

managed firms. In contrast, small family-owned domestic firms are overrepresented amongst badly managed firms.

4) Uncertainty around future expectations for firms own sales growth and national GDP growth is lower in better-managed firms.

5) The accuracy of sales and national GDP growth forecasts are robustly higher in better-managed firms, as well as larger and older firms. This suggests one channel for superior management practices to raise firm productivity is through improved forecasting – they are better at predicting (and presumably planning for) the future.

Intangible investment and spatial spillovers: evidence from Great Britain

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Outline

Intangible assets represent a key driver of productivity. They foster innovation and the efficient utilisation of production inputs via the accumulation of knowledge and information. They congregate in the most dynamic regions and are often seen to disadvantage lagging regions. Nonetheless, the positive externalities generated by intangibles are also unlikely to be spatially fixed. Under certain conditions, proximity (either spatial or relational) to intangible capital can be as advantageous productivity-wise as *in situ* high levels of regional endowment in this type of capital. This paper aims to measure the effects of intangibles in boosting regional labour productivity where they are found, to explore whether they generate spatial spillovers elsewhere, and to scope the potential spillover creating potency of London - the most important locus of intangible capital in Great Britain. In this paper a region's relative specialization in employment in intangible producing sectors is used as a proxy for the 'critical mass' influence of intangible investment on labour productivity.

In the absence of a regional series of intangible capital investment, the present study utilises the available estimates of intangibles at national level that have been produced for the UK (Marrano and Haskel 2006; Marrano et al 2009; Goodridge et al 2018). These national estimates are apportioned among 122 NUTS3 regions of Great Britain via type-of-employment proxies. The underlying assumption is that intangibles production is located where intangibles-producing labour is to be found. Although such proxies are patently more accurate for some types of intangibles than others, there seems little doubt that intangible investment overall clusters unevenly across the country. Intangible hotspots are easily found in London and the South East exactly in those areas delivering high on labour productivity.

The following empirical model (equation 1) using panel data is specified to test whether a relationship between labour productivity and endowment of intangible activities exists at the regional level, and whether and to what spatial extent the regional endowment of intangible activities generates externalities which are related to the productivity level in neighbouring regions.

$$\log(LP_{it}) = \alpha + \beta \log \left[\frac{SEIS_{it}}{(1 - SEIS_{it})} \right] + \sum_{d=1}^D \delta_d \log \left[\frac{SEIS_{ijt}^d}{(1 - SEIS_{ijt}^d)} \right] + \sum_{k=1}^K \varphi_k X_{it}^k + \theta_i + \gamma_t + \varepsilon_{it} \quad (1)$$

where the right-hand side of the equation includes the logistic transformation of the variable capturing the share of employment in intangible sectors ($SEIS_{it}$); the logistic transformation of the variables capturing the share of employment in intangible sectors in neighbouring regions $j = 1, \dots, J$, with $i \neq j$, located within continuous and non-overlapping distance bands d centred in the reference region i and defined for equally-spaced intervals of 60 minutes of travel time (by car) up to 240 minutes, i.e. $0 < d_1 \leq 60$, $60 < d_2 \leq 120$, $120 < d_3 \leq 180$ and $180 < d_4 \leq 240$; the term X_{it}^k denoting a vector of control variables which includes population density (PD_{it}) - defined as the logarithm of population per square kilometre - and human capital endowment (HC_{it}) - defined as the logistic transformation of the share of economically active individuals aged 16-64 years with education level 4 or higher of the National Vocational Qualification (NVQ); the term θ_i capturing NUTS-3 regional fixed effects; the term γ_t capturing year fixed effects; ε_{it} denoting the error term.

In addition, the spatial scale of intangible activities is tested through the following empirical specification (equation 2):

$$\log(LP_{it}) = \alpha + \beta \log \left[\frac{SEIS_{it}}{(1 - SEIS_{it})} \right] + \vartheta \log \left[\frac{SEIS_{jt}}{(1 - SEIS_{jt})} \right] + \mu \log(d_{ij}) + \pi \log \left[\frac{SEIS_{jt}}{(1 - SEIS_{jt})} \right] \times \log(d_{ij}) + \sum_{k=1}^K \varphi_k X_{it}^k + \theta_i + \gamma_t + \varepsilon_{it} \quad (2)$$

where the variable $SEIS_{jt}$ captures the share of employment in intangible sectors in a unique region j , and the term d_{ij} denotes the distance in hours between each reference region i and the unique neighbouring region j . The interaction term between these two variables is included to test the spatial scale at which the potential spillover effect generated by the region j is related to labour productivity in the estimation sample of $N - j$ reference regions.

The period of the analysis is 1999-2012, which is composed of an initial period of protracted economic growth followed by recessionary years from 2008. Nonetheless, the growth of the intangible capital is continuous throughout the period.

The results of the analysis confirm that the presence of intangibles boosts regional labour productivity where they are found. Overall considering all regions, a region's labour productivity level is positively related to its endowment (share) of intangible activities (elasticity 0.062),

although this is somewhat reduced (elasticity 0.055) when spillover effects from neighbouring regions are accounted for.

In addition, intangibles promulgate spatial spillovers on labour productivity elsewhere. Over all regions, a positive relationship (elasticity 0.031) emerges between the endowment of intangibles of neighbouring regions within 60 minutes travel time and labour productivity in the reference region, while a negative and increasing-with-distance effect arises from neighbouring regions located at a longer driving distances. These results are confirmed in separate modelling when excluding as neighbours, first the regions in the first percentile of the intangible employment share distribution and second the macro-area of Inner London. In contrast and third, the exclusion of the regions in the fifth percentile of the intangible employment share distribution seems to eliminate any significant positive effect of intangible activities from neighbouring regions even within 60 minutes.

Finally, London appears to be the only major source of spatial spillovers in Great Britain. Inner London - West has a significant, positive and decreasing-with-distance effect on the labour productivity of neighbouring regions up to about 4 hours distant, while Inner London – East casts its spillover influence somewhat wider - up to about 7 hours. In contrast apart from Berkshire, which is less spatially influential but still generates significant and positive spillovers up to about 3 hours distance, the remaining regions making up the upper 5th percentile of intangible endowment (Cambridgeshire CC, Buckinghamshire CC, Oxfordshire and Surrey) do not produce significant spillover effects at any distance.

References

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