productivity insights network

PIN – 02

Evidence Review

FDI, Capital and Investment Markets

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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, Glasgow Caledonian University, SQW, University of Cambridge, University of Essex, University of Glasgow, University of Leeds and the University of Strathclyde. 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

This gap analysis concentrates on what we know and, more importantly, on what is still needed in terms of further work, with regards to issues of investment in determining (total factor and labour) productivity. Thus, *inter alia* it covers the importance of inward (and outward) FDI, in terms of its impact on UK productivity; as well as exports and imports in driving productivity; and access to finance. Linked to the latter is firm investment in physical and intangible capital (the former allowing firms to update production techniques and introduce new and better products, the latter incorporating 'knowledge' and 'dynamic capabilities' – cf. Teece, 2017); investment in R&D and thus innovation outcomes is also included in the separate gap analysis covering "technology, innovation, competitiveness, and enterprise", and thus there are overlaps which will need to be considered. Investment in human capital is largely the domain of other gap analyses (skills, education & labour markets; work and employment) and is not covered here. The current analysis also covers the particular and important role that geography has in understanding productivity issues, both from the perspective that different areas have different 'mixes' of firms with different productivity distributions, affecting average productivity levels in those areas; and that spatial location itself matters because of the potential for agglomeration effects (e.g., 'spillovers').

Some Current Overviews of the Causes of the 'Productivity Puzzle' Pertaining to Current Gap Analysis

Internal analysis undertaken by the Business Growth Directorate at BEIS (BEIS, 2018) places particular emphasis on the distribution of firm-level productivity, showing that the gap in (labour) productivity between the leader-laggard firms is greater in the UK; productivity dispersion affects all regions, sectors and sizes of business in the UK, although larger and/or foreign-owned in manufacturing firms operating in more competitive markets have on average higher productivity; and much of the post-2007 slow-down is attributable to services such as distribution and hospitality. Much of this has been confirmed in previous work (e.g., Harris and Moffat, 2017, using plant-level data for the UK), and little is offered by way of explanations except, firstly, to suggest that 'zombie firms' (those that should have closed but are 'kept' open perhaps by banks not wanting to further negatively impact on the volume of bad debts on their balance sheets) have increased in importance – especially in the SME sub-group – and, secondly, that the UK has poorer management practices vis-à-vis other countries.[1,2]

Recently McKinsey (2018) have published their conclusions from a year-long study centred on "solving the productivity puzzle". Their analysis (based mostly on seven major, industrialised countries, including the UK, and six sectors[3]) suggests that three 'waves' are central to understanding the slow-down in recent years: the waning of (labour) productivity growth after the mid-1990's;[4] the impact of the 2007-08 financial crisis which weakened demand and

[1] Much of the work in this area is based on rather small samples of firms that are compared across nations

[2] The last section in the BEIS analysis looks at 'what works' in terms of policy to improve productivity. Given the low level of public support available in the UK, any impact is unlikely to be significant in terms of 'solving' the current productivity problem, although it is important to know what can potentially be rolled-out and up-scaled, if the government was minded to put more resources into improving productivity levels in the UK.

[3] Auto manufacturing, finance, retail, technology, tourism and utilities.

[4] Much of this waning is attributed to ICT investments and outsourcing/offshoring having been mostly implemented by the end of the 1990s. Cette et. al. (2016) provide evidence that this occurred – hence the slow-down in productivity was pre-recession – but they also emphasised for some countries that this also coincided with what should have been reallocations in resources across sectors to boost efficiency that did not occur (because of structural rigidities in labour- and product markets) while unfavourable reallocations due to sharp falls in the cost of accessing finance did occur (adding to 'zombie firms' discussed in more detail below)

increased uncertainty, thus impacting on investment and driving down capital intensity (the latter is often the prime reason for increases in labour productivity);[5] and constraints on the pace at which digitisation has been introduced in recent years, which will reduce the need for certain types of jobs and thus increase labour productivity. The consequence of all three were a (labour) productivity weak but job-rich (both hours worked and numbers of workers) recovery post 2008, especially in the US and UK.[6]

More recent 'academic' based work has been summarised in Harris and Moffat (2017a), noting that previous results – mostly based on using industry-level data – are mixed, with no consensus emerging on what explains the UK's productivity puzzle. As noted above, Harris and Moffat (op. cit.) also found that total factor productivity declined almost exclusively in the (distributive and hospitality) service sector, and in smaller plants. However, when the data are sub-divided into plants that opened, closed and continued throughout 2007-12, they found that continuing plants in both manufacturing and services experienced significant falls in TFP (i.e., for manufacturing, new plants had much higher TFP that offset the decline experienced by continuing plants, while in services such offsetting did not happen). When decomposing the change in TFP (2007-12) into underlying determinants (which feature as variables impacting on TFP when the latter is econometrically modelled), they found that a large part of the reason for the fall in TFP was as a result of a 2008-12 negative 'shock', and not changes in foreign ownership, or spatial factors.[7] This, of course, begs the question of what were the underlying reasons for such a negative 'shock', something not explored in their paper. When reconciling what happened with regard to TFP and the fall in labour productivity[8] (which was very similar overall in both manufacturing and services), Harris and Moffat found that the fall in manufacturing was mostly the result of a fall in the use of intermediate inputs coupled with a much smaller decline in the capital-labour ratio (i.e., the declining labour productivity was a result of changes in 'factor proportions', but not the result of a large relative decline in physical investment); in services the decline in labour productivity was more to do with declining TFP.

Based on this limited discussion (which reflects a much wider literature that contains similar analysis and outcomes), previous work suggests that looking at micro-level (firm and plant) data – where we can look at the distribution of productivity – is most likely to help with understanding the productivity puzzle in the UK; and that there is still much evidence needed to understand more fully the importance of the 'mix' of plants and firms in terms of sectors, size, location, their characteristics (such as ownership, engagement in productivity-enhancing activities such as R&D and exporting); as well as under-researched areas such as the importance of reallocation across different firms (including 'churn' and the importance of zombie firms and in particular credit-rationing), and 'intangible' factors (such as management practices and investment in 'knowledge' creation); and more research on what caused the slow-down in productivity post

[5] These factors have also combined to lower – indeed reverse – wage growth, which then lowers the need to substitute cheaper investment for more expensive labour, and thus boost labour productivity.

[6] Note, the McKinsey study does review some of the 'other' leading explanations for the slow-down (pp. 29-36), such as the mismeasurement of productivity (like most studies they conclude that it is very difficult to know how important this is, but it is unlikely to be a major factor); the financial crisis leading to credit constraints (impact on the ability for especially small firms to invest), zombie firms, capital misallocation, and weak demand/uncertainty all reducing investment incentives; structural shifts (associated with the slowdown in ICT investment and maturation of global supply chains, continued deindustrialisation, declining business dynamism resulting in greater productivity divergence between leader-laggard firms). However, the study does not provide any in-depth analysis of the relative importance of these factors, but rather concentrates on demonstrating numerically the importance of the three 'waves' discussed above.

[7] That does not mean such factors are not important in explaining TFP *levels*; rather, changes in these variables were relatively insignificant and thus do not explain *changes* in TFP, post-2007.

[8] $\Delta(y-e)_{it} = (\hat{\alpha}_E - 1)\Delta e_{it} + \hat{\alpha}_M \Delta m_{it} + \hat{\alpha}_K \Delta k_{it} + \Delta ln\overline{TFP}_{it}$; i.e. changes in labour productivity (log output, *y*, minus log employment, *e*) are negatively related to increases in employment [since $(\hat{\alpha}_E - 1)) < 0$, where $\hat{\alpha}_E$ is the output-elasticity of output with respect to labour], and positively related to increases in intermediate inputs (*m*), capital stock (*k*) and TFP.

the mid-2000's, what happened specifically due to the financial crash (i.e., the causes of the post-2007 TFP 'shock'), and what determines the rate of diffusion of new technologies that will improve TFP in the future.

The rest of this gap analysis is to consider the wider literature base, which will then result in a more comprehensive list of research questions that are in need of further analysis.

Other Literature

Direct Impact on Productivity of (Inward) FDI

Confirming the results from others studies (e.g., Harris and Robinson, 2002, 2003; Harris and Moffat, 2013, 2015[9]) that US-owned MNE's are on average more productive than other MNEs, Criscuolo and Martin (2009) consider if foreign-owned plants have higher productivity in the UK (for manufacturers 1996-2000) because they 'cherry-pick' by taking over the best plants (in productivity terms); or after takeover, they transfer in 'best practice' based on their comparative advantage. They separated out US- and other-foreign owned plants, and test for separately for what they term the 'best firm' effect (acquired brownfield plants transfer in knowledge assets that improve subsidiary productivity performance) and the 'plant picking' effect (plants that are acquired with existing superior performance). To identify these two effects, they look at productivity changes pre- and post-acquisition. Their conclusion is that US-owned productivity advantages were achieved by 'plant picking', more so than for other foreign-owned plants who also engaged in similar 'cherry-picking' but with less success. These results confirm and extend those published in Harris and Robinson (2002), and Girma (2005) and Girma et. al. (2007).[10] Harris and Moffat (2013) also provide evidence separately for manufacturing and services (using 1997-2008 plant-level data) finding that plants that were foreign-owned throughout had the highest contribution to TFP growth, followed by those plants that became foreign-owned (manufacturing) or those who were always UK-owned (services). Thus, their results are not fully supportive of Criscuolo and Martin (op. cit.); moreover, the latter pay little attention to 'greenfield' inward-FDI versus 'brownfield' acquisitions.[11] Harris and Moffat (2015a), using plant-level data for various sub-sectors covering both manufacturing and services (1997-2008) found that brownfield US-owned plants had a TFP advantage in all sectors covered while greenfield US-owned plants did even better in most sectors. EU-owned plants did well (greenfield or brownfield) in manufacturing but less so in services. For foreign-owned plants from other countries, they had much lower TFP in manufacturing (vis-à-vis UK-owned) although greenfield inward investment resulted in higher TFP. Overall, greenfield investment did better than brownfield, suggesting the former was relying on parent companies productivity advantages; this again provides some caveats when considering the Criscuolo and Martin (2009) study. Note, none of the above studies concentrated (or for some even made mention of) spatial effects, except Harris and Moffat (2015a), who showed that the South East of England comprised the

[9] See also Stehrer and Woerz (2009) for a concise review of the literature. Note, some studies seek to answer different questions related to whether MNEs have a greater impact on productivity; e.g., Higón et. al. (2011) use (unrepresentative, based on large firms heavily engaged in R&D) micro-data for the UK to test if R&D undertaken by UK-owned non-MNE firms, UK-owned firms engaged in outward FDI and foreign-owned firms have different impacts on TFP. They report the productivity enhancing effects of R&D are smallest for UK-owned non-MNE firms, larger for foreign-owned and largest for UK-owned MNEs.

[10] They are also in line with evidence for other countries – see Table 2.2 in Harris (2009)

[11] Ashraf et. al. (2016) did consider the effects of both greenfield and brownfield FDI on TFP for 123 countries during 2003-11, but they used aggregate *country* level data, entered greenfield and brownfield impacts separately (not jointly) into their model, and (surprisingly) they find greenfield FDI had no statistically significant effect on TFP while M&As had a strong positive effect on TFP but only in developed host countries.

'frontier' benchmark region, and being located in other areas resulted in often significant, sizeable and negative (relative) impacts on TFP.[12]

More recent studies go beyond simply testing if firms engaged in FDI have higher productivity; for example, Román et. al. (2016) take a more holistic view of how trade and FDI interrelate (i.e., incorporating the role of globalisation and FDI supply-chain activities[13]). Based on the theoretical literature, they compare the motivations of MNEs that organise horizontally (in IO terms) as those that "… choose to locate their plants in specific countries or regions with the purpose of serving those markets, and hence produce the same good … in each country or region… Vertical firms, instead try to minimize production costs by fragmenting the different stages of production and placing them at the most favourable locations in terms of resource endowments … By and large, the setup adopted by horizontal firms may be considered as an alternative to exports (trade and FDI are negatively associated) … Vertical MNEs, on the other hand, bring about trade flows among the different stages of the value chain, thus being complementary with trade" (Román et. al., op. cit, p. 200). However, they also accept that this distinction ignores the "knowledge-capital model" which combines horizontal and vertical features (MNEs respond to factor costs by, say, having vertical relationships for R&D and the production process; but horizontal relationships when locating production close to markets intended to be served – the so-called 'home market bias"). Their results, using EU-19 data for 1995-2009, show *overall* evidence in favour of FDI being vertically integrated, but they also point out there is also evidence of both patterns where the knowledge-capital model is more consistent with explain intra-European FDI flows (but only when Ireland and Benelux are excluded from the sample). Part of the issue here, relating to being more precise in their results, is that the study uses aggregated data; MNE activity and trade are both represented by country level data, when ideally what is needed is more micro-level data that can separate out the activities of different types of MNEs.

Simpson (2012) also recognises that horizontal and vertical FDI can have different implications for the skill intensity of an MNEs home country operations; moreover, UK MNEs with different overseas investment strategies can result in differential effects on productivity at home. Using UK micro-data for 1998-2004 (and especially using the ONS Annual Inquiry into Foreign Direct Investment), Simpson identifies the countries in which overseas investment takes place, finding that firms investing in relatively low-wage economies tend to substitute for relatively low-skilled labour in the UK and have higher TFP (moreover, those who invest in low-wage economies tend to invest in a large number of countries overall, suggesting that only the most productive firms are able to overcome the high fixed costs of investing in a large number of overseas location – Simpson, op. cit., pp. 254-55).[14,15]

Borin and Manchini (2016) use manufacturing firm-level Italian data for 1998-2011 in a similar study to the one undertaken by Simpson (op. cit.). The impact of outward FDI on TFP was modelled, which also used propensity score matching to overcome selection issues, and they found Italian firms that invested abroad for the first time, especially in advanced economies, showed higher productivity post-entry and no negative home effects on blue-collar workers (and indeed increased white-collar employment in high-tech sectors).

[12] Other evidence on location impacts is covered below.
[13] For more on this see Immarino and McCann (2013).
[14] These results suggest there may be some issues of selection effects whereby to invest in a wider range of countries, the UK MNE has be more productive, as well as they become more productive from undertaking an investment strategy more in line with vertical FDI.
[15] This approach, applied to explaining inward FDI, is likely to have relevance to where and why foreign-owned (and indeed multi-region UK-owned) plants locate in the UK, and the implications for host region productivity. This relates also to a well-established literature on potential 'branch-plant' effects of multi-locational firms (see Phelps, 2009, for a recent discussion of this phenomenon). This is taken up below when discussing the locational impacts of plants on TFP.

Indirect Impact on Productivity of Inward FDI

Aside from whether inward FDI plants have higher productivity, which as the evidence above shows for US- (and to some extent) EU-owned plants is generally the case (suggesting they contribute to increasing aggregate UK productivity[16]), there is a wider question of whether there are (technological and geographic) spillovers from their presence. That is, do UK-owned plants (particularly those not belonging to outward FDI firms) benefit – and thus have higher productivity – from the co-location of MNEs in their area? There have been many studies for the UK (and elsewhere[17]) that look at this topic, including early examples such as Harris and Robinson (2004) who used micro-level plant data and Driffield and Love (2005), who used more aggregated industry-level data. Standard examples of the approach used to measure spillovers – including the channels that such spillovers can take – are presented in Javorcik (2004) and more recently in Harris and Moffat (2014, especially Chapter 5-6). Usually there is an attempt to measure intra-industry spillovers separately from backward (or vertical) and forward (horizontal) linkages, using input-output linkages to capture which sectors to include in measuring such links. Studies also often separate technological (intra- and inter-industry) from geographical (intra- and inter-area) links (the former based on IO links at the national level, the latter using more generally the presence of inward FDI at a spatial – such as travel-to-work area – level). For the US, Javorcik (op. cit.) concentrated on technological links, finding positive TFP spillovers taking place through backward linkages but not forward linkages. For the UK, Harris and Moffat (op. cit.) measure a wide range of industry and spatial spillovers for 2011-12, with the overall picture for manufacturing suggesting that foreign- (and particularly US-) owned (intra- and inter-industry and intra-area) spillovers are generally beneficial in boosting TFP in UK-owned plants not engaged in OFDI (the major caveat was with respect to other non-US/EU foreign-owned plants, where impacts were generally negative, possibly indicating their technology acquiring nature rather than technology exploiting). The results for services provided few, if any, clear patterns with regard to spillover impacts; there is a mix of positive and negative values, and some were implausibly large.

The above studies do not separate out whether the motivation for inward FDI produces separate outcomes; this has been considered in a series of papers involving Nigel Driffield (Driffield and Love 2006, 2007; Driffield Love and Taylor 2009). These papers consider explicitly the difference between technology exploiting and technology sourcing FDI (based on R&D intensity differentials at industry level) and also allow for differences in unit labour costs between home and host economies. The findings are:

- The UK gains from productivity spillovers where the incoming investor has some form of technological advantage ("technology exploiting" FDI);
- This positive spillover is significant only where the technological advantage of the foreign investor is sufficiently great to offset the disadvantage of higher unit labour costs in the UK;
- Technology sourcing FDI has negative effects on UK productivity when it also has lower unit labour costs in the UK;
- Technology exploiting FDI has a positive effect on demand for skilled labour in the UK, especially where there is no labour cost advantage in the UK;
- Technology-sourcing FDI reduces the demand for skilled labour in the UK, especially where the UK has lower labour costs;

[16] Not all studies have found higher TFP *growth* in firms that export and/or are foreign-owned (e.g., Kimura and Kiyota, 2006, using micro-level data for Japan). However, results often depend on the model specification used; e.g., Kimura and Kiyota (op. cit.) found that once they had controlled for the initial TFP level for each firm they get their preferred results that firms that engage in FDI and/or exporting have higher productivity growth, and those that do both have the highest.

[17] E.g., Sari et. al. (2016) for Indonesia; Lin et. al. (2009) for China.

- Technology sourcing FDI increases demand for unskilled labour where unit labour costs in the UK are lower than in the home country.

A specific issue with these studies involving Driffield is that they use industry-level data, and thus they conflate (domestic- and foreign-owned) plant and firm distributions with very different productivity levels into single aggregate (average) measures. There is also no account taken of spatial spillovers, both in terms of whether these occur and if the effects vary over space (e.g., the South East versus other areas).

Perhaps a more important issue is that when measuring potential spillovers, nearly all studies are limited by the fact that they do not have primary data that identifies the source and strength of the spillovers (e.g., they do not know if domestic plants interact with internationalised plants, and what if any transfer of knowledge occurs). Instead the approach taken is to assume that the greater the 'presence' of internationalised capacity (e.g., total inward FDI employment or output in an industry and/or locality), the greater the likelihood for spillovers to occur. And thus, if positive correlations can be found between internationalised presence and plant-level productivity in domestically-owned plants, it is assumed that spillovers 'must be' present. Obviously, such an approach has major weaknesses.

Some studies in this area combine or cover other potential sources of knowledge spillovers, such as trade, and some also link these sources with the intervening impact (mediating role) of variables such as absorptive capacity (e.g. measured by human capital, or R&D being undertaken). An example is Ali et al. (2016) who consider knowledge spillovers via imports and inward FDI with human capital acting as a proxy for the ability of firms to absorb potential spillovers.[18,19] Using aggregated European country-level data for 1995-2010, they confirm the productivity enhancing effects of FDI-related spillovers as well as import-related spillovers, with strong complementary between the two that is even stronger when moderated through the presence of quality-adjusted human capital.

Other studies consider if spillovers from inward FDI presence enhances domestic exporting (and thus by implication TFP, given that the literature shows firms usually have to increase TFP to overcome export-trade barriers – e.g., Greenaway and Kneller, 2007, Wagner, 2007 – and post-entry there may be learning-by-exporting effects, cf. Aw et. al., 2011).[20] Saadi (2014) found that a greater presence of FDI in developing and emerging countries increased the exporting of more sophisticated goods (those with higher unit values/income elasticities), the latter normally undertaken mostly by developed countries (this is referred to as increased exporting productivity). It was presumed (but not tested principally because aggregated country data was used) that their results were reliant on foreign-owned firms being more likely to export such high-productivity goods; and it was also assumed that there were spillovers to domestic firms that allowed them to do likewise. Harris and Moffat (2014) also tested whether there was evidence

[18] Mayer-Foulkes and Nunnenkamp (2009) consider a similar question of whether the presence of (US-owned) inward FDI is more likely to increase productivity in regions and sectors that are initially close to the technological frontier (vis-à-vis farther away), presuming them to have greater absorptive capacity to internalise spillovers (the influential study by Blomström and Kokko, 1998, also argued that spillovers depends on the absorptive capacity of local firms). They found that US FDI leads to divergence rather than convergence in growth for host countries below a certain threshold of relative income, and convergence for those above the threshold.

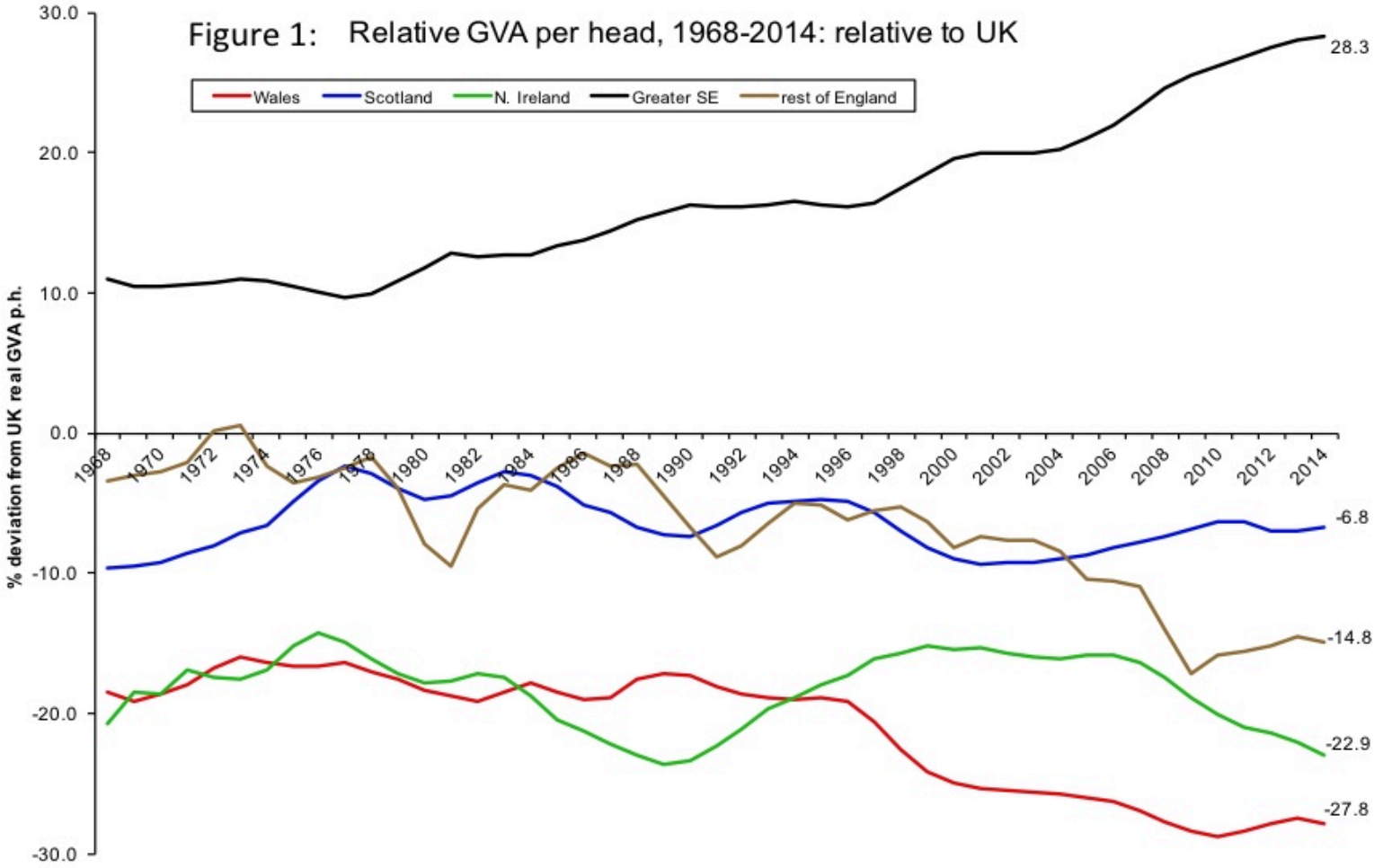
[19] Harris and Moffat (2015b) consider the impact of both exporting and importing goods and services on productivity in the UK; they find that plants in both manufacturing and services that both export and import had higher productivity than plants that only do one of these activities. For manufacturing, this is true regardless of whether trade occurs in goods or services (which suggested that servitisation of manufacturing is beneficial). The results were more mixed for services, and the benefits from involvement in international goods networks that were seen in manufacturing did not occur in services.

[20] Harris and Li (2008) look at firm-level evidence for the UK on the contribution of exporting to UK productivity growth between 1996 and 2004. They show exporting leads to productivity gains both via exporting firms themselves becoming relatively more productive over time, as well as inter-firm reallocations of resources towards more productive exporting firms. See also Harris and Li (2012).

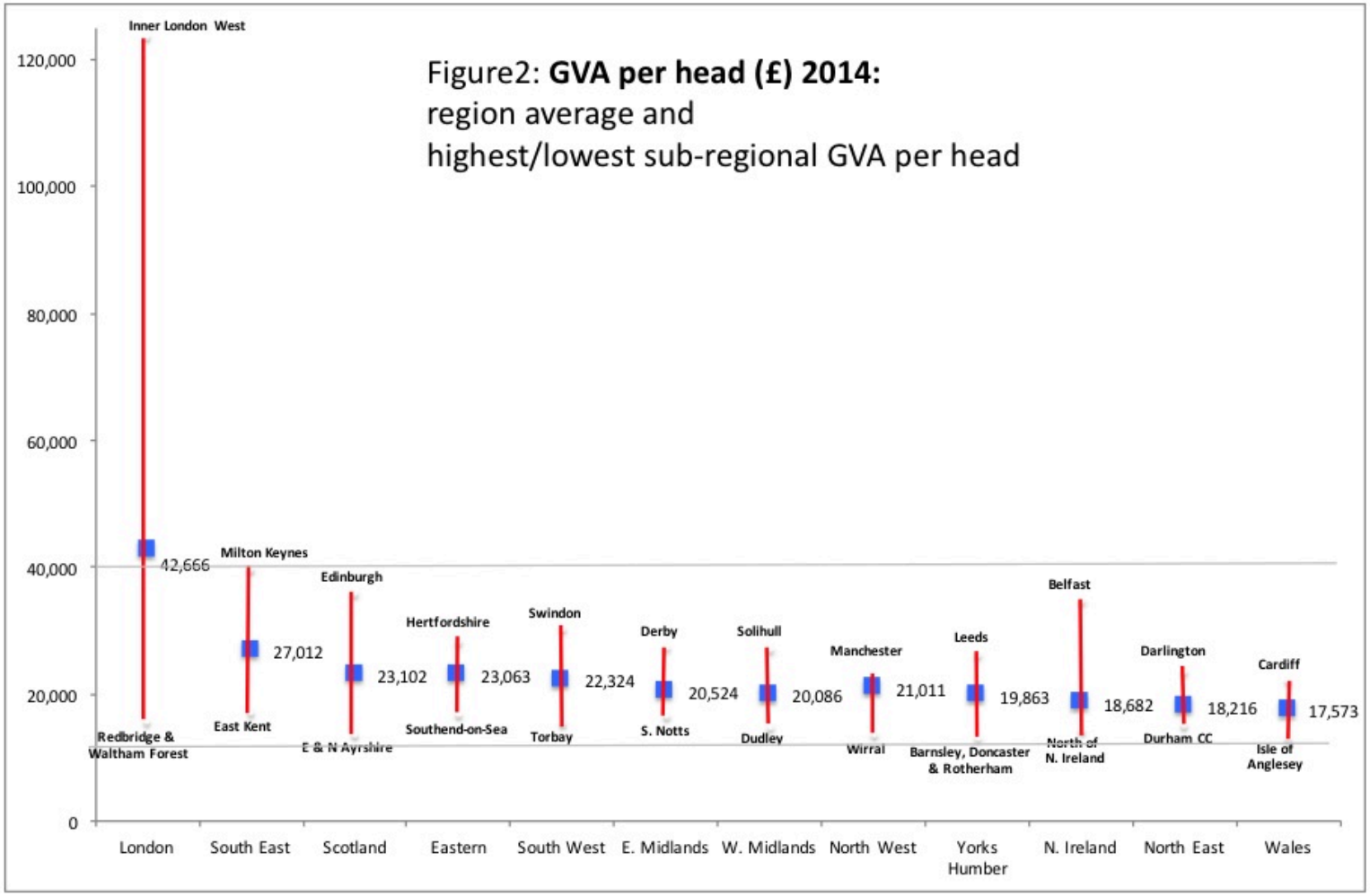
of spillovers from foreign-owned presence on the propensity of UK-owned plants not belonging to firms engaged in outward FDI to engage in exporting (i.e., the extensive margin, as data was not available on how much was exported). Again, they measure a wide range of industry and spatial spillovers for 2011-12; the overall picture for manufacturing showed no clear pattern that suggests the presence of internationalised plants has a generally positive spillover impact on exporting. The evidence suggested that the largest positive impacts came from the presence of US-owned plants, but even here it was not a uniformly positive set of spillover effects. The results for service sectors was significantly different: services were more reliant on the 'presence' of UK-owned internationalised firms than were manufacturers, while for other foreign ownership groups intra-industry and inter-area spillovers were more important determinants of exporting in services than manufacturing.

Another approach to how inward FDI impacts on domestic UK firms is to consider whether the threat of entry of greenfield FDI induces productivity impacts. Aghion et. al. (2009) sought to test if the threat of (what they term 'frontier', given the higher TFP of FDI) entry (proxied by actual entry) induced incumbents that are close to the technology frontier to innovate more (and thus become more productive), while those further from the frontier reduce their efforts to innovate and subsequently become less productive. To measure the frontier, they used labour productivity in industry-equivalent US sectors. They found a significant and positive correlation of greenfield foreign firm entry on subsequent (labour and TFP) productivity growth in domestic manufacturing incumbents using 1987-1993 data, but only in those industries where the gap between the UK and US industry frontier was smallest. Note, they did not consider the impact of 'brownfield' inward FDI (which during this period was at least as important as 'greenfield' inward investment), and their results are based on only just over 5,000 domestic incumbents (they do not appear to have weighted the data, so the results therefore will be strongly biased to large firms). Spatial variations were also not considered, when it might be expected that threat of entry depends on the competitiveness of markets, which are likely to vary significantly across different UK geographies.

Figure 1: Relative GVA per head, 1968-2014: relative to UK



Source: ONS Regional Accounts



Source: ONS Regional Accounts

Impact of Location on Productivity

McCann (2016) sets out the wide, and increasing, disparities in GVA per person across the regions and cities of the UK. Figures 1 and 2 capture these core differences.[21] Understanding how these differences are both the consequence and cause of productivity differences is in large part to determine to what extent these differences are due to (a) factors that measure the impact of location on TFP (so-called 'place' effects) separately from factors measuring plants' characteristics that impact on TFP ('non-place' effects); and (b) whether a particular spatial area has relatively too many (too few) plants with characteristics that are negatively (positively) related to higher TFP. That is, each ('place' or 'non-place') determinant will have a positive or negative impact on TFP and if a particular area has (relatively) too many plants associated with negative impacts, overall it will have lower TFP vis-à-vis other areas. Harris and Moffat (2017b) illustrate the approach, when explaining why Scotland between 1997-2012 had overall lower TFP relative to the rest of Great Britain. 'Place effects' *inter alia* can be attributed to factors such as the quality of the infrastructure (e.g., access to quality transport networks, access to specialised knowledge in universities or R&D hubs, or indeed being located in an 'assisted area' where public support to firms is available), the quality and availability of local labour with the required skills, and the prevalence or otherwise of technological knowledge spillovers due to agglomeration (i.e., Marshall-Arrow-Romer (intra-industry) localisation and Jacobian (inter-industry) diversification/urbanisation economies of scale; see Harris, 2017, for a discussion); and/or spillovers from the presence of FDI or clusters of exporters[22] (which have been discussed above). Agglomeration can be captured in different ways such as including direct (proxy) measures in models that determine productivity (cf. Harris and Moffat, 2015a, 2017b)[23] or by allowing for spatial lags in econometric models, or by obtaining plant-level indices of the extent to which plants cluster (see Scholl and Brenner, 2016) and entering these into models determining plant-level TFP.[24] 'Non-place' effects cover the underlying characteristics of plants, which impact on productivity, irrespective of where firms are located (e.g., older plants tend to have lower TFP; MNEs and those that export tend to have higher TFP – cf. Harris and Moffat, 2015a, Tables 2 and 3).

In terms of the extent to which heterogeneity in firm productivity across Europe is due to firms' characteristics vis-à-vis region/sector/country effects, Aiello and Ricotta (2014) find that (cet. par.) firm characteristics account for some 90% of the variance. This is perhaps not unexpected since in all regions/sectors/countries the variance between the 'best' and the 'worse' firms across the productivity distribution is very large, and their methodology is to estimate models that separate out the variance across firms vis-à-vis the variance across regions/sectors/countries (i.e., unlike others, such as Harris and Moffat, 2015a, 2017b, they do not include all the determinants of TFP – firm characteristics and other 'place' effects – into their

[21] See also Kierzenkowski et. al. (2017), especially Figures 5 and 6 which show how regions in the UK stack up behind Greater London and the South East, who have the largest percentage of 'frontier' best-performing labour productivity firms. The CBI (2016) also undertook a review of regional differences in productivity, concluding that there were four main drivers of regional productivity differences; in order of impact, these are educational attainment of young people at 16 and skills, transport links that widen access to labour, better management practices and the proportion of firms with export and innovate. Finally, Bernick et. al. (2017) have provided some background analysis of differences across regions based mostly on micro-level firm-based data.

[22] Or other forms of clustering, say of plants engaged in R&D.

[23] The results from this work suggest – see Harris (2017, Table 4.1) – intra-industry agglomeration has an important and significant affect in most sectors (particularly in manufacturing) but (ceteris paribus) diversification is often significant *but* negative (perhaps reflecting congestion costs). Similar results have been obtained for the US – see Henderson (2003), Baldwin et al (2010), Martin et al. (2011).

[24] The latter has yet to be done, but work is in progress to measure both the extent there are clusters in the UK (and where they are concentrated) and more importantly their impact on TFP.

model).[25] In policy terms, such a result also misses the point about why do some regions, cities (and sectors) have a longer tail of underperforming plants/firms. How could regions with lower productivity move their TFP distribution to the right, so 'catching-up' with frontier regions where TFP is on average higher?

Harris and Moffat (2017b) went on to tackle the last question raised, when considering what could be done to increase Scotland's TFP level to bring it closer to the average for the rest of Great Britain. Their analysis of what determined TFP levels confirmed earlier work (of theirs and others) that younger plants tend to have higher TFP while plants belonging to foreign-owned enterprises generally had higher TFP (especially if US-owned and to some extent if they were set up as 'greenfield' operations). This would suggest that policy that encourages more entrepreneurial activity and higher inward foreign direct investment should boost TFP (a policy that indeed has long been at the core of past – and indeed current – efforts in Scotland). But when contributions to TFP growth were calculated, separating out what happened in Scotland from the rest of Great Britain, Harris and Moffat (op. cit.) found that in Scotland, the contribution of new plant start-ups to explain TFP growth was strongly negative. In contrast, new plants in the rest of Great Britain contributed substantially to productivity growth. Moreover, when TFP growth was disaggregated in terms of whether the plant was UK- or foreign-owned, separately for Scotland and the rest of Great Britain, they found that the worst relative performance was associated with the foreign-owned sector in Scotland (-1.9% p.a. TFP growth), and the best with the foreign-owned sector in the rest of Great Britain (6.4% p.a. TFP growth). The Scottish performance was dominated by the closure of relatively productive foreign-owned plants post-1997, while in the rest of Great Britain the foreign-owned sector opened more productive plants. This suggests that Scotland suffered heavily from what has been labelled a 'branch plant' effect whereby the 'footloose' foreign-owned sector was more likely to close productive capacity in 'peripheral' regions when called upon to restructure their operations, even when such plants had relatively high TFP.[26] This 'branch plant' syndrome has been summarised by Phelps (2009) as the '… road to nowhere: the transformation of the UK's old industrial regions into branch plant economies'.[27] Overall then, Harris and Moffat (op. cit.) found that while foreign-owned plants have, on average, higher productivity in the UK, those that set up in Scotland seem to have been insufficiently embedded into the economy (and/or had insufficiently high value-added functions to guarantee that they remained open); similarly, many of the new plants were of insufficient quality to contribute to higher TFP. The extent to which this is also prevalent in other spatial locations is likely to help in understanding spatial differences in UK productivity levels.

Other work on spatial productivity differences, involving micro-level UK data include Harris and Moffat (2015c) and especially Harris and Moffat (2012). The former decomposed aggregate TFP growth in Britain for 1997-2008 to show the contribution of different LEPs showing that the

[25] To explain the large differences in TFP between Scotland and the rest of Great Britain, Harris and Moffat (2017b) found both positive and negative 'place' effects in different industries but that 'non-place' effects were negative in all sectors and particularly in the largest sector where the productivity gap between Scotland and the rest of GB happened to be the greatest. But there was no single source ('place' or 'non-place') to explain Scotland's productivity gap and therefore Harris and Moffat argued that policy needs to be tailored to the needs of different sectors.

[26] Since in this period foreign multinational companies were significantly engaged in 'offshoring' to parts of the world with lower (wage) costs, it is likely that lower valued-added – but efficient – facilities in countries like Scotland would have been at risk of closure. Such an example would be the foreign-owned plants that made up the computer and electronics industry in 'Silicon Glen' (see McCann, 1997). It employed some 7.7% of all manufacturing workers in 1997, but only 1.7% by 2012.

[27] As detailed in Phelps (op. cit.), branch plant economies suffer from: 'functional truncation' (the absence or removal of high-value-added segments such as management, R&D, sales and marketing); concerns over product and process innovation rates in branch plants; concerns over employment quality; a lack of local linkages; and (v) concerns over the stability of employment. Harris and Hassaszadeh (2002) showed using similar micro-level data for UK manufacturing that new plants acquired by the foreign-owned sector were much more likely to be closed down. More recently, Kimura and Kiyota (2006) found similar negative impacts on survival associated with FDI in Japan.

largest LEPs, in population terms, with higher levels of job density, greater reliance on manufacturing and skilled worker occupations, higher proportions of workers with NVQ4+ qualifications, and lower turnover of businesses, achieved the highest TFP growth.[28] The second paper considered whether spatial spillovers and "place" effects were important by considering if cities had higher TFP than their rural hinterlands, and whether London and/or the South East dominated in terms of TFP. The results showed that plants located in cities generally performed better than plants in the same region outside of these cities; but with the exception of Bristol, no city had significantly higher TFP levels than the South East. This suggested that spatial externalities associated with (a non-London) city location were not as important as the benefits of being situated in the South East region. Why this should be the case clearly has implications for understanding differences in productivity associated with location in the UK.

Impact of Access to Credit/Finance on Productivity

The role of finance on economic growth – and more particularly productivity – has attracted much attention since the early work of King and Levine (1993). More recently it has been presented as a potential (major) source of the 'productivity puzzle', especially through the impact of credit rationing on firm investment leading to misallocation and lower capital-labour ratios, and in the likelihood of an increase in 'zombie firms' (those who should close because of low TFP and profitability, but through a combination of low interest rates and bank forbearance have remained open, diverting resources away from more efficient firms). Heil (2017) provides a literature review of the area, showing that firms need finance (particularly bank credit in the current context) to finance additions to the (tangible and intangible) capital stock, R&D spending, firm entry and exit (and also, especially in terms of working capital, intermediate inputs and the hiring of labour). All of these inputs impact on (labour and total factor) productivity. Where there are frictions to getting access to finance, the outcome is lower productivity – through misallocation (e.g., the inefficient firms receiving too large a share of finance) and under-investment, particularly in recessions (and even more so in recessions linked to banking crises – see Rioja et. al., 2017). Based on Schumpeter's notion of 'creative destruction', it is presumed that productivity should increase during recessions as the least productive firms are "cleansed" through exiting; but when there are frictions, and where firms rely more on external finance (as is the case for higher TFP levels linked to doing more R&D, investment in knowledge assets, and/or exporting), resources may be reallocated to less productive firms, leading to declines in productivity. In particular, unprofitable firms remain in production and impede reallocation (Caballero et. al., 2008; Adalet McGowan et. al., 2017[29]).

[28] This strong performance was mostly the result of reallocations of output shares across plants towards high productivity plants that remained open throughout the period considered, as well as the opening of high productivity plants.

[29] While Caballero et. al. (op. cit.) found that zombie firms in Japan directly curtailed aggregate productivity, with additional distortionary effects through depressed product prices and increased wages reducing incentives for new firm entry, Adalet McGowan et. al. (op. cit) confirmed the existence of negative spillover effects using data for European countries from 2003 to 2013 (they also produced evidence that around 7 per cent of the UK capital stock in 2013 may be tied up in zombie firms; R3, in 2012, suggest that there are 160,000 firms, or 9% of UK companies, who are in this situation). Harris and Moffat (2016), using UK micro-level data for 2002-2012, found that post-2008 the probability of plant closure exogenously weakened, and more importantly the inverse relationship between TFP and the probability of plant closure was weakened, in all sectors apart from retailing. Further analysis also showed that this was especially true of UK-owned plants that belonged to firms not owned by a larger enterprise group or involved in outward FDI (whereas plants belonging to firms that were part of a larger enterprise group, foreign-owned plants and plants belong to firms involved in outward FDI were less likely to see a weakening of the TFP-closure relationship, suggesting they were less dependent upon bank financing). Barnett et. al. (2014) also discuss the impact of credit rationing on capital misallocation through 'unusually high" firm survival rates and reduced investment in physical and intangible capital –

The above literature concentrates on (presumed) short-term effects of financial frictions on productivity; the wider literature in this area, whichis mostly based on the use of aggregate data, also looks at a long-run (causal) link,. Most (recent) studies using panel data have found evidence that causality runs from finance to economic growth but that at higher levels 'too much' finance can impart a dampening effect (see section 3.2 in Heil, 2017). Recently Prochniak and Wasiak (2017) used sector data for 28 EU and 34 OECD economies covering 1993-2013, confirming that finance impacts on long-run economic growth through capital accumulation and enhancing the productivity of factor inputs, especially through effective allocation of resources. Stolbov (2017) using 1980-2013 OECD data finding that causality runs from greater credit depth to higher growth for only a handful of countries, which includes the UK. Jerzmanowski (2017) used US State-level data to show the impact of financial deregulation on boosting both TFP growth and real investment in physical assets, especially in manufacturing likely due to facilitation of firm entry and innovation[30] (confirming that this relationship was not due to the growth of the finance industry itself). Ganau (2016) also found evidence using data for Italian manufacturing firms, 1999-2007, for a negative credit constraints-productivity relationship; Cavalcanti and Henrique Vaz (2017) confirm this was also the case for SMEs in Brazil using data for 1996-2010.

Topics for Future Research

There has been significant use of government collected UK firm- and plant-level panel data to look at most of the topics covered above, and based on the availability of these data (covering 1973-2015 for manufacturing, and 2007-2015 for most other sectors[31]), the starting point for further research should be updating and significantly extending earlier analyses of the determinants of (labour and total factor) productivity taking account of the following:

- The motivations driving firms' engagement in FDI and trade, and its impact on productivity, including greenfield and brownfield, technology-sourcing versus exploitation, direct and indirect (spillover) effects, entry effects and the impact on competition, with a particular emphasis on explaining spatial differences across various UK sectors with associated likely 'branch-plant' effects.
- The importance of investment in knowledge (intangible) assets, firms' absorptive capacity, innovation outputs, and how these relate to TFP, and whether there are significant differences across sectors and spatial locations.
- The role of competition, firm entry and exit (i.e., Schumpeter-type 'churning'), past and future trends in globalisation and regulation, including the impact of Brexit, on productivity, accounting for likely different responses across sectors and spatial locations.

their assessment is that some 6-9 percentage points of the 12 percentage point shortfall in labour productivity in the fourth quarter 2013 might have been 'explained' by these factors.

[30] Note, Jerzmanowski (op. cit.) did not directly test if manufacturing benefited from entry and innovation – he assumes this. In contrast, Hombert and Matray (2016) show using US patent data for 1975-1998 that a negative shock to access to finance reduced the number of innovative firms especially in smaller "opaque" firms, where young and productive inventors leave small firms and move out of geographical areas where lending relationships are truncated. In contrast, Coad et. al. (2016) found using UK Community Innovation Survey data that certain types of firms were relatively less likely to face barriers to innovation associated with the cost of finance such as those engaged in exporting, and higher productivity and larger firms.

[31] Excluding agriculture, most of financial services and public sector organisations. Other data that can be linked to the ONS Annual Business Inquiry include Business Enterprise R&D (from 1996 onwards), data on outward FDI (from 1997), and bi-annual data on innovation-related activities contained in the Community Innovation Survey.

- Further understanding of the specific shock effect of the Great Recession on UK productivity, both to understand its causes, whether it has resulted in permanent changes in TFP, and to build resilience for the future.
- The extent to which location (such as clustering and agglomeration, and hence a wide range of spillover effects) impact on productivity, using new approaches such as those set out in School and Brenner (2006); and why some locations have more 'leading/frontier' firms compared to others.

The use of such micro-data allows researchers to take directly into account firm- and plant-level heterogeneity, which is such an important feature of productivity distributions.

Topics that will require other data sources – such as Orbis from Bureau van Dyk – can cover topics such as:

- The short- and long-run importance of finance in determining productivity, and the importance of 'zombie firms'.
- The importance of management practices and changing business models on productivity

New analyses should aim to cover as many of the topics covered in this gap analysis as possible, corroborating the results previously obtained for the UK and elsewhere, with an emphasis on providing further insights as to what is driving the level and growth of productivity in different sectors and parts of the UK.

Where existing secondary data cannot provide sufficient answers, there is (probably limited) scope for primary data collection and greater use of case studies –for example, to 'measure' the extent, type, and strength of knowledge and technological linkages across firms that lead to increases in productivity.

Comparisons with other countries would significantly help to understand the results found using British data; taking Germany as a comparator would be especially useful, if access to comparable micro-data could be obtained. And undertaking work that can directly feed into policy (such as the current UK Industrial Strategy) would be especially beneficial.

Bibliography

Adalet McGowan, M., Andrews, D., and V. Millot (2017) The Walking Dead? Zombie Firms and Productivity Performance in OECD Countries, *OECD Economics Department Working Papers No. 1372*, OECD, Paris.

Aiello, F., and F. Ricotta (2014) Firm Heterogeneity in productivity Across Europe. What Explain s That? Department of Economics, Statistics and Finance, University of Calabria. Online from the Munich Personal RePEc Archive, paper No. 56222.

Ali, M., Canter, U., and I. Roy (2016) Knowledge Spillovers Through FDI and Trade: the Moderating Role of Quality-adjusted Human Capital, *Journal of Evolutionary Economics*, 26, 837-868.

Ashraf, A., Herzer, D., and P. Nunnenkamp (2016) The Effects of Greenfield FDI and Cross-border M&As on Total Factor Productivity, *The World Economy*, 39, 1728-55

Aw, B. Y., Roberts, M. J. and D.Y. Xu (2011), R&D Investment, Exporting, and Productivity Dynamics, *American Economic Review,* 101, 1312–44.

Baldwin, J., Beckstead, D., Brown, W. and D. Rigby (2010) Agglomeration Economies: Microdata panel Estimates from Canadian Manufacturing, *Journal of Regional Science* 50**,** 915-934.

Barnett, A. et. al. (2014) The UK Productivity Puzzle, *Bank of England Quarterly Bulletin*, 2014, Q2.

BEIS (2018) The Productivity Challenge: Evidence Pack. Understanding the UK's weak productivity. Business and Local Growth Analysis, Business Growth Directorate, BEIS, January 2018.

Bernick, S., Davies, R. and A. Valero (2017) Industry in Britain – An Atlas. *CEP Special Paper no. 34.,* LSE.

Blomström, M. and A. Kokko (1998) Multinational Corporations and Spillovers, *Journal of Economic Surveys*, 12, 247-77.

Borin, A. and M. Manchini (2016) Foreign Direct Investment and Firm Performance: an Empirical Analysis of Italian Firms, *Review of World Economy*, 152, 705-732.

Caballero, R., Hoshi, T., and A. Kashyap (2008) Zombie Lending and Depressed Restructuring in Japan, *American Economic Review*, 98, 1943-1977.

Cavalcanti, T. and P. Henrique Vaz (2017) Access to Long-term Credit and Productivity of Small and Medium Firms: A Causal Evidence, *Economics Letters*, 150, 21-25.

CBI (2016) *Unlocking Regional Growth: Understanding the Drivers of Productivity Across the UK's Regions and Nations*, CBI, December.

Cette, G. Fernald, J.G., and B. Mojon (2016) The Pre-Great Recession Slowdown in Productivity, *Federal Reserve Bank of San Francisco Working Paper 2016-08*.

Coad, A., Pellegrino, G., and M. Savona (2016) Barriers to Innovation and Firm Productivity, *Economics of Innovation and New Technology*, 25, 321-334.

Criscuolo, C. and R. Martin (2009) Multinationals and U.S. Productivity Leadership: Evidence from Great Britain, *Review of Economics and Statistics*, 91, 263-81.

Driffield, N. and J. Love (2005) Who Gains from Whom? Spillovers, Competition and Technology Sourcing in the Foreign-owned Sector of UK Manufacturing, *Scottish Journal of Political Economy*, 52, 663-686.

Driffield, N. and J. Love (2006) Does the Motivation for Foreign Direct Investment Affect Productivity Spillovers to The Domestic Sector? *Applied Economics Quarterly*, 52, pp. 3-26.

Driffield, N. and J. Love (2007) Linking FDI motivation and host economy productivity effects: conceptual and empirical analysis, *Journal of International Business Studies*, 38, pp. 460-473.

Driffield, N. Love, J. and K. Taylor (2009) Productivity and Labour Demand Effects of Inward and Outward FDI on UK Industry, *Manchester School*, 77, pp. 171-203.

Ganau, R. (2016) Productivity, Credit Constraints and the Role of Short-Run Localization Economies: Micro-Evidence from Italy, *Regional Studies*, 50, 1834-1848.

Girma, S. (2005). Technology Transfer from Acquisition FDI and the Absorptive Capacity of Domestic Firms: An Empirical Investigation. *Open Economics Review*, 14, 165-178.

Girma, S. et. al. (2007), Do Exporters Have Anything to Learn from Foreign Multinationals, *European Economic Review*, 51, 981-998.

Greenaway, D. and Kneller, R. (2007), 'Firm heterogeneity, exporting and foreign direct investment', *The Economic Journal*, 117, F134-F161.

Harris, R. and C. Robinson (2002) The Impact of Foreign Acquisitions on Total Factor Productivity: Plant-level Evidence from UK Manufacturing, 1987-1992, *Review of Economics and Statistics*, 84, 562-568.

Harris, R. and Hassaszadeh, P. (2002) The Impact of Ownership Changes and Age Effects on Plant Exits in UK Manufacturing, 1974-1995, *Economics Letters* 75, 309-317.

Harris, R. and C. Robinson (2003) Foreign Ownership and Productivity in the United Kingdom: Estimates for UK Manufacturing Using the ARD, *Review of Industrial Organization*, 22, 207-223

Harris, R. and Q. C. Li (2008) Evaluating the Contribution of Exporting to UK Productivity Growth: Some Microeconomic Evidence, The *World Economy*, 31, 212-235.

Harris, R. (2009) The Effect of Foreign Mergers and Acquisitions on UK Productivity and Employment. Report to UKTI, October.

Harris, R. and Q,C. Li (2012) Export-market dynamics and firm-level productivity: evidence for UK tradable sectors, *Industrial and Corporate Change*, 21, 649-670.

Harris, R. and J. Moffat (2012) Is Productivity Higher in British Cities? *Journal of Regional Science*, 52, 762-786.

Harris, R. and J. Moffat (2013) The Direct Contribution of FDI to Productivity Growth in Britain, 1997-2008, *the World Economy*, 36, 713-736.

Harris, R. and J. Moffat (2015a) Plant-level Determinants of Total Factor productivity in Great Britain, 1997-2008, *Journal of Productivity Analysis*, 44, 1-20.

Harris, R. and J. Moffat (2015b) The Impact of Exporting and Importing Goods and Services on Productivity in the UK, *World Economy*, 38, 1781-1794.

Harris, R. and J. Moffat (2015c) Total Factor Productivity Growth in Local Enterprise Partnership Regions in Britain, 1997-2008, *Regional Studies*, 49, 1019-1041.

Harris, R. and J. Moffat (2016) Plant Closure in Britain Since the Great Recession, *Economics Letters,* 140, 27-30.

Harris, R. and J. Moffat (2017a) The UK Productivity Puzzle, 2008-2012: Evidence Using Plant Level Estimates of Total Factor Productivity, *Oxford Economic Papers*, 69, 529-549.

Harris, R. and J. Moffat (2017b) The sources of the Scotland-Rest of the UK Productivity Gap: implications for Policy, *Regional Studies*, 51, 1297-1311.

Harris, R (2017) Regional Competitiveness and Economic Growth: The Evolution of Explanatory Models, in *Handbook of Regions and Competitiveness Contemporary Theories and Perspectives on Economic Development* by R. Huggins and P. Thompson (eds.) Edward Elgar, 80-116.

Heil, M. (2017) Finance and Productivity: A Literature Review, *OECD Economics Department Working Papers No. 1374*, OECD, Paris.

Henderson V. (2003), Marshall's Scale Economies, *Journal of Urban Economics*, **53** (1), 1–28.

Higón, D.A., Antolín, M.M. and J.A. Mañez (2011) Multinationals, R&D, and Productivity: Evidence for UK Manufacturing Firms, *Industrial and Corporate Change*, 20, 641-659.

Hombert, J. and A. Matray (2016) The Real Effects of Lending Relationships on Innovative Firms and Inventor Mobility, *Review of Financial Studies*, 30, 2413-45.

Immarino, S. and P. McCann (2013) *Multinationals and Economic Geography: Location, Technology and Innovation,* Edward Elgar, Cheltenham, UK.

Javorcik, B.S. (2004) Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages, *The American Economic Review*, 94, 605-627.

Jerzmanowski (2017) Finance and Sources of Growth: Evidence from the U.S. States, *Journal of Economic Growth*, 22, 97-122.

Kierzenkowski, R., Gal, P., and G. Fulop (2017) Where to Get the Best Bang for the Buck in the United Kingdom? Industrial Strategy, Investment and Lagging regions, *OECD Economics Departmental Working Papers* No. 1426, OECD Publishing, Paris.

Kimura, F., and K. Kiyota (2006) Exports, FDI, and Productivity: Dynamic Evidence from Japanese Firms, *Review of Word Economics*, 142, 695-719.

King, R. and R. Levine (1993) Finance and growth: Schumpeter Might be Right, *Quarterly Journal of Economics*, 108, 717-737.

Lin, P., Liu, Z., and Y Zhang (2009) Do Chinese Domestic Firms Benefit from FDI Inflow? Evidence of Horizontal and Vertical Spillovers, *China Economic Review*, 20, 677-691.

Martin, P., Mayer, T. and F. Mayneris (2011) Spatial Concentration and Plant-level Productivity in France, *Journal of Urban Economics* 69**,** 182-95.

Mayer-Foulkes, D. and P. Nunnenkamp (2009) Do Multinational Enterprises Contribute to Convergence or Divergence? A Disaggregated Analysis of US FDI, *Review of Development Economics*, 13, 304-318.

McCann, P. (1997) How Deeply Embedded is Silicon Glen? A Cautionary Note, *Regional Studies* 31, 695-703.

McCann, P. (2016) *The UK Regional-National Economic Problem: Geography, Globalisation and Governance*, Routledge, London.

McKinsey & Company (2018) Solving the Productivity Puzzle: the Role of Demand and the Promise of Digitization, Available online from: https://www.mckinsey.com/~/media/McKinsey/Global%20Themes/Meeting%20societys%20expectations/Solving%20the%20productivity%20puzzle/MG-Solving-the-Productivity-Puzzle--Report-February-2018.ashx.

Phelps, N. (2009) From Branch Plant Economies to Knowledge Economies? Manufacturing Industry, Government Policy, and Economic Development in Britain's Old Industrial Regions, *Environment and Planning C: Government and Policy* **27,** 574-592.

Prochniak and Wasiak (2017) The Impact of the Financial System on Economic Growth in the Context of the Global Crisis: Empirical Evidence for the EU and OECD Countries, *Empirica*, 44, 295-337

R3 (2012) 14,000 New Zombie Companies Created Since June, The Association of Business Recovery Professionals, 19th November 2012.

Rioja, F., Rios-Avila, F. and N. Valev (2017) Productivity During Recessions with Banking Crises: Inter-industry Evidence, *Economics Letters*, 152, 50-53.

Román, V.M., Bengoa, M., and B. Sánchez-Robles (2016) Foreign Direct Investment, Trade Integration and the Home Bias: Evidence from the European Union, *Empirical Economics*, 50, 197-229.

Saadi, M. (2014) Does Foreign Direct Investment Increase Exports' Productivity? Evidence from developing and Emerging Countries, *International Review of Applied Economics*, 28, 482-506.

Sari, D.W., Khalifah, N.A., and S. Suyanto (2016) The Spillover Effects of Foreign Direct Investment on the Firms' Productivity Performances, *Journal of Productivity Analysis*, 46, 199-233.

Scholl, T. and T. Brenner (2016) Detecting Spatial Clustering Using a Firm-Level Cluster Index *Regional Studies*, Vol. 50, No. 6, 1054–1068.

Stehrer, R. and J. Woerz (2009) 'Attract FDI!" – A Universal Golden Rule? Empirical Evidence for OECD and Selected Non-OECD Countries, *European Journal of Development Research*, 21, 95-111.

Teece, D.J. (2017) A Capability Theory of the Firm: an Economics and (Strategic) Management Perspective. *New Zealand Economic Papers*, forthcoming. https://doi.org/10.1080/00779954.2017.1371208

Wagner, J. (2007), 'Exports and productivity: a survey of the evidence from firm level data', *The World Economy,* 30, 60-82.