Regional disparities and development in the UK.

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The following note addresses some key issues that should be considered when developing the UK's first National Spatial Policy. In a first step I will take a data-driven approach to highlight the historic extent and evolution of regional disparities from the 1960s onwards. I will then draw out some considerations for modelling the 'underperformance' of regions as I believe this is central to the question on how a 'spatially rebalanced' economy would look like. Section 3 looks at some regional productivity based on recent data from the ONS at varying spatial aggregations. In section 4 the literature on the effects of agglomeration economies and regional shocks will be discussed, while the final section summarises some of the research on regional development specific to the UK.

The following discussion of data and literature reveals some basic facts about regional disparities in the UK. This in turn raises a number of key questions and suggestions for policymakers to consider where and when appropriate (not ranked by order of importance):

- **Regional economic disparities are not a new phenomenon in the UK** and exist at least since the 1960s (earliest continuous data series). However, average incomes appear to have dispersed further since then. Hence, to decrease disparities between regions (if this is the decided aim) one must look at long-term structural changes such as the industrial mix and the availability of skills.

- **The story of Greater London and the South-East is one of over-performance**. The question to be asked is whether this comes at the expense of the rest of the country (e.g. by absorbing talent) or whether other regions have simply 'underperformed' for various reasons.

- **Regional disparities are relative by definition**, and regional development is meaningless without a politically-agreed benchmark. Hence there needs to be a discussion (and agreement) on whether improving the current regional economic performance should be compared against national performance or the long-term potential of the region itself.

- **Labour productivity differs vastly across regions.** The majority of places in the UK (72% on NUTS-3 regions) have an output per hour worked that is below the national average. As productivity is the main driver of long-term incomes and living standards it is fundamental to explore the underlying drivers of this 'spatial productivity gap' in the UK.

- **Any long-term policy vision needs to be fully aware of the importance of agglomeration economies** as a fundamental driver in shaping places and regional development. Also, academics have long thought about the economic performance of UK regions and firms, which should be fully accounted for when designing a new policy framework.

- Finally, one must ask about the **role of digital infrastructure** in terms of internet and data access, speed and latency rates, **as well as computer skills, as 'new' sources of regional disparities.** This is particularly relevant as the supply and demand of goods and services is increasingly delivered digitally, including across borders.

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1. Regional economic disparities in the UK are strong and persistent

1.1. In 1966 the share of South East England in total UK GDP was 35.8%, which is exactly the same almost 30 years later, in 1994 (see Figure 1). Similarly, Wales seems to be stuck at 4.2%, while Scotland increased its share only moderately from 8.5% to 8.8%. Northern Ireland on the other hand had 2.3% in 1994, compared to only 1.7% in 1966. Regions that now have less of the national economic pie are the North West (-1.8; in percentage points), West Midlands (-1.4), Yorkshire and the Humberside (-0.8), and the North (-0.4).[2] Interestingly, in the period 1978 to 1994 the share of Greater London in UK GDP declined slightly from 15.6% to 15% (dashed line in Figure 1), while the rest of the South East increased its share from 18.7% to 20.8%.

1.2. One may argue that these are merely regional economic accounts that do not say much about living standards or productivity. Hence, Figure 2 examines the regional income per capita, when compared to the UK average (=100). Regional productivity will be analysed in more detail in Section 3. The South East again stands out as the only place where income per head has been consistently above UK average, with 114.8% in 1966 and 116.8% in 1994.

1.3. By splitting out Greater London after it becomes apparent that it has always been significantly richer than the rest of the country. For example, in 1978 London had incomes of 125.6% compared to the national average, while the rest of the South East was closer to the average at 105.6%. The only other place that had incomes above the national average in 1966 were the West Midlands (108.5%), though 10 years later it fell below, and by 1996 reached only 92.6%.

1.4. The best performing regions of the period of analysis were Northern Ireland (63.3% to 82.2%), East Anglia (95.9% to 102%), and Scotland (89% to 99.7%). Overall 6 of the 12 regions discussed here increased their position relative the UK average, while the other 6 lost out comparatively. Over the same period, the absolute difference between the best and the worst place (in terms of average incomes) has decreased from 51.5 percentage points in 1966 to 34.6 in 1994. Of course here we need to also keep in mind that the Northern Irish experience is unique in itself. Cases such as West Midlands (-15.9), Yorkshire and the Humberside (-7.4), and the North West (-5.7) provide plenty of room for scepticism.

1.5. Finally, also the dispersion of regional incomes has increased. This is visible in Figure 2, where up until the 1980s regions appear to 'converge' around average incomes of 95%. In the period until the mid-1990s the paths of regions seem to spread out and disperse. This can be supported statistically, by calculating the standard deviation (measuring the average dispersion around the mean), which increases from 17.2 in 1966 to 20.4 in 1994. Regional economists refer to this as 'divergence' (as opposed to 'convergence'). We will see below that this trend also holds at a finer geographical level, and for a later time period.

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[2] For consistency with historical data we are using old regional breakdowns that were changed in 1995.

1.6. In Figure 3 regional income per head is shown for a more recent period (1998-2016).[3] Particularly the divergence of average incomes in London is remarkable and clearly visible at the top of the graph. Since this pushes up the UK average, most other regions lose out in comparative terms, with the exception being Scotland. However, it is also important to note that these figures do not control for living costs such as rents, which also differ widely across regions.

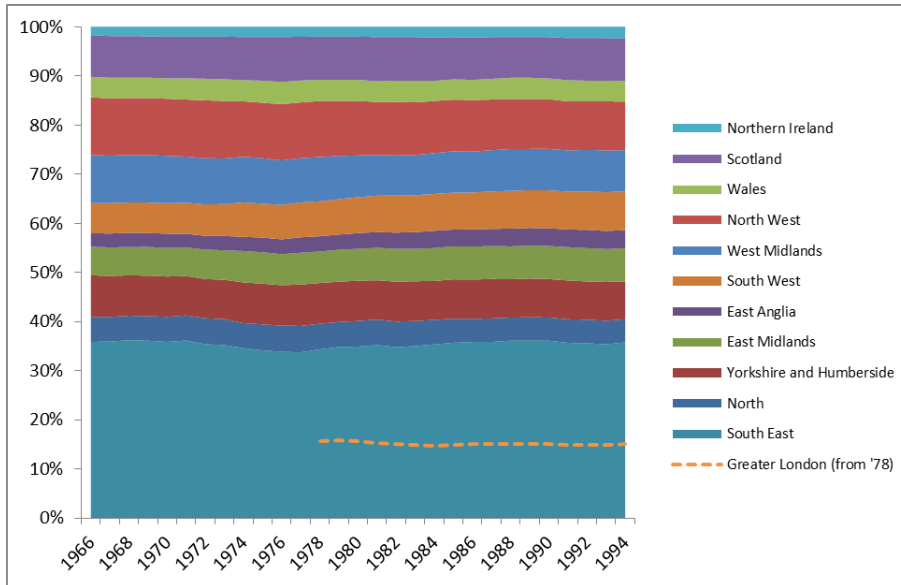**Figure 1. Regional share of UK GDP in current prices, 1966 - 1994. Source: own calculations based on ONS data**

Figure 2. Regional GDP per head in current prices compared to UK average (=100), 1966 - 1994. Source: own calculations based on ONS data
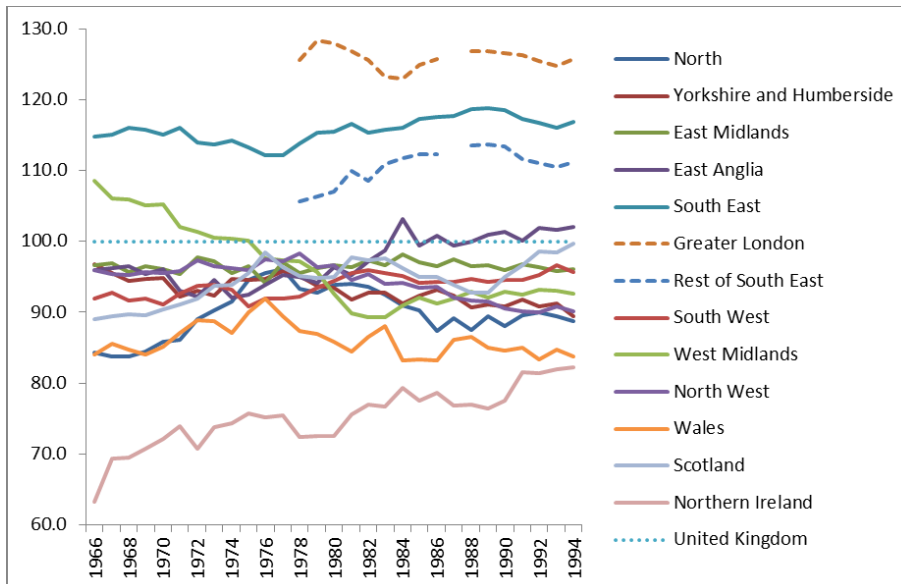

Figure 3. Regional GVA per head (balanced) compared to UK average (=100), 1998 - 2016. Source: own calculations based on ONS data

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[3] Numbers in Figure 3 are related but not directly comparable to Figure 2, since the methods to calculate regional income per head differ slightly and also the regional aggregation has changed after 1995. This makes no difference to the trends though, which is what we are interested in here.
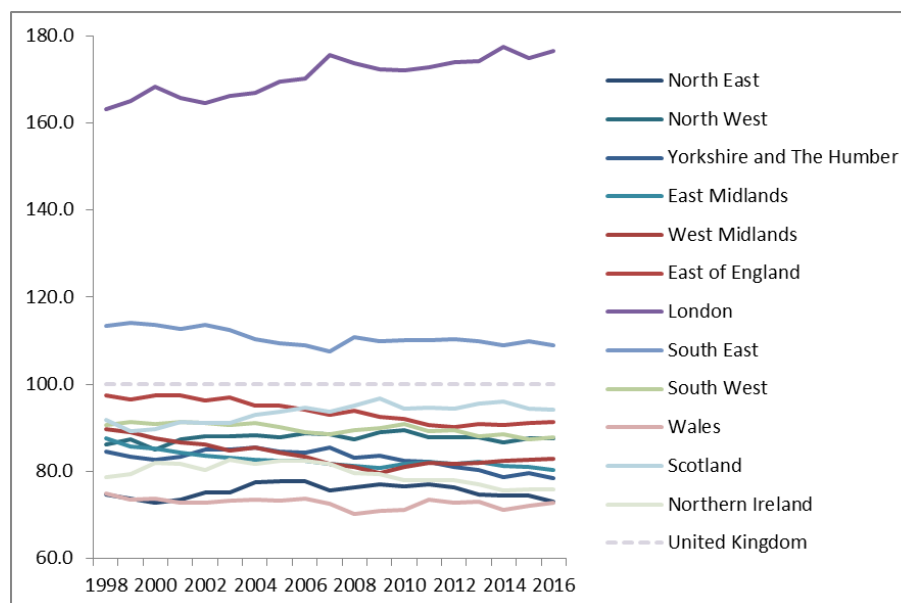
2. Modelling regional 'underperformance': key considerations and metrics

2.1. In order to assess regional 'underperformance' one must set a benchmark against which regional 'performance' should be measured. This can be other regions (or other 'comparable' regions) in the same country, but it can also be other regions in other countries (as in the case of the EU Regional Policy). However, one can also argue that this should be the region itself, based on some sort of assumption regarding future performance in relation to the occurrence of current interventions. In the end it will depend on what the aim of the policy intervention should be. It is clear that maximising local development does not necessarily equate to maximising aggregate levels, which often benefit from strong centres of agglomeration (e.g. finance in London).

2.2. Once the benchmark is fixed the performance criteria can be selected. These will differ depending on who will make use of that information. Arguably the most important outcome variable from a policy-perspective should be the living standard of people in a given region - now and in the future. This includes levels of under- and unemployment, life satisfaction, crime, etc., which together can form a comprehensive picture of regional development. Due to availability an obvious candidate to include would be (real) GDP per capita in terms of levels and growth.

2.3. Studies have found many factors that can be used to assess the performance of regions. Some can be better measured than others. Investment in physical assets is probably the most straightforward as it includes infrastructure (e.g. roads, rails, airports) and fixed capital formation by businesses (e.g. machinery, buildings). Investments in human capital are more difficult to grasp as labour is mobile, across regions but also countries. Hence it is important to measure the education and skill levels of people that are currently living or working in a place. The third basic factor is investment in intangible capital relating to levels of innovation and stocks of knowledge. Famously, knowledge does not tend to 'leave a paper trail' and is often tacit or embedded within people and organisations. It is the most

challenging factor to measure empirically apart from general conditions related to culture or institutions.

2.4. A key issue for any type of 'regional' analysis is the choice of the spatial unit in terms of the level of aggregation as well as the type of a region. The level refers to the size of a region (small vs. large, e.g. postcodes vs. government regions), while the type relates to the nature of a region's borders (administrative vs. functional, e.g. boroughs vs. travel-to-work-areas). Administrative units have the clear advantage that they are directly relevant for policy making processes; however they are often not very meaningful in economic terms. Functional spatial units can more closely resemble local labour markets or employment areas that account for commuting patterns of people. Hence, they are generally to be preferred for economic analyses, though administrative areas remain useful when thinking about the level of interventions in an institutional sense.

2.5. There are various ways to model regional development and disparities as such. A fairly straightforward, data-driven way would be to use a regression setting to predict the association between various regional characteristics and levels of development. Some of these will be time-varying (skills, labour force participation) and some will be fairly fixed (distance to capital, port, border), while others are fixed for any feasible timespan of analysis (culture). Once the most important characteristics are identified one can look at the current endowments in a region to assess the 'gap' to frontier regions. Such a partial equilibrium analysis has the advantage that it can incorporate a large amount of data points for fairly small spatial units.

2.6. However, when assessing the costs and benefits of policy intervention it is desirable to have a model that does not need to hold "all else constant". General equilibrium (GE) models[4] can overcome this limitation, at the cost of including fewer regional characteristics and higher levels of spatial aggregation. At a minimum a GE model would require data on regional population growth, employment, sectoral composition, consumption, productivity, investment, and trade flows. Regional models are described in Giesecke and Madden (2010, 2013) and Partridge and Rickman (2010).

3. The productivity of UK regions

3.1. Following the Bean Review and in line with devolution agreements and city deals announced in recent years, the ONS recognised the increasing importance of producing reliable and timely regional-level statistics for evidence-based policy-making (ONS, 2016). The ONS uses average labour productivity as a proxy for regional productivity. Broadly speaking, labour productivity refers to the amount of output (goods and services) that can be produced per hour worked or per filled job. Output is measured by gross value added (GVA).

3.2. In December 2017 the ONS published balanced measures of regional for the first time GVA ('balancing' the income and the production approach of measuring GVA). It was also

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the first ONS publication to use VAT returns from the HMRC. For the UK, statistics were provided at three NUTS levels[5] and by using a simple proportional approach also at the local authority (LA) level. In addition, for England data was provided at the level of Local Enterprise Partnerships (LEPs). Since February 2018 labour productivity estimates are also available at the level of UK city regions.

3.3. Plotting the data shows graphically that there is a large variation in GVA per hour worked across regions in the UK. This variation increases when moving from higher to lower spatial levels of aggregation (see Figure 4) for 12 NUTS-1, 40 NUTS-2, and 168 NUTS-3 regions. The absolute differences in regional productivity in 2016 increases from 52 percentage points at the NUTS-1 level to 73 at the NUTS-2 and 107 at the NUTS-3 level.[6]

3.4. For example, when comparing regions at the NUTS-1 level to the UK average, London had an average labour productivity of 134% in 2016, while Wales and Northern Ireland only reached 82-83%. At the NUTS-2 level, Inner London West had the highest average productivity at 146%. At the same time, labour productivity in Cornwall was just below 73%. The contrast in differing productivity becomes even starker at the NUTS-3 level, as the London Borough of Tower Hamlets exceeds average productivity of 172%, compared to only 65% in the Welsh principal area Powys.

3.5. Next, I focus on the most detailed level of 168 NUTS-3 regions. By comparing regions to average productivity in the UK it appears that 153 (72%) are below the average, with only 61 (28%) being above (in 2016). This is even slightly worse than in 2004, when 63 regions were above average in terms of labour productivity. Also the standard deviation – as a measure of dispersion around the mean – increased from 16.6 to 17.4 over the same period.

3.6. Another important piece for analysing the 'performance' of regions is the consumption pattern of households. So far, the ONS has produced estimates for regional gross disposal household income (GDHI) from 1997 to 2016. However, this cannot be directly translated into the consumption of goods and services as it does not account for differing savings ratios. Work on Household final consumption expenditure (HFCE) is ongoing and the ONS is planning to publish first experimental statistics at the NUTS-1 level at the end of 2018.

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[5] NUTS refers to the Nomenclature of Units for Territorial Statistics, which is a statistical classification for economic territories used by Eurostat.
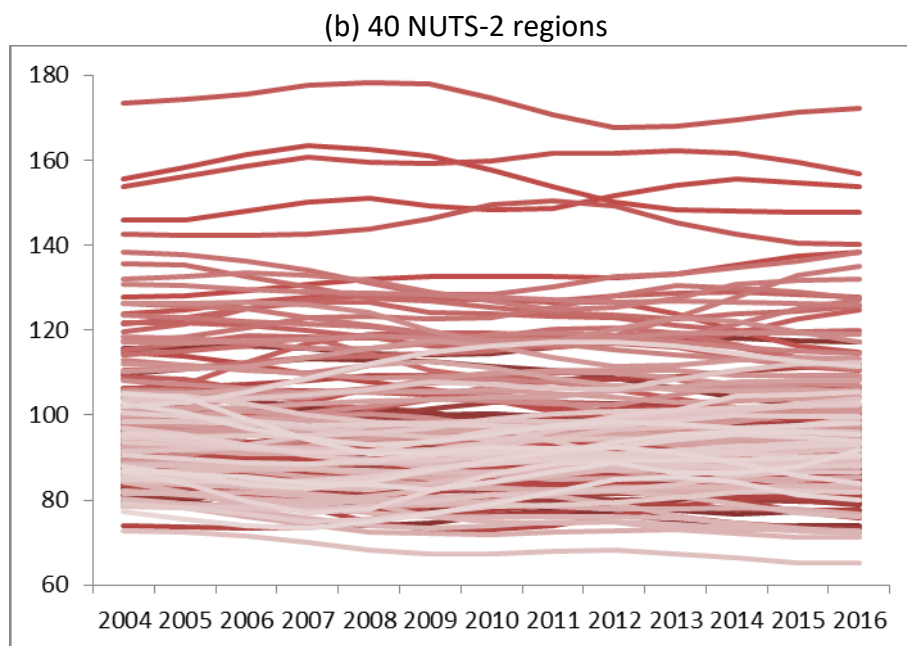[6] Also the standard deviation increases from 14.4 (NUTS-1) to 15.8 (NUTS-2) and 17.4 (NUTS-3).

Figure 4. Regional labour productivity (nominal, smoothed GVA per hour worked) by NUTS-1, NUTS-2, and NUTS-3 regions, UK=100, 2004-2016. Source: own calculations based on ONS data

(a) 12 NUTS-1 regions

(b) 40 NUTS-2 regions
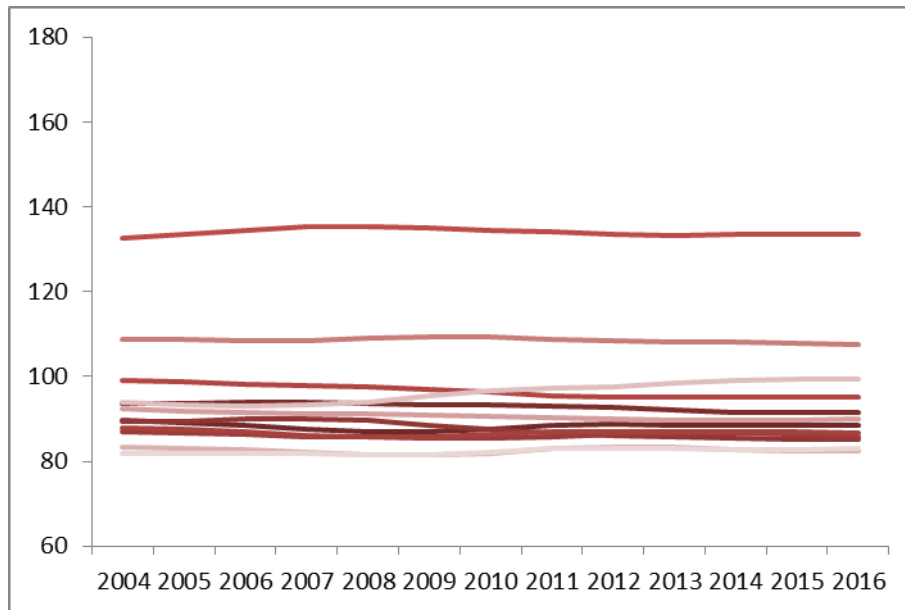
(c) 168 NUTS-3 regions
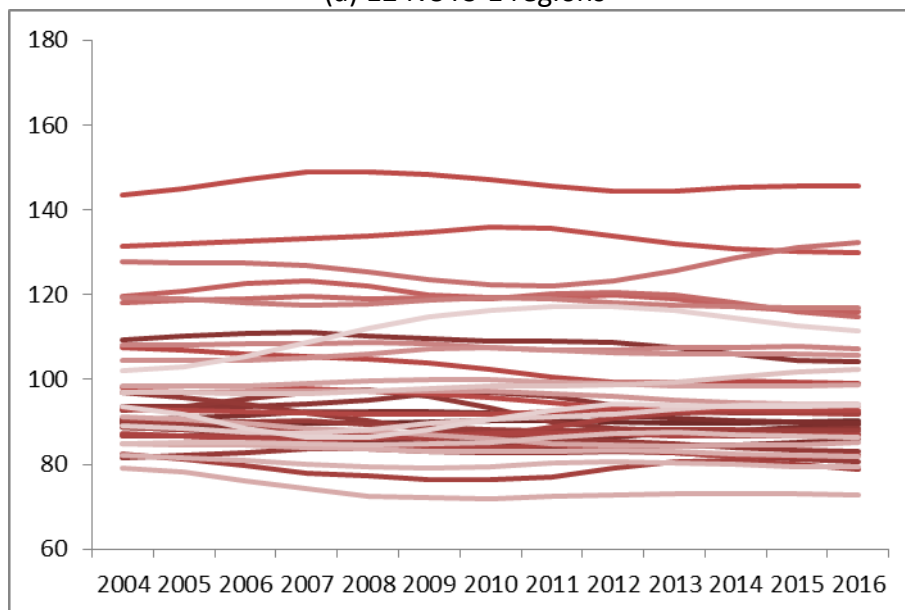
4. Agglomeration effects: amplify or mediate firm-level responses to shocks?

4.1. 'Agglomeration economies' generally refer to the spatial concentration of economic activity. As initially observed by Marshall (1890), this can be the result of localised sharing of ideas (technology), labour market pools (skills), and specialised production inputs (vertical linkages). Significant agglomeration between firms in the same industry sector is also found in the case of the UK (Duranton and Overman, 2005).

4.2. Empirical measurements of agglomeration economies suffer from the classic 'chicken and egg' problem: do good firms and people gravitate towards centres of agglomeration, or do agglomerated places make firms and people better? While in practice it is probably a bit of both, this is not a very useful starting point for assessing which places have conducive levels of agglomeration and which ones have the potential to develop these. By definition not every place can be 'agglomerated' as it is a relative metric, and if firms or people move to one place they necessarily leave another.

4.3. Agglomeration effects are important for location decisions of firms. This can lead to positive feedback loops if more firms tend to go where there already is agglomeration of economic activity. The flipside is that it can reinforce disparities between places. This cycle can also be difficult to break by policymakers. Studies show that government subsidies in the form of "Regional Selective Assistance" grants have some effect on location decisions of firms in the UK. However, this is mainly the case when a location already hosts existing plants in the same industry as the entering firm (Devereux et al., 2007) and firms are small as large firms tend to 'game the system' (Criscuolo et al., 2018).

4.4. To understand the impact of economic shocks on agglomerations a further distinction between 'localisation' and 'urbanisation' economies is necessary. Places with agglomeration based on specific industries benefit from the former (also referred to as Marshall-Arrow-

Romer externalities) and they have a specialised industrial structure. On the other hand, urbanisation economies refer to benefit accruing in places with a diverse industrial structure (Jacobs, 1969). The underlying idea is that firms benefit from being exposed to different ideas in other industries. In theory these concept are not mutually-exclusive.

4.5. Similar to the modern portfolio theory in finance, it is easy to see that a certain level of diversification in terms of industrial structure should be beneficial to mitigate idiosyncratic shocks. Without falling into the trap of the 'regional resilience' debate, mitigation can refer to the anticipation, absorption and recovery (bouncing back) of a region (Martin and Sunley, 2015). While specialisation is not always bad (e.g. computer science or biotech vs. coal or textile production), a more diverse economic base is generally seen as beneficial in mitigating shocks (Davies and Tonts, 2010).

4.6. In the end, any discussion of agglomeration economies within the context of regional development needs to be well-aware of the vast existing literature. Only the comparison of a number of different metrics allows for assessing 'agglomeration' and its role in spatio-temporal and spatio-sectoral planning.

5. Overview of economic research on 'performance' of UK regions and firms

5.1. Empirical studies assessing the performance of regions in the UK are limited and usually based on some sort of assessment of policy interventions. However, the issue has regained attention recently due to the discussions around the industrial strategy and spatial 'rebalancing' of the economy (generally by encouraging growth and development outside the South-East of England). Kierzenkowski et al. (2017) look at the industrial strengths of all 12 regions in the UK. Their most important finding is that regional productivity is not driven by capital intensity of firms, but rather a region's sectoral composition and the type of investments by firms (e.g. in knowledge-intensive services). Further, Bernick et al. (2017) provide an 'atlas' of industry in the UK and highlight a number of interesting trends in relation to regional disparities. This includes the location of large firms and start-ups; concentration of productivity and innovation; leading vs. lagging sectors; and exporter status.

5.2. One way to assess the performance of a region is to look at the evolution of disparities over time. However, if lagging regions experienced relative catch-up with leading regions this can be the result of 'better' performance of the lagging region as well as 'worse' performance of the leading one. Related to this, Montfort (2008) discusses the benefits and drawbacks of a range of convergence measures. In the case of the UK, Monastiriotis (2006) finds that between 1981 and 2002 there has been a regional divergence (at the county level) in terms of nominal wages, mainly driven by the period of the 1980s. A more up-to-date study is not available at this point in time but Section 1 provided some additional high-level analysis.

5.3. Another way to look at the performance of regions is to see how they react to shocks (see discussion of agglomeration and resilience above). The UK economy has had a number of shocks that qualify for such investigation, including the entry of China into the WTO in

2001, the global financial crisis in 2008 and most recently the referendum on the membership of the European Union. Foliano and Riley (2017) find that places in the UK that have a higher exposure to import competition from China experienced a sharper decline in manufacturing jobs. For the case of Brexit, Dhingra et al. (2017) demonstrate that regions that are more expose to trade with the EU will stand to suffer more. Certainly more research on regional performance in relation to large shocks is desirable.

5.4. A number of studies examine the impacts of policy intervention on regional performance. Devereux et al. (2007) and Criscuolo et al. (2018) find positive impacts of the Regional Selective Assistance (RSA) scheme in the UK in the form of raising employment and investment. However, local productivity was not affected. Others look the effectiveness of EU Structural Funds, and generally find positive effects (Di Cataldo, 2017; Di Cataldo and Monastiriotis, 2018). A third group of studies looks at the intersection of foreign direct investment (FDI) and regional performance: Wren and Jones (2011) demonstrate a positive impact of government grants on the attraction of FDI, while the presence of multinationals is positively associated with innovative activity of domestic firms (Crescenzi et al., 2015). An evaluation of the area based intervention (LEGI) in the UK showed that while here are positive effects in terms of local employment creation, this is cancelled out by displacement effects close to the boundary (Einiö and Overman, 2016). Others find that a unionism is positively associated with higher productivity and wages at the regional level in the UK, which potentially outweigh negative effects on employment levels (Monastiriotis, 2007).

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