Planning for Infrastructure: Challenges to Northern England

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Abstract
Long-neglected, infrastructure planning has returned to the political limelight in the UK. While the debate has been preoccupied with the financial, efficiency and regulatory aspects of major infrastructure development, there is a lack of systematic understanding of the spatial issues. This paper seeks to provide an overview of the changing policy environment of infrastructure planning in regards to spatial distribution patterns in England. It also explores the knowledge gaps, policy questions and challenges of infrastructure development in the lagging northern regions. It concludes with a discussion to shape a future research agenda and actions for infrastructure planning in lagging regions.

Keywords:
infrastructure, planning, northern England, spatial analysis, economic growth

Introduction

Infrastructure investment has returned to the political spotlight in the UK, especially after the 2007 financial crisis, as capital spending on infrastructure is seen as a way to stimulate economic growth and to improve the large proportion of infrastructure assets that are in urgent need of investment. Indeed, in his keynote speech on the economy, the Chancellor reiterated the importance that:

> We are delivering the biggest programme of investment in our railways since Victorian times, the biggest programme of road building since the 1970s …… And HS2 [High Speed Rail 2] will transform the economic geography of our country and help spread rising prosperity to the Midlands and the North of England, which is why I am passionately in favour of it. (Osborne, 2013)

Through the 2011 and 2013 National Infrastructure Plans (NIPs) (HM Treasury and UK Infrastructure, 2011; 2013), the UK coalition government[1] has identified over 500 projects worth approximately £250 billion to be delivered through public and private funds. The *Investing in Britain's Future* report (HM Treasury, 2013a) further announced the government's commitment to £100 billion in public infrastructure spending over the next parliament. At a time of economic austerity, the commitment to invest in major infrastructure like HS2 has no doubt caused a major political rift as well as public scrutiny. While the Chancellor claims that HS2 will bring economic benefits to the Midlands and northern England, the National Audit Office (NAO, 2013) nonetheless provides a scathing indictment of the government's case by pointing out the shortfall of a £3.3 billion funding gap and the flaws and errors in its impact analysis. The NAO review is critical of the cost-benefit analysis calculation as it fails to clearly attribute the economic impacts of HS2 to specific locations (ibid, para 4.10).

The lack of spatial expression of government policies and plans, especially infrastructure planning, has long been challenged by a series of studies commissioned by the Royal Town Planning Institute (RTPI) (Wong et al, 2001; 2006; 2012). The importance of having a national policy framework to integrate land use, transport and environmental policies, and national strategies including roads, rail and air transport has been strongly lobbied by the Confederation of British Industries for over two decades (CBI, 1992; 1995; 2000). The opposition Labour Party's recent infrastructure planning review by Sir John Armitt (2013) again raises concern over the lack of strategic assessment of long-term infrastructure requirements. He recommends the development of Sector Infrastructure Plans, with details on specific projects, funding and delivery arrangements, to allow more robust national infrastructure assessment.

Clearly an infrastructure project such as HS2 might provide a major shock to the system resulting in different winners and losers (Martinez and Givoni, 2012). While the promise by the Chancellor in his Budget Speech (Osborne, 2010) that an economy 'where prosperity is shared among all sections of society and all parts of

[1] The UK General Election took place in May 2010. The Labour Party was replaced following a hung parliament by a new coalition government comprising the Conservative and Liberal Democrat parties.

the country' can be interpreted as rhetoric, from a national planning perspective, it is crucial that policies are sensitised to the ways in which space-time dynamics shape spatial outcomes (Wong and Watkins, 2009). The spatial implications, in terms of benefits and cohesion, of infrastructure planning are particularly pertinent in England given the deeply entrenched north-south regional divide. The regional re-balancing debate should not just be confined to the economic performance of the peripheral regions, but also the capacity of the buoyant regions to manage the growth pressures for sustainable development (Wong, 2002a; Wong et al, 2011).

Due to a lack of systematic assessment of the spatial implications of infrastructure development, this paper first seeks to highlight the key policy contexts that shaped infrastructure development and investment over the last decade and their interface with the identified spatial distribution patterns of infrastructure provision and requirements in England. This involves mapping analysis of infrastructure stock and investment patterns with secondary data sources. It then seeks to identify the knowledge gaps, policy questions and challenges of infrastructure development with key policy actors and infrastructure providers in both public and private sector of the lagging northern regions. This was informed by primary data collection from the discussion sessions of a national stakeholder conference; informal interviews with four Members of Parliament and national infrastructure providers; and fifteen exploratory interviews with key actors in various infrastructure sectors of northern England.

This paper is structured into four further sections. The next section broadly explores the connection between infrastructure, economic growth and spatial development. It then discusses the uneven nature of the English infrastructure planning environment by focusing on the impact of privatisation and the aspatial planning approach, the transport infrastructure capacity, and the infrastructure investment patterns. The discussion then turns to identify key infrastructure challenges of northern England by examining views from practitioners and policymakers. The paper concludes by drawing out a discussion to shape the research agenda for developing transformational infrastructure planning in lagging regions.

Infrastructure, economic growth and spatial development

Physical infrastructure embraces the more immobile and long-term features of an area which demarcate it from other more mobile factors of production such as labour and entrepreneurship (Biehl, 1986). Another defining feature of infrastructure is its *polyvalence* in terms of being used for multiple activities (Nijkamp, 1986). The dual nature of infrastructure as both public goods and capital goods means that it is invariably linked with the development of 'the territory by enabling communication, transport and relationships to take place' (Zanon, 2011, 327) throughout the city and the wider world (Neuman and Smith, 2010). Modern cities and towns embody an extremely complicated and vibrant process in which infrastructure plays an important mediating role between flow, movement and exchange (Graham, 2000a). Neuman (2006, 6) thus defines infrastructure as 'a long-lasting network connecting producers and service providers with a large number of users through standardised (while

variable) technologies, pricing, and controls that are planned and managed by coordinating organizations'.

There is an on-going debate about the impact of public capital investment on infrastructure and its relationship to private investment and growth (Barro and Sala-i-Martin, 2004). This debate largely stems from the work of Aschuer (1989) who argued that public investment in infrastructure had a positive impact on productivity. While a few studies have disputed such an argument, the vast majority has instead focused on debating the level of positive impact (Crafts, 2009). The relationship between infrastructure provision and economic development is also not that well understood in Britain (Diamond and Spence, 1989; NAO, 2013). This is partly due to the lack of comprehensive data on the capacity, quality and use of the infrastructural stock, and partly related to the methodological limitations of cost-benefit analysis to assess the wider spatial spillover effects of transformational infrastructure projects (see Laird et al's discussion in this special issue). It is, however, important to note that there is a certain degree of fuzziness over the definition of location and infrastructure (Wong, 2002b). Due to the relational and relative nature of locational attributes, infrastructure can be seen as the add-on fixed production factor to a physical site to enhance its development value and potential (Bruinsma et al, 1990). Location is related to attributes external to an area rather than its internal characteristics. Locational advantage is the result of the interplay between physical location (which is supposedly unchanged) and the dynamics of other changes such as accessibility, communication networks and infrastructure (Wong, 2002b). Research continues to highlight spatial inequality in inter-metropolitan accessibility in Europe (Bruinsma and Rietveld, 1993) and within the UK (Wong et al, 2006) in terms of road, rail and air networks.

Recent work on OECD countries shows that public capital investment has resulted in an average output elasticity of 0.22 percent (Kamps, 2006), while Afraz et al. (2006) calculated an average output elasticity of between 0.1 and 0.2 percent for European countries. This average of 0.2 percent would suggest an approximately 31 percent growth-maximizing ratio of public to private capital, highlighting the potential contribution of public capital investment to economic growth. However, a key concern is about how such growth is spatially distributed. Farole et al. (2009, 6) provide an insightful explanation that uneven spatial distribution of growth is 'the combined result of agglomeration tendencies, the uneven geography of innovation, the wider process of geographical fragmentation of production, and the recursive feedbacks of these forces to the geography of institutional capacities'. This is partly linked to new economic geography's (NEG) preoccupation with spatial agglomeration (Krugman, 1991; Martin and Ottaviano, 1999) by arguing that 'spatial concentration of industrial activities increases growth at the regional and aggregate level without generating regional growth differentials' (Cerina and Mureddu, 2010, 1). This presents a policy dilemma of choosing between efficiency (aggregate growth) and equity (regional convergence). As explained by Cerina and Mureddu (2010), under the conception of NEG, improving infrastructure in the lagging region to attract economic activities may not generate the type of growth that maximises national equilibrium allocation. Of course, others have a rebuttal on the NEG claim by

showing empirical evidence that regional dispersion of economic activities can improve national economic performance (e.g. Gardiner et al, 2010; Henderson et al., 2001; Sbergami, 2002).

The spatial perspective of infrastructure planning has recently turned to understand the importance of interdependency between different infrastructure sectors across different territories. The debate focuses on the vulnerability of places to catastrophic cascade failures of infrastructure, where a failure in one part or one sector of the network can result in a chain reaction of failures across the system. As such, it is particularly important to understand, manage and coordinate infrastructure networks to protect against such failures (Cutter et al., 2008; Kaika and Swyngedouw, 2000). Spatial configurations of infrastructure development (e.g. airports, nuclear power stations) can be part of the planning strategies to spread the risk of massive disturbance and extreme events, both natural and man-made. This may not be in tune with the single minded conception of economic agglomeration, but clearly 'resilience and risk management' has to be part of the conceptualisation of economic growth and efficiency (Ashby et al., 2009; Bristow, 2010).

The discussion highlights that the relationship between infrastructure investment and economic growth is not at all straight forward and the attribution of economic growth to spatial development is both controversial and methodologically challenging. Indeed, Farole et al. (2009, 18) conclude that 'the tradeoffs between growth maximization through spatial unevenness and growth enhancement through combating underdevelopment must be rigorously assessed and defined'. This echoes Feser's (2014) concern over whether the right policies and investment strategies are in place and the uncertainty surrounding the changing subnational economic development institutions in the US and England. The struggle between growth efficiency and spatial equity forms the premise for us to examine infrastructure development and planning in England, especially in the lagging regions.

Policy environment and uneven provision

This section tracks the changing policy environment of infrastructure planning and examines its interface with the spatial distribution patterns of infrastructure provision and requirement.

Privatisation and the aspatial approach of infrastructure planning

During the 19th century, infrastructure in the UK was highly decentralised to local councils, with responsibility shared between the private and public sector for providing water, energy, communication and waste management (Hall et al., 2012). Gradually throughout the mid-20th century key infrastructure sectors were nationalised, or more tightly regulated, as government began seeing the potential of these sectors to facilitate national economic growth, particularly during and shortly after the Second World War (Hall et al., 2012; Hughes 1989). However, a reversal of government approaches on infrastructure investment and delivery through privatisation efforts, started under the Thatcher government, sought to reduce public financial burden and promote greater efficiency (Hall et al., 2012; Marshall, 2011).

One controversial development of privatisation was the introduction of the private finance initiative (PFI). The PFI, introduced by the Major government in 1992, is a way of creating 'public–private partnerships' by funding public infrastructure projects with private capital to provide value for money and reduce public sector borrowing requirements (Clark and Root, 1999). Between 1992/93 and 2011/12, signed PFI contracts by the UK Government resulted in approximately £52 billion of investment capital (HM Treasury, 2012). The use of PFIs has allowed for continued investment in infrastructure, but the long-term cost of PFI repayments brings about concerns related to the ability of government to pay for those investments (Agénor and Yilmaz, 2006). Overall, the government is required to pay over £240 billion in PFI obligations between 2012/13 and 2049/50, with annual payments peaking in 2015/16 at £10 billion.

The outcome brought by deregulation and privatisation processes throughout many, but not all, infrastructure networks, often results in what Guy et al. (1997) refer to as a 'splintering' effect, that is, a 'patchwork' of infrastructure with the core concepts of universality and affordability being replaced by service concentration and profitability. The rise of a more spatially delineated infrastructure 'patchwork' may have exclusionary impacts, as individuals might be denied access to particular networks (Brenner, 1998) that exist beyond their individual marginalised boundaries (Speak and Graham, 1999). Yet how premium networked spaces, or infrastructure 'hotspots' (Moss, 2003), are developed is highly variable as they 'are the results of the strategies of coalitions of interests within the contested and highly complex geopolitical and governance contexts of their respective cities' (Graham, 2000b, 186).

The UK government's desire to encourage competition and a free market often conflicts with strategic spatial planning considerations that attempt to direct infrastructure investment to stimulate economic growth in lagging regions. Marshall (2010) argues that the emphasis on the market has resulted in increased investment in London and the South East at the expense of other parts of the UK. He further argues that the government prefer to adopt a non-spatial approach to infrastructure planning to desensitise the political nature of such development projects. The fact that national policy guidance documents such as the National Planning Policy Framework (NPPF) (CLG, 2012) and the National Policy Statements for infrastructure sectors are deliberately *a*spatial, and the NIP is largely a catalogue of existing infrastructure projects without any strategic spatial reference, can at best result in a partial picture of sectorally-based spatial development. This begs the question of how local planning can perform the coordination and management role of sustainable infrastructure development and economic growth when there is a lack of a spatial framework to join up different sectoral policies across different spaces in England, let alone across the UK (Wong et al., 2012). Gaining the consensus for such an approach is difficult and clearly not just a problem in the UK. In his discussion of major European infrastructure planning Marshall (2013) broadly notes two key governance structures at work, consensualist – where governing becomes a multi-level bargaining process between different state agencies and external organisations such as in the Netherlands, Germany and Scandinavia, and majoritarian – composed of more centralised, majority rules unitary states such as

the UK and France. Yet the key factor for Marshall is not whether a state is consensualist or majoritarian, but rather related to the amount of political capital summoned to develop a process of infrastructure development based on long-term consultation, institution building and consensus – something that seems lacking in the UK context.

Transport infrastructure capacity and spatial connectivity

The importance of using public capital investment in infrastructure to support economic growth raises questions about the spatial distribution of public funds and the strategy of spatial development. In England, the post-war period saw a rise in the use of a north-south divide narrative to explore regional inequalities as redistributive 'one-nation' policies were implemented in the 1950s and 1960s and subsequently dismantled in the next three decades (Raco, 2007; Gonzalez, 2011). Since the turn of the millennium, the government has been attracted to the idea of pursuing a balanced competitive regional development strategy by improving the economic performance of lagging regions through a market-led competitiveness agenda while promoting continued growth in the economically successful centre (HM Treasury, 2001). This coincides with the NEG thesis on spatial agglomeration and growth efficiency. The drivers of competitive growth have recently shifted from a regional perspective to the sub-regional scale of city-regions (Baker and Wong, 2013), though the spatial divide largely persisted as London and the South East region continued to dominate the economic growth of the country (Hincks et al., 2013; Morgan, 2006).

In a RTPI commissioned study, the differential spatial accessibility across the UK was starkly illustrated via the mapping analysis of key indicators, which led to the conclusion that 'the dominance of the super-London/South East functional area has overshadowed the development of the rest of the UK' (Wong et al., 2006, 54). The findings are re-examined here by comparing London with Manchester and the wider northern England and by highlighting potential changes brought by major infrastructure investment in these areas.

Figures 1 and 2 show the differential rail accessibility quality of London and Manchester in terms of the actual rail journey time incurred. While both cities have excellent rail links with other cities in the country, it is clear that London offers 1.6 times more direct links than that of Manchester. With fast speed rail links, the journey time between London and many northern cities such as York, Newcastle-upon-Tyne, Edinburgh and Glasgow are significantly compressed, thereby enhancing human mobility for business and leisure trips. Despite the fact that Manchester is in closer proximity to these northern cities, train journey times are actually very similar to those of London. The government's commitment of over half a billion pounds of investment by 2018 in the northern rail network through the Northern Hub initiative will see faster trains connecting Liverpool, Manchester, Leeds, Sheffield and the North East.

Figure 1 Rail times from London by type of service
Source: Wong et al., 2006, 18

Figure 2 Rail times from Manchester by type of service
Source: Wong et al., 2006, 18

Turning to airport capacity, the five major London airports accounted for 61.6% of all international passengers at UK airports in 2012, followed by Manchester at 8.6%, and Birmingham at 4.6% (see Figure 3). However when scheduled, rather than chartered, international flights (Figure 4) are considered separately, the dominance of London-area airports is even clearer. In total, they accounted for 64.7% of all international scheduled passengers, with Heathrow alone having the lion's share of 35.2% of the total. The largest share at a regional airport was Manchester, with 7.8% of the share. In 2012, Manchester Airport handled 19.7 million passengers yet with the spare capacity to handle as many as 55 million passengers (M.A.G., 2013). There was, nonetheless, no mention of Manchester Airport as a UK international gateway in the 2011 and 2013 NIPs. Manchester handles considerably less international flights, which results in passengers having to travel to London or other European hubs (e.g. Amsterdam) to make international connections. While Manchester, Liverpool, Leeds, and Newcastle have relatively good access to airports, areas outside of these core cities in the north struggle with air accessibility. Sea transport is also a concern with uneven concentrations throughout England (see Figure 5).

Figure 3 Percentage of all international passengers at international airports in the UK in 2012
Source: Civil Aviation Authority, 2013, Table 5

Figure 4 Percentage of scheduled international passengers at international airports in the UK in 2012
Source: Civil Aviation Authority, 2013, Table 5

Figure 5 Percentage of total port tonnage at UK ports in 2012
Source: Department for Transport, 2013, Table Port0112

Despite new government investment and the NIP, the analysis continues to affirm the findings in the RTPI report that 'London as a city specialises in international traffic links, both through providing international scheduled flights via Heathrow Airport and handling international trade through its ports. ….. London also controls the country's political and financial system and serves as the knowledge centre with a large amount of research capacity, especially when combining its impact with the capacity in the wider hinterland' (Wong et al., 2006, 54).

Infrastructure investment patterns

Infrastructure sectors exist at the heart of a complex symbiotic process with their mutual interdependency and embedded nature in social processes (Graham, 2000a, 114) infrastructure landscapes are highly influenced by the wider governance and regulatory processes of the state (McFarlane and Rutherford, 2008). Given the current public finance constraints (HM Government, 2010), it becomes critical to the government that limited public funds are targeted so as to lever private sector

investment to maximize the economic and social benefits of infrastructure investment. Under such policy ethos, infrastructure investment in England tends to continue its differential spatial trajectories as shown earlier.

Recent infrastructure investment continues to favour London (see Figure 6), with £36 billion targeted to the capital (representing 40% of all capital English regional projects and programmes) (HM Treasury, 2013b). London is followed by the South West, with an investment of £19 billion, however £16 billion of that is directed towards the construction of the Hinkley Point C nuclear power station. The East Midlands and the North East, with an investment of £2 billion and £2.2 billion respectively, receive the least amount of capital funding. On a per capita basis the East Midlands continues to trail in investment with just £567 per person while the North East performs better with £884 per person (see Figure 7). The South West does exceptionally well at £3,558 as a result of the investment in Hinkley Point C, however when this singular investment is removed the region drops to second to last with £362 per person. Even with London's sizable population, it continues to dominate with a per capita investment of £4,333.

Figure 6 English regional projects and programmes by capital value
Source: HM Treasury, 2013b, 30

Figure 7 English regional projects and programmes in £'s per capita
Source: HM Treasury, 2013b, 30

When labour productivity is explored, the south, led by London (129.4) and the South East (107.4), also performs far better than the UK average (100) and notably exceeds the northern regions, with Yorkshire and Humber (87.9) and the West Midlands (88.8) having much lower levels of labour productivity (see Figure 8).

Figure 8 English regional labour productivity (UK = 100)
Source: ONS, 2013, Table 5

The continued differential economic performance means that it will be challenging for northern England to compete when infrastructure accessibility and funding are spatially concentrated in the south. More importantly, they do not have the institutional capacity like Scotland to develop their own strategic spatial plans to guide infrastructure investment. Two distributional forces are, therefore, matters of concern for northern England: the ability of the north to compete against the London/South East functional region for infrastructure investment; and the equitable spatial distribution of that investment throughout the northern regions.

Enabling transformational infrastructure: challenges to northern England

When infrastructure is built and properly conceived as a network, it can add value to the recipient and, more importantly, move beyond being individually empowering to become transformational at a wider scale to increase productivity in a dynamic state (Neuman, 2006, 7). The greater the intensity and coordination present within the infrastructure network, the greater the potential for empowering actions, improving

livability and generating prosperity and growth. The proposals in the NIPs and other new infrastructure policies will have massive impacts on the functional economies of the lagging northern regions. In order to map out the transformational pathways for northern England, a national stakeholder conference was held in February 2012 at the University of Manchester with academics, central and local government, the private sector, consultants and professional organisations (see Table 1).

The workshop provided an opportunity for key stakeholders to collectively: discuss the nature of the transformations that can be expected; draw out the implications for business and government; and develop a research agenda by identifying areas with major knowledge gaps and importance. Four sets of pressing research issues were identified from the workshop: (1) policy coordination and institutional framework; (2) measurement and perception; (3) finance and risk management; and (4) spatial equity and social inclusiveness. These key issues were further explored with four national infrastructure providers and politicians through informal interviews. These helped to inform the development of the semi-structured, in-depth interview schedule with key actors in the north of England. A total of 15 exploratory interviews took place in summer 2012 and Table 2 shows the broad distribution of the interviewees. Each of the four identified issues will be discussed by triangulating the findings that emerged from the workshop discussion and the in-depth exploratory interviews. Since all interviews were carried out on an anonymous basis, verbatim quotations are provided on the rule that the identity of the participants cannot be identified.

Table 1 Participants of the February 2012 Stakeholder Workshop

Table 2 Participants of semi-structured interviews in northern England, summer 2012

Policy coordination and institutional framework

The drastic abolition of the regional tier of government has left the north with a policy gap in terms of strategy making, intelligence collection and wider economic development coordination (Baker and Wong, 2013). The view of workshop participants and interviewees is that devolution of power and financial agreements between certain city-regions and central government, via initiatives such as City Deals[2], have increasingly been playing a role to fill the vacuum to provide strategic coordination across some sub-regions. These are, nonetheless, not yet fully matured, for example:

> The North West lost something with the removal of the regional tier. There is a gap while we wait for the Local Enterprise Partnership (LEP)[3]

[2] City Deals were first introduced in eight major cities outside London in July 2012 and have now been followed by 20 additional cities and involve negotiating city specific agreements related to the devolution of power from central government in policy areas such as housing, regeneration and transportation.

[3] LEPs are business-led, locally initiated, partnerships that are designed to meet locally focused economic growth initiatives. They have varying geographic boundaries, but broadly consist of existing sets of local authorities or in some cases functional economic areas. A small amount of start-up funding has been provided by central government, however, the main funding for LEP initiatives is to

> to become more mature. The old regional regime was swept away very quickly, so there is a natural gap in the meantime. Previously, the North West was very good at linking to our strategic activities, maybe the new structure will emerge and develop the capacity to fill with our type of network - but it hasn't yet. (Government Agency 1)

There is a lack of clarity and alignment of national views and interests on infrastructure decisions with those at the local level. Indeed many Whitehall departments are struggling to manage the devolution of power towards the local level (Ayres and Pearce, 2013). It is important to strike a balance over the provision of strategic national guidance for infrastructure integration and investment priorities and the empowerment of local decision making to create local capacity.

> Strategic decisions need to be taken at the national level and have to be planned by national government, but what we need to make sure is that during this process it takes account of local needs and is not just based on Whitehall models. (Local Enterprise Partnership 1)

Criticism is made over the silo mentality and fragmentation of Whitehall departments, as well as the arms length agencies, to achieve an integrated approach of infrastructure development. For instance, the Department of Transport and its agencies all have separate policy briefs. Such difficulties are not new, as different government departments often interpret policies based on their own internal objectives, policies and processes (Marsh, 2008). The different assessment models and criteria used by different government departments and agencies have prevented them from joining up and integrating different infrastructures.

> I think there is a lack of government policy or guidance related to arms-length infrastructure bodies such as Highways Agency, Network Rail, British Waterways, all public bodies, all delivering a transport service. …… And if there was some sort of national infrastructure policy that said improving that road is a priority, then maybe the Highways Agency would say, oh ok that's a priority for each of us, but instead we negotiate with these people as if we were a developer. (Transport Sector 1)

The lack of policy integration is also evident from the fact that the NIP is hardly mentioned in the core strategies of Local Development Plans. This is because the NIP is a Treasury document, not a Department for Communities and Local Government document where planning activities lie. This clearly highlights the need for greater policy coordination, both vertically and horizontally, to integrate and prioritise infrastructure delivery at different spatial levels.

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come from bids to other Government funds such as the Rural Growth Fund or funding provided for infrastructure, which is then to be leveraged to obtain additional private sector funding. LEPs are also able to secure funding from EU Structural Funds that provide an important additional source of support for projects in addition to national funds.

Measurement and perception bias

Methodological limitations of cost-benefit analysis for infrastructure investment have been greatly discussed by both policy-makers and academics (Odgaard et al., 2005). The focus of the government's assessment model on congestion and capacity has inevitably favoured areas with high population and high job density.

> The ability to take forward bigger schemes and to finance them in the future depends on getting criteria which recognise them as national schemes now; and some of the cost benefit analysis is based on criteria that inevitably favour schemes in the South East where there are high wages and more congestion and, therefore, you get a better cost-benefit! So, it's not a level playing field in terms of competing for national funding.
>
> (Property Developer 1)

However, increasing capacity in such growth areas often just fuels the spiral of congestion-induced investment. More importantly, current cost benefit analysis tends to be weak to ascertain transformational and long-term benefits (Lakshmanan, 2011). There was a very strong view among workshop stakeholders and interviewees that more innovative and holistic multi-criteria assessment methods are needed to take into account the wider economic growth, employment creation potential, accessibility, and poverty reduction concerns to inform infrastructure investment decisions.

> The investment of the Department of Transport is all about the transport case, the cost-benefit ratio and has not really taken into account the wider economic benefits to the full extent. That is where changes in devolution may change it by looking at investment from the Gross Value Added perspective, the economy, and prioritising on that basis. (Transport Sector 2)

The poor perception of the quality of infrastructure assets, differential spatial development and differential investment opportunities in the North is widely seen as a problem to unlocking the spare and unused infrastructure capacity. More importantly, there is a lack of understanding on how policy decisions such as HS2 or airport expansion can change investment behaviour and business perceptions of connectivity cost, which is seen as important to improve investment appraisal and impact assessment methods.

> The focus on policy is towards Heathrow, but it is a congestion issue really … Manchester has an international airport here but you can't fly directly to [Los Angeles]. The national infrastructure debate is still very much skewed from a congested South East point of view. (ICT Sector 1)

Transportation connections remain a major problem across the country. This is particularly acute in the north where only 44% of companies in the North West and North East are satisfied with their domestic transport connections, compared to 77% in London (CBI/KPMB, 2012). In the north as well as in London, passenger

congestion on rail is increasingly a problem, with 13% of passengers standing on trains in the afternoon rush hours in London and Manchester, 12% in Leeds, 7% in Sheffield, and 6% in Liverpool (Department for Transport, 2011). Yet there is a general view that London and the South East is seen as a higher priority for government investment, despite what is viewed by workshop stakeholders and interviewees as an acute need for higher levels of infrastructure funding in the north.

Finance and risk and uncertainty management

The emphasis on value for money and short-term rates of return by the government and the private sector respectively has channeled funding towards the economically buoyant areas of the country and led to spatial disparities in infrastructure investment. The chronic under-investment outside the South East can only be transformed by innovative approaches to overhaul the inertia of the system. To transform regional development does not simply mean investing in major new infrastructure, but to identify the critical assets, spare and unused capacity, and strategic needs that can facilitate the transformation effects. There is a general consensus among workshop participants and interviewees that this cannot be done by individual local authorities, rather there needs to be a wider strategic vision.

> [There is no longer] any form of political decision taking machinery above the level of the individual district council. It's been balkanised. It affects [northern local authorities] vision, because nobody has any vision, it also affects their lobbying power vis-à-vis the South East. The problem is going to be attenuated by the fact that for many people the only political institution they have left is their individual district council, and those councils are subject to extreme cuts ……. there will be no strategic capacity left, no thinking capacity, no economic development capacity and we will be in an even bigger mess than we are now. With one or two honorable exceptions I'm sure. But by and large we are going to be completely enfeebled. (Government Agency 2)

There is an urgent need to look for different financial models and return profiles to supply funding for infrastructure investment in the north, as the short-term rate of return in the north will not be as attractive as its southern counterparts.

> From a manufacturing point of view we can point out a range of companies that can testify that the north is a great place to do business. But the counterfactual always rules. The counterfactual says well I might be able to make a better rate of return in the south and I want to make a better rate of return quicker, so I will do the easy thing and invest in the south. I think that is also true of infrastructure decision-making. (Local Enterprise Partnership 2).

New approaches will be needed to reduce the cost of procurement by sharing plans, sensitive information and integrating the delivery of different infrastructure. Pooling resources from different pots to allow infrastructure developers to recoup their costs from other schemes that benefits from such investment are potentially seen as a way

forward, such as through the Community Infrastructure Levy[4] and City Deals. Planning is seen as a key instrument to plan for the integration of different infrastructural development by both public and private sectors. However, there is a need to streamline the process of public consultation and enquiries to get things done more quickly to reduce uncertainty and risk for investment.

Spatial equity and social inclusiveness

Within the UK, there is a need to balance competitive market demand for investment with wider strategic and equitable policy concerns. The current government reforms, the removal of the regional tier and a move towards more competitive funding schemes tend to result in particular difficulties for certain areas of the north.

> I think you are seeing a lot (of areas being left behind). I think you are seeing more of it as a consequence of the fact that you don't have regional development agencies or anybody else really targeting, to try and get investment into those areas that have traditionally struggled to do so. (Infrastructure Consultant 1)

While past central government programmes had equity and redistributive concerns at their core, the current round of initiatives tend to focus on competitive economic-growth (Deas, 2013). This is likely to create winners and losers. Certain local authorities may be well placed to take advantage of a more locally orientated approach and environment of policy liberation, while others may not have the resources or institutional capacity to organise and benefit from these new initiatives. This core-periphery debate is not restricted to an inter-regional divide, but also the widening intra-regional gap, particularly between urban and rural areas. There is a concern that success in one area will be at the expense of others, especially smaller urban and rural areas in the north. Projections for Greater Manchester already show future growth levels exceeding the North West (Oxford Economics, 2014).

> Greater Manchester (GM) is in a great position compared to all the other North West regional areas. GM is so far ahead of the game that they are capturing the leakage and displacement, which means that a lot of the opportunities that would have gone to those surrounding areas are being lost to GM. It's not necessarily new economic growth if you look at it at a national level, but it's new economic growth at a sub-regional level because GM is growing at the expense of the areas around it. (Infrastructure Consultant 2)

Currently, regional impacts and benefits of infrastructure investment tend to focus on project spend but not corporate revenues, and on GDP and income rather than on a wider set of socio-economic indicators. Intra-regional inequality was a key policy

[4] The community infrastructure levy (CIL) was introduced in April 2011 and allows local authorities in England and Wales to charge a levy on new developments in their area. The rates are set by the local council based on the type and size of development. Charges are paid to the local authority which can then use the money to support development by funding new local infrastructure.

feature of the former Labour government to shift the debate away from inter-regional concerns (Gonzalez, 2011). Recent changes by the coalition government have turned away from regionalism altogether by moving towards localism and the city-region scale. More innovative methods are thus needed to provide a synoptic view of spatial distribution and equity by integrating socio-environmental concerns, qualitative perception and behavioural information into different assessment models and methods.

Conclusions

Planning, development and construction of infrastructure is a highly contentious and politically visible concern and is potentially open to various forms of manipulation and contestation by a range of actors, from politicians to private corporations to advocacy groups (Barnett, 2008; Young and Keil, 2010). In the midst of the debate on major infrastructure investment in the UK, this paper serves two main purposes: first, to contextualise the uneven spatial landscape of infrastructure planning and provision in England; and second, to elicit views from policy actors and practitioners over the knowledge gaps, policy issues and challenges of infrastructure delivery to transform the lagging behind northern regions.

The mapping analysis highlights the continuous divide between London and its wider South East hinterland and the rest of the country in terms of infrastructure endowment and future investment plans. The proposals in the government's NIPs will further reinforce the north-south divide. The findings from the workshop and the interviews suggest that there has been chronic under-investment in the north, which means that to change the inertia of the system will require a step change with a major overhaul of the system.

There are major challenges to make such a step change. There is too little capacity for the north to deliver transformational infrastructure and it will always rely on public funding to unlock private investment. This is partly related to finance, but partly related to risk and the government's lack of clarity and strategic vision of its own policies. There surely remains an imperative for strategic thinking even if the region is no longer seen as the optimal spatial focus for this. City-regions are seen as the most robust scale to address infrastructure investment at the local level, especially in the light of the success of Greater Manchester in attracting transport funding. There is an argument to have further devolved power to give the main cities in England the power of the London mayor with a strategic brief. However, this will likely further create winners and losers, as already seen in the case of Greater Manchester and its surrounding areas. Planning has been pointed out as a key way to plan for the integration of different infrastructure. Nevertheless, there is a need to streamline the process of public consultation and enquiries to get things done more quickly and to reduce the risk of investment without compromising the democratic process. The wholesale abolition of the regional policy structure by the coalition government means that the visibility of the north, to both politicians and investors based in London, has been reduced and that there is a lack of regional voices to advocate its case in Whitehall.

The findings in this paper are exploratory in nature. It aims to develop a better understanding of the knowledge gaps and challenges of how infrastructure can be delivered in different ways to positively transform the economic, environmental and social outlook of the northern regions. Based on the analysis, four main areas of research are identified to help inform infrastructure planning in northern England, though they will be of strong relevance to other lagging regions outside England. Firstly, there is a need to understand the interdependence and integration across different infrastructure sectors to allow the development of innovative policy and business models to deliver a transformative effect. Secondly, major research is required to improve existing funding models from the narrow emphasis on value of money and short term rates of return by the government and the private sector respectively, as they tend to reinforce the trends of investing in economically successful areas. Thirdly, rather than crouching on the narrow focus of economic growth, research has to be carried out to identify the spatial displacement effects, in broader socio-economic and environmental terms, brought by uneven spatial infrastructure investment patterns of the government. Finally, better understanding of the changing governance and capacity building models to deliver strategic and integrative planning for infrastructure development is critical if major transformation is to be delivered in the lagging regions.

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References

Afraz, N., Aquilina, M., Conti, M., and Lilico, A. (2006) Impact of Transport Infrastructure on Economic Growth, Annex 6 to Final Report of COMPETE: Analysis of the Contribution of Transport Policies to the Competitiveness of the EU Economy and Comparison with the United States, Karlsruhe, ISI.

Agénor, P., and Yilmaz, D. (2006) The Tyranny of Rules: Fiscal Discipline, Productive Spending, and Growth, Working Paper No. 73, Centre for Growth and Business Cycle Research.

Armitt, J. (2013) The Armitt Review: an independent review of long term infrastructure planning, review commissioned for Labour's Policy Review. London, Labour Party.

Ashby, J., Cox, D., McInroy, N., Southworth, D. (2009) An International Perspective of Local Government as Steward of Local Economic Resilience. Manchester, Centre for Local Economic Strategies.

Ayres, S. and Pearce, G. (2013) 'A Whitehall perspective on decentralisation in England's emerging territories', Local Economy, 28, 801-16.

Baker, M. and Wong, C. (2013) 'The delusion of strategic spatial planning: what's left after the Labour government's English regional experiment?' Planning Practice and Research, 28, 83-103.

Barnett, C. (2008) 'Political affects in public space: normative blind-spots in non-representational ontologies' Transactions of the Institute of British Geographers 33, 186–200.

Barro, R. J. & Sala-I-Martin, X. (2004) Economic Growth, 2nd ed. Cambridge MA, MIT Press.

Biehl D (1986) The Contribution of Infrastructure to Regional Development. Luxembourg: Commission of the European Communities.

Brenner, N. (1998) 'Global cities, glocal states: global city formation and state territorial restructuring in contemporary Europe', Review of International Political Economy, 5, 1–37.

Bristow, G. (2010) 'Resilient regions: re-'place'ing regional competitiveness', Cambridge Journal of Regions, Economy and Society, 3, 153–67.

, F. R., and Rietveld, P. (1993) 'Urban agglomerations in European infrastructure networks', Urban Studies, 30, 919–34.

Bruinsma, F., Nijkamp, P., Rietveld, P. (1990) Infrastructure and Metropolitan Development in an International Perspective, Research Memorandum 1990-56, Amsterdam, Department of Economics, Free University, Amsterdam.

Confederation of British Industry (1992) Shaping the Nation. London, CBI.

Confederation of British Industry (1995) Missing Links. London, CBI.

Confederation of British Industry (2000) Manifesto - Towards 2010. London, CBI.

Cerina, F., and Mureddu, F. (2010) Is agglomeration really good for growth? Global efficiency, interregional equity and uneven growth. Working Paper, Sardinia, CRENoS.

Civil Aviation Authority (2013) *Table 05 Air Transport Movements*, http://www.caa.co.uk/ (accessed 21 January 2014).

Clark and Root (1999) Infrastructure shortfall in the United Kingdom: the private finance initiative and government policy, Political Geography, 18, 341-65.

CLG (2011) English Local Authority Expenditure, http://www.ons.gov.uk/ons/rel/construction/construction-statistics/no--12--2011-edition/chapter-9---local-authority-expenditure.xls (accessed 21 January 2014).

CLG (2012) National Planning Policy Framework. London, CLG.

Crafts, N. (2009) 'Transport infrastructure investment: implications for growth and productivity', Oxford Review of Economic Policy, 25, 327-43.

Cutter, S.L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E. and Webb, J. (2008) 'A place-based model for understanding community resilience to natural disasters', Global Environmental Change, 18, 598–606.

Deas, I. (2013) 'Towards Post-political Consensus in Urban Policy? Localism and the Emerging Agenda for Regeneration Under the Cameron Government', Planning Practice & Research, 28, 65-82.

Department for Transport (2011) Rail Statistics, http://www.dft.gov.uk/statistics/series/rail/ (accessed 21 January 2014)

Department for Transport (2013) Port Freight Statistics, https://www.gov.uk/government/organisations/department-for-transport/series/ports-statistics (accessed 21 January 2014).

Diamond, D. and Spence, N. A. (1989) Infrastructure and Industrial Costs in British Industry. London, HMSO.

Farole, T., Rodríguez-Pose, A. and Storper, M. (2009) Cohesion Policy in the European Union: Growth, Geography, Institutions, Working Paper of London School of Economics, London. http://ec.europa.eu/regional_policy/archive/policy/future/pdf/6_pose_final-formatted.pdf (accessed 21 January 2014)

Feser, E. (2014) 'Planning local economic development in the emerging world order', Town Planning Review, 85.

Gardiner, B., Martin, R. and Tyler, P. (2010) Does spatial agglomeration increase national growth? some evidence from Europe, Journal of Economic Geography, 11, 979-1006.

Gonzalez, S. (2011) 'The North/South divide in Italy and England: Discursive construction of regional inequality', European Urban and Regional Studies, 18, 62-76.

Graham, S. (2000a) 'Introduction: Cities and Infrastructure', International Journal of Urban and Regional Research 24, 114-19.

Graham, S. (2000b) ‘Constructing Premium Network Spaces: Reflections on Infrastructure Networks and Contemporary Urban Development’, International Journal of Urban and Regional Research, 24, 183-200.

Guy, S., Graham, S. and Marvin, S. (1997) ‘Splintering networks: Cities and technical networks in 1990s Britain’, Urban Studies 34, 191-216.

Hall, J.W., Henriques, J.J., Hickford, A.J. and Nicholls, R.J. (eds) (2012) A Fast Track Analysis of strategies for infrastructure provision in Great Britain: Technical report, Oxford, Environmental Change Institute.

Henderson J. V., Shalizi Z., and Venables A. J. (2001) ‘Geography and development’, Journal of Economic Geography, 1, 81-105.

Hincks, S., Webb, B. and Wong, C. (2013) ‘Fragility and Recovery: Housing, Localities and Uneven Spatial Development in the UK’, Regional Studies, OnlineFirst.

HM Government (2010) Spending Review 2010, HM Treasury, London.

HM Treasury (2001) Productivity in the UK: The Regional Dimension, HM Treasury, London.

HM Treasury (2012) PFI Projects Data, https://www.gov.uk/government/publications/pfi-projects-data, (accessed 21 January 2014).

HM Treasury (2013a) Investing in Britain’s Future, Norwich, The Stationary Office.

HM Treasury (2013b) National Plan 2013, London, The Stationary Office.

HM Treasury and UK Infrastructure (2011) National Infrastructure Plan 2011, London, The Stationary Office.

Hughes, T. P. (1989) American Genesis. New York, Viking.

Kaika, M. and Swyngedouw, E. (2000) ‘Fetishizing the modern city: The phantasmagoria of urban technological networks’, International Journal of Urban and Regional Research, 24,120–38.

Kamps, C. (2006) ‘New Estimates of Government Net Capital Stocks for 22 OECD Countries, 1960–2001’, IMF Staff Papers, 53, 120–50.

Krugman P. (1991) Geography and Trade, Cambridge MA, MIT Press.

Lakshmanan, T. R. (2011) ‘The broader economic consequences of transport infrastructure investments’, Journal of Transport Geography, 19, 1–12.

M.A.G. (2013) Capacity for Growth: M.A.G.'s submission to the Airports Commission, http://www.magworld.co.uk/magweb.nsf/AttachmentsByTitle/LongTermCapacity/$file/Long+Term+Capacity+Options.pdf, (accessed 21 January 2014).

Marsh, D. (2008) 'Understanding British Government: Analysing competing models' British Journal of Poltics and International Relations, 10, 251–68.

Marshall, T. (2011) 'Reforming the process for infrastructure planning in the UK/England 1990-2010', Town Planning Review, 82, 441-67.

Marshall, T. (2013) Planning Major Infrastructure: A Critical Analysis. Abingdon, Routledge.

Martin, P., and G. Ottaviano (1999) 'Growing Locations: Industry Location in a Model of Endogenous Growth' European Economic Review, 43, 281-302.

Martinez, H.S. and Givoni, M. (2012) 'The accessibility impact of a new High-Speed Rail line in the UK – a preliminary analysis of winners and losers', Journal of Transport Geography, 25, 105-14.

McFarlane, C. and Rutherford, J. (2008) 'Political infrastructures: governing and experiencing the fabric of the city', International Journal of Urban and Regional Research 32, 363–74.

Morgan, K. (2006) 'Devolution and development: territorial justice and the north south divide', Publius, 36, 189–206.

NAO (National Audit Office) (2013) High Speed 2: A review of early programme preparation, http://www.nao.org.uk/wp-content/uploads/2013/07/Full-Report.pdf (accessed 21 January 2014).

Network Rail (2010) The Northern Hub: Transforming rail in the North, http://www.networkrail.co.uk/6486_TheNorthernHub_TransformingrailintheNorth.pdf (accessed 21 January 2014).

Neuman, M. (2006) 'Infiltrating infrastructures: On the nature of networked infrastructure', Journal of Urban Technology, 13, 3-31.

Neuman, M. and Smith, S. (2010) 'City planning and infrastructure: once and future partners', Journal of Planning History, 9, 21-42.

Nijkamp, P. (1986) 'Infrastructure and regional development: A multidimensional policy analysis', Empirical Economics, 11, 1-21.

Odgaard, T., Kelly, C., Laird, J., (2005) 'Current Practice in Project Appraisal in Europe' (paper delivered to the European Transport Conference, Strasbourg).

ONS (2013) Region and Country Profiles – Key Statistics, http://www.ons.gov.uk/ons/rel/regional-trends/region-and-country-profiles/region-and-country-profiles---key-statistics-and-profiles--october-2013/regional-profiles---key-statistics--october-2013.xls (accessed 21 January 2014).

Osbourne, G. (2010) Budget 2010: Full text of George Osborne's statement, The Daily Telegraph, http://www.telegraph.co.uk/finance/financetopics/budget/7846849/Budget-2010-Full-text-of-George-Osbornes-statement.html (accessed 21 January 2014).

Osborne, G (2013) Chancellor of the Exchequer's keynote speech on the economy, https://www.gov.uk/government/speeches/chancellor-speech-on-the-economy (accessed 21 January 2014).

Oxford Economics (2014) Greater Manchester Forecasting Model, New Economy Manchester, http://neweconomymanchester.com/stories/1775-greater_manchester_forecasting_model (accessed 2 May 2014)

Raco, M. (2007) Building Sustainable Communities. Spatial Policy and Labour Mobility in Post-War Britain, Policy Press, Bristol.

Sbergami, F. (2002) Agglomeration and Economic Growth: Some Puzzles , HEI Working Paper No. 02/2002, Graduate Institute of International Studies, Geneva.

Speak S. and Graham, S. (1999) 'Service not included: marginalised neighbourhoods , private service disinvestment, and compound social exclusion', Environment and Planning A., 31, 1985–2001.

UKCES (2008) Working Futures 2007-2017: Evidence Report 2, Institute for Employment Research, Warwick.

Wong, C. and Watkins, C. (2009) 'Conceptualising spatial planning outcomes: towards an integrative measurement framework', Town Planning Review, 80, 481-516.

Wong, C., Ravetz, J. and Turner, J. (2001) The United Kingdom Spatial Planning Framework, the Royal Town Planning Institute, London.

Wong, C. (2002a) 'Is there a need for a fully integrated spatial planning framework for the United Kingdom?' Planning Theory & Practice, 3, 277-300.

Wong, C. (2002b) 'Developing Indicators to Inform Local Economic Development in England', Urban Studies, 39, 1833-63.

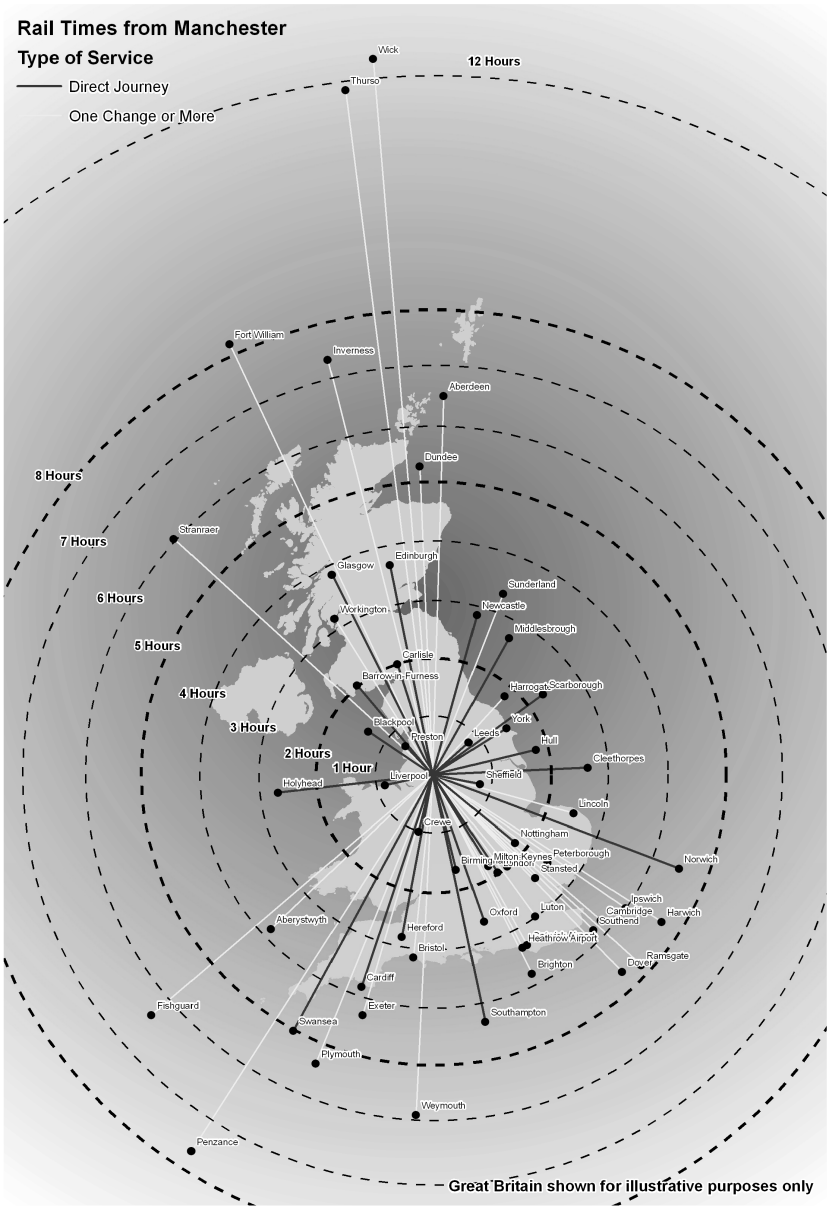
Wong, C. Rae, A. and Schulze-Baing, A. (2006) Uniting Britain, Royal Town Planning Institute, London.

Wong, C., Gibb, K., McGreal, S., Webb, B., Leishman, C., Blair, N., Hincks, S. and MacIntyre, S. (2011) Housing and Neighbourhood Monitor 2011: Fragility and Recovery, Joseph Rowntree Foundation, Bristol, Policy Press.

Wong, C., Baker, M., Hincks, S., Schulze-Baing, A. and Webb, B. (2012) A Map for England, Spatial Expression of Government Policies and Programmes, Royal Town Planning Institute, London.

Young, D. and Keil, R. (2010) 'Reconnecting the disconnected: the politics of infrastructure in the in-between city', Cities, 27, 87–95.


Rail Times from London
Type of Service
Direct Journey
One Change or More
13 Hours
10 Hours
8 Hours
7 Hours
6 Hours
5 Hours
4 Hours
3 Hours
2 Hours
1 Hour
30 Minutes
Wick
Thurso
Fort William
Inverness
Aberdeen
Stranraer
Dundee
Glasgow
Edinburgh
Workington
Barrow-in-Furness
Sunderland
Cleethorpes
Newcastle
Middlesbrough
Hull
Carlisle
Blackpool
Harrogate
Leeds
Sheffield
York
Lincoln
Holyhead
Liverpool
Manchester
Nottingham
Norwich
Aberystwyth
Crewe
Fishguard
Hereford
Birmingham
Leicester
Peterborough
Stansted Airport
Ipswich
Harwich
Luton Airport
Milton Keynes
Swansea
Cardiff
Bristol
Heathrow Airport
Southend
Ramsgate
Exeter
Gatwick Airport
Southampton
Brighton
Dover
Plymouth
Weymouth
Penzance
Great Britain shown for illustrative purposes only


Rail Times from Manchester
Type of Service
Direct Journey
One Change or More
12 Hours
8 Hours
7 Hours
6 Hours
5 Hours
4 Hours
3 Hours
2 Hours
1 Hour
Wick
Thurso
Fort William
Inverness
Aberdeen
Dundee
Stranraer
Edinburgh
Glasgow
Sunderland
Newcastle
Workington
Middlesbrough
Carlisle
Barrow-in-Furness
Harrogate
Scarborough
York
Blackpool
Preston
Leeds
Hull
Cleethorpes
Liverpool
Sheffield
Holyhead
Lincoln
Crewe
Nottingham
Peterborough
Norwich
Milton Keynes
Stansted
Ipswich
Luton
Cambridge
Southend
Harwich
Oxford
Aberystwyth
Hereford
Heathrow Airport
Bristol
Ramsgate
Dover
Brighton
Cardiff
Fishguard
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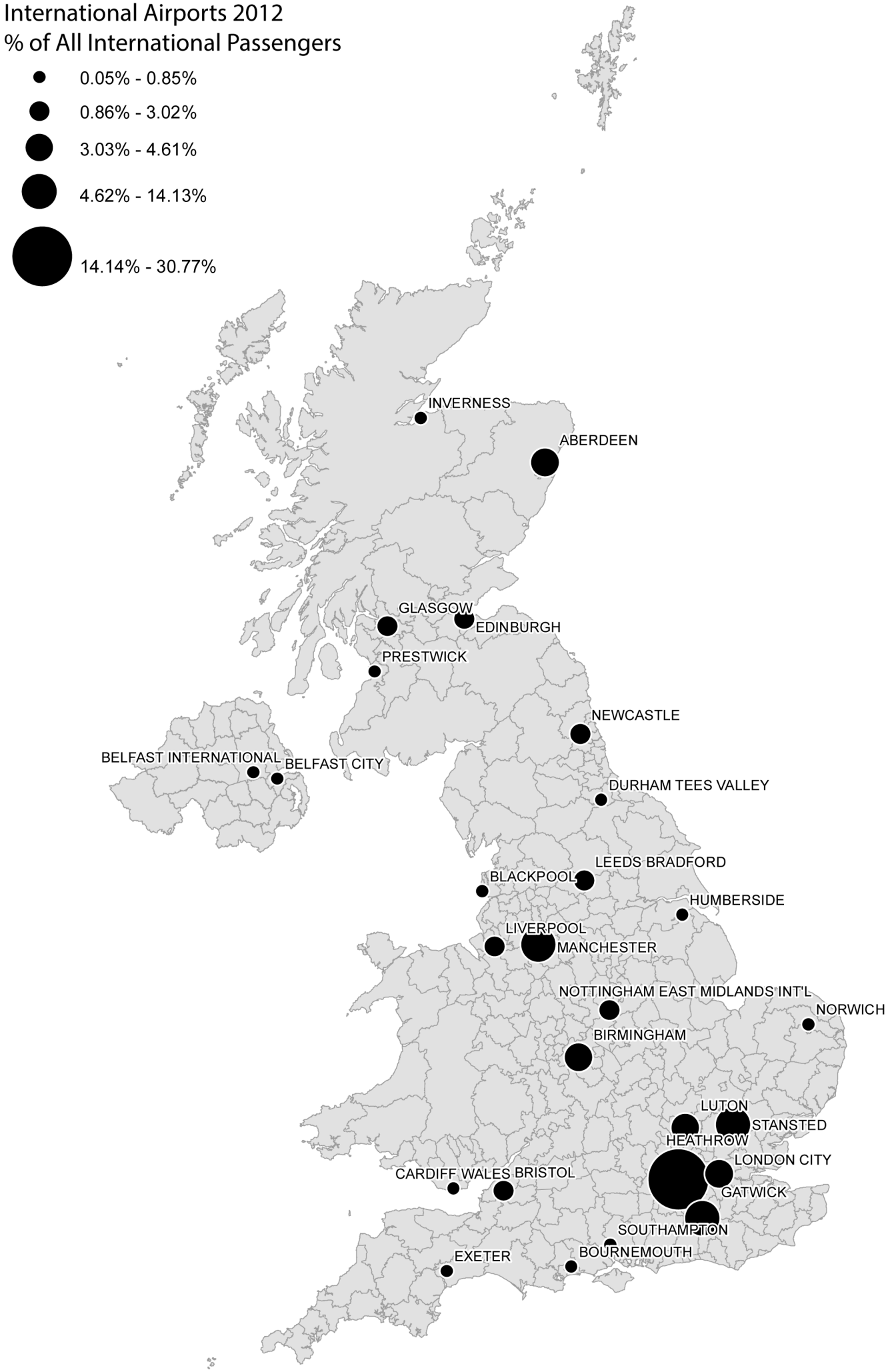
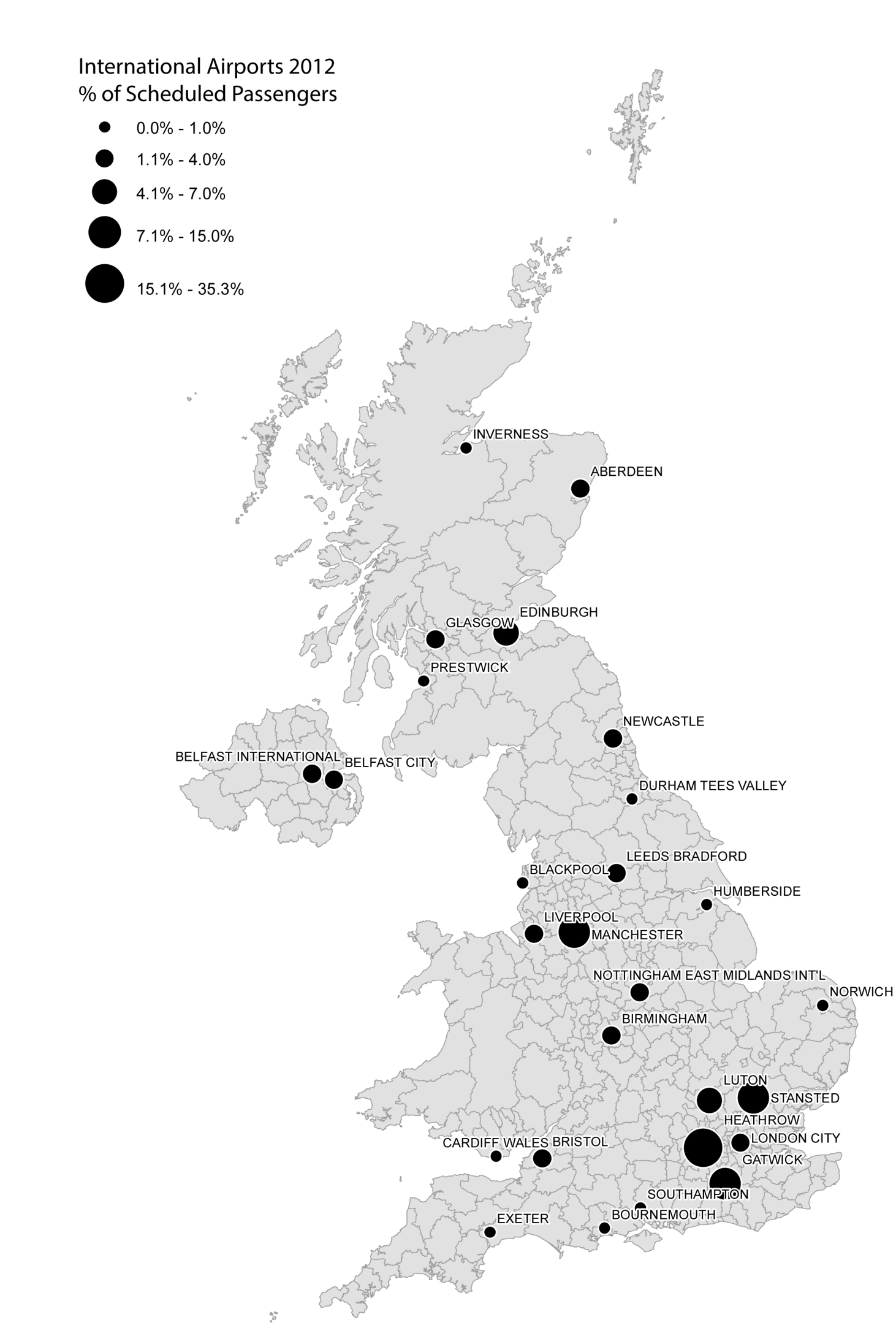
Plymouth
Weymouth
Penzance
Great Britain shown for illustrative purposes only


International Airports 2012
% of All International Passengers
0.05% - 0.85%
0.86% - 3.02%
3.03% - 4.61%
4.62% - 14.13%
14.14% - 30.77%
INVERNESS
ABERDEEN
GLASGOW
EDINBURGH
PRESTWICK
NEWCASTLE
BELFAST INTERNATIONAL
BELFAST CITY
DURHAM TEES VALLEY
LEEDS BRADFORD
BLACKPOOL
HUMBERSIDE
LIVERPOOL
MANCHESTER
NOTTINGHAM EAST MIDLANDS INT'L
NORWICH
BIRMINGHAM
LUTON
STANSTED
HEATHROW
LONDON CITY
CARDIFF WALES
BRISTOL
GATWICK
SOUTHAMPTON
BOURNEMOUTH
EXETER


International Airports 2012
% of Scheduled Passengers
0.0% - 1.0%
1.1% - 4.0%
4.1% - 7.0%
7.1% - 15.0%
15.1% - 35.3%
INVERNESS
ABERDEEN
EDINBURGH
GLASGOW
PRESTWICK
NEWCASTLE
BELFAST INTERNATIONAL
BELFAST CITY
DURHAM TEES VALLEY
LEEDS BRADFORD
BLACKPOOL
HUMBERSIDE
LIVERPOOL
MANCHESTER
NOTTINGHAM EAST MIDLANDS INT'L
NORWICH
BIRMINGHAM
LUTON
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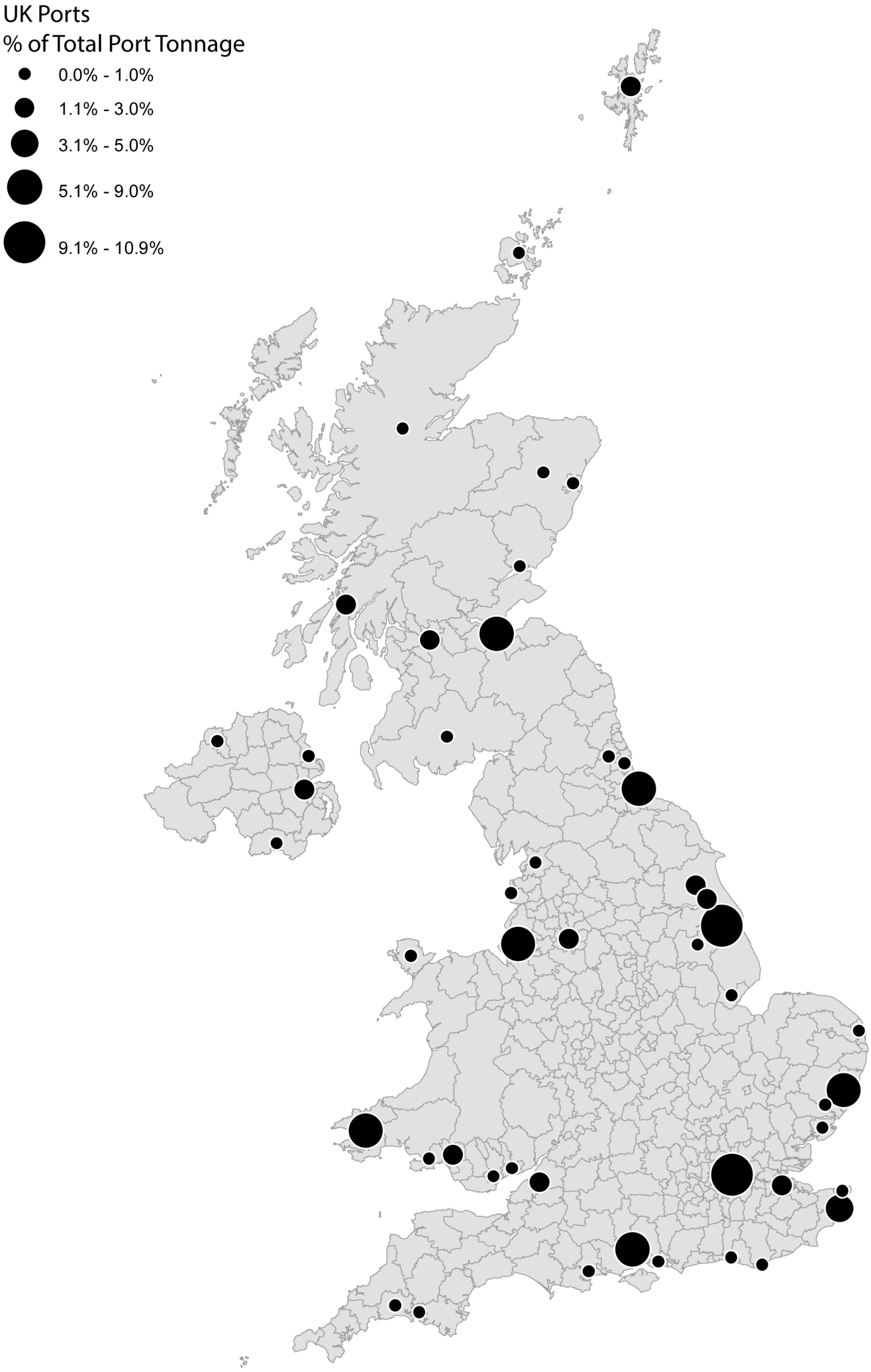
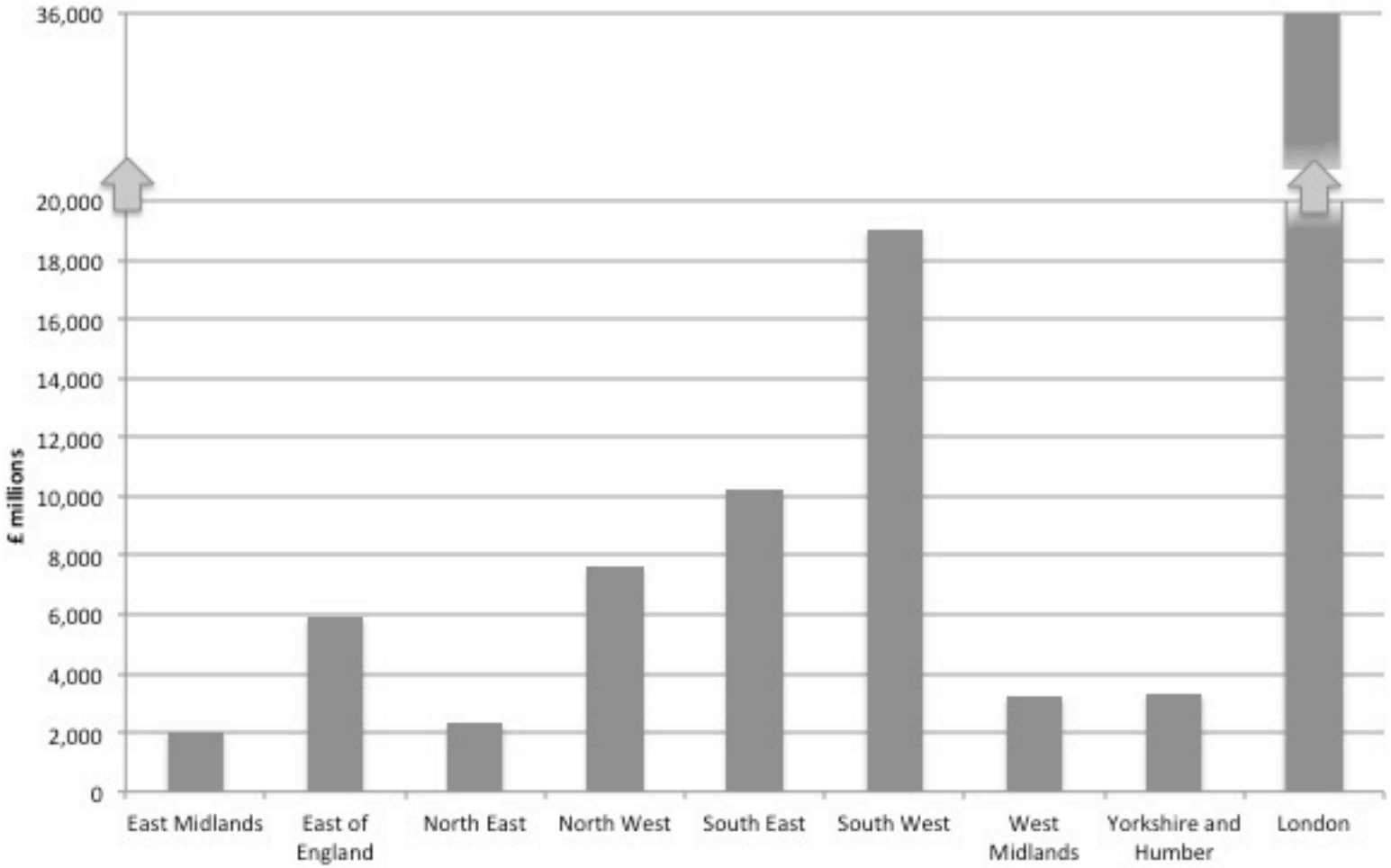
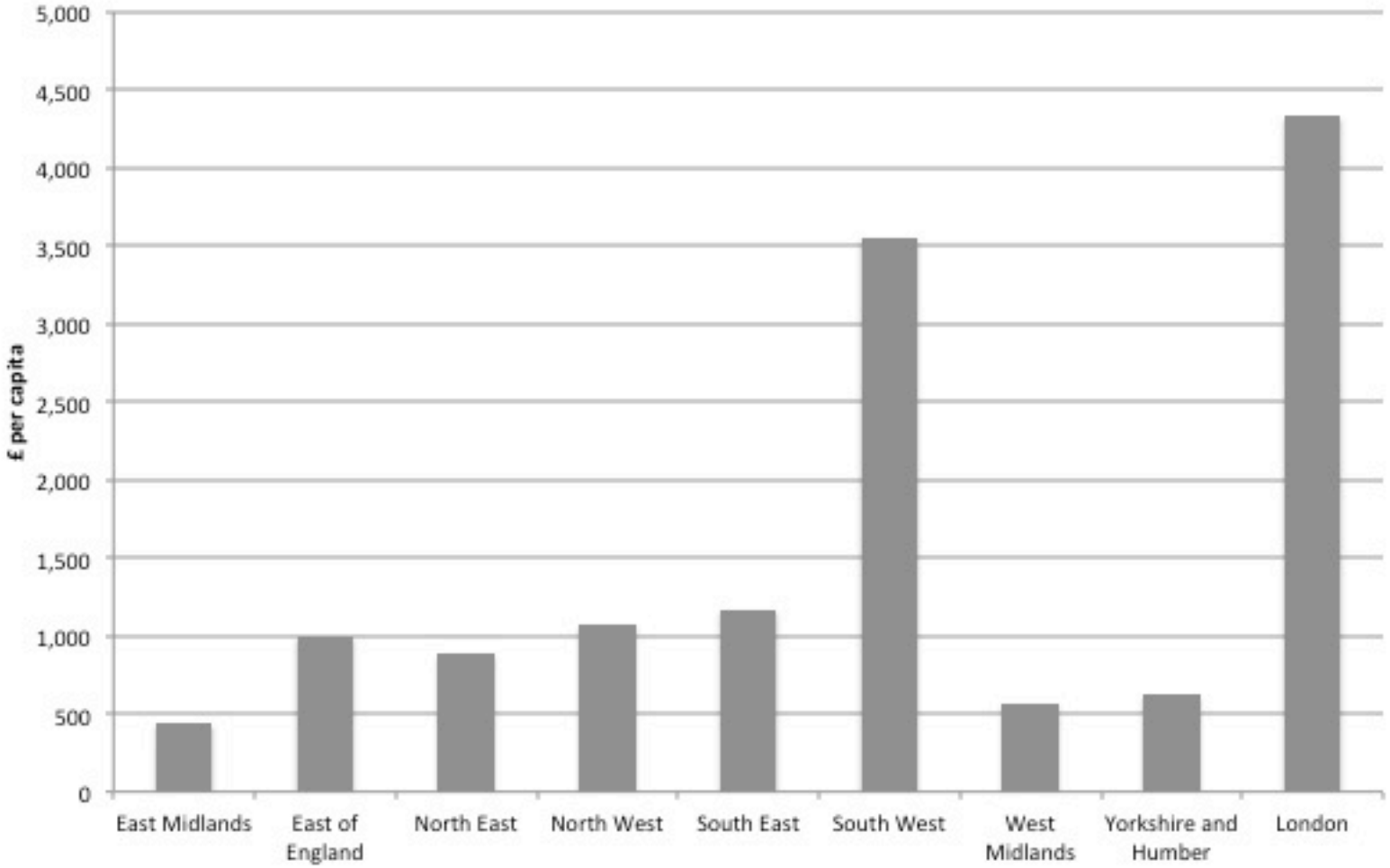
BRISTOL
LONDON CITY
GATWICK
SOUTHAMPTON
BOURNEMOUTH
EXETER


UK Ports
% of Total Port Tonnage
0.0% - 1.0%
1.1% - 3.0%
3.1% - 5.0%
5.1% - 9.0%
9.1% - 10.9%


36,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
£ millions
East Midlands
East of England
North East
North West
South East
South West
West Midlands
Yorkshire and Humber
London


5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
£ per capita
East Midlands
East of England
North East
North West
South East
South West
West Midlands
Yorkshire and Humber
London