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THE HUMAN-CAPITAL NEEDS OF TECH CITY, LONDON

By Max Nathan

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Executive Summary

East London's digital cluster, known colloquially as Silicon Roundabout, has been growing organically since the 1990s, without much input from government. In 2010 the current government sought to rebrand the area as "Tech City," triggering debate about the role of public policy in cluster development. An analysis of the human-capital needs and history of Tech City points to a number of areas for intervention, namely bringing in talent and up-skilling the existing workforce.

Digital clusters develop because firms place a premium on physical proximity. Perhaps paradoxically for a sector built around the Internet, tech companies often prefer face-to-face interaction—especially in their early stages. Small firms and new startups often rely on informal collaboration and freelancers, which means they depend on the "soft" infrastructure of bars and cafés. Innovation thrives in cities: the presence of auxiliary services—such as finance and business support—helps lower the costs of innovation, and diverse populations and universities help provide the creative and cultural ingredients. This urban infrastructure has helped creative neighborhoods transition into the digital era: clusters such as Tech City in London and "Silicon Alley" in New York form a digital layer over existing design and media hubs.

Human capital is an essential component of a successful cluster. The availability of skilled workers—along with cheap space, social amenities, access to the rest of London, and general "buzz"—is one of Tech City's main selling points. Yet firms here report that skills shortages are hindering their growth. An undersupply of native skilled developers encourages recruiters to look afield, but visa restrictions make hiring the right workers difficult. Tech firms are often too small to take advantage of intercompany transfers (and their more relaxed rules), and these firms' limited capacity may not match the time, costs, and paperwork involved in applying for skilled visas. Meanwhile, it is difficult for prospective entrepreneurs from outside the United Kingdom to enter Tech City: the £200,000 threshold for entrepreneur or investor visas is relatively high for young tech entrepreneurs, and the policy is administered by border control staff with little experience in judging business plans.

An undersupply of native skilled developers encourages recruiters to look afield, but visa restrictions make hiring the right workers difficult.

Policymakers' control over cluster development is limited: policies that seek to map clusters and then maximize their growth rarely deliver expected benefits to firms. However, policies that are not cluster specific—such as human-capital interventions aimed at improving the international supply of workers through migration or the local supply of workers through skills training—are likely to have indirect effects that help clusters grow.

Even within the United Kingdom's centralized system, local policymakers have a number of tools at their disposal. They can help small and medium-sized enterprises (SMEs) navigate complex immigration rules, lobby the national government on immigration reform, encourage take-up of underused immigration policies (such as the Graduate Entrepreneur scheme), support local business networks and links to universities, and encourage tech recruitment fairs and apprenticeships.

National policymakers, meanwhile, might make a number of immigration policy changes. Investor visas could explicitly target industry experts and not just individuals of high net worth; the post-study visa could be reactivated to encourage talented foreign students both to visit the United Kingdom and to stay; and the application process for employers could be streamlined. Although human-capital interventions appear to confront policymakers with a trade-off between supplying workers from abroad and developing the skills of native workers, this balance may not be so difficult to strike. For example, Tech City apprenticeships aim



to place local workers into administrative roles while programmers tend to be recruited from national and global labor pools.

I. Introduction

“Tech City”—the area spanning the boroughs of Islington, Hackney, the City, and Tower Hamlets—is probably the largest digital economy hotspot in London.¹ The area has historically been a site for creative and cultural industries, and a tech focus has been quietly growing since the 1990s, centered on the Old Street roundabout (informally known as the Silicon Roundabout). The area sprang to national prominence three years ago, when the current government rebranded the area as Tech City. A raft of policies—covering finance, immigration, business support, high-speed Internet, and workspace—were introduced to grow the cluster, attract foreign investment, and connect the thriving Shoreditch arts scene with empty spaces in the now-defunct Olympic Park.²

Like many other advanced Western economies, the United Kingdom has begun to see the tech sector as a golden ticket to competitiveness.

This strategy reflects a renewed interest in industrial policy in general and new technologies in particular.³ Like many other advanced Western economies, the United Kingdom has begun to see the tech sector as a golden ticket to competitiveness, especially in the context of the rise of China and the other BRIC countries (Brazil, Russia, India, and China), and demand for environmentally resilient goods and services. For example, the London School of Economics (LSE) Growth Commission—a high-powered panel of independent experts—recently named innovation, infrastructure, and human-capital investments as key to reversing the United Kingdom’s economic fortunes. But a lack of evidence on how to best encourage cluster growth makes

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- 1 The briefing draws on a number of recent papers that include: Max Nathan, “The Wider Economic Impacts of High-Skilled Migrants: A Survey of the Literature” (IZA Discussion Paper 7653, IZA, Bonn, 2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2342525; Max Nathan and Anna Rosso, *Measuring the UK’s Digital Economy with Big Data* (London: National Institute of Economic and Social Research, 2013), http://niesr.ac.uk/sites/default/files/publications/SI024_GI_NIESR_Google_Report12.pdf; Max Nathan and Henry Overman, “Agglomeration, Clusters and Industrial Policy,” *Oxford Review of Economic Policy* (forthcoming); Max Nathan and Emma Vandore, “Here Be Startups: Exploring a Young Digital Cluster in Inner East London” (SERC Discussion Paper 146, Spatial Economics Research Centre, London, 2013); Max Nathan, Heather Rolfe, and Carlos Vargas-Silva, *The Economic and Labour Market Impacts of Tier 1 Entrepreneur and Investor Migrants*, Report to the Migration Advisory Committee (London: National Institute of Economic and Social Research and Center on Migration, Policy, and Society, 2013), www.gov.uk/government/uploads/system/uploads/attachment_data/file/257258/economic-research.pdf; Max Nathan, Emma Vandore, and Rob Whitehead, *A Tale of Tech City: The Future of East London’s Digital Economy* (London: Centre for London, 2012), <http://centreforlondon.org/publication/a-tale-of-tech-city/>; Max Nathan, “East London Tech City: Ideas Without a Strategy,” *Local Economy* 26, no. 3 (2011): 197–202. This report represents the views of its author, not those of the coauthors of these papers or the research funders.
 - 2 Launching the initiative in November 2010, the prime minister said, “Our ambition is to bring together the creativity and energy of Shoreditch and the incredible possibilities of the Olympic Park to help make East London one of the world’s great technology centres.” See Prime Minister David Cameron, “East End Tech City” (speech, East London, November 4, 2010), www.gov.uk/government/speeches/east-end-tech-city-speech.
 - 3 The UK government has traditionally supported sectors such as aerospace and automotive; officials are now shifting their attention to new technologies and sectors, notably digital and the “information economy.” Vince Cable, “Industrial Strategy” (speech to Imperial College London, Department for Business Innovation and Skills, September 11, 2012), www.gov.uk/government/speeches/industrial-strategy-cable-outlines-vision-for-future-of-british-industry.



it difficult to identify where to invest.⁴

One policy area that has proved especially difficult to get right is immigration. Migrants play an important role in clusters such as Tech City, both as workers and as business founders. But while the United Kingdom is reforming policies to attract and retain skilled migrant workers and migrant entrepreneurs, getting the design of these programs right is tricky. Tech City's future—and that of other digital clusters in the United Kingdom and further afield—partly depends on better immigration policy.

This report analyzes the importance of human capital to the development of Tech City. It sets out a detailed case study of Tech City, and the opportunities that immigration affords firms in the cluster. It sets this discussion in a broader framework linking cities, digital sectors, and (highly skilled) immigration. It also provides a descriptive analysis of the local area, drawing on enterprise-level microdata as well as interview material from local businesses. Finally, it identifies policy options and makes recommendations for local and national actors.

II. The Development of Digital Clusters

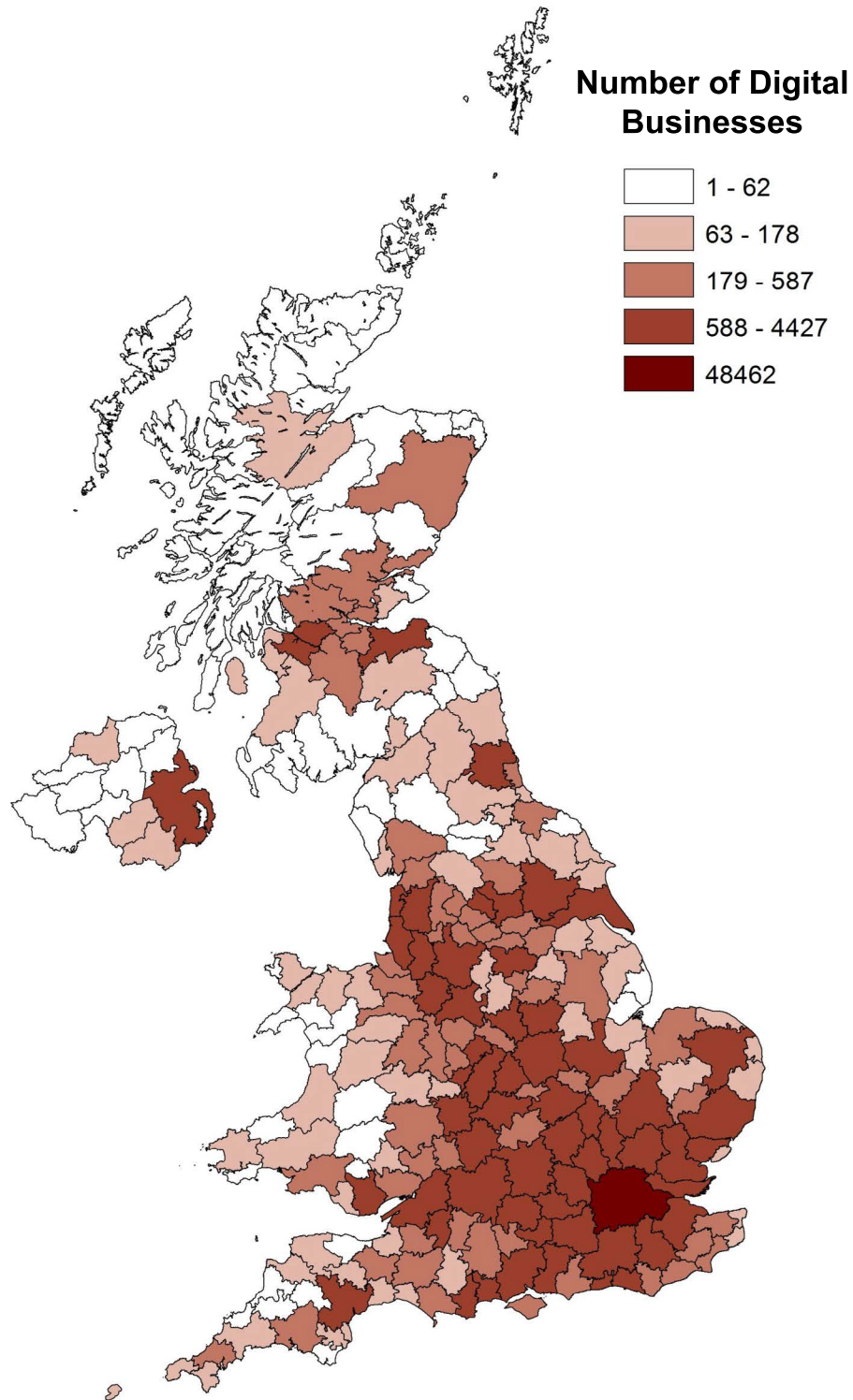
The digital economy—the new economic order that has sprung up around the Internet—has two component parts: (1) industries that produce computer networks or hardware (that is, information and communications technology, ICT) and (2) industries that make software or other forms of digital content. The music industry, for example, is now largely a digital content sector; industries such as publishing, television, and newspapers are increasingly moving online.

Tech City's future—and that of other digital clusters in the United Kingdom and further afield—partly depends on better immigration policy.

⁴ Philippe Aghion et al., *Investing for Prosperity: Skills, Infrastructure and Innovation*, Report of the LSE Growth Commission (London: Centre for Economic Performance/Institute for Government, 2013), www.lse.ac.uk/researchAndExpertise/units/growth-commission/documents/pdf/LSEGC-Report.pdf.



Figure 1. The Footprint of the United Kingdom's Digital Economy, 2012



Note: Categories are quantiles, plus London.

Source: Data from the National Institute of Economic and Social Research/Growth Intel. For definition of what constitutes a digital business, see Max Nathan and Anna Rosso, Measuring the UK's Digital Economy with Big Data (London: Growth Intelligence and National Institute of Economic and Social Research, 2013), http://niesr.ac.uk/sites/default/files/publications/SI024_GI_NIESR_Google_Report12.pdf.



Despite this diversity, digital economy firms tend to be geographically concentrated. As in the United States, the United Kingdom's digital economy is not evenly distributed: most businesses are located in London and the Greater South East (see Figure 1).

A. Cities and Clusters Help Lower the Costs of Innovation

Long-term economic growth is thought to be influenced largely by the rate at which we generate new ideas. New thinking pushes the boundaries of technology; translated into products and services, new ideas help societies and organizations become more effective and productive.⁵ Investing in new ideas—through hiring skilled workers, or spending on research and development (R&D)—can help individual firms build innovative capacity and raise productivity. But while firms that are able to capitalize on innovation are likely to gain market share—both in domestic markets and internationally⁶—they may face obstacles in the process; for instance, many firms launching new and risky ventures find it difficult to raise necessary funds.

Cities, especially large urban cores, can help existing firms deal with these challenges—and help new businesses come into being.⁷ By facilitating the flow of ideas and providing clusters of auxiliary services (such as specialist finance and business support), big and economically diverse cities act as “nurseries” for start-ups and young SMEs.⁸ Cities also provide other ingredients—such as cultural diversity, “activist” universities that reach out to local businesses, and other public actors—that are especially important for knowledge-intensive firms in the digital sector. Strong links may be observed between past levels of entrepreneurship in an area and subsequent economic growth.⁹ Clusters often develop from earlier “versions” of themselves: the culture of entrepreneurship that produced a network of design and media companies, for instance, can help those firms transition into a “digital creative” era of web design and online journalism—much as we see in East London and in New York's Silicon Alley.¹⁰

B. Even Digital Firms Like Face-to-Face Communication

Clusters have emerged in a number of spatial forms—from the sprawling city-region that is California's Silicon Valley to the tightly clustered arts and fashion districts of London, Paris, and Berlin.¹¹ Among the digital content activities that dominate the London scene, there is a strong tendency toward “micro-clustering,” involving densely linked networks of firms and supporting actors (such as venture capital

- 5 Robert E. Lucas, “On the Mechanics of Economic Growth,” *Journal of Monetary Economics* 22 (1988): 3–42; Paul M. Romer, “Endogenous Technological Change,” *Journal of Political Economy* 98 (1990): 71–102.
- 6 Philip McCann and Zoltan J. Acs, “Globalization: Countries, Cities and Multinationals,” *Regional Studies* 45, no. 1 (2011): 17–32; Gordon H. Hanson, “Immigration, Productivity and Competitiveness in American Industry,” in *Competing for Talent: The United States and High-Skilled Immigration* (Washington, DC: American Enterprise Institute, 2012).
- 7 Alfred Marshall, *Principles of Economics* (New York: Macmillan, 1918); Masahisa Fujita, Paul Krugman, and Anthony J. Venables, *The Spatial Economy: Cities, Regions, and International Trade* (Cambridge, MA: MIT Press, 1999); Edward L. Glaeser, *The Triumph of the City* (London: Pan Macmillan, 2011); Enrico Moretti, *The New Geography of Jobs* (Boston: Houghton Mifflin Harcourt, 2012).
- 8 Jane Jacobs, *The Economy of Cities* (London: Vintage, 1969); Gilles Duranton and Diego Puga, “Nursery Cities: Urban Diversity, Process Innovation and the Life Cycle of Products,” *American Economic Review* 91 (2001): 1454–77.
- 9 AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, MA: Harvard University Press, 1994); AnnaLee Saxenian, *The New Argonauts: Regional Advantage in a Global Economy* (Cambridge, MA: Harvard University Press, 2006); Edward L. Glaeser, Sari Pekkala Kerr, and William R. Kerr, “Entrepreneurship and Urban Growth: An Empirical Assessment with Historical Mines” (NBER Working Paper Series No. 18333, National Bureau of Economic Research, Cambridge, MA, 2012), www.nber.org/papers/w18333; Aaron Chatterji, Edward L. Glaeser, and William R. Kerr, “Clusters of Entrepreneurship and Innovation” (NBER Working Paper Series No. 19013, National Bureau of Economic Research, Cambridge, MA, 2013), www.nber.org/papers/w19013.
- 10 Gilles Duranton, “Urban Evolutions: The Fast, the Slow, and the Still,” *American Economic Review* 97, no. 1 (2007): 197–221; Ron Boschma and Koen Frenken, “The Emerging Empirics of Evolutionary Economic Geography,” *Journal of Economic Geography* 11, no. 2 (2011): 295–307.
- 11 William R. Kerr and Scott Duke Kominers, “Agglomerative Forces and Cluster Shapes” (CES Working Paper 12-09, Harvard University, Cambridge, MA: 2012), www2.census.gov/ces/wp/2012/CES-WP-12-09.pdf.



providers, accountants, lawyers, and workspace providers).¹²

Perhaps paradoxically, digital firms' core production-side activity often requires face-to-face communication, especially in the early stages: developing a business plan, writing key pieces of code, building client relationships, and raising finance (even in the South Bay, many venture capital firms operate on the "40-minute rule"—they do not invest in any business they cannot easily visit in person). The presence of multiple small firms and freelancers means that informal networks and "soft infrastructure" (such as bars and cafés) are important in sourcing collaborators and opportunities.¹³

But at the same time, new technology also allows more physically dispersed activity, especially as firms become more established. Low-cost digital sourcing, storage, communication, and marketing and sales platforms increasingly permit SMEs and micro-businesses to operate across borders, as "micro-multinationals."¹⁴ These technological shifts may also uproot some production-side activities from specific local environments, with firms adopting a mix of global and local ways of working.

C. The Role of Policy in Cluster Formation

These complex, often intangible, dynamics can make it difficult for policymakers to carve out an appropriate role. In theory, clustering should occur organically as firms sort themselves into optimal locations. In reality, poor decisions, imperfect information, lack of finance, or other constraints often prevents this from occurring. Given the evident economic benefits of clustering, there is a strong case for policy intervention. However, there are real challenges in moving from economic theory to public policy practice.

To date, most area-based industrial policies are "cluster programs" inspired by the work of Michael Porter.¹⁵ Like Porter's research, these policies map a cluster in terms of physical and product space, then seek to maximize its size on the assumption that benefits to firms will increase in parallel. But studies indicate that these policies have little positive impact on firms' actual outcomes.¹⁶ This might be because cluster policies encourage firms to collocate even when the benefits have ceased to accrue: as the cluster grows, the costs of collocation also rise as firms compete for limited resources.¹⁷ Similarly, clusters generate and attract new entrants, who may enhance knowledge spillovers (good for existing, incumbent firms), increase levels of competition (bad for incumbents), or both.¹⁸ If this combination of competition and creative destruction forces incumbents to innovate and push the weakest firms out of the market, this raises aggregate productivity in the cluster (good for the city) but leaves both individual winners and losers.¹⁹

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- 12 Thomas A. Hutton, *The New Economy of the Inner City: Restructuring, Regeneration and Dislocation in the Twenty-First Century Metropolis* (Abingdon: Routledge, 2008); Michael Storper and Allen J. Scott, "Rethinking Human Capital, Creativity and Urban Growth," *Journal of Economic Geography* 9, no. 2 (2009): 147–67; Caroline Chapain, Phil Cooke, Lisa De Propis, Stewart MacNeill, and Juan Mateos-Garcia, *Creative Clusters and Innovation: Putting Creativity on the Map* (London: NESTA, 2010), <http://craftni.org/images/uploads/Creative-Clusters-29Nov.pdf>.
 - 13 Elizabeth Currid, *The Warhol Economy: How Fashion, Art, and Music Drive New York City* (Princeton, NJ: Princeton University Press, 2007).
 - 14 David Keeble, Clive Lawson, Helen Lawton Smith, Barry Moore, and Frank Wilkinson, "Internationalisation Processes, Networking and Local Embeddedness in Technology-Intensive Small Firms," *Small Business Economics* 11, no. 4 (1998): 327–42; Hal R. Varian, "Technology Levels the Business Playing Field," *New York Times*, August 25, 2005, www.nytimes.com/2005/08/25/business/25scene.html.
 - 15 Michael E. Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990); Michael E. Porter, "Location, Competition, and Economic Development: Local Clusters in a Global Economy," *Economic Development Quarterly* 14 (2000): 15–34.
 - 16 Claas van der Linde, "The Demography of Clusters—Findings from the Cluster Meta-Study," in *Innovation Clusters and Interregional Competition*, eds. Johannes Broecker, Dirk Dohse, and Rüdiger Soltwedel (Berlin: Springer Verlag, 2003).
 - 17 Ron Martin and Peter Sunley, "Deconstructing Clusters: Chaotic Concept or Policy Panacea?" *Journal of Economic Geography* 3, no. 1 (2003): 5–35; Gilles Duranton, "California Dreamin': The Feeble Case for Cluster Policies," *Review of Economic Analysis* 3 (2011): 3–45.
 - 18 James R. Markusen and Anthony J. Venables, "Foreign Direct Investment as a Catalyst for Industrial Development," *European Economic Review* 43, no. 2 (1999): 335–56.
 - 19 Marc J. Melitz, "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica* 71, no. 6 (2003): 1695–725; Philippe Aghion, Richard Blundell, Rachel Griffith, Peter Howitt, and Susanne Prantl, "The Effects of Entry on Incumbent Innovation and Productivity," *Review of Economics and Statistics* 91, no. 1 (2009): 20–32.



Given the evident ineffectiveness of cluster-level approaches, policymakers are probably better off focusing on market failures that affect individual firms and people within clusters. For example, interventions to improve young firms' managerial capacity or access to finance are likely to be more helpful than cluster mapping and marketing. Policymakers will also need to make important welfare decisions, potentially trading off overall (e.g., London, national) welfare (which implies losses for existing firms) against the desire to build (area-level) cluster competitiveness (which protects those existing firms). Such strategic choices involve an important role for immigration policy—in influencing a cluster's long-term supply of skilled workers, refreshing firms' recruitment pools, and shaping the local supply of entrepreneurs and new ideas.

III. The Case of Tech City

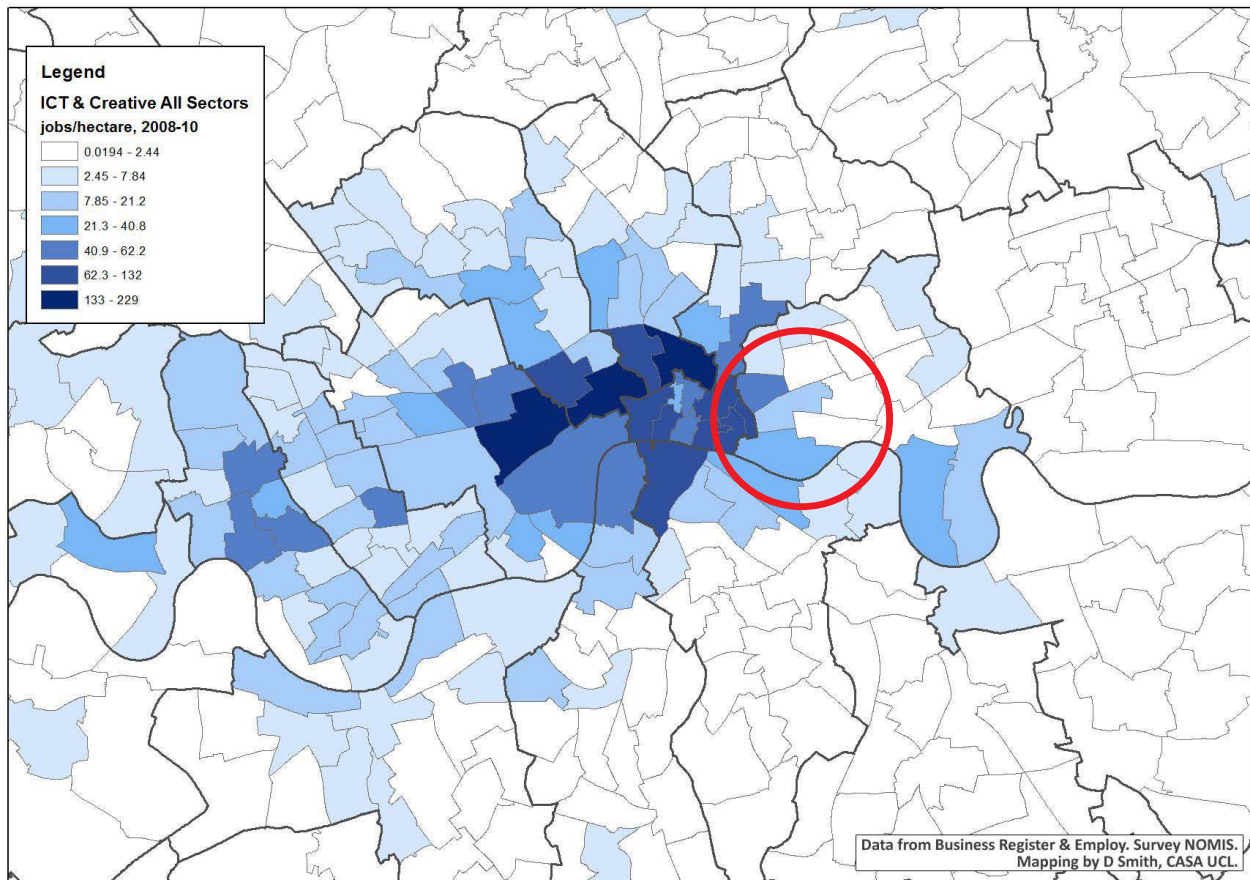
How do these issues play out in a real-world cluster—Tech City? This section sets out the key features of the area: the geography, counts of firms and jobs, and some key cluster dynamics. It also highlights a number of issues for policymakers.

A. Tech City Basics

Inner London has several digital economy hotspots, as measured by employment density (see Figure 2). Tech City is at the eastern end of this corridor, spanning the boroughs of Islington, Hackney, the City, and Tower Hamlets. There are three core wards (Clerkenwell, Hoxton, and Haggerston) surrounded by six others (Bunhill, Cripplegate, Portsoken, Spitalfields, St. Peter's, and Whitechapel).

Given the evident ineffectiveness of cluster-level approaches, policymakers are probably better off focusing on market failures that affect individual firms and people within clusters.

Figure 2. Tech City in Context



Source: Max Nathan, Emma Vandore, and Rob Whitehead, *A Tale of Tech City: The Future of East London's Digital Economy* (London: Centre for London, 2012), <http://centreforlondon.org/publication/a-tale-of-tech-city/>.

The area is one of the largest concentrations of digital economy activity in the capital. Analysis of the Business Structure Database (BSD) shows that in 2010 there were about 1,400 digital economy firms in the core wards and about 2,800 in the wider area. These figures are likely undercounts, as they include only businesses large enough to have employees or pay value added tax (VAT). Company registrations have risen substantially since 2010, but only a fraction of these businesses will reach a scale sufficient to make it into the BSD.²⁰

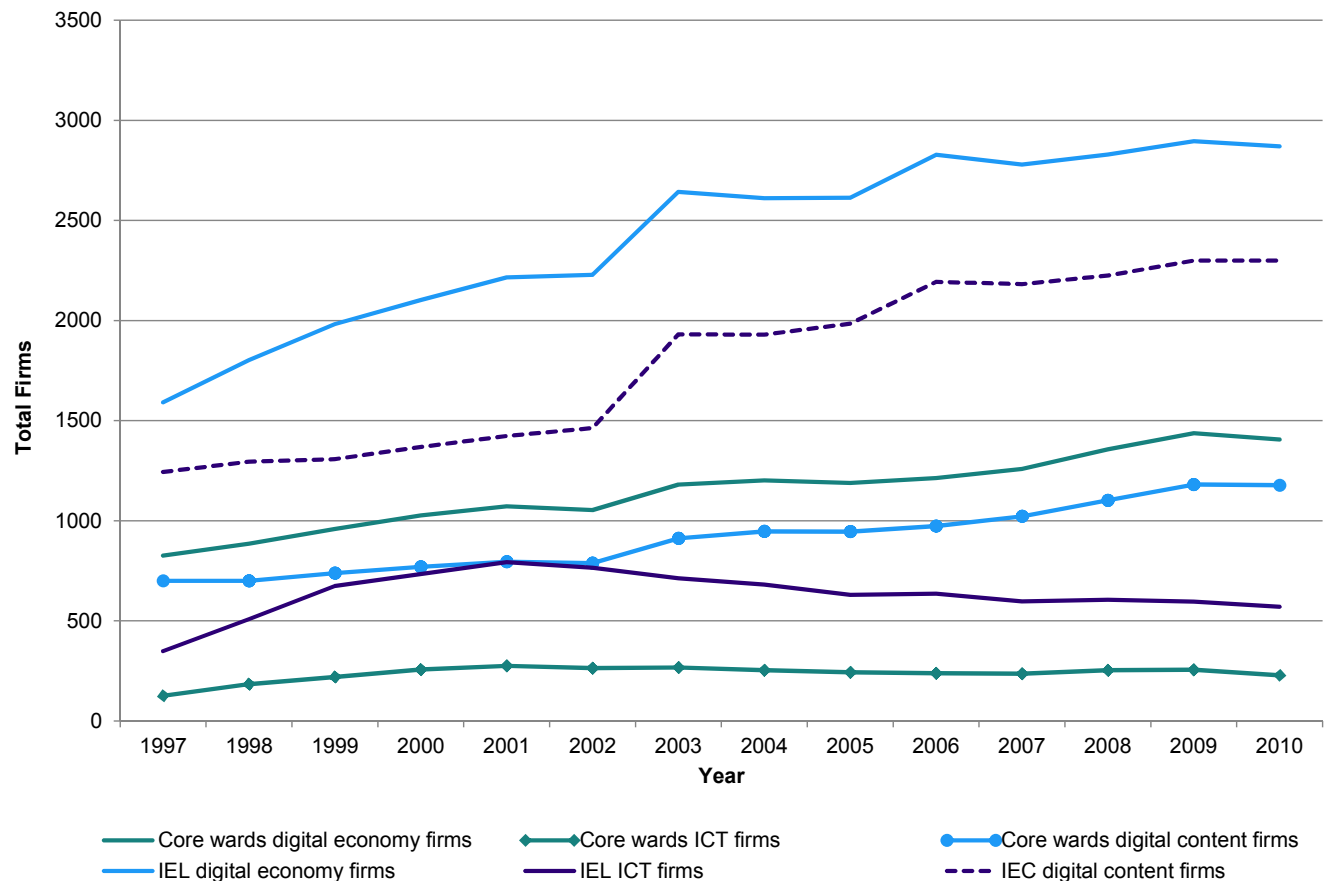
The system has grown organically over many years, with minimal direct policy intervention until 2010. It is thus the opposite of the top-down official clusters in countries such as France, Russia, and Malaysia.

Firm counts doubled from 1997 to 2010 (see Figure 3). The digital layer seems to have developed in four phases: slow growth in the late 1990s, peaking in the first dot-com boom; gradual growth in the mid-late 2000s; and a tapering off in the past few years (though the newest firms may not appear in VAT lists). Digital content firms drive growth to a striking extent.

20 Robert Budden and Henry Mance, "Silicon Roundabout is UK Technology Hotspot," *Financial Times*, July 15, 2013.



Figure 3. Enterprises in Inner East London, 1997–2010



Note: ICT is information and communications technology and IEL is Inner East London.

Source: Max Nathan and Emma Vandore, "Here Be Startups: Exploring a Young Digital Cluster in Inner East London" (SERC Discussion Paper 146, Spatial Economics Research Centre, London, 2013).

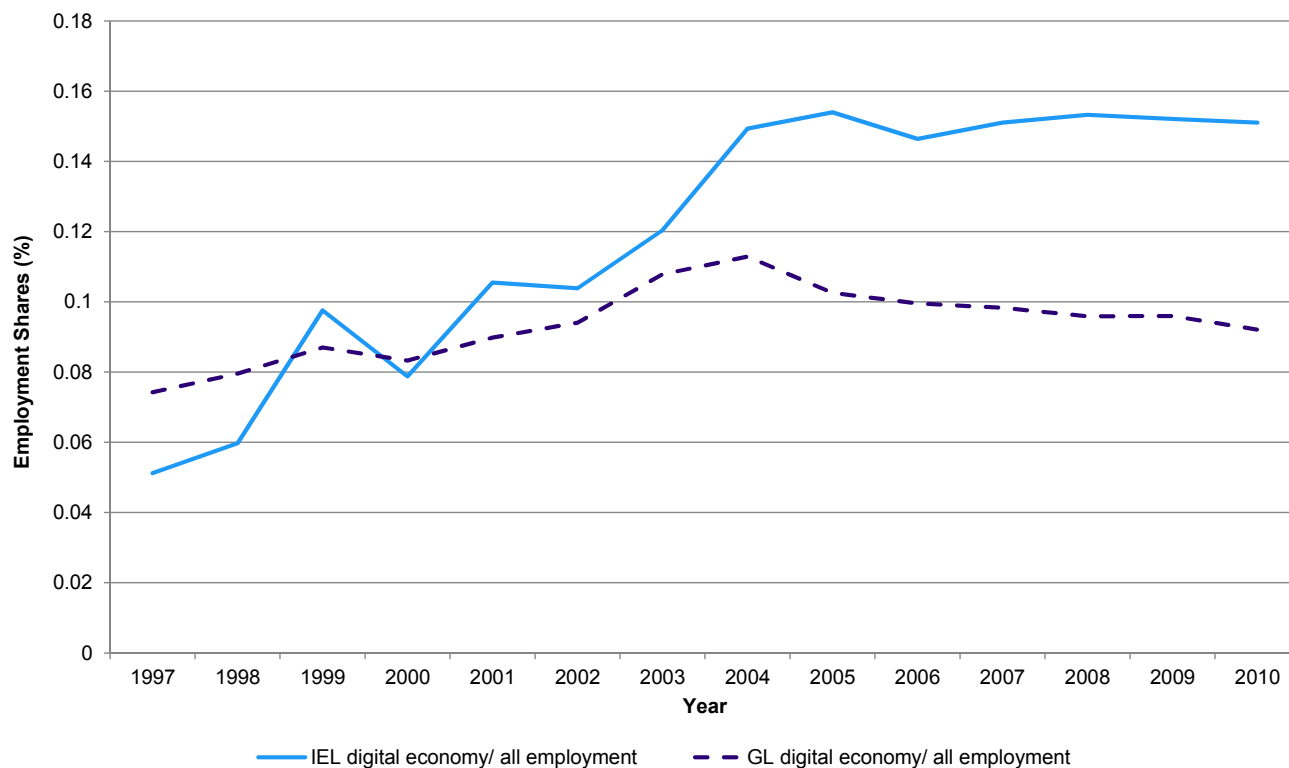
Similar trends are evident in employment growth. Digital economy employment more than doubled between 1997 and 2010 (versus a 44 percentage point jump in Greater London). As a share of the Inner East London employment base, the digital economy has become increasingly dominant, rising from around 5 percent to more than 15 percent of all jobs in the period (see Figure 4). Digital jobs in the area are notably denser than across Greater London (since around 2000) and the rest of the United Kingdom.

The area supported approximately 46,700 jobs in 2010, with the biggest share in digital content (one of the two components of the digital economy, alongside ICT). ICT in the area is dominated by specific industry codes such as telecommunications and computer hardware consultancy. Of the more diverse digital content offerings, software consultancy, advertising, radio and TV, news, and publishing hold the largest shares.²¹

Analyzing even individual industry codes hides a great deal of detail. Exploratory analysis by the Tech City Map group (which created an online interactive map of local firms) indicates the huge diversity of content activities within these broad categories: a recent survey of 774 of firms found that 16 percent work in digital marketing, and more than half are creative tech firms such as 3D and animation designers.²²

²¹ Nathan, Vandore, and Whitehead, *A Tale of Tech City*.

²² Kam Star, "Tech City—The Story Behind The Numbers."

**Figure 4. Employment Shares in Inner East London, 1997–2010**

Note: IEL is Inner East London; GL is Greater London.

Source: Nathan and Vandore, “Here Be Startups: Exploring a Young Digital Cluster in Inner East London.”

Immigration, particularly skilled immigration, can play a number of potentially important roles in urban growth, especially in knowledge-intensive sectors such as the digital economy.

B. Tech City’s Human-Capital Needs

Immigration, particularly skilled immigration, can play a number of potentially important roles in urban growth, especially in knowledge-intensive sectors such as the digital economy.²³ Skilled migrants may influence productivity and its drivers, such as entrepreneurship, investment, and innovation. In theory, these impacts may be positive or negative, although empirical studies largely identify small net positive effects. For example, through a process of self-selection, migrants may tend to be highly entrepreneurial individuals willing to experiment and disrupt existing business models and industries.²⁴ Skilled migration may also help individual firms raise their productivity—for instance, by hiring “star” workers, creating a more diverse workforce (which, evidence suggests, helps raise levels of innovation), or garnering

23 Nathan, “The Wider Economic Impacts;” William R. Kerr, “U.S. High-Skilled Immigration, Innovation, and Entrepreneurship: Empirical Approaches and Evidence” (NBER Working Paper Series No. 19377, National Bureau of Economic Research, Cambridge, MA, 2013), www.nber.org/papers/w19377.

24 George J. Borjas, “Self-Selection and the Earnings of Immigrants,” *American Economic Review* 77 (1988): 531–53; Harriet Orcutt Duleep, David A. Jaeger, and Mark C. Regets, “How Immigration May Affect U.S. Native Entrepreneurship: Theoretical Building Blocks and Preliminary Results” (IZA Discussion Paper 6677, Institute for the Study of Labor, Bonn, 2012), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2101944.



knowledge about specific international markets.²⁵ These channels are particularly important to industries—such as those in the digital economy—that are human-capital intensive and involve global labor markets. They are also important for cities such as London, which contains more than one-third of all UK migrants. Urban locations may also amplify or constrain skilled migrant “effects”: migrants tend to be concentrated in urban areas, and as discussed in Section II.A, cities enhance productivity.²⁶

Easy access to skilled workers is an important part of Tech City’s appeal. Advantages cited by firms include cheap space (compared with the central parts of London), excellent amenities (especially food, coffee, and nightlife), easy access to the rest of London, the presence of similar firms and skilled staff, and a general “buzz.”²⁷ This buzz involves, among other things, formal and informal networks of collaborators, serendipitous meetings, and the area’s “soft infrastructure.” Firms report that they encounter no problems persuading people to work in the area, in contrast to rural areas or science parks.²⁸

Nonetheless, skills shortages are a potential impediment to the area’s development. An inability to find skilled staff is the most important growth challenge cited by local firms, along with a lack of management capacity.²⁹ While these challenges are common to SMEs, characteristics of the digital economy make them substantially harder to overcome.

I. Skills Shortages

In interviews many firms flag an undersupply of skilled developers in the United Kingdom—often blaming school and university syllabuses—forcing them to rely more on immigrant workers. This often means hiring from outside the European Economic Area (EEA) (and notably from North America and South or Southeast Asia). As one founder put it, “[A lack of decent UK] education coupled with visa restrictions is not a particularly good combination.”

Skills shortages are a potential impediment to the area’s development.

In turn, current UK migration rules and processes cause problems, especially the (real and perceived) time, costs, and bureaucracy involved in processing Tier 2 visa applications (that is, for skilled workers who have a job offer). Local tech firms are typically too small, or lack capacity, to take advantage of more relaxed rules on intercompany transfers.

2. Absence of Entrepreneurial Culture

Second, the area still lacks a deep pool of experienced entrepreneurs and investors. The East London cluster is embryonic when compared to the South Bay Area. Instead, inexperienced investors are reacting to business plans from (often) new and inexperienced companies. The absence of “elder wisdom” and

25 Scott E. Page, *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools and Societies* (Princeton, NJ: Princeton University Press, 2007); Frédéric Docquier and Hillel Rapoport, “Globalization, Brain Drain, and Development,” *Journal of Economic Literature* 50, no. 3 (2012): 681–730.

26 Gianmarco Ottaviano and Giovanni Peri, “The Economic Value of Cultural Diversity: Evidence from U.S. Cities,” *Journal of Economic Geography* 6, no. 1 (2006): 9–44; Giovanni Peri, Kevin Shih, and Chad Sparber, “STEM Workers, H1B Visas and Productivity in U.S. Cities” (Working paper, mimeo, 2013), <http://emlab.berkeley.edu/users/webfac/card/laborlunch/peri.pdf>.

27 Nathan, Rolfe, and Vargas-Silva, *The Economic and Labour Market Impacts*.

28 “You have no problem, ever, persuading someone to work here. Whereas, if we were on a Science Park in Newbury, I’m certain we wouldn’t find good-caliber developers when we needed them, or that if we could they wouldn’t want to move to where we were. So that’s the first thing. Apart from that, it’s kind of handy being close to other like-minded companies. . . . I actually don’t think you get many pearls of wisdom in those conversations, but it just makes you feel less isolated” (Nathan and Vandore, “Here Be Startups”).

29 Nathan, Vandore, and Whitehead, *A Tale of Tech City*.



networks of entrepreneurs can leave young start-ups looking for needed advice.³⁰

Despite recent immigration policy reforms, investors and entrepreneurs are rarely imported from outside the United Kingdom. International talent may enter the East London system through universities, especially through postgraduate study routes. But the two-year poststudy visas for non-EEA graduates were abolished in 2012, and their replacement, the Tier 1 Graduate Entrepreneur scheme, had processed just 119 applications nationally in its first year, compared to approximately 48,000 during a 12-month period for its predecessor.³¹ More broadly, universities and the higher education (HE) community have had little direct involvement in the cluster to date—unlike some other high-tech hotspots where universities are key actors.

Despite recent immigration policy reforms, investors and entrepreneurs are rarely imported from outside the United Kingdom.

The government often points to its other flagship policy for attracting foreign investment, the Tier 1 Entrepreneur/Investor programs, as evidence of its commitment to supply international talent to Tech City. However, studies have raised questions about the effectiveness of this initiative.³² For example, the minimum entry requirement of £200,000 may deter younger entrepreneurs, the selection procedure is administered by border control staff without experience judging business plans, and the program imposes a false distinction between “entrepreneur” and “investor” (many investors want to both set up businesses and invest in others). Moreover, the programs do not address broader obstacles to establishing firms in the United Kingdom, such as difficulties opening bank accounts. Rigid visa-renewal timescales are often incompatible with the messy and unpredictable process of actually growing a business from scratch.

IV. Policy Options

Policymakers’ control over clusters is limited. As noted earlier, conventional cluster policies appear to have little positive effect on average outcomes—and may create losses for some existing firms. Moreover, the East London system has emerged without obvious direct policy intervention.

However, individual firms face specific growth challenges that are amenable to public policy interventions, such as changes to finance markets, skills, and migration policies. This multilevel set of issues calls for careful governance arrangements able to reach across local private actors (entrepreneurs, firms, investors, landlords, local amenities), public actors (London’s mayor and the Greater London Authority [GLA], boroughs, universities, and colleges), and national actors (the Department of Business [BIS] and 10 Downing Street).

In the United Kingdom local policymakers’ influence is especially limited. The United Kingdom’s highly centralized governance arrangements give local authorities and the London-level government very limited financial autonomy. London’s mayor and GLA have greater powers than many city leaders—with powers

30 One interviewee cited in Nathan and Vandore remarked on the lack of “elder wisdom” in East London compared to the U.S. West Coast, “where I’ve had my most useful conversations;” “It’s either being able to call someone when you’ve got a problem. . . a web server scalability problem, or whether you’re about to raise a round of funding and you’re wondering what to do about, you know, salary rises for your early employee or issuing equity. . .” (Nathan and Vandore, “Here Be Startups”).

31 Jack Grove, “Just 119 Graduate Entrepreneur Visas Granted in 12 Months,” *Times Higher Education*, October 3, 2013, www.timeshighereducation.co.uk/news/just-119-graduate-entrepreneur-visas-granted-in-12-months/2007861.article.

32 Nathan, Rolfe, and Vargas-Silva, *The Economic and Labour Market Impacts*.



over the funding of adult education, transport infrastructure, and strategic planning, for instance. But local policymakers have next to no control over immigration policy, which is set nationally.

Policy interventions to boost human capital might be aimed at the international supply of workers (through migration) or the local supply of workers (through skills and active labor market programs). Even if unable to decide such interventions, local policymakers could encourage them in several ways, as follows:

- **Brokerage**, by helping local SMEs navigate complex/bureaucratic immigration rules in order to increase the supply of international talent. For example, GLA has recently introduced an online immigration guide aimed at London SMEs, and future policy could build on this—via a team of individual advisers, for instance.
- **Nudging/lobbying** the national government on immigration reform and encouraging the take-up of underused human-capital policies (such as the new Graduate Entrepreneur scheme, which, as noted earlier, is being utilized far less than its predecessor).
- **Internationalization**, by providing support for exports and international scaling, for example through the Tech City Investment Organisation (TCIO) and UK Trade and Investment agencies.
- **Networking**, by connecting local businesses to one another, and to key public actors such as universities; and by encouraging HE spin-offs and joint ventures, for example, through the recently announced Smart Cities Catapult program and the existing partnership between Cisco, Imperial College London and University College London.
- **Linking local communities to jobs** by boosting the profile and coverage of digital economy recruitment fairs, and experimenting with labor market intermediary programs (such as Tech City Apprenticeships) that place young people in local SMEs and manage their contracts.

Policy interventions to boost human capital might be aimed at the international supply of workers (through migration) or the local supply of workers.

There are a number of national interventions designed around the migration system. These include:

- **Entrepreneur visas.** A number of countries—notably Chile, Canada, and the United Kingdom—have developed specific visa programs for migrant entrepreneurs. There is very little systematic evaluation of these programmes, and strong anecdotal evidence that they are hard to design well.³³ These vary in design; notably, the United Kingdom levies a substantial financial bond on entrants and where applications are decided by immigration agency staff rather than business experts. Chile, by contrast, runs its program along the lines of a competition for venture funding, and provides cash, workspace, and business development support for successful applicants.
- **Investor visas.** Alongside some other Organization for Economic Cooperation and Development (OECD) countries, the United Kingdom has also developed a program to attract international investors. As with entrepreneur visas, there is little structured evaluation of such initiatives, although anecdotal evidence from the United Kingdom suggests that the UK scheme could be productively integrated with trade/investment programmes. Specifically, policies should explicitly attract individuals who are industry experts, not just high net-worth individuals, and target sending countries that represent new markets for the United Kingdom, such as the BRIC countries. In the case of the United Kingdom, this would imply changing the requirements of the

33 Nathan, Rolfe, and Vargas-Silva, *The Economic and Labour Market Impacts*.



Tier 1 investor visa to include a specific human-capital/expertise criterion, alongside the current requirement that applicants hold £1 million in funding.

- **Pro-innovation policies.** The international evidence, especially from the United States, suggests that universities and academic research communities are an important entry point for inventors and innovative individuals, especially since entry is conditional on ability.³⁴ Skill-biased migration policies should ensure that international applicants have access to higher education and postgraduate study. In the case of the United Kingdom, this might involve revisiting the abolition of the two-year post-study visa, more user-friendly entry processes for exceptional ability individuals (especially in the science, technology, engineering and mathematics [STEM] fields), and further funding for leading universities to build clusters of researchers.
- **Agile bureaucracy.** The evidence from East London suggests that many SMEs find national migration regimes off-putting—to the point of making second-best hires in order to avoid the red tape involved. This is now an issue of serious concern: UK Border Agency data suggests that Tier 2 employer applications are well below their caps, even for shortage occupations. It is possible that the caps are in fact extremely generous—but the weight of evidence is that the process discourages applications.³⁵ National policymakers could streamline the process to make it more user-friendly and less costly.

Supporting even a well-targeted visa program that promises to enhance UK productivity is not politically easy for elected leaders.

In crafting human-capital policies that support the digital sector, policymakers face a number of difficult questions. First, they may confront a trade-off between supplying workers from abroad (whether labor migrants or international students) and developing the skills of native workers, especially those in the local area. To some extent this is mitigated by the variety of skills profiles and jobs that recruiters are looking to fill. For example, office managers, receptionists, and administrators are often recruited within London, while programmers tend to be recruited from national/global labor pools.

Second, programs to introduce migrant entrepreneurs will, if successful, increase business entry into the cluster. This is likely good for longer-term aggregate outcomes—such as levels of innovation, productivity, and consumer welfare—but some existing local firms and their workers will be the losers in the short term.

Third, while there is some public support for programs to attract high-skilled immigrants, most people want to keep migration numbers down. Supporting even a well-targeted visa program that promises to enhance UK productivity is not politically easy for elected leaders, given levels of popular hostility to immigration. This political reality has clearly affected the design of Tier 1 initiatives—for the worse.

34 Gnanaraj Chellaraj, Keith E. Maskus, and Aaditya Mattoo, “The Contribution of International Graduate Students to U.S. Innovation,” *Review of International Economics* 16, no. 3 (2008): 444–62; Jennifer Hunt, “Which Immigrants Are Most Innovative and Entrepreneurial? Distinctions by Entry Visa,” *Journal of Labor Economics* 29 (2011): 417–57; Eric T. Stuen, Ahmed Mushfiq Mobarak, and Keith E. Maskus, “Skilled Immigration and Innovation: Evidence from Enrolment Fluctuations in U.S. Doctoral Programmes,” *The Economic Journal* 122, no. 565 (2012): 1143–76; Jennifer Hunt, “Are Immigrants the Best and Brightest U.S. Engineers?” (NBER Working Paper Series No. 18696, National Bureau of Economic Research, Cambridge, MA, 2013), www.nber.org/papers/w18696.

35 Nathan and Vandore, “Here Be Startups.”



V. Conclusions and Recommendations

Cities are important sites of entrepreneurship and innovation, especially for the tech industry. New start-ups with highly innovative, even risky, new business ideas often develop side by side. In theory, clustering should occur organically, but where it does not, public policy should be able to directly help clusters form and grow. In practice, cluster initiatives to date have a very mixed record, and our understanding of effective policy levers is poor.

Skilled migrants can play critical roles in economic development, especially in high-tech clusters such as Tech City. But evidence that firms are having trouble making the most of immigration point to a number of areas for policy action.

National policymakers could consider reframing UK immigration policy to make contributing to economic development an explicit goal (especially as it relates to skilled migrants), reinstate poststudy work routes, shorten the visa-processing times for skilled workers with a job offer (e.g., by setting the target that all applications handled within four weeks or less), pilot various entrepreneur visas (e.g., randomly assigning Tier 1 applicants to different processing workflows and /or stay requirement regimes), and introduce the criterion that applicants to investor visa programs have business expertise.

Evidence that firms are having trouble making the most of immigration point to a number of areas for policy action.

Local policymakers could improve support for small businesses navigating bureaucratic processes; help firms recruit skilled workers; develop tech-focused graduate entrepreneur programs in partnership with local universities (including through profile-raising activities and competitions to raise the standard of applicants); and pilot a range of active labor market programs (in addition to Tech City Apprenticeships) to better connect local people to Tech City employment opportunities.

Most of these policy recommendations could also be developed in other cities and regions across the United Kingdom: under the government's localism agenda, many big cities are negotiating for London-style autonomy.

For more on MPI's Transatlantic Council on Migration, visit:
www.migrationpolicy.org/transatlantic



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