Geography has always played a central role in the organization of economic activity. Cities first formed as trading hubs for agricultural and manufactured goods. Many of them emerged where trading routes intersected or where goods moved from one mode of transportation to another. With the onset of the industrial revolution, cities became centers of large-scale industrial production. As industrialization advanced, some expanded into megacities, while others saw their fortunes decline.

In the innovation-driven economy of the 21st century, cities continue to play a pivotal role. However, the forces shaping the geography of economic activity have changed. Companies want to be in urban hotspots, because that is where the most skilled and talented workers live. Well-paying and rewarding jobs as well as the buzz of city life, in turn, attract yet more highly skilled individuals to those hotspots. Innovation also relies crucially on the exchange of ideas among people. Such exchanges usually happen best when people live and work in close proximity to each other.

Yet, the economic geography of the 21st century has another important dimension. Technology has facilitated new ways of collaborating and sharing knowledge, connecting skilled individuals located far apart. The emerging global innovation landscape is thus one of geographically concentrated centers of excellence around the world, which are embedded in a global network carrying knowledge in many directions.

The evolving geography of innovation matters. Governments around the world strive to promote a policy environment conducive to innovation. Doing so requires an understanding of the local dynamics of innovation ecosystems. For example, where can government-funded research best enhance nascent technological capabilities? How can smart city planning encourage opportunities for knowledge sharing and collaboration? More broadly, the spread of innovative activity within economies increasingly affects the regional distribution of incomes. Understanding the driving forces behind this trend, in turn, enables better policy responses.

Our *World Intellectual Property Report 2019* offers an empirical perspective on the global geography of innovation. It does so by following the geographical footprint that innovators have left in millions of patent and scientific publication records over the past few decades. WIPO's *Global Innovation Index* has already embraced this big data approach in identifying the world's largest science and technology clusters. This report goes further. It employs more data going back several decades, analyzes time trends and explores in some detail how innovators from around the world collaborate with each other. The emerging picture is a complex one, with a limited number of global innovation hotspots in a few countries accounting for most innovative activity. Collaboration is widespread, taking place in increasingly larger teams and – for most but not all countries – it is increasingly cross-border in nature.

In addition to this economy-wide perspective, the report includes two case studies that explore in detail the evolving geography of innovation for two fields of technology undergoing rapid change. One case study focuses on autonomous vehicles technology. It details how innovation is reshaping the car industry, with information technology (IT) companies challenging established carmakers. This transformation is broadening the innovation landscape, with several IT-focused hotspots – which traditionally were not at the center of automotive innovation – gaining prominence.

The other case study focuses on agricultural biotechnology. Scientific and inventive activity in crop biotechnology is concentrated in a few high-income economies and China, and – within those economies – mostly in large metropolitan areas. Relative to other areas of innovation, however, it is more geographically widespread, spanning many countries in Africa, Latin America and Asia. This partly reflects a need to adapt innovations to local conditions.

The evidence presented in this report highlights how globally intertwined innovation has become. Crucially, the ability of companies and researchers to collaborate across borders has relied on policies largely favoring openness and international cooperation. The report makes the case for maintaining policy openness and further strengthening international cooperation. Solving increasingly complex technological problems will require ever larger and more specialized teams of researchers. International collaboration helps form such teams and will therefore be indispensable in continuously pushing the global technology frontier.

While offering original insights, the analysis presented in this report also comes with certain caveats. Patent

The evidence presented in this report highlights how globally intertwined innovation has become.

and scientific publication data provide rich and internationally comparable information on innovative activity. However, they neither capture all such activity, nor do they fully portray the rich interactions taking place among innovators. In addition, the dynamic forces that shape the direction of global innovation networks are manifold and interact with one another in intricate ways. Further research that offers empirical guidance on these forces would be of much value.

We hope that this report contributes to a greater appreciation of the importance that geography exerts on innovative activity and, in doing so, that it helps in refining policies to promote innovation and ensuring that its benefits are widely shared.

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