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Leveraging the Digital Transformation for Development: A Global South Strategy for the Data-driven Economy

Dan Ciuriak and Maria Ptashkina

Key Points

- The digital transformation provides developing economies new opportunities to leapfrog industrial age infrastructure, to draw on the vast knowledge spillovers from the internet, to take advantage of new markets offered by digital platforms and to exploit production possibilities enabled by digital technologies.
- It also increases the distance to the technological frontier as leading-edge countries race forward, creates new competitive challenges in capturing production mandates in tasks that can be automated and poses daunting new governance challenges.
- Developing countries can leverage the valuable data they generate, given their population size, rapid adoption of mobile technology and digital procurement potential, to improve the bargains they strike with advanced country suppliers and platforms and in trade negotiations.

Introduction

The digital transformation — the adoption of online business models and the general shift of economic and social activity online — is changing the way that businesses operate, the way economies function and the way that societies interact.[1] The exploitation of data enables new industrial models ("Industry 4.0") and, more broadly, underpins the emergence of a new kind of economy — the data-driven economy — based on the specific characteristics of the essential capital of this age: data.

For developing countries, it opens up new opportunities for convergence, including by leapfrogging intermediate infrastructures of the industrial age, drawing on the vast knowledge spillovers from the internet, taking advantage of the new markets offered by digital platforms and exploiting production possibilities enabled by digital technologies. In particular, digital infrastructure coupled with strong governance provides the means to launch micro-multinational firms from anywhere in the world, skirting the traditional coordination/missing

1 See CIGI's essay series, Data Governance in the Digital Age, for an exploration of the myriad issues raised by digital transformation: www.cigionline.org/data-governance-digital-age.

About the Authors

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market problems routinely faced by would-be entrepreneurs in less developed economies.[2]

At the same time, as with all technological revolutions, the opportunities will tend to be captured initially mainly by the technological leaders, which will also pioneer the management of the new economic and social governance issues that the data-driven economy generates. The trailing-edge countries will face new challenges in sustaining convergence while managing trade relations with advanced countries as technology disrupts work patterns globally through the looming changes in production mandates for tasks that can be automated. This emerging technology poses daunting new governance challenges in managing the impact of digital technologies on national security, integrity of governance, industrial adjustment, preservation of competition and cultivating trade and investment links to the global economy.

From Convergence to Leapfrogging

For the Global South, the initial experience in the data-driven economy will, on several grounds, likely be divergence as the technological and income gaps with the most advanced countries widen.

First, the digital transformation will enable the industrialization of learning as innovation becomes increasingly driven by machine learning. This will accelerate the pace of change in the data-driven economy, condensing into years what took decades in the knowledge-based economy, just as the industrialization of research and development in the knowledge-based economy telescoped into a few decades what took centuries in the preceding industrial era (Ciuriak 2018a). An example of the possibilities for acceleration is provided by the efforts to train a computer to play the game Go: the initial efforts, based on human patterns, eventually defeated a human grand master; the second version — Alphabet's AlphaGo Zero,

2 The coordination or missing markets problem refers to the situation where success in one enterprise requires simultaneous investments in complementary enterprises. This development problem was first articulated by Rosenstein-Rodan (1943); a modern articulation is offered by Hoff (2001).

which learned from first principles unaided and unencumbered by human experience by playing some 4.9 million games against itself in a few days — not only beat a human grandmaster but also beat the first version 100–0 in match play (Silver et al. 2017). Similarly, the data-driven economy promises to take the optimization of production processes to a new level through the use of data generated by Internet of Things (IoT) devices. This acceleration of innovation will naturally spread the field across numerous dimensions of economic performance since diffusion takes time.

A second factor promoting initial divergence is investment costs. The assembly of data is a library function, which is a cost centre; it is the exploitation of data that creates profit centres. Given high library costs, many early data applications, especially in the IoT space, leveraged open public data. The advanced countries have already paid many of the necessary fixed costs to capture and process data and have assembled enormously rich datasets. They are reaping the benefits in terms of gaining first-mover advantages in pioneering commercially viable applications. In addition, they are establishing commanding market positions on the basis of the economies of scale and scope, network effects and information asymmetries in the data-driven economy that promote the emergence of "superstar firms" (Ciuriak 2018b). The developing world is only starting to play catch-up in making the foundational investments.

Related to this, the accelerating shift of the research frontier steadily increases skill requirements. Companies that have the computer and coding specialists and data analytical skills more generally get ahead; those that do not are increasingly falling by the wayside (Organisation for Economic Co-operation and Development [OECD] 2016). Developing countries thus find themselves in a familiar "Catch-22" situation: countries with growing populations will be unable to claim tasks in the global distribution of labour without more education; without those workers earning adequate income, states will not be able to raise the needed revenue to help their workers gain sufficient education (Lee 2017).

Further, the data-driven economy builds on the knowledge-based economy, in which the essential capital is intellectual property (IP). Endowments of protected IP are already highly skewed and promise to become even more so as data-related IP proliferates, including through copyright protection for databases and through the use by leading data-driven firms of their financial leverage to expand their data portfolios (for example, the procurement contract in Google's "smart city" project in Toronto cedes the data generated by the project to Google; Wylie 2018; Scassa 2018). IP generates rent and excludes competition: the 20-year term of exclusion developed for a slower-moving pre-industrial era likely means exclusion for the useful life of a technology in the fast-moving data-driven economy. Thus, in the data-driven economy, the Global South will tend to be a rent payer, not a rent earner, and for many technologies may be effectively sidelined as a producer.[3]

The Global South may nonetheless still benefit from the technological revolution as consumer and user of diffused technology. Moreover, developing countries will have niches in which they can develop competitive advantage, particularly where their lack of legacy infrastructure reduces the cost of adopting new technologies and such adoption faces less vested interest resistance. Several concrete strategic recommendations can be made for the Global South in this context.

First, developing countries should emphasize technology acquisition through every means possible, in particular by leveraging knowledge and information spillovers made abundant in the digital age. Knowledge externalities have become global in nature with open platforms and free software providing businesses and governments immediate access to frontier research (Goldfarb and Trefler 2018). In addition, as barriers to movement of persons and inflows of foreign direct investment (FDI) rise in some advanced countries, they fall in relative terms for developing economies. Professional migration and academic exchange create a unique combination of technical skills and local market knowledge in developing countries. For developing countries, FDI continues to be a conduit for inflow of knowledge and skills, notwithstanding newfound security concerns in advanced countries about FDI inflows into innovation-intensive sectors (for example, US concerns about the use of Huawei

3 IP regimes standardize the minimum level of protection across countries with highly diverse requirements. Developing economies face a difficult choice of whether to acquiesce to IP regimes that generate rent flows to the advanced economies that dominate IP ownership or to seek other ways to leverage their productive assets – for example, through allowing informal, and inherently vulnerable, markets.

equipment in its 5G networks, given strategic rivalry between the United States and China).

Second, developing countries should focus private sector development on digitally enabled micro, small and medium enterprises. Although size and market incumbency have so far played the decisive role in determining global leadership in the data-driven economy, any country and company can find its niche (OECD 2016). As markets become increasingly customized, multiple entry points appear both for firms and for nations, given coherent digital strategies. The Global South has some advantages to exploit, such as population size and knowledge about local market peculiarities. However, given the generally small size of national markets, it will be advantageous to build cross-border digital governance frameworks into regional economic integration schemes, such as the African Continental Free Trade Agreement, in order to help bring down barriers to international expansion caused by incompatible rules and infrastructures.

Third, developing countries should follow the example of a number of small economies that have demonstrated their small size does not prevent them from being a leader in some specific areas of the data-driven economy:

- Estonia has invested heavily in digitalizing government and increasing overall digital literacy and has developed one of the most progressive systems of e-government, including providing extra-territorial sovereign services through its e-citizenship program, thus, in effect, commercializing an aspect of its sovereignty.[4]
- Singapore is one of the world's leaders in adopting smart city design and derives competitiveness from its superb functionality.
- Rwanda's emerging digital economy provides an example of a lower-income economy finding success by emphasizing technology in its development strategy, including through the development of its telecommunications infrastructure, technological adoption and education strategy (*Science and Technology* 2018).

Fourth, developing countries should aim to leapfrog traditional technologies in adopting solar-electric, internet-based urban systems. In this regard, the infrastructure deficit in developing countries can be considered a blessing as well as a curse, given that the ever-growing pace of technological development leads to faster obsolescence rates. For example, while the developed countries moved through the different phases of network development — from analogue to digital and copper to fibre optics — the Global South can go directly to fibre (OECD 2016). As pointed out by Martin Mühleisen (2018), "it is striking that less-developed countries are leading technology in many areas, such as mobile payments (Kenya), digital land registration (India), and e-commerce (China). These countries facilitated the quick adoption of new technologies because, unlike many advanced economies, they weren't bogged down in preexisting or antiquated infrastructure." Similarly, developing countries have the fewest sunk costs in moving to the latest 5G wireless communication standards; they should make this a priority — and the International Monetary Fund and the World Bank should support this.

Fifth, to enable sustainable urban systems to develop, developing economies will need to avoid premature rural-urban migration that would both undermine the development of smart sustainable cities and also drain the countryside of the labour force needed to sustain agricultural development. The Global South should thus aim to insert new agricultural technology to support rural development and income growth (for example, by inserting nucleus farms with modern technology into rural areas in developing economies, from where technology can spread). Moreover, given the high skewing of infrastructure endowments between urban and rural populations, smart city policies should also be accompanied by measures to maximize positive spillovers to rural hinterlands — for example, through rapid deployment of solar-powered mobile telephony strategies to integrate rural districts without the large-scale investment demanded for electrical grids.

4 I am indebted to Sean McDonald for this insight.

The Governance Challenge

The digital transformation opens up seemingly unbounded scope for market failure, government failure and social dysfunction. Market failure is predicted because the data-driven economy powers the emergence of superstar firms through the combination of economies of scale and scope, network externalities and pervasive information asymmetry (Autor et al. 2017; Ciuriak 2018b). Government failure is predicted because it facilitates surveillance (including through collaboration with big tech) and thus expands the coercive power of governments, potentially undermining the evolved balance between individual liberty and the ability to address issues requiring collective action that characterizes the modern functional economy. Social dysfunction is predicted by the fragmentation of understanding that is implicit in a "post-truth," "alternative facts" information environment and by the collapse of civility in the online world. The governance challenges posed by the data-driven economy are thus immense; for the Global South, these are amplified by the development gap.

For developing countries to address these governance challenges, they should first, and at a minimum, formulate a comprehensive plan for governance of the digital economy, if only to focus the attention of policy makers on the myriad potential problems. As comprehensive as the data-driven agenda is, a plan helps to systematize and break down the complex issues into concrete tasks, such as investment promotion, infrastructure prioritization, market regulation or developing privacy guidelines, that can be addressed by line ministries. Such a plan would help alert policy makers to the need to address, *inter alia*, cyber security, protection of the integrity of governance, industrial adjustment to new forms of manufacturing and new factors of production (for example, machine knowledge capital), preserving market competition and the impact of trade and investment links to the global economy. While concrete rules and regulations can be devised for each of these areas separately, the overall strategy needs to consider the interaction between all these different fields.

The International Dimension

The data-driven economy creates the potential for large international rents, which naturally create incentives for strategic trade and investment policy aimed at capturing them (Ciuriak 2018b). This type of behaviour is not new — it characterized the 1980s technology wars between the United States, Japan and the European Union, when similar inducements for strategic behaviour emerged. The geo-economic stakes are large, and the Global South will be entangled through trade relations with the leading data-driven economy states, which will inevitably be projecting power in the digital realm (McDonald and Mina 2018).

Not surprisingly, strategic rivalry has emerged at the very outset in the data-driven economy in the form of digital trade wars (Ciuriak and Ptashkina 2018), which have now escalated into an all-out trade war between the United States and China, in which the main *casus bellum* is China's "Made in China 2025" strategy that targets a number of high-tech sectors, including advanced robotics and artificial intelligence (McBride 2018). The rivalry among the great digital powers is spilling over into the Global South in at least two major theatres: the rollout of 5G telecommunications networks and the digital chapters of trade agreements. Regarding 5G networks, these are key for IoT applications and represent a technological step that has been described as closer to the invention of the Gutenberg press than the incremental improvement from 3G to 4G networks (see Kharpal 2018 for sources). In the 5G contest, the United States has applied intense diplomatic pressure on its allies to exclude China's Huawei, which in 2018 emerged as the leading 5G supplier, arguing that Huawei equipment posed a significant national security risk (Kharpal 2018). These developments lead inevitably to issues of alignment. These are very early days in this contest, but the marketing is well under way to developing countries.[5]

Similar scenarios will likely emerge in the future with other technologies offered on a competitive basis by the leading countries and companies. Different standards and lack

5 See, for example, https://tmt.knect365.com/africacom/5g-africa.

of interoperability between different systems also have the potential to create alignment issues through lock-in effects for technology application. More subtly, the fragmentation of the digital world into separate "data realms," each with its own regulation of the most basic commodity of digital space — information — and each subject to *sui generis* manipulation and feedbacks, militates against convergence of understandings, with worrisome implications for the ability to address global commons issues of vital importance to the Global South.

The Global South should thus consider the long-term implications of conditionality of co-operation with a given international partner. Co-operational conditionality in this context should be understood in its broad sense, encompassing not only investment conditionality and technology transfers, but also data localization and usage, licencing and other issues embedded in infrastructure investment contracts.

Regarding regional and bilateral trade agreements, the United States and the European Union have sharply different and not necessarily mutually consistent regimes for the governance of data — and China does not sign onto digital regimes at all. Developing countries face large information and power asymmetries vis-à-vis the advanced countries in negotiating terms, especially given that there is no established way to assess the value proposition of commitments on data. While some countries have begun to build a regulatory environment for e-commerce, developing countries are not yet ready in many respects for rule making concerning an enabling environment for data (Aaronson 2018). In the constantly evolving rule-making environment, developing countries should, to the extent possible, be cautious and not rush into binding commitments, which might lead to a lock-in of the advantages of the global big tech companies.

Despite its relatively vulnerable position in this fractured global environment, the Global South is not entirely without assets and options. The assets include the valuable data these countries generate, given their population size and rapid adoption of mobile technology, and their future potential for procurement of digital infrastructure. Awareness of these assets can help developing countries improve the bargain in dealing with advanced country suppliers and platforms and in trade negotiations.

Discussion and Conclusions

This policy brief tries to work out some of the implications for the Global South of the emergence of Industry 4.0 and the evolution toward a data-driven economy. While the digital transformation opens up new opportunities for convergence of the Global South in terms of technological leapfrogging, knowledge spillovers and access to new market platforms and production techniques, it also throws up some daunting competitive and governance challenges. These include keeping pace with advanced markets as they embrace new innovation-accelerating technology, dealing with the economic and political governance challenges of the data-driven economy that are only now starting to be addressed in the advanced countries, managing trade relations with the advanced countries and coping with the looming changes in the division of labour globally between human and machine and between the North and the South.

Historically, the rise in living standards has largely been a phenomenon of technological advance (Romer 1990). Observationally, the major accelerations — the industrial revolution, the advent of the knowledge-based economy and now the digital transformation — have been concentrated in leading-edge regions, with the result that gaps between the leading and trailing regions initially widened. This, per se, is not necessarily troubling, if the trailing regions still continue to advance in their development. A major cautionary note in this regard is that many of the features of the industrial era that provided opportunities for developing countries to converge will not likely be present in the data-driven economy. The exploitation of big data does not lend itself to global value chains, and opportunities to plug into global value chains through out-

sourced tasks may be substantially reduced with the emergence of machine knowledge capital. Inward FDI in the data-driven economy tends to be extractive rather than contributing knowledge capital. Unlike IP, data is not transparent — proprietary databases are not accessible, algorithms are protected trade secrets and there is no time limit on this secrecy as there is with patents.

The global economic environment is also being impacted by the data-driven economy. The "winner take most" economics predicts ruthless strategic rivalry to capture the global rents that winning promises. No need to predict — it is happening. The Global South will face alignment pressures, including through trade agreements with digital chapters, in a context where the value propositions are not self-evident and the means for assessment of these value propositions have not yet been developed; information and power asymmetries make for troubling prognoses as to outcomes. Finally, the domestic governance challenges — already severe given the propensity for market and government failure in the data-driven economy — will be compounded by geopolitical rivalry and vulnerability of developing countries to manipulation. Again, no need to predict — it is happening.

In this context, it will take a rare combination of strong leadership, clever digital economy industrial strategies and leveraging the possibilities that the digital transformation provides for participatory democracy to counter the power concentration of the data-driven economy and enable developing countries in the Global South to navigate the course to a sustainable future.

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DATA GOVERNANCE IN THE DIGITAL AGE

SPECIAL REPORT

Available as a free PDF download and digital essay series at www.cigionline.org

Introduction and epilogue by **Rohinton P. Medhora**

Data has been hailed by some as "the new oil," an analogy that captures the excitement and high expectations surrounding the data-driven economy. The success of the world's most valuable companies (Apple, Google, Facebook and Microsoft) is now underpinned by a sophisticated capacity to collect, organize, control and commercialize stores of data and intellectual property. Big data and its application in artificial intelligence, for example, promises to transform the way we live and work — and will generate considerable wealth in the process. But data's transformative nature also raises important questions around how the benefits are shared, privacy, public security, openness and democracy, and the institutions that will govern the data revolution. The recent Cambridge Analytica scandal has exposed the vulnerability of democracies to data strategies deployed on platforms such as Facebook to influence the outcomes of the Brexit referendum and the 2016 US presidential race. Any national data strategy will have to address both the economic and non-economic dimensions of harnessing big data. Balances will have to be struck between numerous goals. The essays in this collection are grouped into five blocks: the rationale of a data strategy; the role of a data strategy for Canadian industries; balancing privacy and commercial values; domestic policy for data governance; and international policy considerations. An epilogue concludes with some key questions to consider around data governance in the digital age.

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