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The False Appeal of Data Nationalism: Why the Value of Data Comes From How It's Used, Not Where It's Stored

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To maximize the economic and societal benefits of data and digital technologies, policymakers should resist the "data localization" trap and focus instead on the fundamentals of ICT adoption.

KEY TAKEAWAYS

- Requiring data to be stored and processed domestically does not drive economic development. Policymakers should focus instead on helping people and firms collect, analyze, and use data to improve innovation, competitiveness, and productivity.
- "Data localization" policies hurt economies by increasing prices and limiting availability of ICT products and services while creating few data center jobs.
- The right strategy is to encourage broad ICT adoption; reduce artificial costs of ICT; improve infrastructure for data innovation; maximize the supply of reusable data; and build workers' data-science and data-literacy skills.

OVERVIEW

Data innovation—the use of data to create value—has become increasingly important to economic growth, competitiveness, scientific discovery, and social progress as new technologies and methods have made it easier to collect, store, analyze, share, and use information.[1] However, as policymakers around the world grapple with the challenge of leveraging digital technologies to drive development, many are being seduced by the misguided and costly fallacy that it is the location of data that matters—i.e., that countries can best serve their economic interests by forcing firms to store data locally, a concept known as "data localization"—instead of focusing on the fundamentals of information and communications technology (ICT) adoption, education, digital infrastructure, and data governance policies, which are necessary to maximize the economic and societal benefits of data and digital technologies.[2]

For consumers and firms alike, digital technologies have fundamentally changed how they conduct domestic commerce and international trade. Consumers rely on data and data-driven services to search online, buy and sell goods and services on e-commerce platforms, send emails, and any number of other tasks, many of which can be done on increasingly powerful and affordable computers, tablets, and smartphones. Meanwhile, firms are using data and digital technologies in virtually all industries—not just the "tech" sector—to streamline business practices and increase efficiency.[3] Firms rely on data to advertise and engage with customers, discern market demand and adapt products and services accordingly, operate production systems, manage global workforces, monitor supply chains, and support products in the field in real time. But to maximize the value of data, it needs to be able to flow across borders. As ITIF argues in "Cross-Border Data Flows Enable Growth in All Industries," there is probably not a single company today with operations, suppliers, or customers in more than one nation that does not rely on moving data across international borders.[4] Moreover, no international trade involving consumers can take place without collecting and sending certain personal data across borders—such as names, addresses, and billing information.[5]

For all countries—developed and developing—the economy can be most productive and innovative when individuals and firms can engage in digital activity and commerce without unnecessary restrictions on how they can use and transfer data.[6] Unfortunately, many policymakers want to impose geographical restrictions on where firms can store data in the hope of supporting digital development. Some restrict the location of data for other reasons, such as to address privacy and cybersecurity concerns, or to ensure that government authorities have access to data for law enforcement or national security purposes (a false premise, which ITIF addresses in other reports).[7] Regardless of the rationale, data localization not only makes it harder and costlier, if not illegal, for firms to transfer data across borders, but also can raise the cost of cloud computing services. Just as economic nationalism can lead to lower productivity for firms and higher costs for consumers, particularly when it is focused on capital goods, "data nationalism" policies will reduce economic growth by limiting a country's ability to benefit from data-driven innovation and increasing the cost of ICT goods and services, which will lead to lower innovation and slower productivity growth.

This policy brief outlines why policymakers should not be distracted by the siren song of data localization and should focus instead on the policies that can actually help their people and firms collect, analyze, and use data to improve innovation, competitiveness, and productivity.

THE MISTAKEN (AND COSTLY) FOCUS ON THE GEOGRAPHY OF DATA STORAGE

Many policymakers mistakenly believe that requiring data to be stored and processed domestically (i.e., data localization) is a shortcut to high-tech jobs, investment, and innovation.[8.] This is a new form of protectionism, similar to how countries use local content requirements and tariffs to protect local manufacturing operations. id="_ednref9">[9.] Given that traditional trade-protectionism tools, such as tariffs, do not work as readily on digital economic activity, countries pursuing digital mercantilism are reverting to "behind-the-border" regulations and technical requirements, such as data localization.

These supposed benefits of data-localization policies, including the stimulus to jobs, are incorrect. One expected benefit is that forcing companies to store data inside a country's borders will produce a boom in domestic data center jobs. In fact, while data centers contain expensive hardware (which is usually imported) and create some temporary construction jobs, they employ relatively few staff.[10] Data centers are typically highly automated, using artificial intelligence, which allows a small number of workers to operate a large facility.[11] In a 2015 review of data center operations across the United States, CBRE Data Center Solutions Group (a U.S. real estate firm) estimated that a typical data center creates between 5 and 30 permanent jobs.[12] For example:

- Microsoft's data center in Quincy, Washington had as many as 500 workers at a time onsite during the construction process, but now employs just 50 full-time staff to operate the center.[13]
- In 2011, a $1 billion data center that Apple built in North Carolina created only 50 full-time jobs and another 250 support jobs in the local community in areas such as security and maintenance.
- Google invested $1.2 billion in a data center in Oregon in 2016, yet only hired 175 employees.[14]
- In 2018, Facebook started construction on a $750 million data center in Utah, which will employ 30-50 people full time once completed.[15]

Policymakers should realize that data center customers need to be free to make their own decisions based on market factors and should not be compelled to purchase local data center services due to government restrictions. Data center operators may open new facilities to meet large and growing demand for data-related services, to be closer to customers so they can provide an improved service (e.g., reduced latency in the time it takes to execute instructions to store or

retrieve data), or to take advantage of cheap and reliable electricity (both critical to data centers). In this case, instead of compulsion, countries should adopt an attraction strategy towards data centers and other ICT companies (domestic and foreign alike) by addressing business environment and regulatory conditions that affect their decision to operate in a market, including ensuring that the country has a robust fiber-optic communications backbone system.

Policymakers in many countries are working to address the "digital divide"—the social and economic disadvantages that may result from a lack of access to technology—but a digital development strategy based on data localization won't help. In fact, such an approach is not only wrong, but harmful to a country's economy and ability to support innovation, since it is likely to affect the price, availability, and range of ICT services. For example, a growing body of literature shows that data localization policies increase the costs of cloud computing services, which has a broader effect on an economy's productivity as it affects all users of these IT services. A 2015 study by Leviathan (an information security company) shows that local companies could have to pay significantly more for cloud services in Brazil, Europe, and elsewhere if data-localization policies cut them off from the most cost-competitive global cloud providers.[16] A 2016 study from the Center for International Governance Innovation (CIGI) and Chatham House shows that restrictive data regulations, including forced data localization, are likely to lead to increased prices and decreased productivity Brazil, China, the European Union, India, Indonesia, Russia, South Korea, and Vietnam.[17] Likewise, the European Center for International Political Economy (ECIPE) has conducted several econometric studies about the costs of data localization and data regulations in the European Union, Russia, Brazil, China, India, Indonesia, South Korea, and Vietnam.[18]

Barriers to data flows also prevent companies with operations in multiple countries from transferring data that's needed for day-to-day activities, such as for human resources, which means companies may have to pay for duplicative services in these countries with data localization and outside them. Likewise, companies may be compelled to spend more on compliance activities, such as hiring data-protection officers, or putting in place software and systems to get individuals' or the government's approval to transfer data. And of course, by limiting consolidation of data across establishments located in multiple nations, these policies limit firms' ability to use data to support research and development and deliver other innovative goods and services.

POLICIES THAT SUPPORT DATA-DRIVEN INNOVATION

It is beyond the scope of this briefing to provide a detailed agenda for national data policy, but it is nevertheless possible to identify the general policy foundations that support individuals' and firms' ability to engage in data-driven innovation. The following sections highlight some of these priorities, including: reducing or eliminating artificial costs of data-related goods and services; focusing on deriving insights from data instead of trying to store it locally; improving the infrastructure that supports data innovation; maximizing the supply of reusable data; and developing data-science and data-literacy skills in workers.

Reducing or Eliminating Artificial Costs Associated With Data and Data-Reliant Goods and Services

Cost is a major driver of ICT adoption for consumers and firms alike, as rising prices generally lead to falling demand. ITIF outlined this case for ICT goods in "A Policymaker's Guide to Spurring ICT Adoption," but the principle also extends to data-related services.[19] Cost should be a central concern as the basics—Internet access and a smartphone—remain beyond the reach of many millions of people around the world. Policymakers should aim to eliminate tariffs on ICT imports, eliminate discriminatory taxes on ICT goods and services, and ensure that users can buy best-in-class technology from anywhere in the world (e.g., remove local content requirements, limits on foreign direct investment, and restrictive certification or licensing arrangements for ICT goods and services). ITIF's modelling in the report "How Joining the Information Technology Agreement Spurs Growth in Developing Nations" shows that the economic growth that developing countries derive from cutting ICT tariffs creates tax revenues that can substantially offset tariff revenue losses.[20]

Focusing on cost and accessibility is critical because for many countries, major gains in digital development will come from getting as many firms as possible to adopt and use existing ICT equipment, computer software, and cloud services. Doing so will help them become more efficient and better able to collect, access, and analyze their own data or that from third-party services. In particular, firms around the world can remotely access and use relatively low-cost, scalable, and increasingly powerful cloud-based data storage and analytic services (such as those providing cloud-based artificial intelligence services) instead of having to invest in their own costly ICT facilities. Policymakers should prioritize policies that encourage the broad use of these ICT goods and services. That is how the greatest social and economic gains are to be made, not by actually producing ICT goods and services. (This is not to say that policymakers shouldn't support local startups and tech firms, but that the biggest economic gains will come from helping all sectors of an economy use more and better ICT goods and services.) A farmer in a developing country checking their smartphone for weather, crop, and price information isn't helped with the use of a potentially more expensive and less capable smartphone that is produced locally. The same premise extends to most of a country's economic activity that is not related to the actual production of technology.

ICT is particularly important in this way as it represents a key "general purpose technology" which supports economic productivity.[21] In a conclusive review of over 50 scholarly studies published between 1987 and 2002 on the topic of ICT and productivity, Dedrick, Gurbaxani, and Kraemer found that, "At both the firm and the country level, greater investment in ICT is associated with greater productivity growth."[22] In fact, nearly all scholarly studies from the mid-1990s onward have found that ICT has significant positive effects on productivity.[23] Indeed, the beneficial effects of ICT on productivity have been found across different levels and sectors of economies, from firms to industries to entire economies, and in both goods- and services-producing industries.[24]

Maximizing the Supply of Reusable Data

To promote the availability of data and encourage businesses to use it, policymakers should both avoid laws and regulations that stifle the supply and flow of data, such as overly burdensome data-protection rules and data-localization policies, and increase the supply of data, such as via open data and freedom-of-information policies. id="_ednref25">[25.]

Creating more-restrictive data privacy or regulatory laws is rather straightforward, but creating such laws to have minimal disruptive effects on users and businesses is much more complex, which is why countries should include innovation as an explicit outcome in relevant data-related laws and regulations. In line with this, policymakers should avoid excessive restrictions that limit the benefits of data innovation, such as unnecessary rules on the use of cookies in web browsers, ill-conceived requirements for artificial intelligence applications, and limitations on the real-time sharing of data, such as the sharing of car data in emergencies. Policymakers should also undertake reviews of where exemptions to data-sharing regulations could be created to enable beneficial uses of data, such as easing legal restrictions on using artificial intelligence with medical data.[26]

In terms of generating and accessing data, a lot of it is ubiquitous, low-cost, and widely available. An entire industry of data brokers makes a living collecting as much data as possible and selling it to companies that find it valuable. Other data, such as satellite and genomic data, might be expensive to acquire but not exclusive and still relatively cheap to share. For example, both the European Space Agency and the U.S. National Aeronautics and Space Administration are mapping areas affected by Cyclone Idai (which has killed thousands of people in Africa) to provide up-to-date information to local authorities to help their relief efforts.[27] As an example of the environmental benefits of using data (in addition to economic and social benefits), researchers use a large database of rhinoceros DNA to prosecute poachers and those trading rhino horns, while in another case a Brazilian firm has developed a remote monitoring system that uses sensors and machine learning to help companies and researchers track and predict the health of forests.[28]

However, policymakers should also see how they can put in place policies that help the generation and use of data in their economy. For example, article 20 of the European Union's General Data Protection Regulation (GDPR), which gives data subjects a right to data portability, provides a good template to give operators of data-generating machinery (such as cars) a similar right to access and share nonpersonal data. Both sets of rights are well-supported by the use of open application programming interfaces (APIs) such as those mandated under the EU's new payment services directive (PSD2), as these allow customers to share their data with third parties in exchange for new services.[29]

Similarly, beyond investment in physical ICT infrastructure (detailed below), policymakers can encourage the development and deployment of key technological platforms that enable data innovation, such as digital public services, smart meters, and smart cities.[30] For example, the Internet of Things can yield important data in public infrastructure. Sensors in roads and public transport networks can measure congestion and indicate how services are being used, which alerts

maintenance teams to problems in real time and supports better long-term planning. Likewise, smart meters provide an important insight into energy use in both households and businesses, supporting new, data-driven approaches to grid management.

Maximizing the supply of reusable data is also about getting more firms to use ICT to generate, collect, and analyze data (which brings us back to the issue of cost as a driver of deployment and adoption). The more firms use ICT services, the more data they can generate, collect, and analyze in order to improve efficiency and drive further research and development. To facilitate this process, policymakers should focus on addressing issues that affect firms' ability to use big data; clouding computing; radio frequency identification technology to track and organize inventories, buildings, and other physical assets; enterprise resource planning tools to help organizing their business processes; and customer relationship software to analyze data.[31]

In fact, in addition to closing the "digital divide" through greater adoption and use of digital technologies, policymakers need to reduce the "data divide"the social and economic inequalities that may result from a lack of collection or use of data about individuals or communities.[32] Gaps are already appearing where certain groups of individuals in countries do not have data collected about them or their communities because of where they live. If this trend toward a data divide continues, we might even see the rise of "data deserts"—areas of a country characterized by a lack of access to high-quality data that may be used to generate social and economic benefits. To ensure that all individuals have access to the vast benefits offered by data-driven innovation and that no group is systemically disadvantaged, policymakers should pursue efforts such as setting up government data collection programs that focus on hard-to-reach populations; ensuring that funding programs aimed at closing the digital divide consider the impact on data poverty; ensuring that digital literacy programs help individuals understand data-producing technologies, such as social media and the Internet of Things; and encouraging civic leaders in these underrepresented groups to understand the benefits of data and know how to integrate technology solutions into grants and development proposals.[33]

Government agencies can also lead the way in supporting data-driven innovation through "open data" laws and regulations that facilitate access and use of the large amounts of they collect.[34] With open data, government agencies can better assess and share their data internally and with other agencies to improve decision-making across the government; the public can access huge amounts of government data quickly and easily; and the private sector can build and improve new products and services to bolster the economy. One way to do this is through public-private partnerships, as many government agencies hold valuable data but do not always have the talent or resources to put it to work. In contrast, businesses may have the talent and resources necessary to innovate with data, but lack access to certain government resources.[35] There are already several countries that policymakers can use as models. The Open Data Barometer provides a global measure of how governments are publishing and using open data for accountability, innovation, and social impact. However, it shows how some countries have not embraced open data policy frameworks and there are large groups of countries without any open data policies.[36]

Related to this, policymakers can also use policy changes to specify that firms use modern,

machine-readable data standards as part of regulatory filings with the government (instead of old-fashioned, unstructured text documents in PDF or HTML format) so that it can be more easily analyzed and used by the government and firms.[37] For example, in 2009, in an effort to improve the utility of regulatory filing data, the U.S. Securities and Exchange Commission (SEC) required public companies to submit financial statements using structured, machine-readable eXtensible Business Reporting Language (XBRL).[38] The XBRL format makes financial data much more valuable, as it allows the SEC, the public, investors, and other stakeholders to easily search and perform automated analysis of this information.[39]

Focusing on Deriving Insights From Data, Not Trying to Store It Locally

Data localization policies are premised on the faulty assumption that the location of data matters in maximizing the value of data. It doesn't. Success in the data economy depends on how effectively firms and individuals can leverage data to generate insights and unlock value.[40.]

Policymakers should focus on how to assist local firms in understanding how they can generate and create value from data, such as through the use or development of data analytics services or by creating data streams around manufactured or agricultural goods. The best approach for firms to maximize the value of data will vary by organization. (See the Center for Data Innovation's report "100 Data Innovations."[41]) For example, GE and Siemens are actively working on services that would collect and analyze data from the machinery they sell.[42] IBM is integrating data from electronic health records, medical imaging, claims, and genetics to improve its Watson Health analytics service.[43] Automotive companies use connected vehicle data to improve their vehicles.[44] Supermarket chains have used data from loyalty-card programs to offer personalized discounts; they now hope to use additional data from third parties to better time those promotions and compete with budget brands.[45] Whole industries, such as health care, agriculture, and consumer goods, are rapidly moving toward collecting increasing amounts of data about their customers and products.[46]

In this way, how firms aggregate data into what people term "big data" is often where the most value is created. For example, while having data about the location and speed of a particular car may be interesting, it is not all that valuable except to the person who is driving (and perhaps their family). But accumulating data from tens of thousands of cars in a metropolitan area and displaying it on a map (e.g., Waze) is incredibly valuable as it gives travelers and first responders real-time information about traffic conditions. Another reason data is more valuable when it is combined is machine learning algorithms are generally more valuable as the size of their training datasets becomes larger. This is part of the reason why many businesses can only maximize the value of data when it's able to flow freely across borders: They collect it from various internal and external sources and use cloud-based analytics platforms to analyze it all. For example, just as diseases don't stop at national borders, the data needed to find cures need to cross borders, too. Powerful data analytics applied to bigger global datasets can help speed the development of cures.

The rarer the disease, the more important it is to build bigger datasets. This is another reason why policymakers looking to support data-driven innovation should look to maximize the use of reusable data and not enact barriers to cross-border data flows.

When considering how to support data-driven innovation, policymakers need to understand a few other key principles.[47] Firstly, data is non-rivalrous, meaning that one person's or firm's use of it does not diminish its availability to other users. It is possible for the same data to support the creation of several new products, services, or methods of production.[48] For example, one business collecting a user's age and location does not preclude another from doing so as well. Therefore the goal of policymakers should be to encourage many firms to be "data rich," rather than fear that data is a finite resource that must be evenly distributed.[49]

Secondly, much of the value that firms derive from data comes not from individual data points but from collective data, such as aggregate user data. This means that policymakers should be encouraging data sharing as well as the development of digital platforms that make it possible to collect and analyze large-scale data sets. Because the value of these digital platforms grows with the number of users—exhibiting what economists call "network effects"—policymakers should not impose unnecessary restrictions on these platforms, such as by artificially limiting their size. Policymakers should see that these concepts underpin the digital economy and that they're beneficial as they increase consumer welfare by lowering costs and increasing value.[50]

Improving Infrastructure That Supports Data Innovation

Infrastructure is a priority issue for digital development as Internet connectivity depends upon it. There are a broad range of factors that go into improving ICT infrastructure, especially in developing countries. This is why the United Nations and World Bank, among others, are rightly focusing on ICT infrastructure as part of broader efforts to improve digital development and data-driven innovation.

Obviously, improved Internet penetration and speeds are crucial to data-driven innovation and digital trade, as inadequate fiber-optic networks lead to poor-quality data services and inconsistent coverage, holding back the spread of mobile Internet services in urban and rural areas. Where the market fails to adequately serve sparsely populated areas, governments should step in with direct investment and leadership in public-private partnerships to help close the gap. Where possible, countries should also look to pool their powers of mobile spectrum allocation at the international level, because this will permit the development of integrated, pan-regional wireless broadband networks and reduce costs that are needlessly duplicated throughout the single market.[51] Policymakers should consider what policies they can change and barriers they can remove to expedite the deployment of next-generation wireless and wireline infrastructure. In some cases, policymakers may find that legacy, inefficient processes that are not well suited to modern network deployment can delay or prevent the rollout of broadband services, which becomes an even bigger problem as countries try and transition to next generation wireless services.[52]

Developing Data-Science and Data-Literacy Skills in Workers

Data innovation does not just happen; people make it happen. Success in the data economy requires a workforce with the skills necessary to operate the latest technology and process and analyze complex data sets. Policymakers in all countries face the challenge of encouraging the development of these data-related skills through their education systems and professional training programs. The Center for Data Innovation's reports "The Best States for Data Innovation" and "The State of Data Innovation in the EU" provide a potential model for countries and organizations to follow in conducting an analysis of how they are doing in addressing the various aspects of human and business capital.[53.]

Firms need workers with both basic and advanced skills. To make the most of data-driven technologies, companies need ICT specialists with the expertise to deploy such technologies, integrate them with the firms' business processes, and train staff in how to use them. A key indicator here is the number of science and technology graduates a country produces, as this provides a rough approximation of graduates with skills relevant to the data economy. Another key indicator is the number of data science degree programs on offer in a given country, as this serves as a proxy for how keen that country's higher education system is to attract and educate those with an interest in data science and innovation, as well as demand from that country's professionals for additional training in the field. However, besides specialists in ICT, firms also need the rest of their employees to develop the requisite ICT skills to make proper use of data throughout the business. This challenge is especially acute for those countries that want to act as hubs for outsourced technology services work, such as India and the Philippines.

CONCLUSION

Policymakers should not succumb to the mercantilist notion that having data stored locally gives their firms any material benefit. Policymakers need to recognize that the impact of mercantilist data localization policies is not limited to the 'tech' sector, but to the entire economy, as people and firms from every sector—agriculture, manufacturing, and services—increasingly rely on ICT services as part of their everyday lives and jobs. That is why a country's digital development strategy needs to prioritize the broad dissemination and adoption of ICT rather than the production of ICT goods and services, as this is where the greater economic and social gains can be made. To maximize the social and economic benefit of data and digital technologies, policymakers should focus on the fundamentals, including how firms use data to generate new insights and value (wherever it is stored, given modern cloud computing) and whether there is a data governance framework in place to support innovation. They also must ensure there is reliable and accessible ICT infrastructure—and a skilled workforce to take advantage of it.

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