INSTITUTE FOR BUSINESS
IN THE GLOBAL CONTEXT

DIGITAL EVOLUTION INDEX: LATIN AMERICA & CARIBBEAN EDITION

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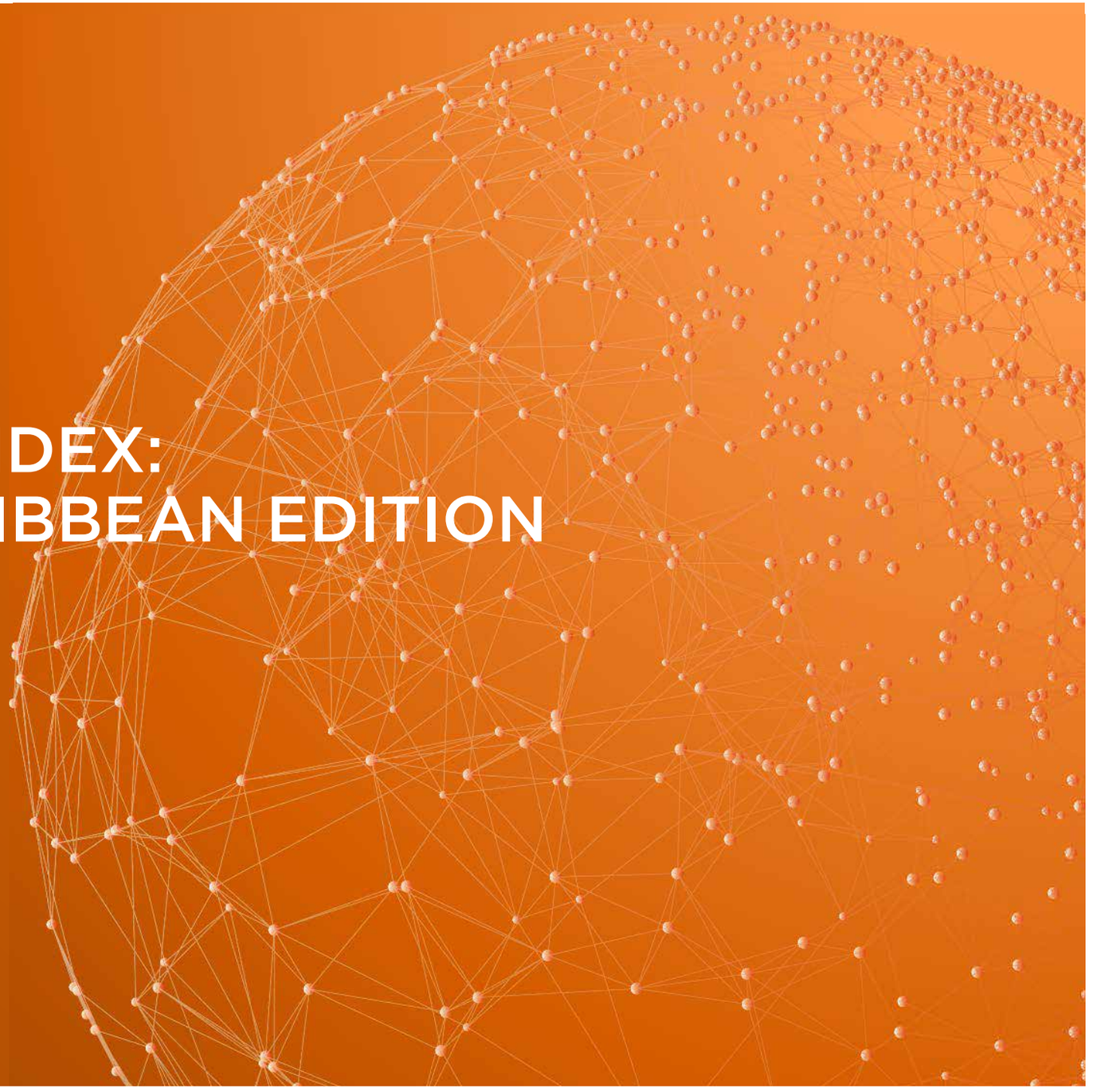

FLETCHER

The graduate school of global affairs at Tufts University

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EXECUTIVE SUMMARY

- The Digital Evolution Index: Latin America and Caribbean Edition (DEI LAC) is a data-driven study of the pace of digital growth in 24 LAC countries across four key drivers of supply, demand, institutional environment, and innovation. It utilizes 99 unique indicators measured over a ten-year period (2008 – 2017) to create an overall digital evolution score and digital momentum score.
- The region is experiencing a digital growth spurt. Nearly half of the 24 LAC markets included in the study demonstrate moderate momentum. A few countries are advancing rapidly: Chile, Costa Rica, Uruguay, Mexico and Colombia are leading the way, both in the state of digital evolution and their rate of progress i.e., digital momentum.
- While LAC has a tremendous potential for digital growth, it is in the middle band of digitalization globally. Governments and businesses need to do a lot more to advance LAC to the state and pace of global digital exemplars such as Estonia, Israel, New Zealand, and the UK particularly in terms of improving digital infrastructure, fostering innovation, and expanding digital and financial inclusion, and promoting digital economy friendly policies.
- There is a significant headroom for improvement in digital and financial inclusion. While access conditions have improved over the years, a large number of people in region remain unconnected or under-connected, unbanked or under-banked. Over a third of the region is yet to experience the internet; women, young adults, and the poorest 40% in LAC are among the unbanked, according to the World Bank's 2017 Global Findex survey.
- The DEI LAC demonstrates that LAC countries are at a crucial turning point – with the right mix of digital-first policy interventions, supply infrastructure stimuli, and a push to improve digital and financial inclusion, the region can unlock its true digital potential.

THE DRIVERS OF DIGITAL EVOLUTION

The Digital Evolution Index: Latin America and Caribbean Edition (DEI LAC) analyzes the underlying drivers that govern a country's digitalization: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. To gain a comprehensive view of digital readiness and competitiveness of countries in the region, we further divided these drivers into 12 components measured using a total of 99 indicators. The four drivers, 12 components, and sample indicators are illustrated below:

Demand

Consumer Capacity to Engage
Indicators measure the ability, willingness and gender makeup of consumers.

Digital Payment Uptake
Indicators measure the use of digital money among consumers and the overall financial inclusion makeup in-country.

Digital Uptake
Indicators measure how fast consumers are adopting technology, connecting to networks, and consuming digital products.

Supply

Access Infrastructure
Indicators measure how accessible, secure, and sophisticated in-country infrastructure is.

Transaction Infrastructure
Indicators measure how fast adoption and accessibility of electronic payment methods have progressed.

Fulfillment Infrastructure
Indicators measure how traditional transport infrastructure and possible bottlenecks have developed

Institutions

Institutions & the Business Environment
Indicators measure the legal and bureaucratic environment in-country.

Institutions & the Digital Ecosystem
Indicators measure e-governance, government facilitation of ICT, competition within the digital ecosystem.

Institutional Effectiveness & Trust
Indicators measure how transparent, effective, and faciliatory institutions in-country are.

Innovation

Innovation Inputs
Indicators measure how financing, startup capacity, and how much talent availability exists in-country.

Innovation Process Development
Indicators measure which countries have developed the best business practices and invest in research and development.

Innovation Outputs
Indicators measure the depth of mobile engagement, innovation reach, and digital social entertainment in-country.

DIGITAL EVOLUTION INDEX: LATIN AMERICAN AND CARIBBEAN EDITION (DEI LAC): SCORES AND RANKINGS

SCORE

RANK	COUNTRY	SCORE
1	Chile	58.7
2	Puerto Rico	54.7
3	Bahamas	53.3
4	Uruguay	53.0
5	Costa Rica	52.6
6	Panama	51.8
7	Barbados	50.0
8	Trinidad and Tobago	48.4
9	Argentina	47.7
10	Mexico	47.6
11	Brazil	47.6
12	Colombia	46.4
13	Jamaica	45.8
14	Dominican Republic	45.1
15	Peru	44.7
16	Ecuador	43.7
17	Guatemala	43.0
18	Belize	42.2
19	Honduras	41.6
20	Paraguay	40.3
21	El Salvador	39.5
22	Bolivia	37.6
23	Nicaragua	37.6
24	Venezuela	32.1

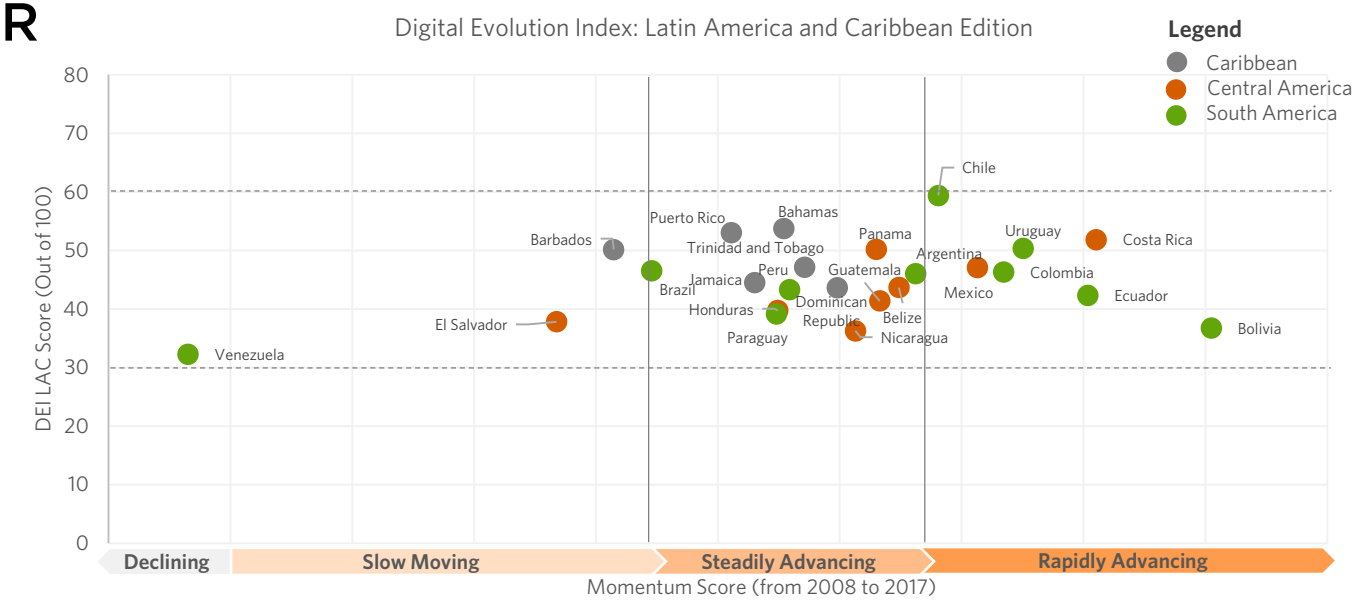
MOMENTUM

	RANK	COUNTRY	SCORE
Rapidly Advancing	1	Bolivia	4.1%
	2	Ecuador	3.7%
	3	Uruguay	3.4%
	4	Mexico	3.3%
	5	Costa Rica	3.3%
	6	Colombia	3.2%
	7	Argentina	3.0%
	8	Chile	2.9%
	9	Dominican Republic	2.7%
Steadily Advancing	10	Panama	2.7%
	11	Guatemala	2.6%
	12	Jamaica	2.6%
	13	Nicaragua	2.5%
	14	Trinidad and Tobago	2.5%
	15	Peru	2.5%
	16	Paraguay	2.4%
	17	Honduras	2.3%
	18	Belize	2.2%
	19	Puerto Rico	2.2%
	20	Bahamas	2.0%
	21	Brazil	2.0%
Slow Moving	22	Barbados	1.6%
	23	El Salvador	1.5%
	24	Venezuela	-0.1%

DIGITAL MOMENTUM: AN EXPLAINER

The competitiveness of a country's digital economy is a function of two factors: its current state of digitalization, as determined by the interplay of the four drivers mentioned above, and—more importantly—its pace of digitalization over time, as measured by the growth rate of a country's digitalization score over a ten-year period (2008—2017). This pace of digitalization, which we refer to as momentum, is a lead indicator of a country's future digital potential and prospects.

We arrayed countries' latest year (2017) score (state of digitalization) on the vertical axis against the growth rate over a ten-year period (pace of digitalization) on the horizontal axis to create the DEI LAC Chart. This chart helps to classify countries in the region into three main groups based on their digital momentum: rapidly advancing; steadily advancing; and slow moving. Venezuela is in a group of its own: Declining.



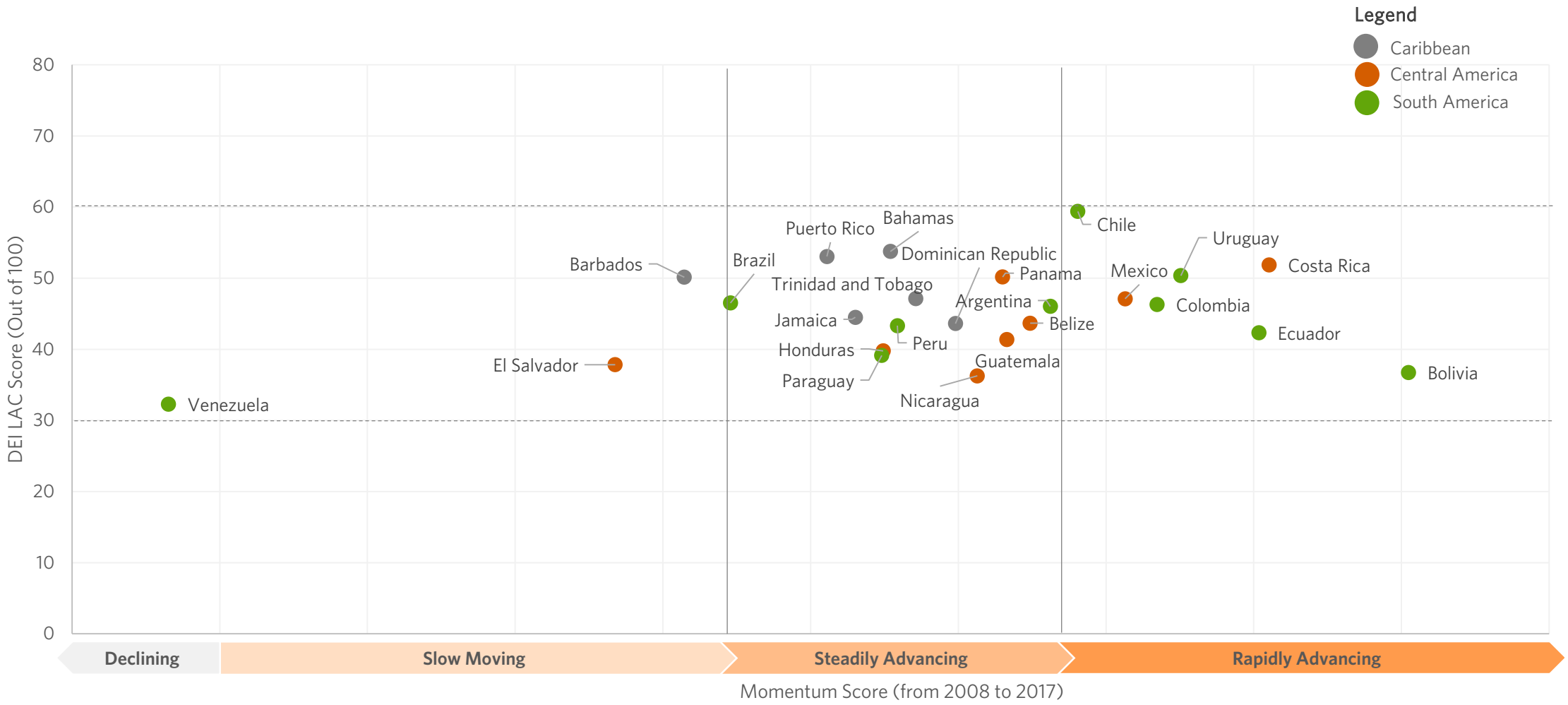
Rapidly Advancing: These countries have made the greatest digital progress since 2008. They are propelled by the relative stability of their institutions, pockets of innovation, and recent improvements in information and communication technology (ICT) infrastructure to cater to the growing demand for digital goods and services.

Steadily Advancing: These countries are making progress but not to the full extent of their potential. Their momentum is hobbled by relatively weak infrastructure and poor institutional quality.

Slow Moving: These countries face significant challenges. Severe infrastructural gaps, institutional constraints, and a low sophistication of consumer demand are holding these countries back.

The final group, **Declining**, represents negative momentum from 2008 to 2017. Venezuela, with its worsening economic crisis, is the sole inhabitant of this group.

THE DIGITAL EVOLUTION INDEX: LATIN AMERICA & CARIBBEAN EDITION (DEI LAC)



METHODOLOGY OVERVIEW

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The Digital Evolution Index: Latin America and Caribbean uses a total of 99 indicators to measure the state and quality of digitalization in a country. It is structured at four levels: indicators, clusters, components, and drivers. Indicators are data points that answer a specific question. Clusters are a statistical grouping of indicators that are normalized, scaled, and weighted to create standardized values for the purposes of analysis and comparison; they combine and capture information from several indicators to illuminate a particular aspect that impacts digitalization as defined above. Combinations of clusters roll up to form components, which are the building blocks for the drivers. Components are built to provide a comprehensive understanding of factors that shape and define the drivers.

Sample of model structure:

Question Answered	Indicator	Cluster	Component	Driver
How much of the population is covered by any mobile cellular telephony?	Percentage of the population covered by a mobile cellular telephone network	Communications Sophistication	Access Infrastructure	Supply
How much of the population is covered by basic mobile broadband?	Percentage of the population covered by at least a 3G mobile network			
How much of the population is covered by high speed mobile broadband?	Percentage of the population covered by at least an LTE/WiMAX mobile network.			
How much bandwidth is available?	International Internet bandwidth (bit/s) per Internet user	Access Availability		
Does ICT improve or hurt access to basic services?	Impact of ICTs on access to basic services			

Indicator Weightings

Indicators are given weights depending on a variety of factors, such as:

- Data quality: Indicators that required more estimations, owing to patchy coverage across countries or years or both, were weighted lower than those with fewer estimations.
- The strength of the data collection methods: Since we only use secondary data, we studied the data gathering processes deployed by the sources of said data. We assigned greater weights to indicators that had more robust processes of data collection. Similarly, we assigned greater weights to observational data over survey data.
- Centrality: The importance of the indicator within its cluster/cluster within its component. Foundational measures, on which many other measures are dependent, were weighted more highly than those that had fewer multiplicative effects.

Driver Weightings

The central hypothesis of the Digital Evolution Index is that digitalization of a country, which we define as "a process where every day human interactions and transactions—with the government, businesses, and fellow humans—and consumption of goods, services, information, and ideas are primarily conducted through the use of the internet and internet-based technologies and services," is governed by four drivers of equal importance: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. Our model, therefore, accords equal weights to all four drivers.

METHODOLOGY OVERVIEW

Momentum Scores

Momentum scores are generated using the compound annual growth rate formula (CAGR). This value represents the mean annual growth rate of the scores over the period of time that the index covers (in this case 2008-2017). The CAGR method, by smoothing out changes in the growth rates over the years, allows us to describe the rate at which the index score is changing for a particular country over time. We like this method because it is a well-tested and robust approach that stakeholders in business and public policy can easily understand and utilize.

Computation of Scaled Scores

Indicators drawn from a variety of sources are scaled to a five-point scale for comparability, to arrive at a high score and a low score. Data scaling is executed by multiplying the data point of a given country by a scale factor. The scale factor is calculated by finding the ratio of the difference between the data point and the minimum value data point in the set and the overall range of the data. This ratio is then multiplied by a factor of 5. In this way, the maximum determined data point in a set will have an index value of 5, while the minimum value in the data set will have an index value of 0. The scaling formula we deployed:

Scaled Value = 5(data value-minimum)/(maximum-minimum)*

The maximum value data point in the set is determined by examining the maximum value data point in a given set excluding any extreme outliers. If there is an extreme outlier in the data set, a maximum value is set as the next highest data point value, and the outlier is given the maximum possible score of a 5.

Estimations

Data quality and veracity issues abound in Latin America and the Caribbean. We imputed missing data using a variety of techniques. For certain indicators, we deployed the spline interpolation method (AMELIA II), using appropriate base factors.

A note on Puerto Rico

Puerto Rico, an unincorporated territory of the United States, endured much damage to its infrastructure from Hurricane Maria in 2017. All estimations for Puerto Rico have been extrapolated based on available data which, for the most part, have been recorded pre-Maria.

More information about our methodology can be found in our Digital Planet 2017 Report.

DATA SOURCES

- Akamai Technologies
- Blue Triangle Technologies
- Euromonitor
- Freedom House
- GSMA
- ILO
- ITU
- Mastercard
- Numbeo
- PCRI
- Wikimedia
- World Bank
- World Economic Forum

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ABOUT US

DIGITAL PLANET

Digital Planet is an interdisciplinary research initiative of The Fletcher School's Institute for Business in the Global Context. Dedicated to understanding the impact of digital innovation on the world, Digital Planet provides actionable insights for policymakers, businesses, investors, and innovators.

INSTITUTE FOR BUSINESS IN THE GLOBAL CONTEXT

The Institute for Business in the Global Context (IBGC) connects the world of business to the world. It is the hub for international business at The Fletcher School, the oldest graduate school of international affairs in the United States. The Institute takes an interdisciplinary approach, preparing global leaders who can cross borders of many kinds and integrate business skills with an understanding of the geopolitical, legal, financial, security, macroeconomic, humanitarian, and environmental impacts on business. The Institute is organized around four core activity areas: education, research, dialogue and a lab. The Master of International Business degree and leadership development programs are at the heart of the education mission. These offerings, coupled with original research in multiple areas — inclusive growth, digitalization, innovation and economic development at scale, sovereign wealth and global capital flows, among others — facilitate a vibrant dialogue on contemporary global issues through conferences, symposia and speaker events. The lab creates opportunities for student teams to take knowledge into the "field" to effect change through entrepreneurial startups and consulting projects. The Institute also houses the Council on Emerging Market Enterprises, a think tank comprising distinguished practitioner-scholar experts, who collaborate with the Institute and The Fletcher School on a variety of initiatives, such as research programs, symposia, and conferences.

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