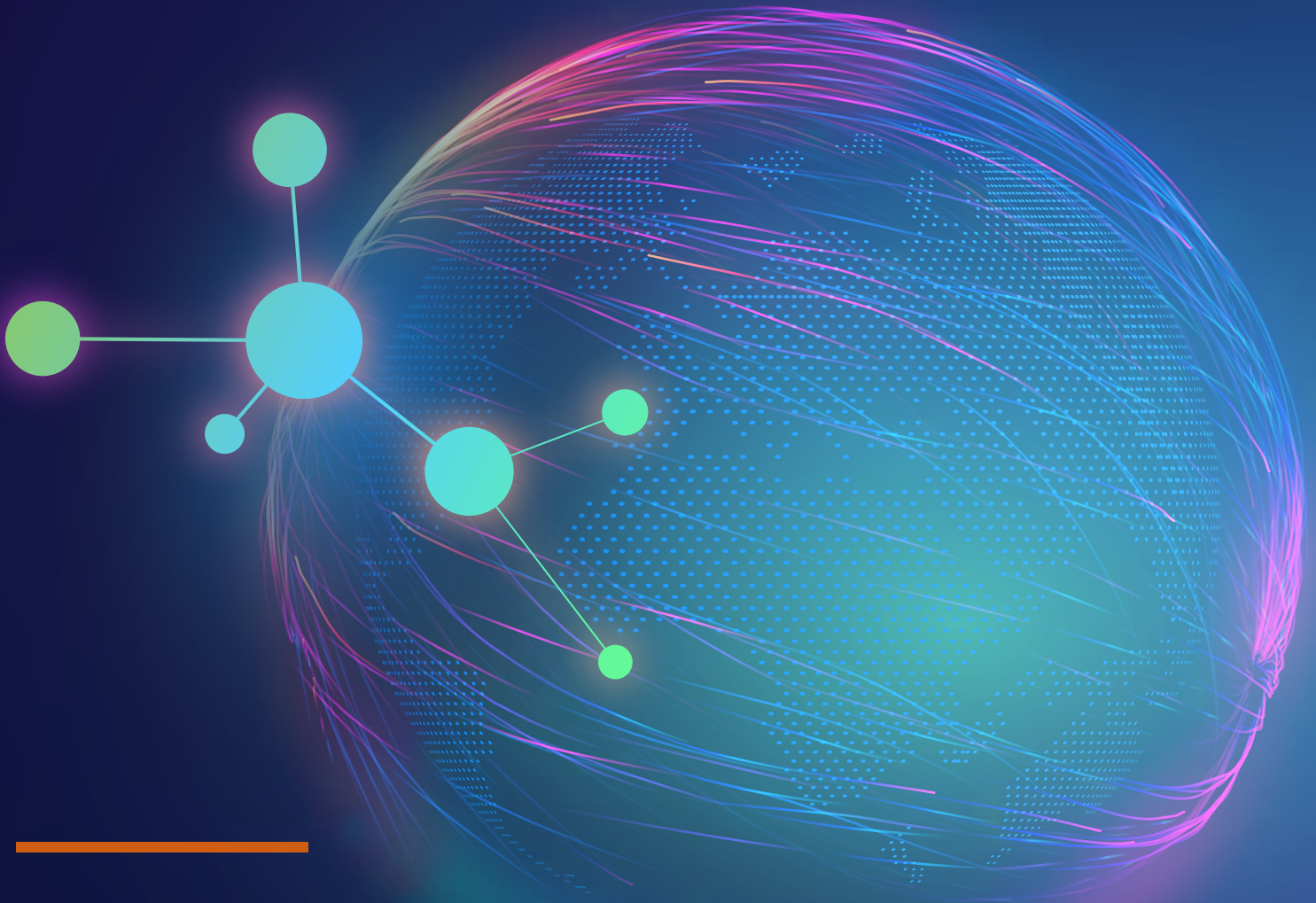


DIGITAL PLANET 2025

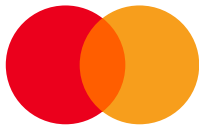
From the COVID Shock to the AI Surge:
How 125 Digital Economies Around the
World Are Evolving and Changing



Bhaskar Chakravorti, Ravi Shankar Chaturvedi,
Christina Filipovic, and Xue Niu

April 2025

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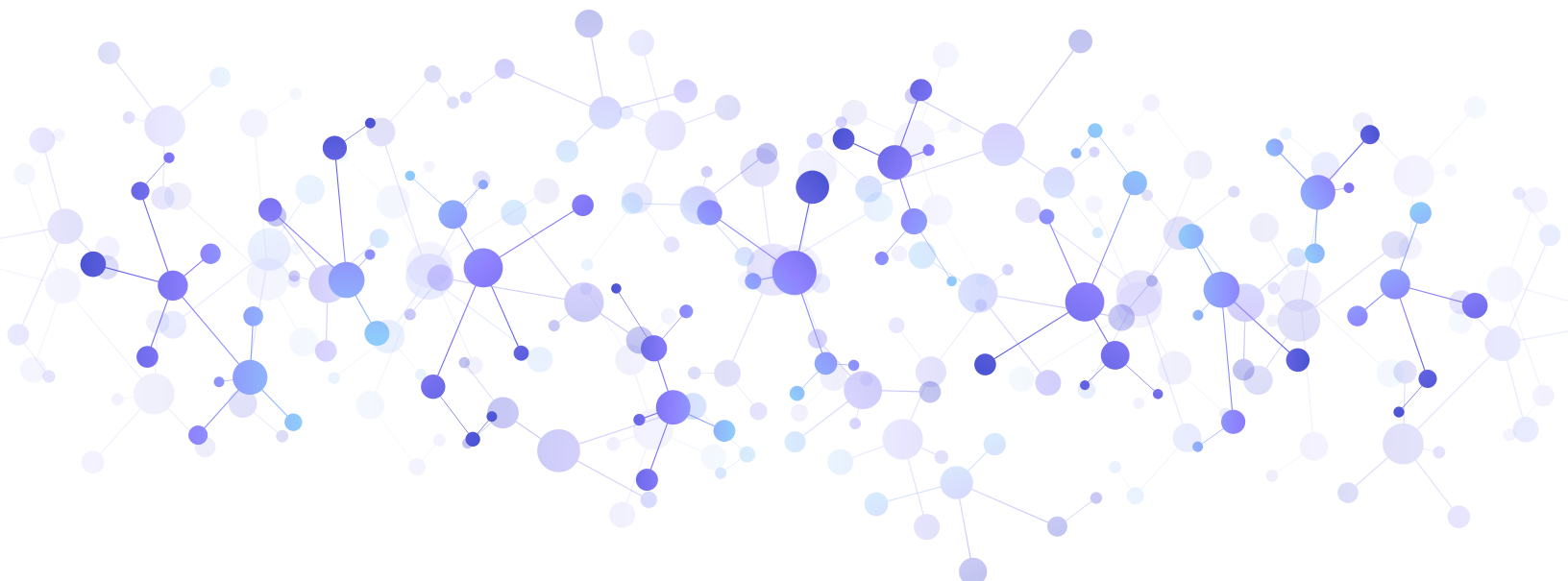
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Executive Summary

In 2020, as the planet paused for a pandemic, we measured the evolution of 90 economies on the Digital Planet in the third edition of our Digital Planet report. We observed:

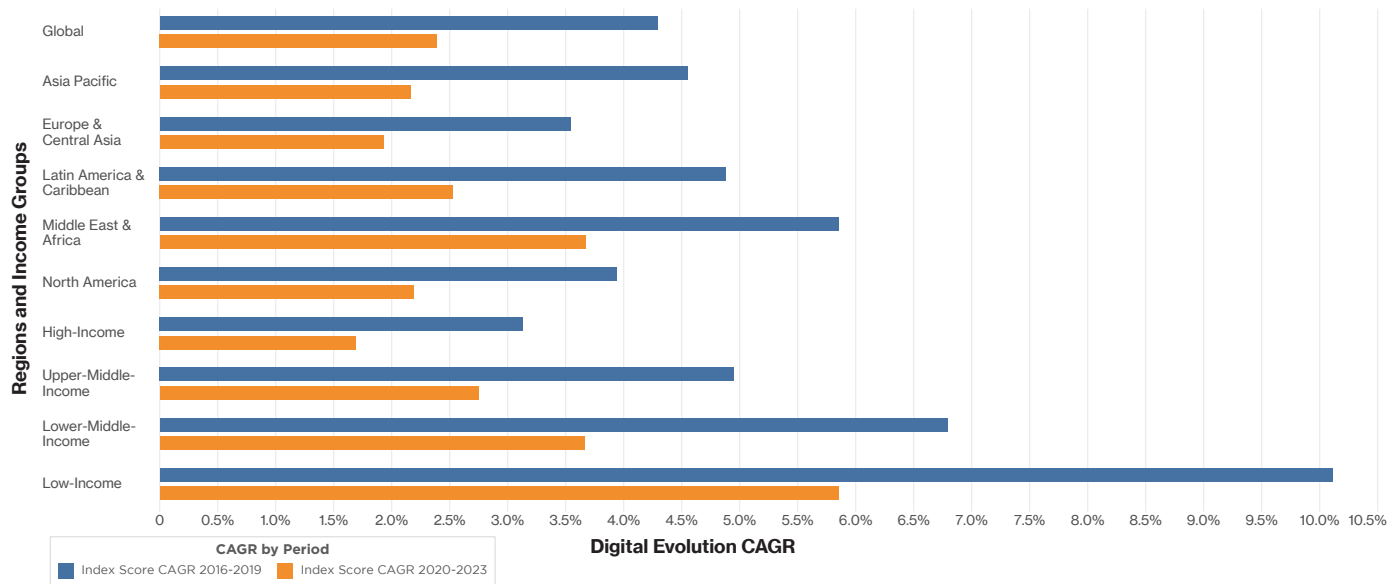
We are experiencing the purest test of the internet imaginable even as we endure the unimaginable—and are quickly discovering how able the internet and its applications are to recreate a facsimile of life as usual, as well as their limitations. This forced dependence on digital systems will, no doubt, accelerate the process of evolution and profoundly impact the state of trust in all things digital. An additional essential lesson this pandemic has taught economies around the world is that the reach and resilience of digital infrastructure and quality of digital inclusion may not be an option anymore but an obligation that nations owe to their citizens.

Today, we analyze and write with the benefit of hindsight and data. The pandemic era nurtured many new digital technologies, companies, and trends—some with more lasting influence and staying power than others. Contactless payments took off during the pandemic; their growth has been nearly ubiquitous in most parts of the world, owing to some combination of strong government support, active infrastructural push by market actors, and, most importantly, a strong consumer preference for a safe, secure, and contact-free transaction alternative to cash at the height of the pandemic.

Videoconferencing also took off due to a shift to remote and hybrid work. Like contactless payments, this was more feasible and durable in countries with solid digital infrastructures and jobs amenable to remote work.¹ Contrary to expert predictions,² some trends, like digitally enabled home fitness, proved less sticky.

In 2020, with the internet as the only tether holding the economy and society together in most parts of the world, the pandemic morphed how we buy, sell, dwell, socialize, work, play, and pay, creating a tremendous groundswell for producers and purveyors of digital technologies in its wake. Claims like “we’ve seen two years’ worth of digital transformation in two months”³ seemed plausible and valid. While that may have been and indeed still may be true for many technology businesses, a careful analysis of the pre-pandemic and post-pandemic trends in the global digital economy reveals a different and somewhat nuanced picture.

First, the emerging post-pandemic story of the digital planet is not one of rapid digital transformation but rather slowing growth. From the pre-pandemic period of 2016 to 2019, the average digital compound annual growth rate (CAGR) of all countries was 4.3%. Post-pandemic (2020-2023), this digital growth rate dropped by 1.9 percentage points to just 2.4%. Across all regions and income groups, digital growth post-pandemic was slower than pre-pandemic. While a handful of countries bucked this relative digital deceleration trend, they were more the exception rather than the rule. These trends hold even when we mute the effect of the pandemic year (2020) and consider the growth rates three years before (2016-2019) and three years after (2021-2023) the pandemic.

Figure 1**Digital Evolution: Pre-and Post-Pandemic Growth Rates**

We also witnessed uneven resilience across countries—while more advanced economies tend to have slower growth consistently, the drop between pre- and post-pandemic digital growth in high-income (1.4 percentage point drop) and upper-middle-income (2.2 percentage point drop) countries was less severe than lower-middle income (3.1 percentage points) and low income (4.3 percentage points) countries. North America, Europe & Central Asia proved more resilient than Latin America & the Caribbean, and Asia Pacific.

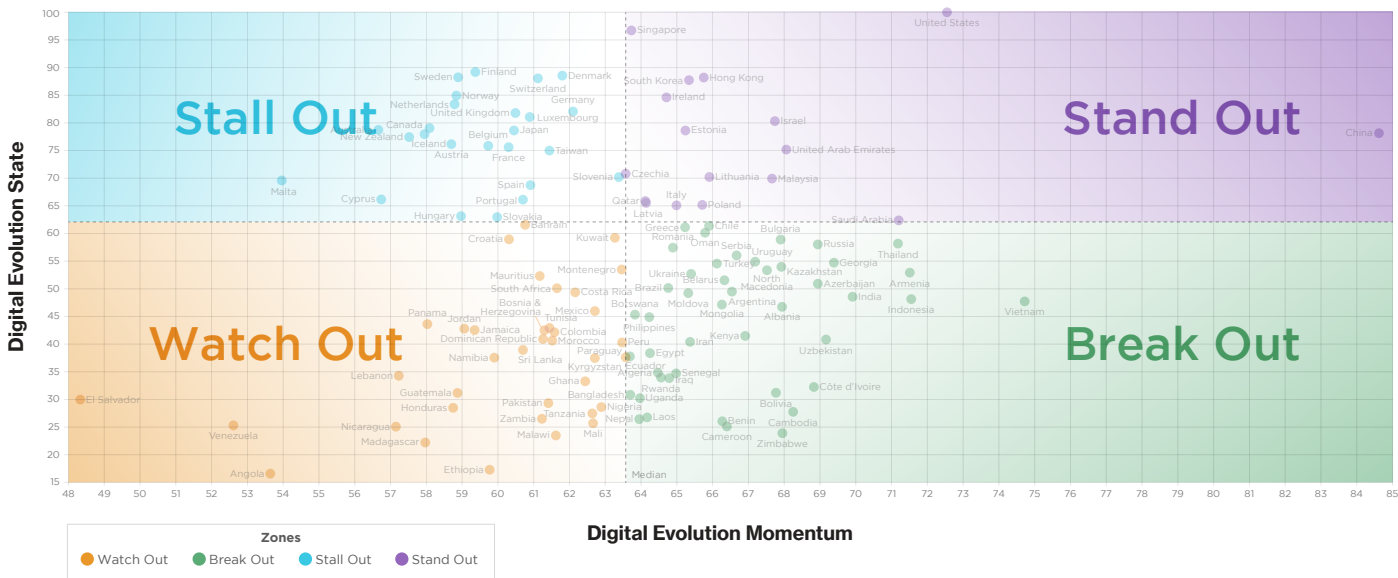
This global digital deceleration is particularly noteworthy in our demand and institution metrics. Gender and (socio-economic) class digital inclusion metrics appear to be plateauing. Since 2019, institutions' ability to regulate technological innovation, foster trust, and achieve bureaucratic efficiency has stagnated.

The softening in digital inclusion and institutional effectiveness represents more than just a pause in progress—it's a critical inflection point. Even as these foundational aspects of the digital ecosystem show signs of stagnation, we find ourselves on the cusp of another technological revolution. With the pandemic in the rearview, the emergence of AI⁴ poses both a challenge and an opportunity for countries, corporations, consumers, and the global commons alike. The pandemic and its aftermath have contributed to accelerating the Artificial Intelligence (AI) of everything while decelerating the inclusion of everyone;⁵ the goal of a digital economy that works for everyone, everywhere by 2030⁶ risks remaining elusive in the absence of collective action.

In this evolving context, we present the latest edition of the Digital Evolution Index. The Index is a data-driven holistic evaluation of the progress of the digital economy over a sixteen-year period (2008 – 2023) in the current edition across 125 economies, combining 184 indicators for each year drawn from public, paywalled, and proprietary data sources. Digital Evolution is shaped by four drivers: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. The resulting framework captures both the state and rate of digital evolution and identifies implications for investment, innovation, inclusion, and institutional policy priorities.

The Digital Evolution framework segments 125 economies into four zones: Stand Outs, Stall Outs, Break Outs, and Watch Outs.

Figure 2
Digital Evolution: State & Momentum



Within the Stand Out segment, two economies are particularly notable as outliers on the map: the United States (highest-scoring) and China⁷ (fastest-moving). Both countries benefit from investment and innovation in AI. China continues to move fast, particularly in Supply and Demand metrics. Notably, as the first country with a mobile-first approach and a primarily mobile-based digital ecosystem to break into the ranks of fast-moving digitally advanced economies, China's trajectory offers an aspirational pathway for populous, high-momentum digital economies like India and Indonesia. China is a fast-mover but is being tailed by Vietnam, the US, and other countries. By 2023, the US pulled ahead of Singapore, buoyed by heavy investment in AI and other innovative technologies.

South Korea and Israel maintain their Stand Out status, consistently performing well across most metrics. Small nations, islands, and entrepôts, like Estonia, Ireland, the United Arab Emirates, Singapore, and Hong Kong,⁸ consistently excel in our Index, demonstrating agility, adaptability, openness, and robust institutional support for innovation. These small but mighty digital entrepôts are the crucial nodes of cross-border data flows. They represent an archetype of how less populous economies can compete and lead the global digital economy by remaining open.

This edition of our Digital Planet report is accompanied by an interactive website facilitating analyses, benchmarking, and comparisons across economies and various parameters. Our [digital evolution interactive](#) offers data, insights, and international comparisons to guide decision-makers to chart a path out of the challenges of the early 2020s and toward a data-enabled, artificial intelligence-augmented, and inclusive digital future.

The map below captures the digital evolution trajectories of 125 economies. We assess the competitiveness of a country's digital economy as a function of two factors: its current state of digitalization and its pace over time, as measured by the CAGR of digital growth from 2008 to 2023. We arrayed countries' latest year (2023) score (state of digitalization) on the vertical axis against the growth rate (pace of digitalization) on the horizontal axis to create the Digital Evolution Chart: an atlas for the digital planet. This chart helps classify economies into four trajectory zones: Stand Out, Stall Out, Break Out, and Watch Out.

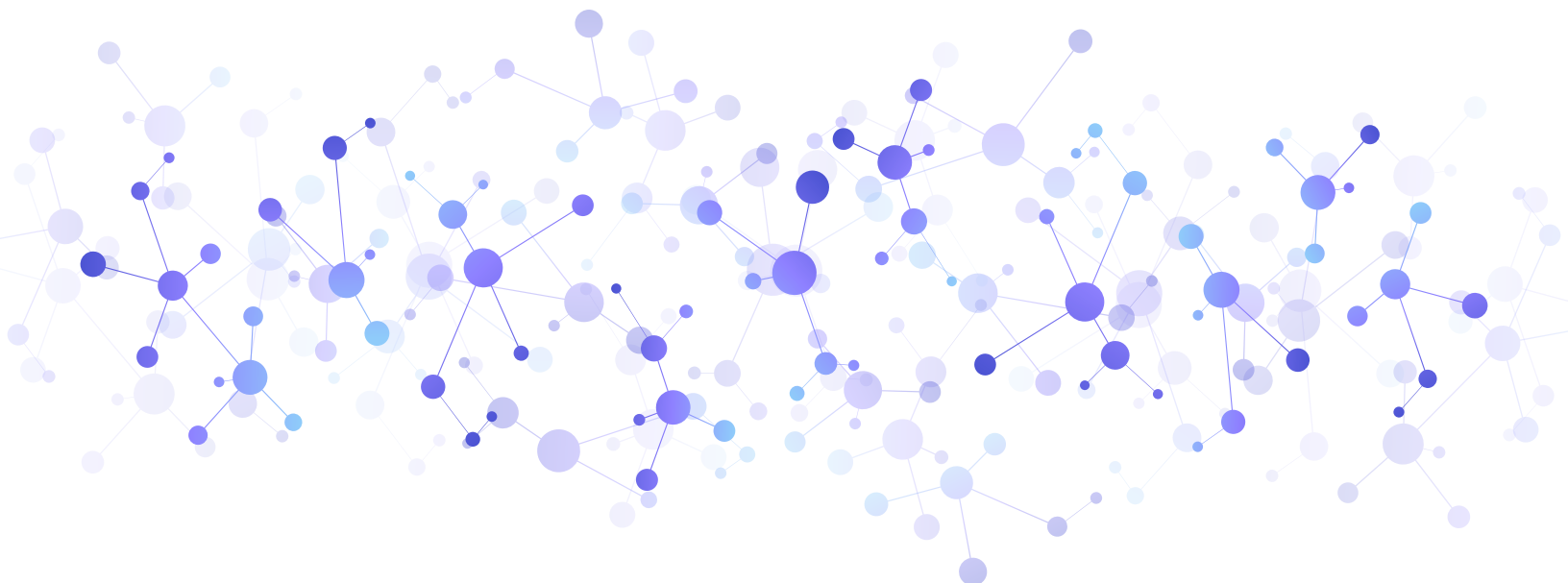
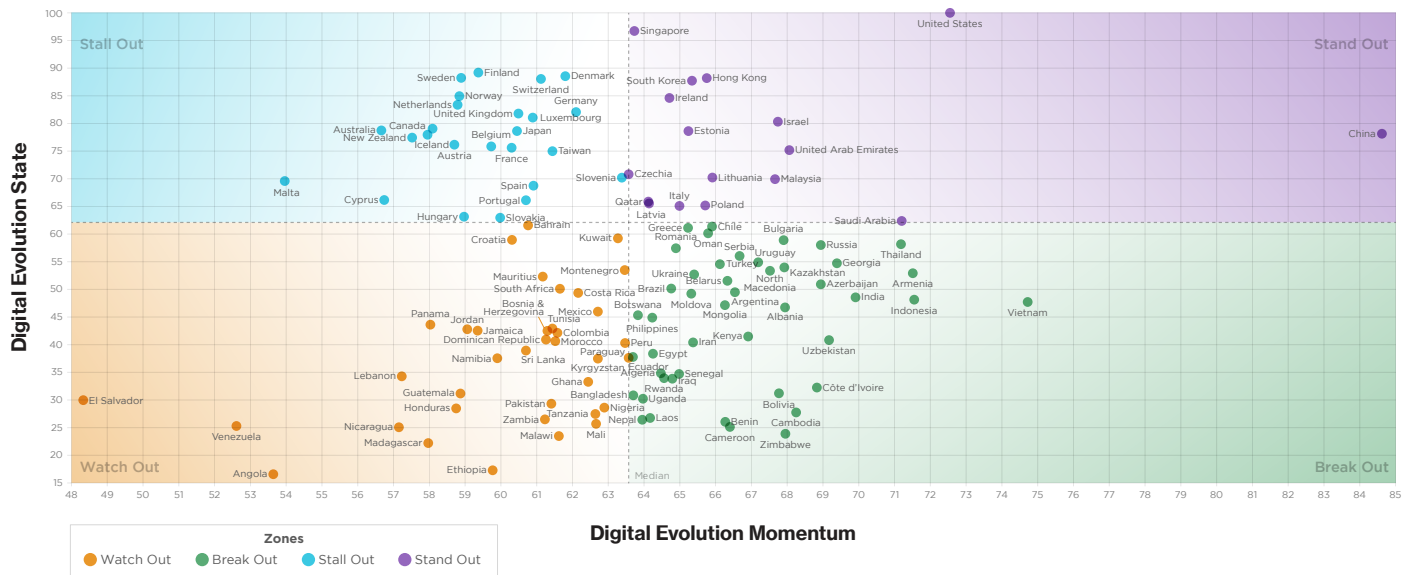


Figure 3

Digital Evolution: State & Momentum



Stand Out economies are highly digitally advanced and exhibit high momentum. They are leaders in driving innovation, building on their existing advantages efficiently and effectively. Their populations exhibit particularly engaged online behavior, and their digital systems provide the most seamless online experience. However, sustaining consistently high momentum over time is challenging, as innovation-led expansions are often lumpy phenomena. To stay ahead, these economies must keep their innovation engines in top gear and generate new demand or run the risk of stalling out.

Stall Out economies enjoy a high state of digital advancement while exhibiting relatively slower momentum. Moving past these “digital plateaus” will require a conscious effort by these economies to reinvent themselves, bet on a rising digital technology in which they have leadership, and eliminate impediments to innovation. To keep from falling behind, Stall Out economies may look to Stand Out economies for lessons in sustaining innovation-led growth. Unlike their Stand Out peers, however, users in Stall Outs tend to experience greater rates of digital inclusion. Evidence suggests these economies may be trading off accelerated growth to introduce regulations and policies to sustain greater social equity, data protections, and trusting attitudes.

Break Out economies are lower scoring in their present states of digitalization but are evolving rapidly. The strong momentum of Break Out economies and their significant headroom for growth would make them highly attractive to innovators and investors. Break Out economies exhibit some of the most optimistic attitudes toward digitalization and technology. Held back often by relatively weak infrastructure and poor institutional quality, Break Out economies would do well to foster better institutions that can help nurture and sustain innovation and invest in improving the quality and depth of access. Break Out economies have the potential to become the Stand Out economies of the future with economies such as Thailand, India, Indonesia, Vietnam, Kenya, and Georgia leading the pack.

Watch Out economies face significant challenges with their relatively lower state of digitalization and slower momentum. With digital weakness on most fronts, Watch Out economies hold the most skeptical attitudes toward digitalization and technology. Still, some of these economies demonstrate creativity in the face of severe infrastructural gaps, institutional constraints, and low sophistication of consumer demand. The surest way for these economies to improve on momentum would be to improve access to the internet for their masses by going beyond merely closing the mobile internet gap—that is, the difference between the number of mobile phones and the number of mobile phones with internet access—into laying down terrestrial broadband infrastructure and bringing more of their citizens into the digital present. Moreover, for the Watch Out economies that demonstrate engaged online behaviors, the key may be in determining how to channel this incipient digital consumption activity into digitally enabled economic growth and gainful employment.

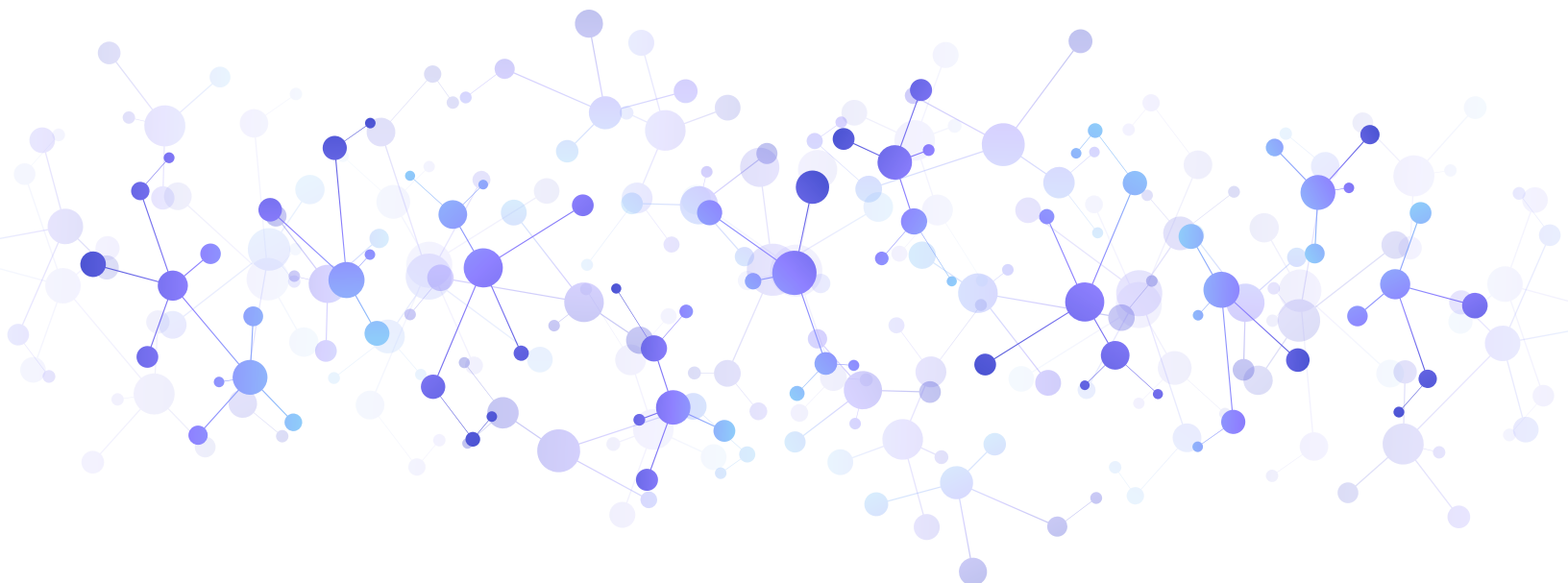
Our analysis of the global digital economy in this edition yields six major takeaways

1. **Post-Pandemic Digital Deceleration:** In the aftermath of the pandemic, global digital growth has slowed significantly compared to pre-pandemic years, with the average compound annual growth rate dropping from 4.3% (2016-2019) to 2.4% (2019-2023). While a few countries like Israel and Bahrain resisted this trend, most experienced slower growth, particularly in lower-income countries where the drop was more severe. Advanced economies showed greater resilience, especially in North America and Europe. The slowdown was most notable in demand and institutional metrics, with digital inclusion and institutional effectiveness stagnating.
2. **Progress to Digital Parity:** Digital deceleration was not just seen across countries but within them as well—measures of digital parity slowed or stalled in the last few years. At an absolute level, Europe and Central Asia remain at the forefront of gender digital inclusion, whereas countries in Africa and the Middle East fall considerably behind—though they are making the most progress. Low-income countries often face challenges with gender digital inclusion, partly due to weaker economic foundations and social mores. The rural-urban divide appears the most stubborn, with sluggish progress over the past decade. North America and Europe consistently excel in rural digital inclusion, while regions such as Latin America and Africa have experienced slower progress.

3. **The AI Amplification Effect:** Artificial Intelligence is amplifying existing digital advantages, and reinforcing the dominance of digitally advanced countries, suggesting a potential "winner-takes-most, if not all" scenario in the relationship between AI and digital development. Strategic investment in AI is crucial to sustaining digital progress. As AI increasingly drives innovation and competitiveness, countries that fall behind in AI adoption may find it increasingly challenging to close the gap.
4. **The Resilience of Digital Entrepôts:** Having evolved into crucial nodes of cross-border data flows, a group of small nations, islands, and entrepôts—who we identify as 'digital entrepôts'—remained resilient through the pandemic years and beyond and have since been doubling down on their defining attributes of agility, adaptability, openness, and robust institutional support for innovation to extend their advantages into and remain relevant in the AI era. They create a demonstration effect for the rest of the world as to what the future of cross-border cooperation in the AI era might look like.
5. **China's Mobile-First Ascension: A New Model for Digital Advancement:** As one of only two upper-middle-income countries in the Stand Out Zone, China is the first primarily mobile-driven digital economy to achieve this status. While the ownership rate for traditional devices like laptops and personal computers (PCs) in China is about 30 percentage points lower than the Stand Out average, the gap in smartphone ownership is just 2%. China's journey from Break Out to Stand Out highlights its success with the widespread use of mobile-optimized super apps and greater digital inclusion across various income groups. China's entry into the Stand Out zone serves as an aspirational model for other mobile-first break out nations, such as India, Indonesia, and Vietnam, that are looking to accelerate their digital advancement.
6. **Europe's Three-Speed Digital Transformation: Established, Surging, and Emerging:** Our analysis of Europe's digital landscape reveals the emergence of three distinct clusters of digital development, each with unique characteristics, challenges, and opportunities. These three groups—Established, Surging, and Emerging economies—are creating a 'Three-Speed Europe'. The three-speed nature of Europe's digital landscape creates a unique ecosystem of interdependent development, with several implications for the EU's stated ambitions of transforming the zone into a single digital market. Established economies offer institutions and governance models refined over decades of digital evolution. Surging economies demonstrate practical pathways to balanced digital growth, bridging high performance with continued momentum. Emerging economies showcase innovative approaches to rapid digital adoption that sometimes bypass traditional development stages altogether. This interconnected development ecosystem positions Europe uniquely in the global digital landscape. The continent contains within itself microcosms of nearly every stage of digital development, creating natural laboratories for policy experimentation and knowledge transfer. Despite varying transformation speeds, Europe's digital future will likely be shaped by how effectively these three groups learn from each other and collaborate on shared challenges in the global digital economy.

Regional Patterns and Insights: Using advanced cluster analysis methods, we developed three distinct archetypes within each region:⁹ Leaders, Linchpins, and Leapfrogs. This archetypal analysis allows us to go beyond the zonal classifications and shine a light on the trajectories of specific economies, which can serve as aspirational benchmarks for other countries desirous of replicating their success.

- **Leaders:** These countries perform strongly on state scores, particularly focusing on supply and institutional metrics. They have robust digital infrastructure, supportive institutional frameworks, open markets, and a high level of digital adoption. They often lead in innovation and set standards for other countries. Some, as digital entrepôts, tend to play an outsized and critical role in the cross-border flows of data. Examples typically include advanced economies with well-established digital ecosystems. In addition to the Stand Outs mentioned above, Japan, Singapore, Luxembourg, Estonia, Costa Rica, Chile, Uruguay, and the United Arab Emirates all emerge as digital leaders in their respective regions.
- **Leapfrogs:** These countries show strong momentum scores in any or all of the four drivers (Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change) over any given time period. Leapfrogs demonstrate a commitment to close the digital gap and the potential for rapid digital transformation by adopting advanced technologies swiftly, often bypassing intermediate stages of digital development. They harness digital advancements to drive significant economic growth and increase their competitiveness. Leapfrogs include countries like Bolivia, Argentina, Egypt, Ukraine, Turkey, Vietnam, Thailand, and Pakistan.
- **Linchpins:** These countries are crucial actors in the global digital economy; they have the heft to shape their domestic and regional digital economies and societies in their likeness. Linchpins might not be the most digitally advanced globally, but they are strategically important due to the size of their digital economy or the number of users. They play a leading role in shaping the norms, rules, regulations, and standards of the global data economy. China, the United States, India, Indonesia, and Brazil are all major linchpins of the global digital economy.



Context

We are at an extraordinary juncture as a global society. On the one hand, these are the worst of times. A combination of human-made poly-crises—an uneven global recovery from the pandemic, climate change causing droughts and floods, wars exacerbating human suffering, food shortages, inflation, and forced displacement—is brewing a perfect storm that imperils every facet of the human condition, puts the poorest and the most vulnerable populations at the greatest risk, and reverses the hard-won economic-, political-, and social-inclusion gains made over the last decade and a half. “There are 745 million more moderately to severely hungry people in the world today than in 2015,”¹⁰ according to a recent UN report, which also warns that at the halfway point to the 2030 deadline, “the achievement of the SDGs is in peril,” with barely 15% of the targets on track.¹¹

On the other hand, the pervasiveness of digitalization, the explosive growth of data and AI, and a growing interest among thoughtful businesses, governments, and philanthropic foundations to nurture AI-enabled innovations by social enterprises and the scaling of digital public infrastructure (DPI) to solve the greatest challenges of our generation suggest that we have the mettle, means, and matériel to meet the moment and turn these into better, more resilient times. AI and DPI allow us to reach more people with essential services like healthcare, education, and financial inclusion and carry in them “the potential to deliver services at scale and increase social and economic opportunities for all.”¹²

While digitalization, AI, DPI, and emerging technologies are no silver bullet¹³ and cannot be expected to solve the coordination problems endemic to economic development¹⁴ or the challenges of the last mile that disadvantaged groups the world over call home,¹⁵ there is a growing consensus among businesses, governments, Intergovernmental Organizations (IGOs), policymakers, philanthropists, and the academy that when combined with the right constellation of actors, institutions, incentives, and interventions, “digital technologies, data, and AI have the potential to accelerate nearly all the SDG targets.”¹⁶ This consensus coalesced into a commitment, The Global Digital Compact—negotiated by 193 member states¹⁷ at the 79th session of the UN General Assembly¹⁸ to “work in collaboration and partnership with the private sector, civil society, international organizations, and the technical and academic communities”¹⁹—which underlines the importance of harnessing emerging technologies, global cooperation, and public-private partnerships to realize the SDGs and a digital economy that works for everyone, everywhere.²⁰

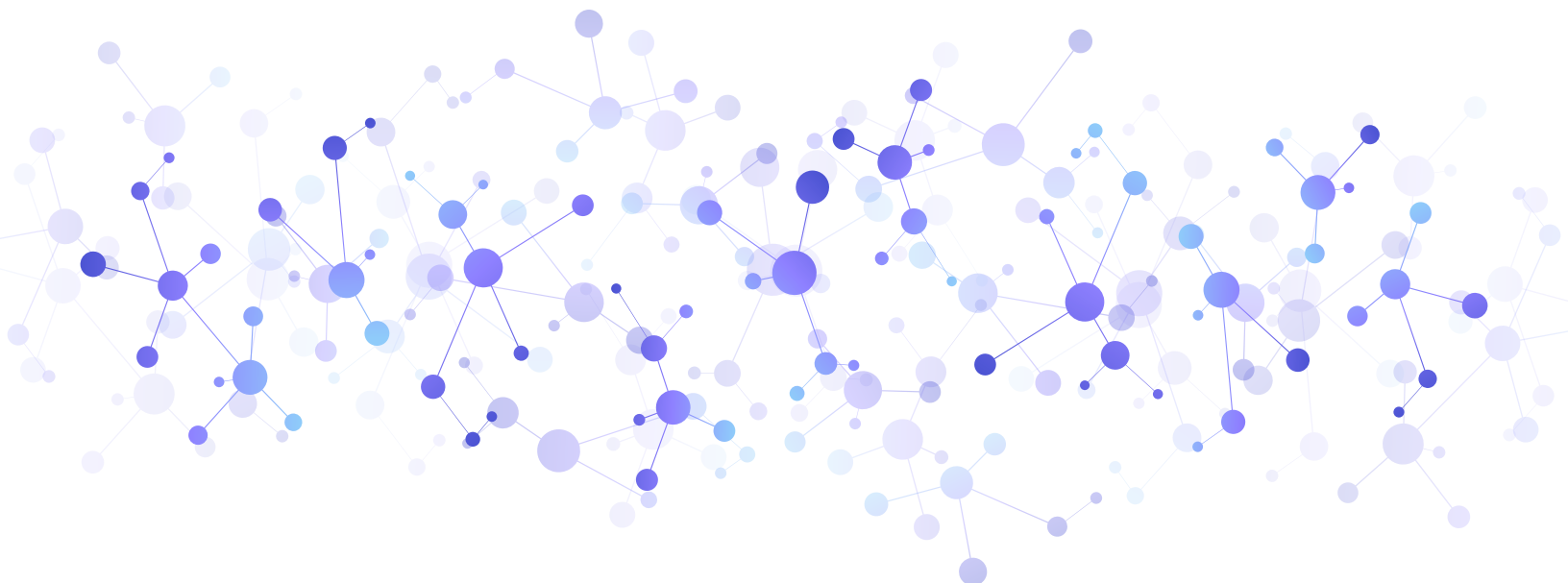
This consensus needs to be backed by coordinated action. We face a very real prospect of a recession in global cooperation²¹ at a moment when it is needed the most. Ajay Banga, the President of The World Bank, was prescient in his warning about the internet of everything happening before the inclusion of everyone.²² We are at the threshold of the era of the AI of everything. The big challenge ahead of the global community is to figure out how to use the AI of everything to advance the inclusion of everyone. The task is all too important, and the time is now.

It is in this turbulent context of geopolitical headwinds and technological tailwinds that The Fletcher School at Tufts University, in partnership with Mastercard, presents the Digital Evolution Index with the hope that it serves as a navigational guide for policymakers and decision-makers to the desired destination of an inclusive and prosperous global digital economy.

This study, and our fourth edition of the digital evolution index, is motivated by the following guiding questions:

- Where in the world is digitalization progressing the fastest?
- What can the fast and advanced digital economies teach their slow and developing peers about closing the gap?
- Is digital leapfrogging possible, and what does it look like? Which economies are exemplars of this phenomenon?
- How close or far are we from a world of digital parity across gender, class, and geographic dimensions? And
- How has the pandemic shaped the digital world?

We endeavored to develop an evidence-based scorecard encompassing 125 economies—complete with an interactive scenario simulator to empower businesses, governments, and policymakers to set and track their inclusive digital transformation goals— to help us find answers to these questions and more in this edition.



The Drivers of Digital Evolution

Figure 4
Digital Evolution Methodology Explained

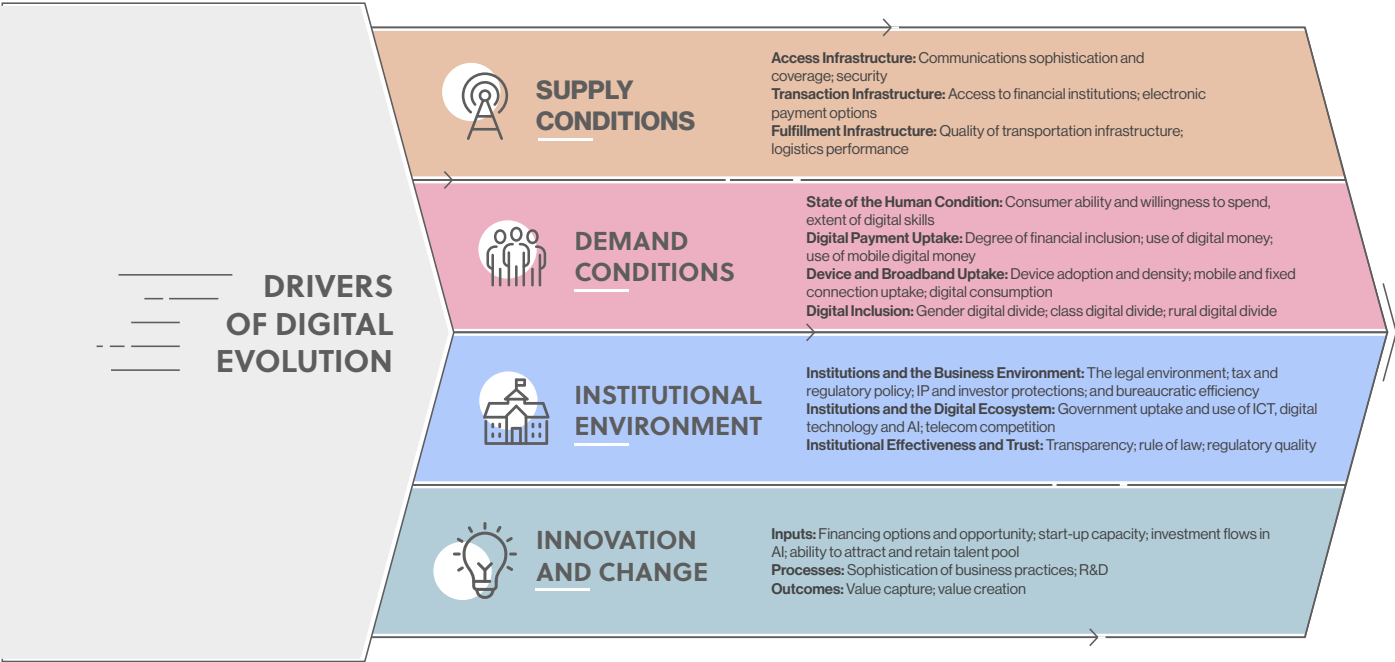
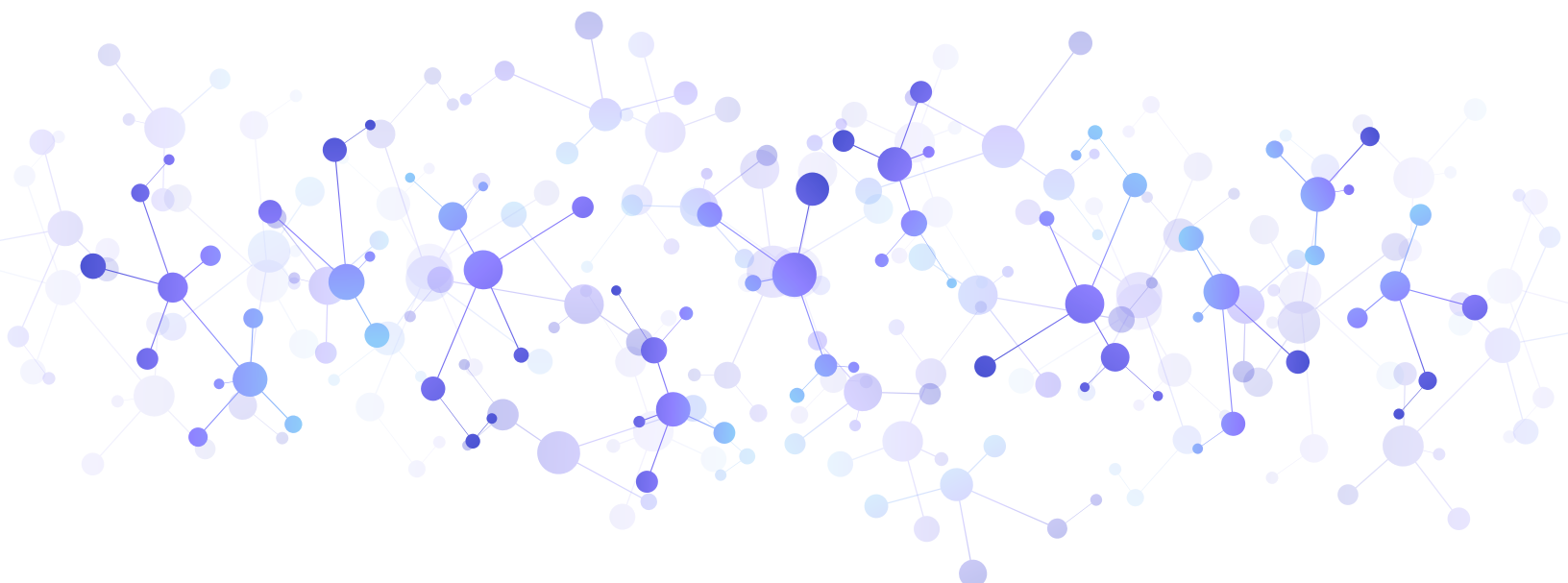


Figure 5

Digital Evolution: State & Momentum



The Four Zones of Digital Evolution

Starting with a baseline of Digital Evolution, the index overlays a momentum score to provide the most comprehensive index to date. The index is then segmented into the following categories:

Stand Out economies are both highly digitally advanced and exhibit strong momentum. They are leaders in driving innovation, building on their existing advantages in efficient and effective ways.

Stall Out economies enjoy a high state of digital adoption despite slowing momentum. They tend to trade off speed for sustainability and are typically invested in expanding digital inclusion and building robust institutions.

Break Out economies, while lower scoring in their current states of digitalization, are evolving rapidly. With such momentum and significant headroom for growth, they are often highly attractive economies to investors.

Watch Out economies face significant challenges with their low state of overall digitalization and low momentum. But despite severe infrastructure gaps, younger demographics in these economies display enthusiasm for a digital future with increased use of social media and mobile payments.

Scores and Rankings

The tables in this section list the 125 economies in the order of their Digital Evolution Scores and Digital Momentum Scores. A higher score represents a higher level of digital advancement. To analyze and compare economies across a variety of parameters including performance across drivers, please visit the [Digital Evolution Index interactive site](#).

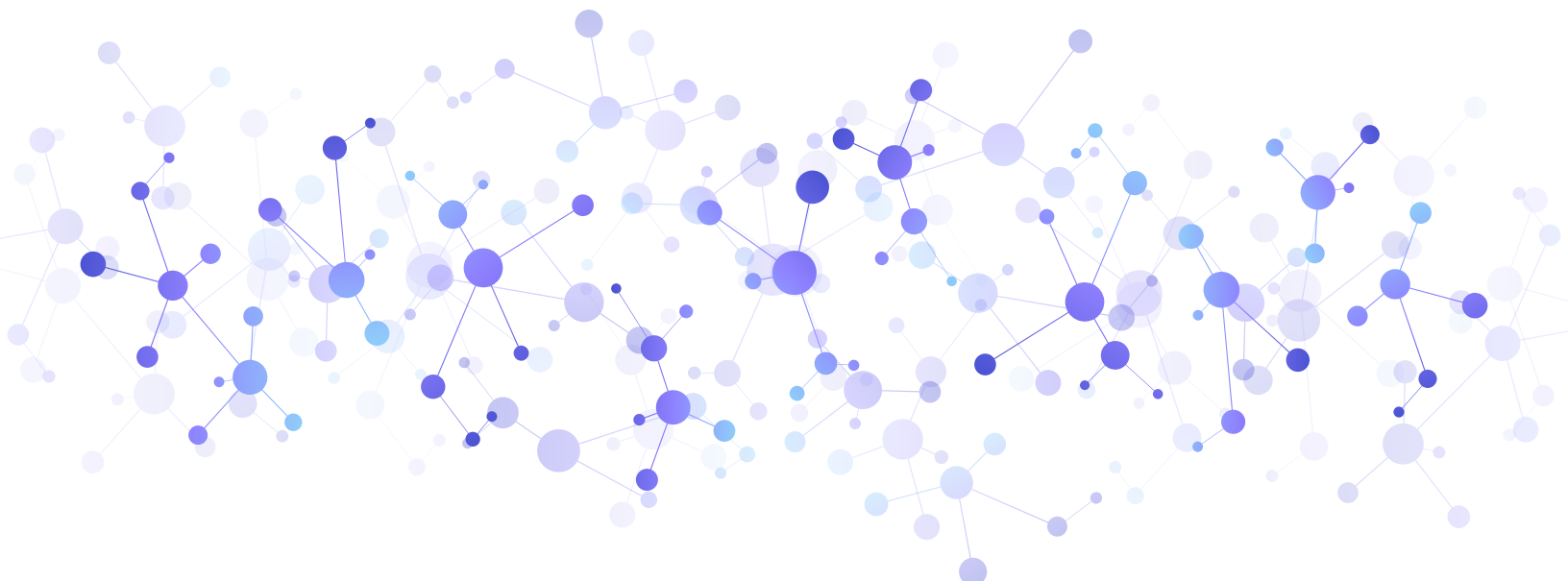


Figure 6
Digital Evolution: State

Rank	Economy	State
1	United States	100.00
2	Singapore	96.72
3	Finland	89.20
4	Denmark	88.55
5	Sweden	88.24
6	Hong Kong	88.20
7	Switzerland	88.05
8	South Korea	87.73
9	Norway	84.94
10	Ireland	84.61
11	Netherlands	83.37
12	Germany	82.06
13	United Kingdom	81.79
14	Luxembourg	81.06
15	Israel	80.32
16	Canada	79.06
17	Australia	78.74
18	Japan	78.63
19	Estonia	78.62
20	China	78.14
21	Iceland	77.96
22	New Zealand	77.44
23	Austria	76.16
24	Belgium	75.85
25	France	75.61
26	United Arab Emirates	75.18
27	Taiwan ²³	74.99
28	Czechia	70.81
29	Lithuania	70.22
30	Slovenia	70.20
31	Malaysia	69.93
32	Malta	69.59

Rank	Economy	State
33	Spain	68.75
34	Cyprus	66.16
35	Portugal	66.12
36	Qatar	65.87
37	Latvia	65.53
38	Poland	65.17
39	Italy	65.09
40	Hungary	63.14
41	Slovakia	62.96
42	Saudi Arabia	62.37
43	Bahrain	61.57
44	Chile	61.36
45	Greece	61.12
46	Oman	60.14
47	Kuwait	59.23
48	Croatia	58.95
49	Bulgaria	58.90
50	Thailand	58.17
51	Russia	58.02
52	Romania	57.44
53	Serbia	56.04
54	Uruguay	54.90
55	Georgia	54.72
56	Turkey	54.56
57	Kazakhstan	53.97
58	Montenegro	53.49
59	North Macedonia	53.36
60	Armenia	52.92
61	Ukraine	52.70
62	Mauritius	52.31
63	Belarus	51.55
64	Azerbaijan	50.92

Figure 6
Digital Evolution: State

Rank	Economy	State
65	Brazil	50.15
66	South Africa	50.11
67	Argentina	49.49
68	Costa Rica	49.36
69	Moldova	49.22
70	India	48.56
71	Indonesia	48.14
72	Vietnam	47.72
73	Mongolia	47.15
74	Albania	46.74
75	Mexico	45.98
76	Botswana	45.33
77	Philippines	44.89
78	Panama	43.62
79	Tunisia	42.92
80	Jordan	42.79
81	Jamaica	42.54
82	Bosnia & Herzegovina	42.50
83	Colombia	42.14
84	Kenya	41.48
85	Dominican Republic	40.92
86	Uzbekistan	40.83
87	Morocco	40.64
88	Iran	40.41
89	Peru	40.30
90	Sri Lanka	38.94
91	Egypt	38.38
92	Ecuador	37.78
93	Paraguay	37.62
94	Namibia	37.55
95	Kyrgyzstan	37.48

Rank	Economy	State
96	Algeria	34.84
97	Senegal	34.70
98	Lebanon	34.28
99	Rwanda	33.95
100	Iraq	33.85
101	Ghana	33.28
102	Côte d'Ivoire	32.25
103	Bolivia	31.21
104	Guatemala	31.17
105	Bangladesh	30.84
106	Uganda	30.23
107	El Salvador	29.97
108	Pakistan	29.33
109	Nigeria	28.62
110	Honduras	28.48
111	Cambodia	27.75
112	Tanzania	27.47
113	Laos	26.75
114	Zambia	26.50
115	Nepal	26.43
116	Benin	26.05
117	Mali	25.69
118	Venezuela	25.30
119	Cameroon	25.13
120	Nicaragua	25.07
121	Zimbabwe	23.89
122	Malawi	23.48
123	Madagascar	22.21
124	Ethiopia	17.29
125	Angola	16.58

Figure 7
Digital Evolution: Momentum

Rank	Economy	Momentum
1	China	84.62
2	Vietnam	74.72
3	United States	72.55
4	Indonesia	71.55
5	Armenia	71.51
6	Saudi Arabia	71.20
7	Thailand	71.18
8	India	69.91
9	Georgia	69.39
10	Uzbekistan	69.17
11	Azerbaijan	68.94
12	Russia	68.94
13	Côte d'Ivoire	68.83
14	Cambodia	68.25
15	United Arab Emirates	68.06
16	Zimbabwe	67.95
17	Albania	67.94
18	Kazakhstan	67.92
19	Bulgaria	67.90
20	Bolivia	67.77
21	Israel	67.74
22	Malaysia	67.66
23	North Macedonia	67.52
24	Uruguay	67.19
25	Kenya	66.91
26	Serbia	66.67
27	Argentina	66.54
28	Cameroon	66.40
29	Belarus	66.33
30	Benin	66.27
31	Mongolia	66.26
32	Turkey	66.12

Rank	Economy	Momentum
33	Lithuania	65.91
34	Chile	65.90
35	Oman	65.79
36	Hong Kong	65.73
37	Poland	65.71
38	Ukraine	65.40
39	Iran	65.37
40	South Korea	65.34
41	Moldova	65.32
42	Estonia	65.24
43	Greece	65.23
44	Italy	64.99
45	Senegal	64.98
46	Romania	64.89
47	Iraq	64.79
48	Brazil	64.76
49	Ireland	64.71
50	Rwanda	64.56
51	Algeria	64.47
52	Egypt	64.25
53	Philippines	64.23
54	Laos	64.17
55	Latvia	64.14
56	Qatar	64.12
57	Uganda	63.97
58	Nepal	63.95
59	Botswana	63.83
60	Singapore	63.73
61	Bangladesh	63.70
62	Ecuador	63.69
63	Czechia	63.57
64	Paraguay	63.57

Figure 7
Digital Evolution: Momentum

Rank	Economy	Momentum
65	Peru	63.47
66	Montenegro	63.46
67	Slovenia	63.38
68	Kuwait	63.27
69	Nigeria	62.89
70	Kyrgyzstan	62.71
71	Mexico	62.71
72	Mali	62.66
73	Tanzania	62.64
74	Ghana	62.44
75	Costa Rica	62.16
76	Germany	62.10
77	Denmark	61.80
78	South Africa	61.65
79	Malawi	61.62
80	Colombia	61.58
81	Morocco	61.52
82	Tunisia	61.44
83	Taiwan	61.44
84	Pakistan	61.41
85	Bosnia & Herzegovina	61.30
86	Dominican Republic	61.26
87	Zambia	61.23
88	Mauritius	61.17
89	Switzerland	61.12
90	Spain	60.91
91	Luxembourg	60.89
92	Bahrain	60.76
93	Portugal	60.70
94	Sri Lanka	60.70
95	United Kingdom	60.49

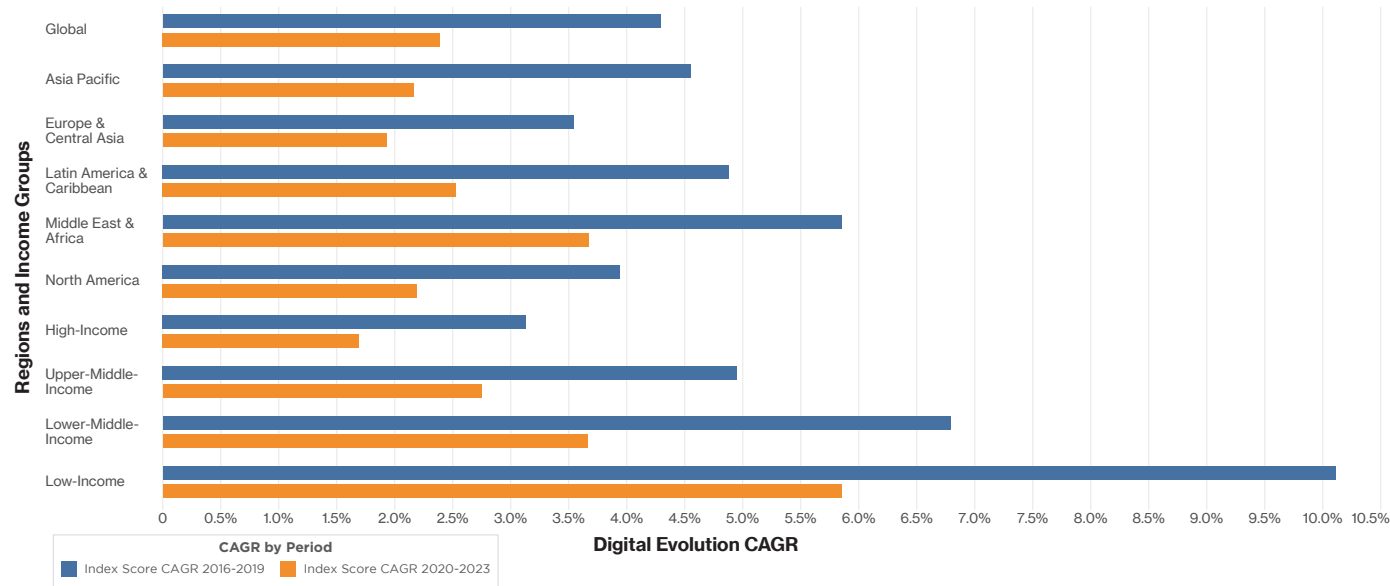
Rank	Economy	Momentum
96	Japan	60.45
97	Croatia	60.31
98	France	60.30
99	Slovakia	59.98
100	Namibia	59.90
101	Ethiopia	59.77
102	Belgium	59.73
103	Finland	59.37
104	Jamaica	59.35
105	Jordan	59.06
106	Hungary	58.97
107	Sweden	58.89
108	Guatemala	58.87
109	Norway	58.84
110	Netherlands	58.79
111	Honduras	58.75
112	Austria	58.70
113	Canada	58.09
114	Panama	58.03
115	Madagascar	57.97
116	Iceland	57.95
117	New Zealand	57.52
118	Lebanon	57.23
119	Nicaragua	57.15
120	Cyprus	56.74
121	Australia	56.66
122	Malta	53.96
123	Angola	53.64
124	Venezuela	52.61
125	El Salvador	48.33

Main Takeaways and Implications

Post-Pandemic Digital Deceleration

Across most countries, the pandemic seemed to accelerate digital usage and growth, but the ex-post-facto analysis reveals a much more nuanced picture. By 2022-2023, amid a broader economic recession and global inflation, many countries experienced a slowdown, with post-pandemic digital growth rates falling below pre-pandemic levels. Rates of demand and institutional improvements dropped notably post-pandemic while supply measures remained more stable across countries. However, there were a handful of digitally resilient countries where the pandemic had little to no impact on digital growth rates. A handful even saw a silver lining with digital growth rates improving post-pandemic.

Figure 8
Digital Evolution: Pre-and Post-Pandemic Growth Rates



While the world economy avoided the worst-case scenario of a recession in 2023, a protracted period of low growth looms large. Growth prospects for many developing countries, especially vulnerable and low-income countries, have remained weak, making a full recovery from pandemic losses ever more elusive.²⁴ Focusing on digital economies, we compared the Compound Annual Growth Rate (CAGR) of overall digital evolution scores and individual driver, component, and cluster scores of all 125 economies between the pre-pandemic period (2016-2019) and the post-pandemic period (2020-2023) (Figure 8).

The digital surge spurred by the pandemic has proven more fleeting than many anticipated. An analysis of year-on-year digital adoption growth rates across 125 economies reveals a sharp reversal of the trend that emerged during the height of COVID-19. The initial acceleration in digital uptake, while significant, was short-lived. Growth rates have since declined precipitously, particularly in 2022 and 2023.

This digital deceleration can be attributed to two primary factors. First, many advanced markets are approaching saturation for digital devices. Second, the extraordinary circumstances that drove online transactions during lockdowns have subsided, leading to a gradual return to pre-pandemic consumption patterns. This shift is exemplified by global mobile e-commerce data: the compound annual growth rate (CAGR) of mobile e-commerce's share of total retail value has more than halved, dropping from 27% pre-pandemic to 11% in the post-pandemic era.²⁵

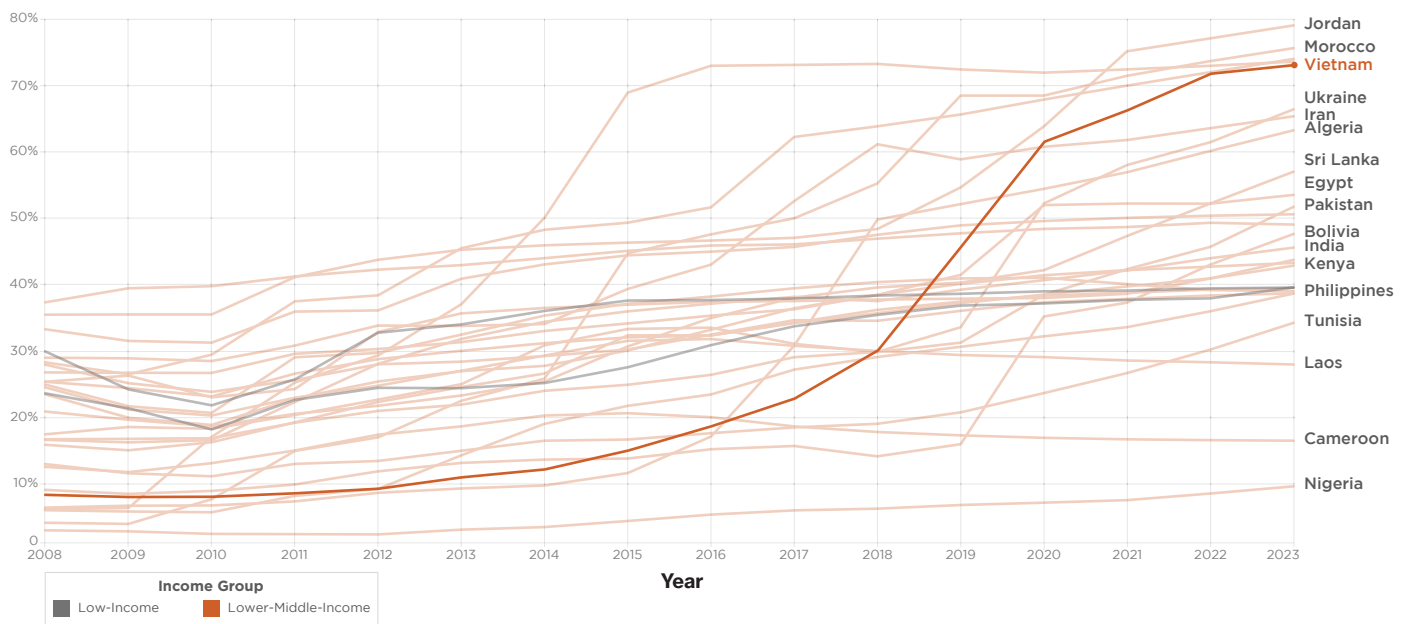
These findings challenge the notion of an enduring digital revolution catalyzed by COVID-19. Instead, they suggest a more nuanced reality: while the pandemic accelerated certain digital trends described above, its long-term impact on adoption rates has been less profound than initially projected.

The digital divide, far from narrowing as hoped, appears to be widening in the wake of the pandemic. Lower-income countries, in particular, have seen a stagnation in progress to class digital parity, a trend that demands urgent attention. The internet access disparity between rich and poor is stark: while high-income and upper-middle-income economies experienced modest decreases in compound annual growth rates (CAGR) of 1 percentage point and 2 percentage points respectively for this measure of class digital parity, the lower-middle income group suffered a substantial 6 percentage point drop.

This divergence is exacerbating existing inequalities. Although all income groups continue to make progress in digital adoption, the pace has slowed considerably compared to the pre-pandemic years, with lower-income countries falling further behind in bridging digital gaps within their borders.

Vietnam offers an instructive case study. Despite being one of the fastest-moving countries in our scorecard and demonstrating impressive growth in household internet access—reaching 86.6% overall—the country is not immune to these challenges. The ratio of internet access between poor and rich households stands at 73%, surpassing regional peers like Laos, the Philippines, and Cambodia, and approaching levels seen in more developed economies like Thailand. However, even Vietnam has experienced a noticeable deceleration in closing its class-based digital divide since the pandemic.

To maintain and accelerate progress, policymakers in Vietnam and similar countries could benefit from leveraging private sector investment to expand digital infrastructure.²⁶ As the World Bank's recent study on technology adoption in developing countries suggested, this approach could prove crucial in bridging the widening technological divide.

Figure 9**Percent of Households with Access to the Internet (poorest 40%/richest 60%)**

The post-pandemic digital landscape thus presents a paradox: while overall adoption continues to grow, the rate of progress—particularly in lower-income countries—has slowed significantly. Addressing this challenge will require targeted interventions and innovative partnerships between the public, private, and philanthropic sectors to ensure that the benefits of digital transformation are equitably distributed across income groups and geographies.

The digital divide is not merely a matter of income disparities within nations; it is increasingly a story of regional inequality. The Middle East and Africa, in particular, are lagging behind other global regions, with the gap widening. This trend is especially pronounced in lower-income countries within these regions, where the disparity in internet access between the poorest 40% and the richest 60% of the population—a key indicator of digital inequality—remains stubbornly high.

This digital chasm is stark in lower-middle-income countries such as Kenya, Laos, and Angola, with poor-rich internet access ratios of 43%, 28%, and 49%, respectively. The situation is equally concerning in low-income countries like Ethiopia and Uganda, registering a 40% disparity. These nations have failed to capitalize on potential acceleration opportunities presented by the global push towards digitalization.

This stagnation is particularly troubling given the rapid digital advancements seen elsewhere in the world. It suggests that without targeted interventions and significant investment, these regions risk being left further behind in the global digital economy. The consequences of such a divide extend beyond mere connectivity, potentially impacting economic growth, education, and social mobility in these already vulnerable economies.

The digital divide is not merely a matter of infrastructure; it is increasingly shaped by government policies and regulations. Low-income countries face particularly acute challenges in this realm. Key indicators such as government effectiveness, internet freedom levels, and voice and accountability metrics reveal a widening gap between these nations and their more affluent counterparts. In countries like Ethiopia²⁷ and Uganda,²⁸ the specter of digital authoritarianism looms large, threatening to exacerbate existing inequalities further.

Yet, amid these challenges, a silver lining emerges: the resilience of established digital and business infrastructure and the emergence of digital public infrastructure.²⁹ Across most countries, these foundational elements have remained relatively stable, suggesting that digital infrastructure can serve as a bulwark against future crises once established. However, this stability is not universal. Developing economies such as Mali, Indonesia, and the Philippines have experienced notable declines in growth rates, indicating difficulties in maintaining digital infrastructure development and ecosystem support during times of crisis.

These trends underscore a critical policy imperative: the need for high-quality infrastructure coupled with the removal of regulatory bottlenecks. As technological change accelerates and digital innovations proliferate, policymakers must craft agile and appropriate regulatory frameworks.³⁰ These frameworks must be robust enough to address the complex challenges of data management and privacy while remaining flexible enough to adapt to rapid technological shifts.

For nations aspiring to be digital leapfrogs, the message is clear: investment in physical infrastructure must be matched by equally robust investments in digital literacy, regulatory capacity, and governance.

While our driver-level analysis provides insights into broad trends, a closer look at individual economies' performance reveals a more detailed picture of the post-pandemic digital landscape. We consider countries "resilient" if the difference in their CAGR between pre- and post-pandemic periods falls between -1 percentage point and +1 percentage point. Countries showing a "silver lining" effect have a CAGR difference greater than +1 percentage point, reflecting a faster growth rate post-pandemic. By examining the digital growth trajectories of 125 economies, we can identify distinct patterns of resilience, improvement, and decline: six countries (4.8% of all studied) improved their digital growth rates, experiencing a silver lining effect. Eighteen countries (14.4%) demonstrated resilience, maintaining stable digital growth. One hundred and one countries (80.8%) faced a slowdown or decline in digital growth rates.

Digital evolution continues to confound expectations, even among the most advanced economies. Singapore and Hong Kong, long heralded as vanguards of digital innovation and previously highlighted in our last report for their robust growth, have not been immune to the global deceleration trend. These city-states, which have historically shaped best practices in the digital realm, initially maintained their impressive trajectory post-pandemic. However, by 2023, the rapid pace of adoption witnessed during the early stages of COVID-19 had given way to more tempered growth.

This pattern of initial surge followed by moderation is not confined to these entrepôts. India, a nation whose digital ambitions have captured global attention, presents a similarly nuanced picture. The world's largest democracy had made significant strides in bridging its mobile internet gap, a development that fueled its digital momentum. Yet, India, too, has seen its growth rates taper.

These trends underscore a broader trend: the initial pandemic-induced digital surge was indeed powerful but perhaps not as transformative or sustainable as initially believed. Even for digital pioneers and emerging powerhouses, the path of technological adoption is proving to be more evolutionary than revolutionary.

Despite this digital deceleration, some economies displayed resilience, maintaining or improving their digital growth rates. The United States leveraged its robust pre-pandemic digital foundations and strong tech sector to maintain relatively stable growth rates. Similarly, countries like New Zealand, Sweden, and Switzerland demonstrated resilience due to their robust governance frameworks and continued investments in digital infrastructure. These experiences underscore the importance of long-term investment in digital infrastructure, policy adaptability, and the potential for advanced and emerging economies to maintain their digital evolution pace despite global disruptions. However, as mentioned earlier, only 14.4%, or 18 of all 125 economies remained resilient, indicating the widespread challenge of maintaining digital growth in the post-pandemic era.

In contrast, only six countries—notably, Ireland, Israel, and Bahrain—experienced a silver lining, comprising just 4.8% of the countries in our country list. They managed to turn the global crisis into an opportunity for digital advancement. Israel, long renowned for its vibrant tech sector and startup ecosystem, has further solidified its position as a digital powerhouse. The country's strategic focus on artificial intelligence has been a key factor in its digital resilience and continued growth, even as other advanced economies have faltered. In a similar vein, Bahrain has emerged as a model of steady digital progress. The Gulf state's sustained investments in digital infrastructure and e-government services have borne fruit during this critical period. Bahrain's success story is underpinned by comprehensive policies and a robust digital foundation, positioning it as an exemplar of digital inclusivity in the region. Ireland, one of the few governments that enjoyed the high trust of its citizens in government almost on par with its Scandinavian neighbors through the pandemic years,³¹ created a government digital wallet app³² to enable its citizens and residents to securely keep digital versions of important identity documents and avail of and pay for public services.

These success stories, however, stand in stark contrast to the broader global picture. While some nations continue to build upon their digital gains, many others grapple with the challenge of maintaining growth momentum. This dichotomy underscores a critical lesson: the importance of long-term, strategic investment in digital infrastructure coupled with adaptable policy frameworks.

As the global digital economy enters a new maturation phase, the imperative for policymakers and business leaders is clear. The focus must shift from merely regaining lost growth rates to ensuring sustainable digital advancement in the years ahead. This will require a nuanced approach that balances rapid innovation with inclusivity and short-term gains with long-term resilience.

The pandemic has served as a stress test for national digital strategies, revealing both strengths and vulnerabilities. As we move forward, the ability to learn from these experiences and adapt accordingly will likely determine which nations emerge as leaders in the evolving digital landscape. The challenge now is not just to recover lost ground but to lay the foundations for a more robust and inclusive digital future.

Progress to Parity

The digital divide is plateauing rather than narrowing as hoped, with lower-income countries experiencing stagnation in their progress towards digital parity. While, when taking a longer-term view, class-based gaps are closing, this progress is plateauing, and urban-rural and gender divides generally remain stubbornly persistent, with some regional variations. Gender parity has the highest absolute level at nearly 90%, but the rate of progress is slowing. Urgent action is needed to reinvigorate efforts and close these entrenched disparities, particularly for gender and rural-urban divides.

As established in the earlier section on digital deceleration, rather than narrowing as anticipated, the digital divide seems to be expanding in the aftermath of the pandemic—both within and across nations. Notably, lower-income countries have experienced stagnation in their efforts to achieve digital parity across class lines, a concerning trend that requires immediate attention.

How has digital parity progressed across other measures—namely gender and urban-rural gaps? The Digital Evolution scorecard highlights these class, gender, and location-based gaps in the “digital inclusion” component of the Index, which focuses on the progress to digital parity across these three key measures.

To contextualize the state of digital inclusion in an economy, we imagined a hypothetical fully inclusive digital economy—with perfect parity in digital access and usage between the rich and the poor, men and women, and the rural and urban populations—and used it as a benchmark against which we normalized individual countries' relative digital parity. This gives policymakers and decision-makers a measure of the extent of digital parity or lack thereof across individual dimensions and a handy sense of the distance to the frontier. Understanding the scoring is simple—100% means there is perfect parity between men and women (or rich and poor, or urban and rural dwellers, as the case may be). This score is tracked yearly—from 2008 to 2023—to show economies' progress over time.

For class digital inclusion, while the last few years reflect a slowing rate of improvement, the gains over a 10-year period are the most impressive of all three measures. The global median for progress to class digital parity improved by 21 percentage points to reach 60% class digital parity in 2023. Gender improvements are a bit more stubborn—just a 4.5 percentage point increase in the last decade, reaching nearly 90% progress to gender digital parity globally in 2023. Globally, urban-rural divides appear to be the most challenging to close, with a tiny 0.6 percentage point increase over 10 years, reaching 59% progress to urban-rural parity in 2023.

We compare our Progress to Parity scores against established analog measures to contextualize the global digital divides further. For example, we map gender digital parity scores against female labor force participation rates. We compare scores against the Gini Coefficient for progress to class digital parity. For urban-rural digital gaps, we consider the rate of urbanization.

The current state of digital inclusion reveals persistent patterns and notable shifts since our last assessment. Indonesia experienced a remarkable improvement in class digital parity, advancing from just 17% in 2013 to approximately 60% a decade later. The country should, however, focus on improving its gender digital parity, as it dropped 3 percentage points to 95% in the same period.

Uganda offers a good model in this measure, significantly narrowing its gender gap with a 34.4 percentage point improvement (from 41.7% in 2013 to 76.1% in 2023). While Laos exemplifies the challenges faced by countries with structural disadvantages across multiple dimensions—its lagging class digital parity rank (124th) correlates with its relatively high Gini coefficient (38.8), while its poor rural-urban digital parity (performed worst among all countries) persists despite only 38% urban population. Similarly, Pakistan and Nigeria face significant challenges, underperforming in all three measures. Their positions in the scatter plots illustrate how structural and socioeconomic factors often create and exacerbate compounding barriers to digital inclusion.

Each country is following its own path in attempting to achieve parity across these measures. Some clear patterns emerge across regions.

Figure 10

Class Digital Inclusion: Progress to Parity

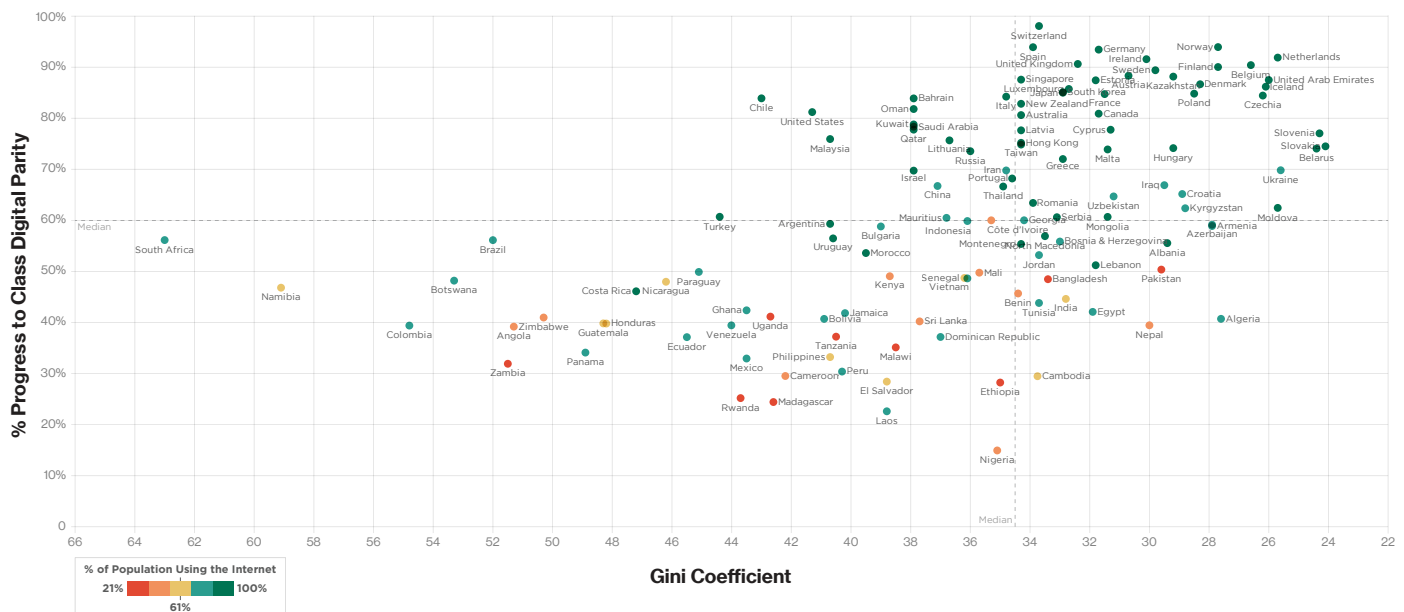


Figure 11
Rural Digital Inclusion: Progress to Parity

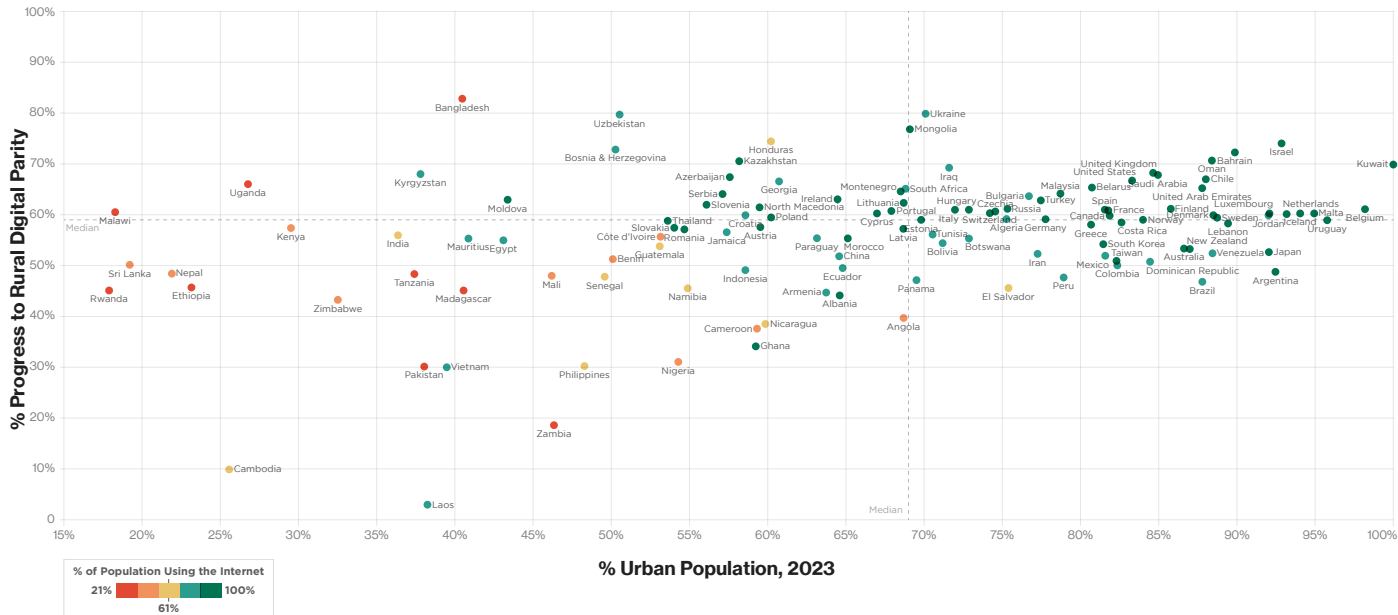
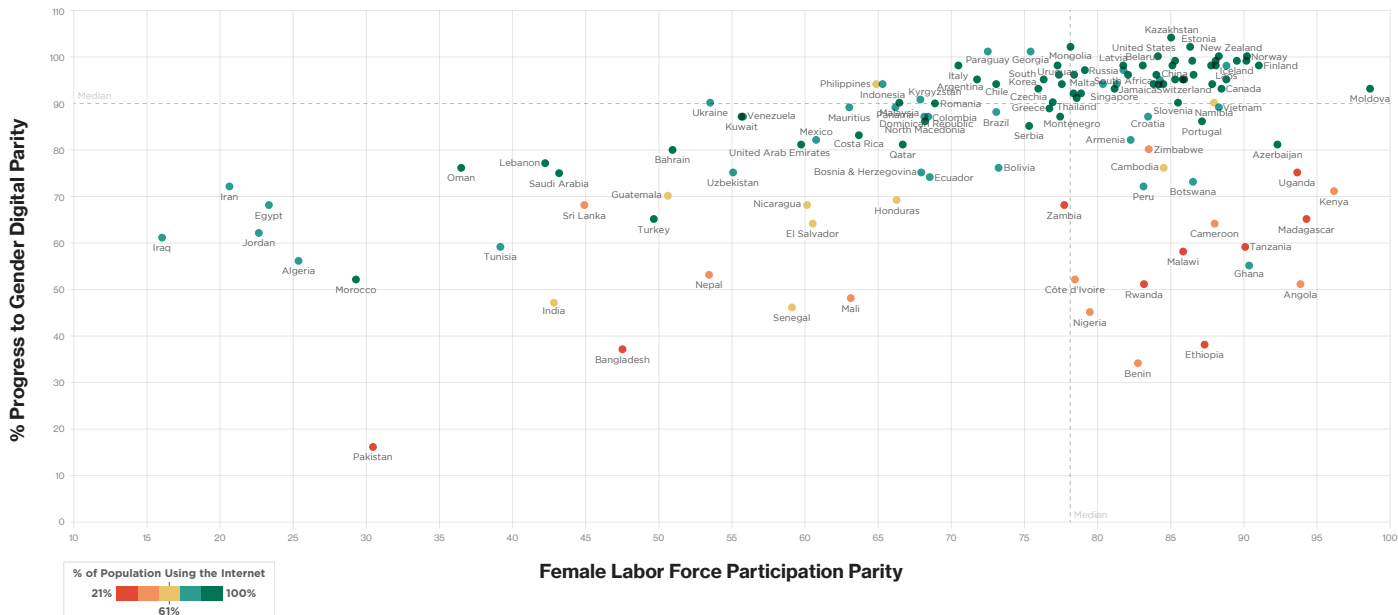


Figure 12
Gender Digital Inclusion: Progress to Parity

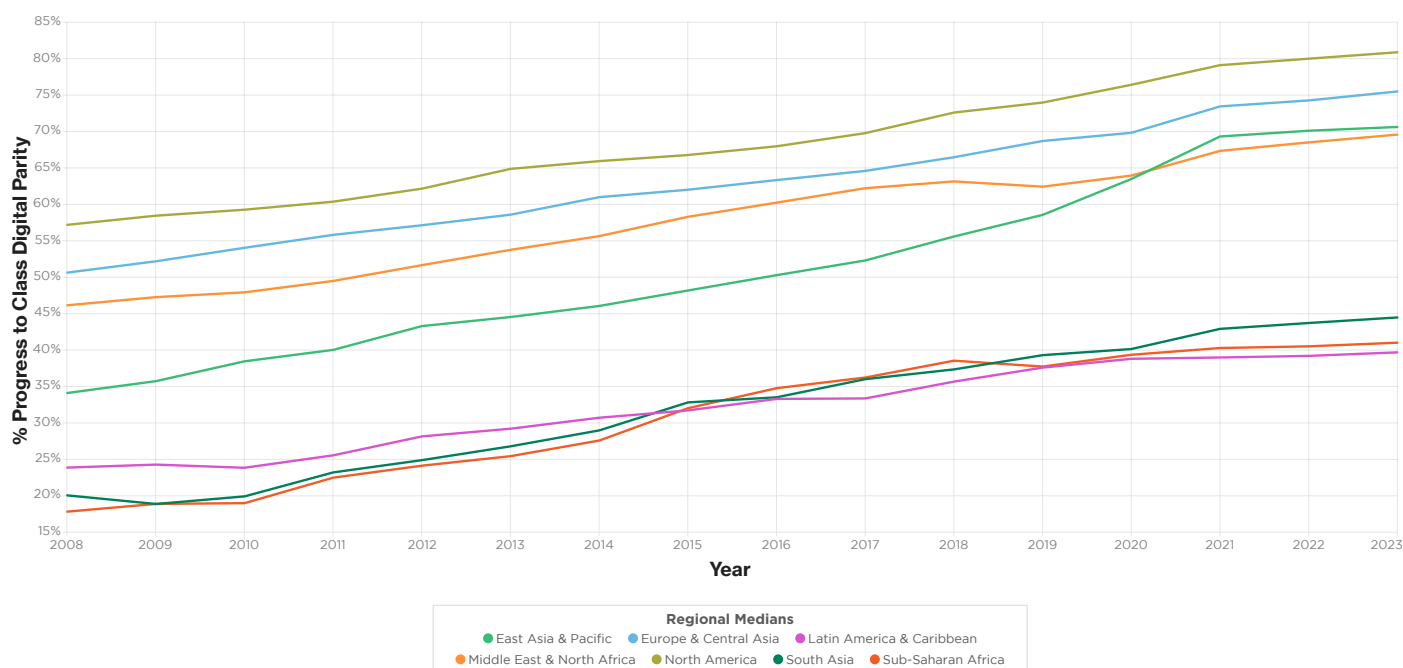


Progress to Class Digital Parity

While progress toward achieving digital parity across socioeconomic classes has been uneven globally, certain regions and income groups have outpaced their peers in recent years. East Asia and the Pacific have demonstrated the strongest advancement, increasing from 44.7% class digital parity in 2013 to 71%³³ in 2023. Notably, Indonesia—ranked 12th among 16 countries in the region—has been the standout performer, surging from 17% to 60% over the same period, overtaking neighbors like Vietnam, the Philippines, and Cambodia starting in 2016.

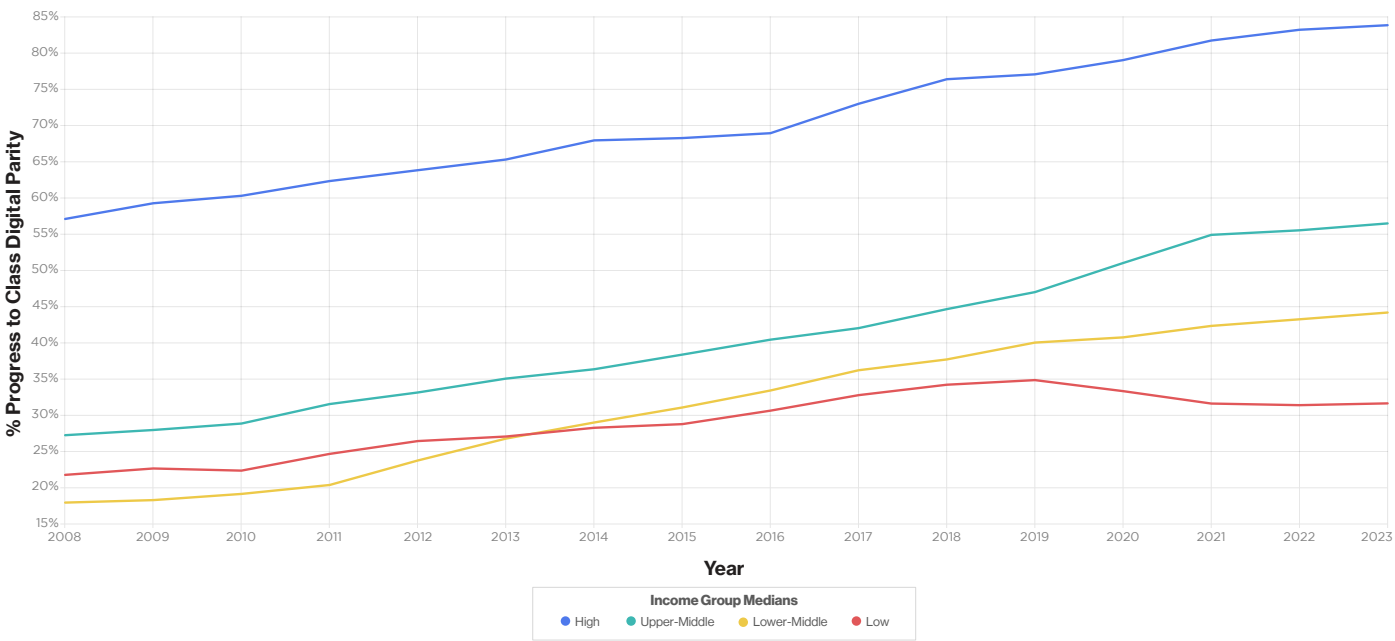
Figure 13

Progress to Class Digital Parity by Region



In contrast, at just under 40% progress, Latin America and the Caribbean lag behind all other regions, both on an absolute basis and in making the least progress in both the past decade (10 percentage point improvement) and the last three years (less than one percentage point).

Figure 14
Progress to Class Digital Parity by Income Group



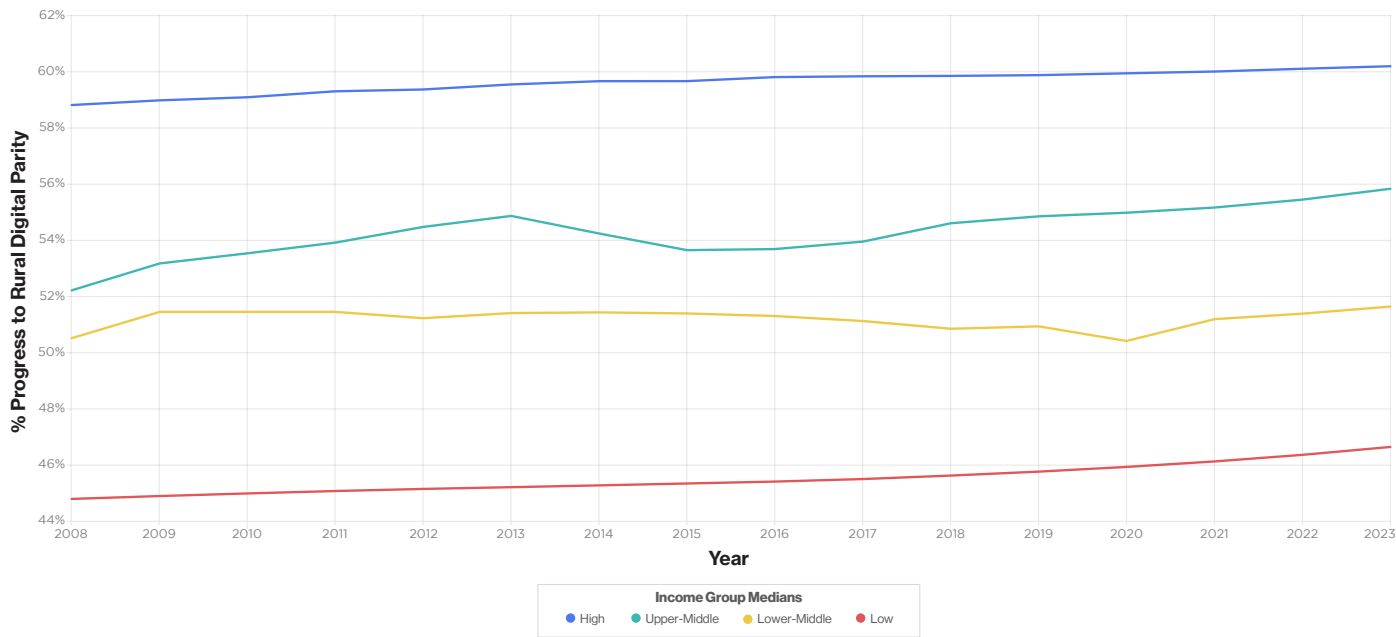
Across income groups, high-income and upper-middle-income countries have made the greatest strides, advancing from 65.4% and 35.1% class digital parity in 2013 to 83.9% and 56.5% respectively by 2023. However, low-income countries have plateaued, registering a tiny improvement from 27.1% in 2013 to 31.7% a decade later. While all income groups continue to see digital adoption spread, the pace has decelerated, with lower-income nations falling further behind in bridging their internal digital divides.

Progress to Urban-Rural Digital Parity

According to the latest figures from the ITU, 81% of urban dwellers globally were using the internet in 2023, while only 50% of those in rural areas were online. The urban-rural gap has barely budged in recent years.³⁴

The drive toward bridging the urban-rural digital divide has stalled across rich and poor countries over the past decade. Low-income countries, starting from the lowest base at 45.4%, have managed just a 1.4 percentage point improvement, inching up to 46.8% rural digital parity by 2023—the greatest progress among the income groups.

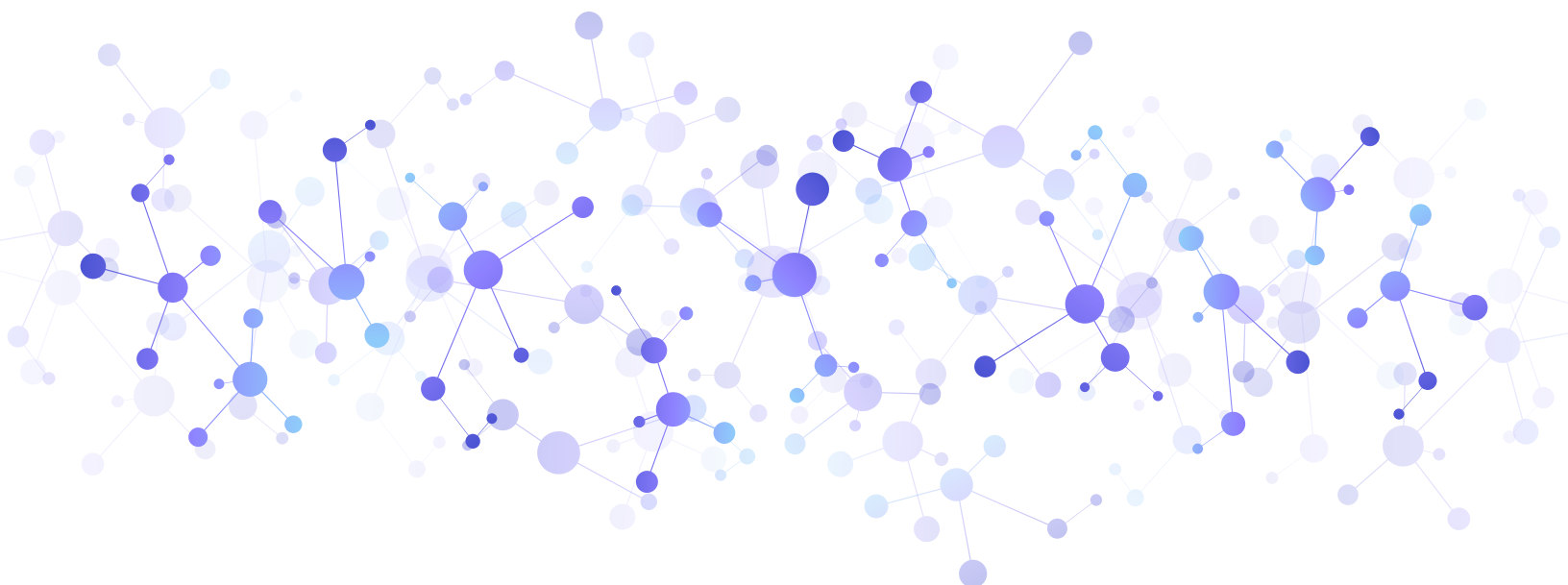
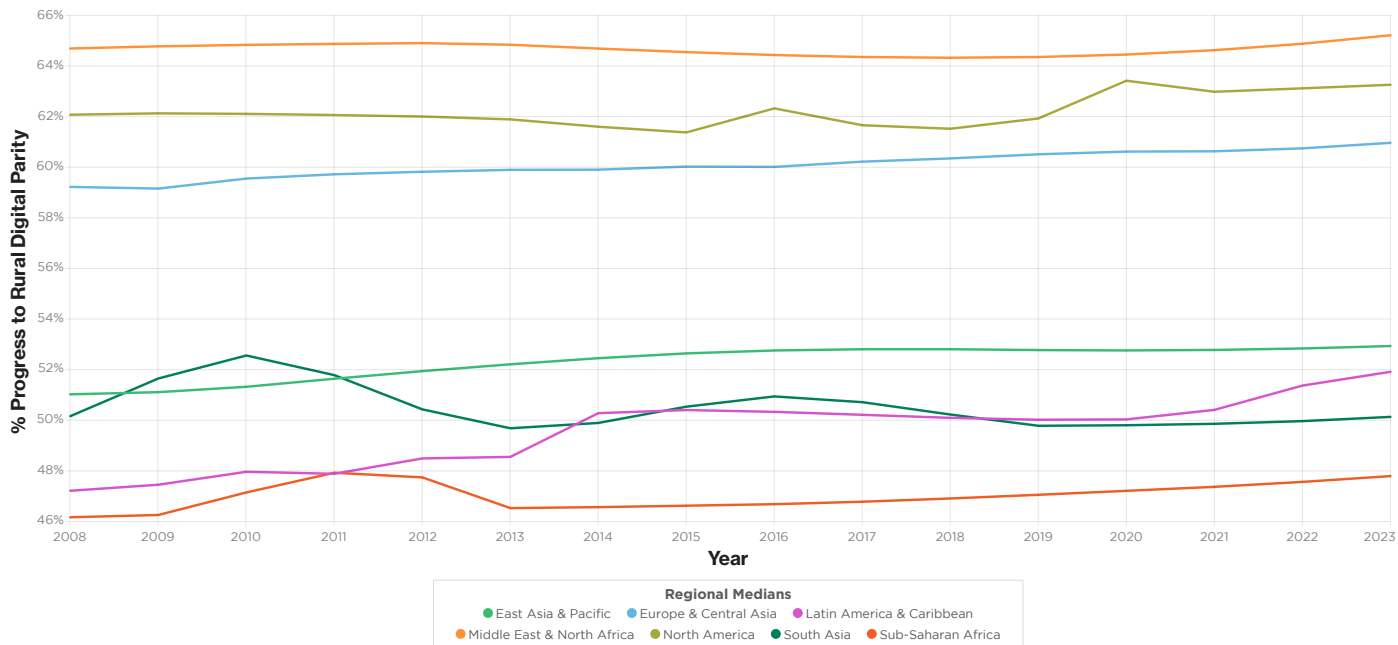
Figure 15
Progress to Urban-Rural Digital Parity by Income Group



In the more recent 3-year period, lower-middle-income nations have seen the largest gains, advancing 1.2 percentage points from 50.6% in 2020 to 51.8% in 2023.

While the overall improvements remain modest, Latin America and the Caribbean stand out as the region making the most headway. Digital parity between urban and rural areas increased from 48.6% in 2013 to 52% in 2023, with Honduras and Nicaragua making the most progress in the region surveyed over the past 3 years.

Figure 16
Progress to Urban-Rural Digital Parity by Region



Progress to Gender Digital Parity

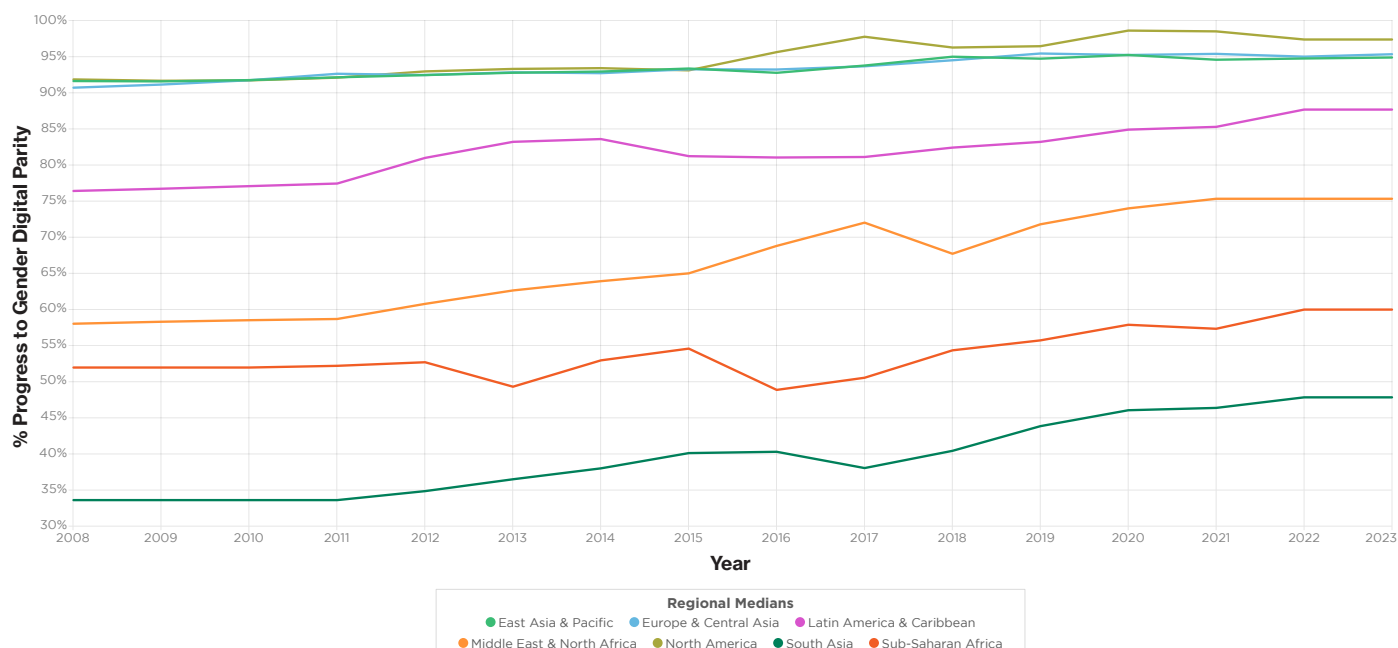
Across all three measures, gender digital parity shows the highest absolute level, with a global median of nearly 90% across all 125 economies studied—perhaps unsurprising given that many households are mixed gender.

Unfortunately, in recent years the rate of progress for gender digital parity is slowing, and in some cases plateauing.

The progress toward gender digital parity varies significantly across regions. Latin America and the Caribbean stand out, achieving 87.8% parity in 2023—just 8 percentage points shy of Europe and Central Asia's 95.5% benchmark. However, this relative success in gender parity contrasts sharply with the region's more substantial cross-regional gaps in rural-urban (51.9% in Latin America vs. 61.0% in Europe) and class-based (39.8% vs. 75.7%) digital divides.

Figure 17

Progress to Gender Digital Parity by Region



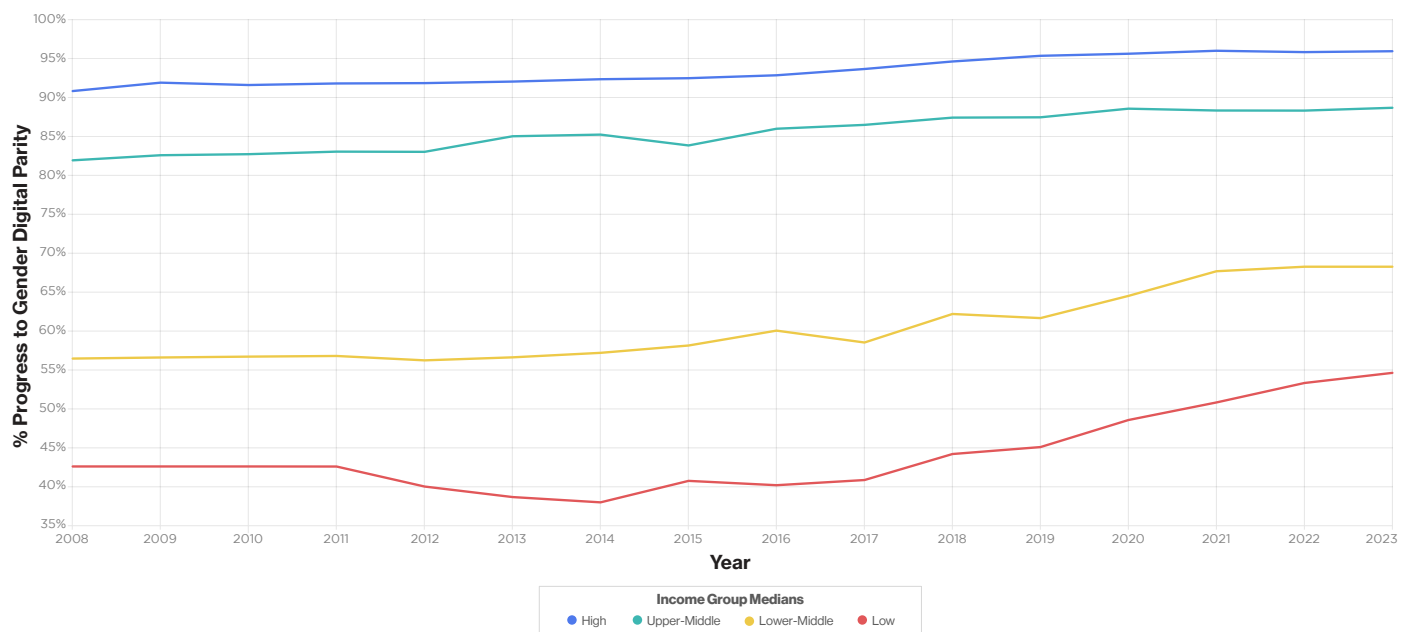
Amid this uneven landscape, the Middle East and North Africa, while still low in absolute numbers, have shown significant improvement—jumping from 62.8% in 2013 to 75.5% in 2023—the sharpest 10-year advance across all regions. Within the MENA bloc, Israel achieved the highest gender parity at 96.4%, while Egypt saw the most dramatic improvement, surging 31 percentage points in ten years to reach 68.6% gender digital parity.

South Asia and Sub-Saharan Africa, though starting from lower baselines, have also charted similar trajectories of over 10-percentage-point gains in the past decade, reaching 48% and 60% parity respectively by 2023. Despite this progress, on an absolute level, these regions, along with Latin America, remain the gender-parity laggards, underscoring the room for further progress.

Uganda stands out as the country making the most headway in the region, vaulting from 41.7% in 2013 to 76.1% in 2023. Targeted development programs play a role in bolstering this progress. For example, a 2021 multi-partner digital literacy and gender inclusion pilot targeting refugee and host communities, reported a fourfold increase in basic digital skills.³⁵

Across income groups, the pace of change for gender digital inclusion is concerning. While lower-middle and low-income countries have registered 11% and 16% gains respectively over the past decade, progress in higher-income nations has nearly stalled, with high-income countries improving from 92% to 96% and upper-middle-income countries edging up from 85% to 89%.

Figure 18
Progress to Gender Digital Parity by Income Group



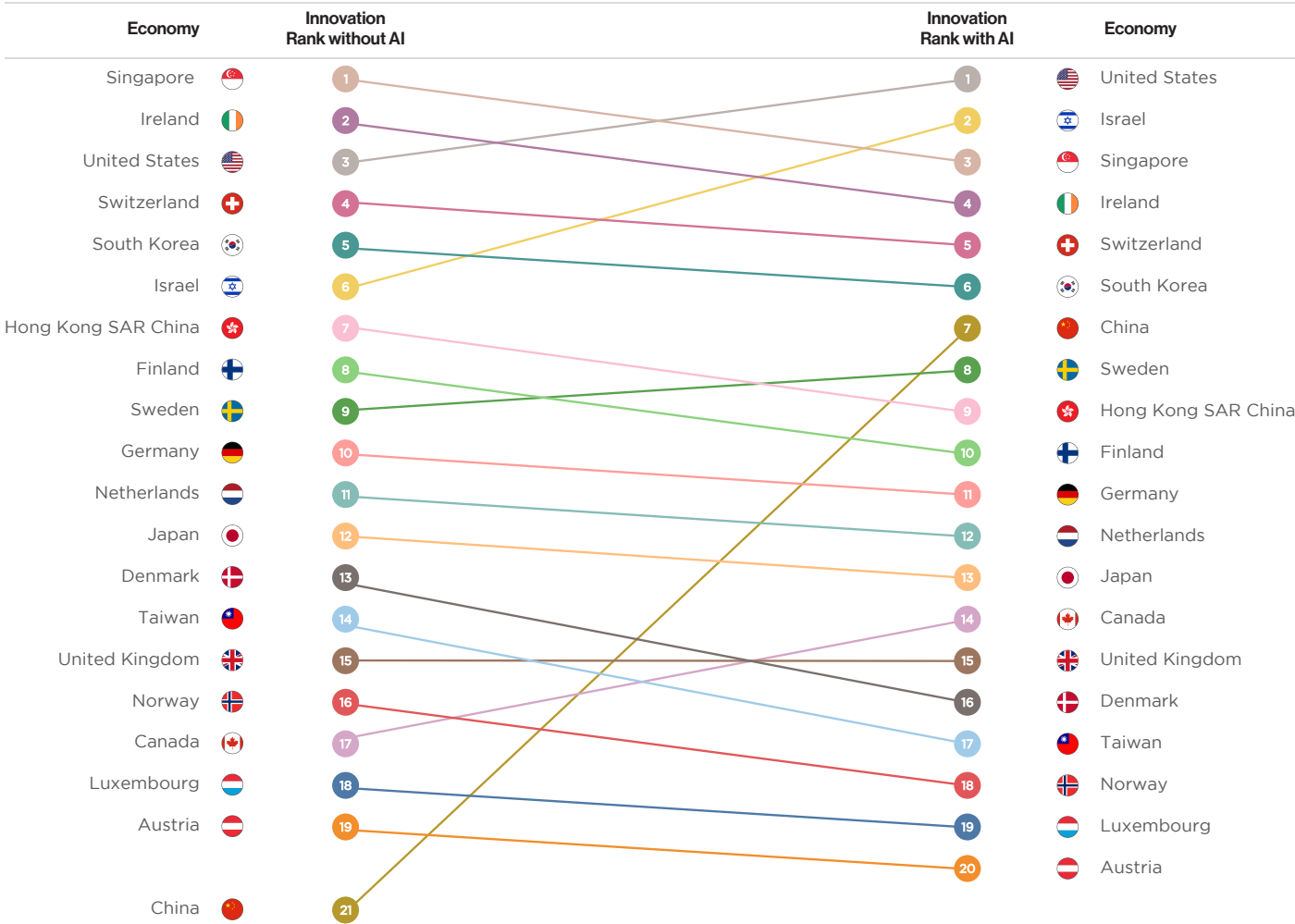
While past efforts have successfully narrowed digital divides, the recent slowdown across key metrics is worrying. Reigniting progress requires deliberate policymaking to foster greater digital equity and inclusion, particularly for women, rural dwellers, and the socioeconomically underprivileged, as connectivity expands.

The AI Amplifier Effect

AI's amplifier effect reinforces the advantage for digitally advanced countries, which points to a potential winner-takes-most, if not all dynamic between AI and digital development. Investing in AI strategically to maintain digital advancement is vital. As AI becomes central to innovation and competitiveness, countries that lag in AI adoption may find it increasingly challenging to catch up.

AI is increasingly becoming a pivotal factor in shaping national digital competitiveness. The digital deceleration and widening digital divide, both within and across countries, risks expanding further as AI supercharges digital evolution.

Figure 19
The AI Amplifier Effect



Our analysis reveals that removing AI-related indicators from the digital evolution index would dramatically alter the global digital hierarchy. Singapore, Qatar, and the United States, would see their positions shift from the Stand Out zone to the Stall Out zone. China's overall index score rank would plummet by seven spots, marking it as the country most affected by this hypothetical AI exclusion. Israel and Canada would also experience significant rank decreases of 6 and 4 spots, respectively.

These findings underscore a critical insight: investments in AI are not merely supplementary to digital competitiveness; they are becoming fundamental. The ability to harness AI for innovation may well become the defining factor in a nation's digital success story. It's no longer just about maintaining digital competitiveness — it's about shaping the future of the global digital economy.

The momentum in innovation for digitally advanced economies can be attributed mainly to their scope of AI development and integration. This is particularly evident in China, Israel, and Singapore.

China, despite tensions with the U.S. over high technology,³⁶ has managed to attract significant American venture capital, with investments exceeding \$3 billion.³⁷ Major tech companies like Intel have also shown interest in the Chinese market.³⁸ Moreover, China is emerging as a powerhouse in AI talent development, with estimates suggesting that half of all AI engineers and researchers globally are from China.³⁹

Israel, punching well above its weight, has nearly 400,000⁴⁰ of its 4.3 million⁴¹ working-age population employed in the tech sector.⁴² The country is doubling down on AI, allocating \$250 million for its national AI Program (2024-2027)⁴³ and adopting a relatively laissez-faire approach to this emerging technology.⁴⁴ Israel boasts the third-highest number of generative AI companies globally, with over 2,220 of its 9,000 startups leveraging AI technologies.⁴⁵

Singapore, too, has positioned itself as an AI leader. The country's sovereign wealth fund, GIC, was among the first institutional investors to venture into AI.⁴⁶ Singapore ranks 15th globally in AI research publications⁴⁷ and 12th in AI patent applications.⁴⁸ The city-state has set an ambitious goal to triple its AI workforce to 15,000, further cementing its commitment to AI-driven growth.⁴⁹

AI bolsters the overall digital evolution scores of these leading economies, emerging as a key driver of index momentum, particularly in the United States, China, Israel, and Singapore. The US has established itself as the epicenter of AI development, with major technology companies and investors committing massive resources to the sector.⁵⁰ Meta, Amazon, Alphabet and Microsoft intend to spend as much as \$320 billion combined on AI technologies and datacenter buildouts in 2025. That's up from \$230 billion in total capital expenditures in 2024.⁵¹ The rapid growth and energy demand of AI technologies are so substantial that they are beginning to rival the output of renewable energy sources,⁵² highlighting both the promise and the challenges associated with this transformative technology.

The Resilience of Digital Entrepôts

Having evolved into crucial nodes of cross-border data flows, a group of small nations, islands, and entrepôts—who we identify as ‘digital entrepôts’—remained resilient through the pandemic years and beyond and have since been doubling down on their defining attributes of agility, adaptability, openness, and robust institutional support for innovation to extend their advantages into and remain relevant in the AI era. They create a demonstration effect for the rest of the world as to what the future of cross-border cooperation in the AI era might look like.

Entrepôts like Hong Kong, United Arab Emirates, and Singapore continue to maintain their Stand Out status, consistently performing well across Supply, Demand, and Innovation metrics. These economies, including small nations like Estonia, South Korea, and Ireland, consistently excel in our Index, demonstrating agility, adaptability, openness, and robust institutional support for innovation. While they weren’t immune to the global digital deceleration trend, these small, agile economies functioning as digital entrepôts continue to play an outsized role as crucial nodes in cross-border data flows with open data policies.

Singapore represents the most archetypal digital entrepôt here, with high rankings and balanced scores across all four drivers in our scorecard. It has outstanding institutional strength: relatively high political stability, high scores in regulatory quality, and low levels of corruption, with well-established infrastructure. As one of the established data center markets across the Asia-Pacific region, Singapore continued to grow despite the challenges of available land and power.⁵³ As a small state, it has leveraged its agility the most. Singapore’s outstanding strength compared to other entrepôts is its continuing good performance in AI investment and talent attraction. In recent years, Singapore has maintained a steady increase in its global share of VC investments in AI and the AI market size. Also, this city-state has consistently outperformed its peers in foreign direct investment inflows, reaching 34.9% of GDP in 2023,⁵⁴ according to World Bank data—the highest among all digital entrepôts. This strong investment performance is coupled with Singapore’s exceptional talent pool, as evidenced by high rankings in science, technology, engineering, and mathematics (STEM) education and skilled labor ratings.

As one of Europe’s top established data center markets, Ireland is another critical digital entrepôt, with top Information and Communication Technology (ICT) service exports and high-technology exports (surged from 25% of manufactured exports in 2018 to 48% in 2023) among global economies.⁵⁵ This position emerges from its tax structure and a deeper structural alignment: an educated, English-speaking population alongside privileged gateway access to the European Union (EU) market that major technology multinationals find irresistible. The Irish economy is unusual internationally in having a very high proportion of overall GVA (Gross Value Added) accounted for by foreign-owned MNEs (multi-national enterprises), but the dominance of foreign firms in the ICT sector is particularly striking in 2021. Foreign firms make up around 33% of the overall wage bill, 65% of profits and around 26% of employment. The equivalent figures for the ICT sector are 74%, 97% and 60%, respectively.⁵⁶ This highlights the dominant role played by foreign-owned firms in the ICT sector and the much smaller contribution of domestic firms to the overall GVA of the sector.⁵⁷ Ireland refreshed its national AI strategy in 2024, considering the significant developments in AI technology and regulation to reduce this potential economic vulnerability to international market and regulatory shifts and embrace the AI transformation.⁵⁸ This strategy, “AI – Here for Good,” was launched in July 2021. The recent increase in AI

adoption—from 49% to 91% within just one year—demonstrates the nation's progressive approach to harnessing AI's transformative capabilities.⁵⁹ The Emerald Isle continues to evolve its digital strategy, actively investing in research centers, helping Ireland diversify its digital advantages and solidify its Stand Out status. Like ancient Celtic bards who transmitted and transformed culture, Ireland promises to be both a conduit and creator in the global digital economy.

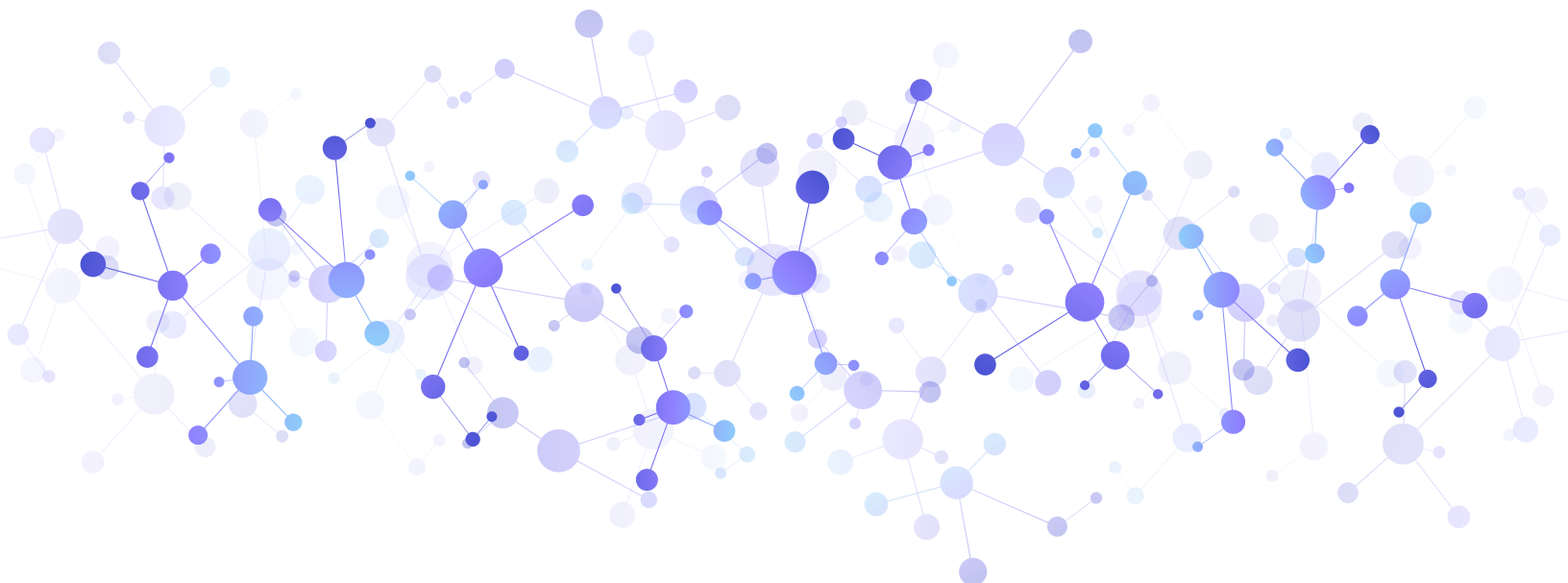
Estonia has become the first nation to implement 100% digital government services, setting a new benchmark for e-governance globally.⁶⁰ As of December 2024, every service—even filing for divorce—can now be completed online, marking a new era in citizen-centric governance.⁶¹ Its e-residency program continues to attract digital entrepreneurs even during travel restrictions, demonstrating the resilience of its digital-first governance model. In 2019, Estonia set about implementing its Kratt strategy — named after a mythological creature, in addition to the benefits to the e-government, it seeks to improve digital public services by creating the best possible user experience and also helping to speed up lengthy processes by tackling menial tasks in the court system⁶² — and, thereafter, devised an AI-based virtual assistant Bürokratt. The virtual assistant Bürokratt is an interoperable network of chatbots on the websites of public authorities that allows people to obtain information from these authorities through a chat window.⁶³ Estonia is in the process of developing a new AI and Data strategy with a broader scope. As Dr. Ott Velsberg, the Chief Data Officer of Estonia said in the interview with Apolitical's Ula Rutkowska, "It will define the government's key strategic priorities and cover aspects of the private sector and society as well. It looks at the whole ecosystem of AI and data. These will still be accompanied by action plans focusing on the next three years."⁶⁴ By 2030, Estonia envisions a government where every individual has personalized digital assistants for education, mental health and other areas. Doctors, police, and other professionals will have specialized assistants, optimizing human work while automating simpler tasks.⁶⁵

The United Arab Emirates has established itself as a critical digital hub in the Middle East, with its data center market valued at USD 1.26 billion in 2024, and is expected to reach USD 3.33 billion by 2030, rising at a CAGR of 18%.⁶⁶ And the Abu Dhabi Government has announced the "Abu Dhabi Government Digital Strategy 2025-2027," advancing the emirate's transformation towards an AI-powered government, aims to position the emirate as a global leader in AI-driven government and will deploy AED13 billion through 2025-2027 to foster innovation and technology adoption in the emirate.⁶⁷ This digital ambition is exemplified by its landmark March 2025 commitment to a 10-year, \$1.4 trillion dollar investment framework in the United States.⁶⁸ A strategic integration of technological innovation, sustainability, and global partnerships is evident in the UAE data center market. This dynamic environment revolutionizes the digital economy of the UAE and makes it more competitive internationally in terms of digital infrastructure.

Hong Kong's strength is evident through its high smartphone possession rate, the use of digital money, internet adoption, ICT goods exports, and real-time payment adoption. Meanwhile, Hong Kong has made significant strides in becoming a Web3 center. It has already put in place a licensing regime for digital asset trading platforms. To facilitate further innovation, regulatory sandboxes have been set up by its regulators to allow innovators to test and refine their ideas, and to get early regulatory feedback. Initiatives like the Hong Kong Monetary Authority's Project Ensemble are accelerating the development of tokenization ecosystems, covering RWAs like fixed income, investment funds, green finance and trade finance.⁶⁹ The convergence of political evolution and Web3 innovation in Hong Kong creates a unique moment of transformation, the adaptability and resilience may still remain the hallmarks of this financial hub, while its overall ranking decreased slightly in our scorecard (from 3rd in 2020 to 6th in 2023), we can still see its resilience from its high demand (ranks 1st across all economies). However, Hong Kong has experienced a concerning

demographic shift in its workforce, with the younger labor force declining from 1,523,100 (41% of the total labor force) in 2018 to 1,319,600 (38%) in 2023,⁷⁰ a significant reduction of approximately 200,000 younger workers over 6 years. A 2022 survey by the Hong Kong Institute of Asia-Pacific Studies revealed that those planning to leave primarily chose the United Kingdom (15.2%) and Canada (15.0%) as their preferred destinations.⁷¹ To address this challenge, the government has implemented a comprehensive talent attraction strategy. The influx of mainland Chinese professionals could counterbalance the brain drain triggered by Hong Kong's recent wave of emigration. Under the TTPS (Top Talent Pass Scheme), the institutions' graduates from the mainland accounted for 95% of the 30,851 TTPS applicants in the first nine months of 2024. These migration patterns indicate Hong Kong's workforce is becoming less international and more embedded in East Asia.⁷²

Beyond their respective strengths, a common thread for these entrepôts is their embrace of technological changes by leveraging the flexibility of the small nation and adaptive regulatory frameworks. They are all performing well in adapting their innovation models to capitalize on their unique advantages—whether Singapore's comprehensive strength across inputs, processes, and outcomes; Hong Kong, Ireland and South Korea's remarkable efficiency in transforming inputs into world-class innovation outputs; Estonia's pioneering focus on e-governance and digital citizenship; or the UAE's strategic investment in becoming a regional data hub and AI development center. These nations demonstrate how smaller economies can punch above weight in the global digital landscape and be resilient in the tides of change to remain Stand Outs through creating specialized niches and maximizing returns on technological investments.

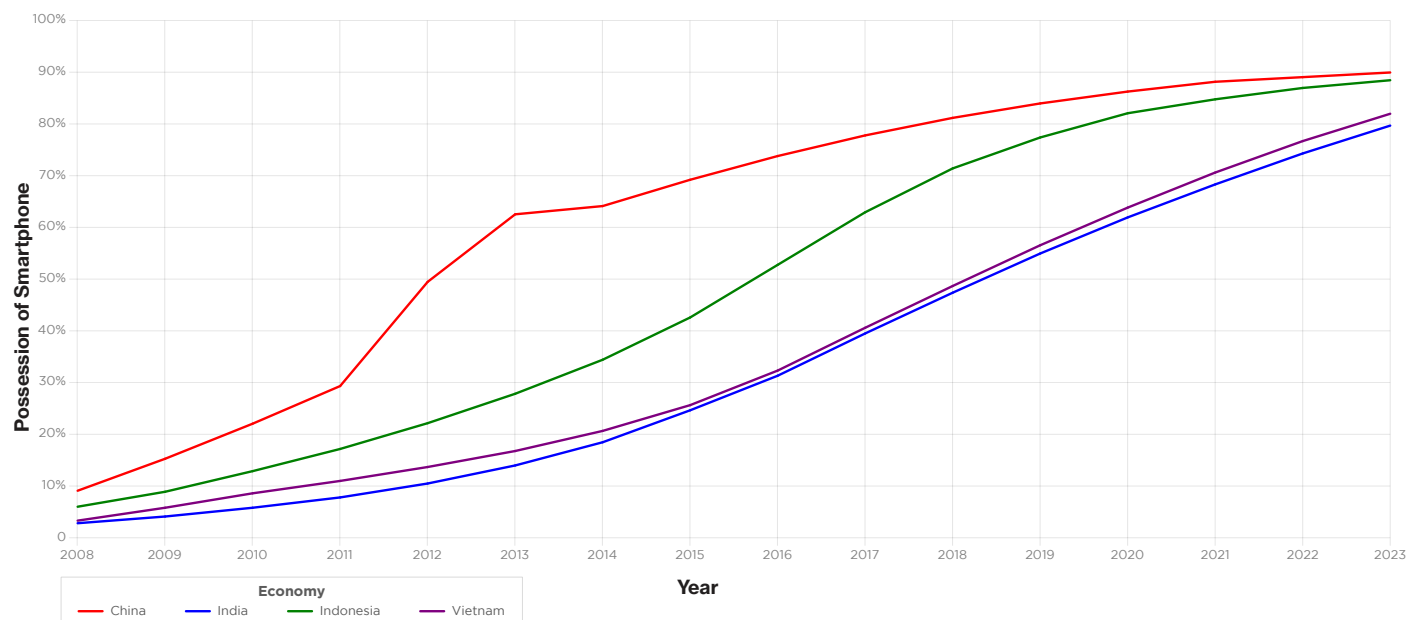


China's Mobile-First Ascension: A New Model for Digital Advancement

As one of the only two upper-middle-income countries in the Stand Out zone, China is the first primarily mobile-driven digital economy to join the ranks of Stand Out nations; for traditional devices like laptops and PCs, China's ownership rate is about 30 percentage points lower than the Stand Out median. However, the difference in smartphone ownership between China and the Stand Out median is only 2%. With the widespread use of super apps optimized for mobile and a higher digital inclusion across different income groups, China's success provides an emulation-worthy roadmap for other Break Out nations like India, Indonesia, and Vietnam, aiming to accelerate their digital progress.

Figure 20

China's Mobile-First Ascension: A New Model for Digital Advancement



Since 2011, Chinese smartphone adoption has risen dramatically, surpassing the Stand Out median and becoming the primary gateway to the internet and digital services. However, ownership of laptops and PCs in China remains below the Stand Out median, indicating a clear preference for mobile platforms. This mobile-centric approach distinguishes China from other Stand Out economies, where device ownership patterns tend to be more balanced.

Saudi Arabia, in contrast, offers an alternative path of digital evolution. Like China, Saudi Arabia has moved from the Break Out to the Stand Out zone but has adopted a more balanced approach to device ownership. In 2008, both countries had similarly low levels of laptop ownership. However, Saudi Arabia has since made significant strides, increasing laptop ownership while maintaining high levels of smartphone adoption. This balanced growth aligns with the country's ambitious digital strategies, such as Vision 2030.⁷³ The results are evident: internet usage in Saudi Arabia now exceeds 98.5%.⁷⁴

The divergent paths of these two nations can be attributed to their distinct demographic and economic characteristics. In China, a largely rural population adopted smartphones as their primary digital gateway, driven by affordability and accessibility. In contrast, Saudi Arabia's smaller, wealthier, and predominantly urban population has maintained a more balanced use of both traditional PCs and mobile devices.

These contrasting approaches highlight the importance of considering local contexts when developing digital strategies. While China's mobile-first strategy has been hugely successful in rapidly expanding digital access, Saudi Arabia's balanced approach may offer greater versatility in the long term. Both models provide valuable insights for other nations seeking to enhance their digital competitiveness.

Among digital trajectories in how device ownership has evolved, India, Vietnam, and Indonesia are showing signs of following a similar trajectory as China regarding device affluence, albeit with a time lag: India is 13 years behind China for laptop ownership. For smartphone ownership, it is three years behind. In 2023, the smartphone ownership rate in India is 79.8% (10 percentage points behind China). Overall mobile ownership: 93.8% (3.6 percentage points behind China) and overall mobile poor/rich ratio: 85% (9 percentage points behind China). Those countries are progressing through stages akin to China's digital evolution and have the potential to close the digital gap more quickly than they would by adopting a traditional laptop-first approach.

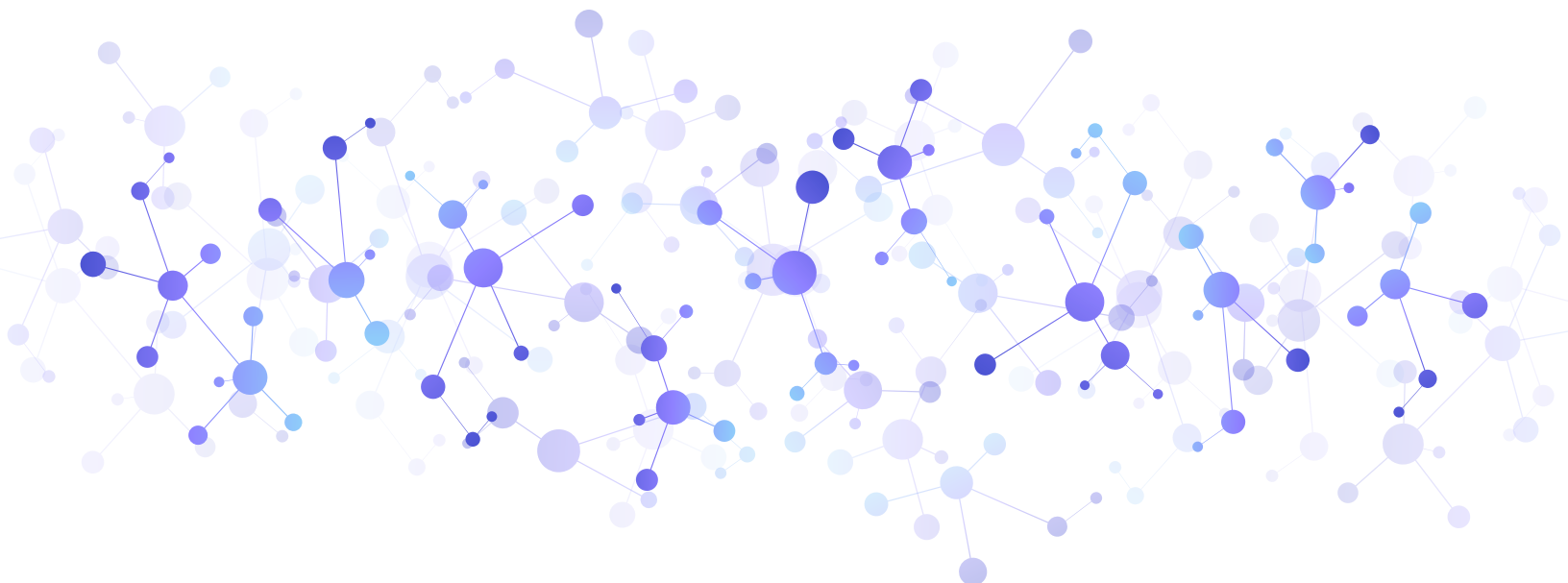
A key factor in China's digital success has been its ability to bridge the divide between rich and poor through mobile technology and developing a rich and varied mobile digital ecosystem. In China, the mobile ownership ratio between the poorest 40% and the wealthiest 60% stands at 94%, compared to just 33% for personal computers. Notably, mobile phones serve as the primary gateway to the internet for the poorest 40%.

In Indonesia, the mobile ownership ratio between the poorest 40% and the wealthiest 60% is 78%, trailing China by 16 percentage points, while India lags by 9 percentage points.⁷⁵ India and Indonesia have significant opportunities to leverage mobile technology, potentially accelerating digital inclusion and driving their digital development.

China's unique mobile-driven trajectory has been shaped mainly by the widespread development and adoption of super apps, designed specifically for mobile devices. These apps enable third-party companies to create mini-programs within their platforms. Tencent Holdings Ltd.'s WeChat is a prime example. Beyond its core function as a messaging app, WeChat allows users to order food, book rides, and purchase plane tickets—not because Tencent offers these services directly, but because it hosts third-party apps within its ecosystem.⁷⁶

For mobile-first emerging markets, as mobile phones become more integrated into daily life and services are developed primarily for mobile use, individuals increasingly rely on these devices to work, study, and perform daily tasks. Markets such as India, Indonesia, and Vietnam have promising opportunities to develop their own super-apps and expand the digital ecosystem, despite facing early-stage challenges, including regulatory scrutiny. Examples like Paytm in India, Grab in Vietnam, and Dana in Indonesia highlight the potential of super apps to drive digital adoption by making essential services more accessible online.

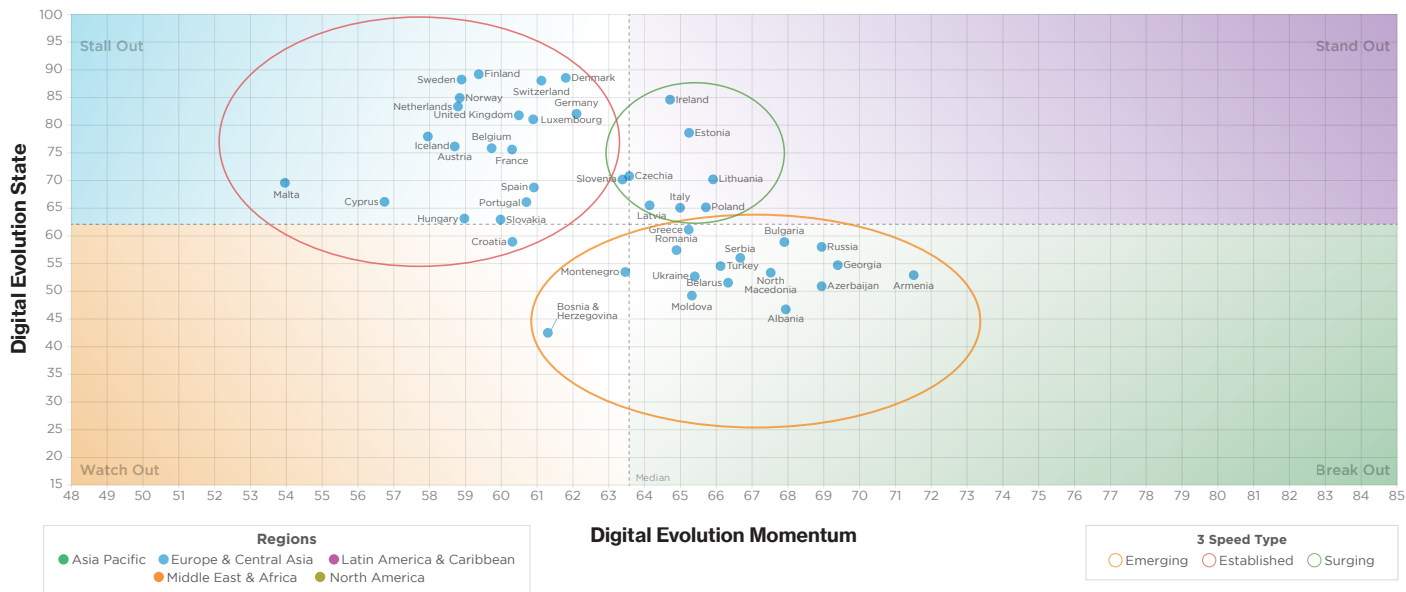
As noted in our previous report, the least digitally advanced economies must allocate their limited resources strategically. Providing internet access through mobile phones yields the highest return on investment. For policymakers in developing countries, prioritizing mobile-first strategies—similar to China's—can accelerate digital progress. However, small screens limit engagement for certain activities compared to laptops and desktop computers. While mobile phones are ideal for digital services like e-commerce, broader access to a variety of devices, as seen in Saudi Arabia, is essential for building a more inclusive and complex digital economy.



Europe's Three-Speed Digital Transformation: Established, Surging, and Emerging

Our analysis of Europe's digital landscape reveals three distinct clusters of digital development, each with unique characteristics, challenges, and opportunities. As shown in Figure 21, these three groups—Established, Surging, and Emerging economies—occupy different positions within our Digital Evolution chart, creating what we call ‘Three-Speed Europe.’ This carries implications for the EU’s stated ambition to transform the zone into a single digital market.

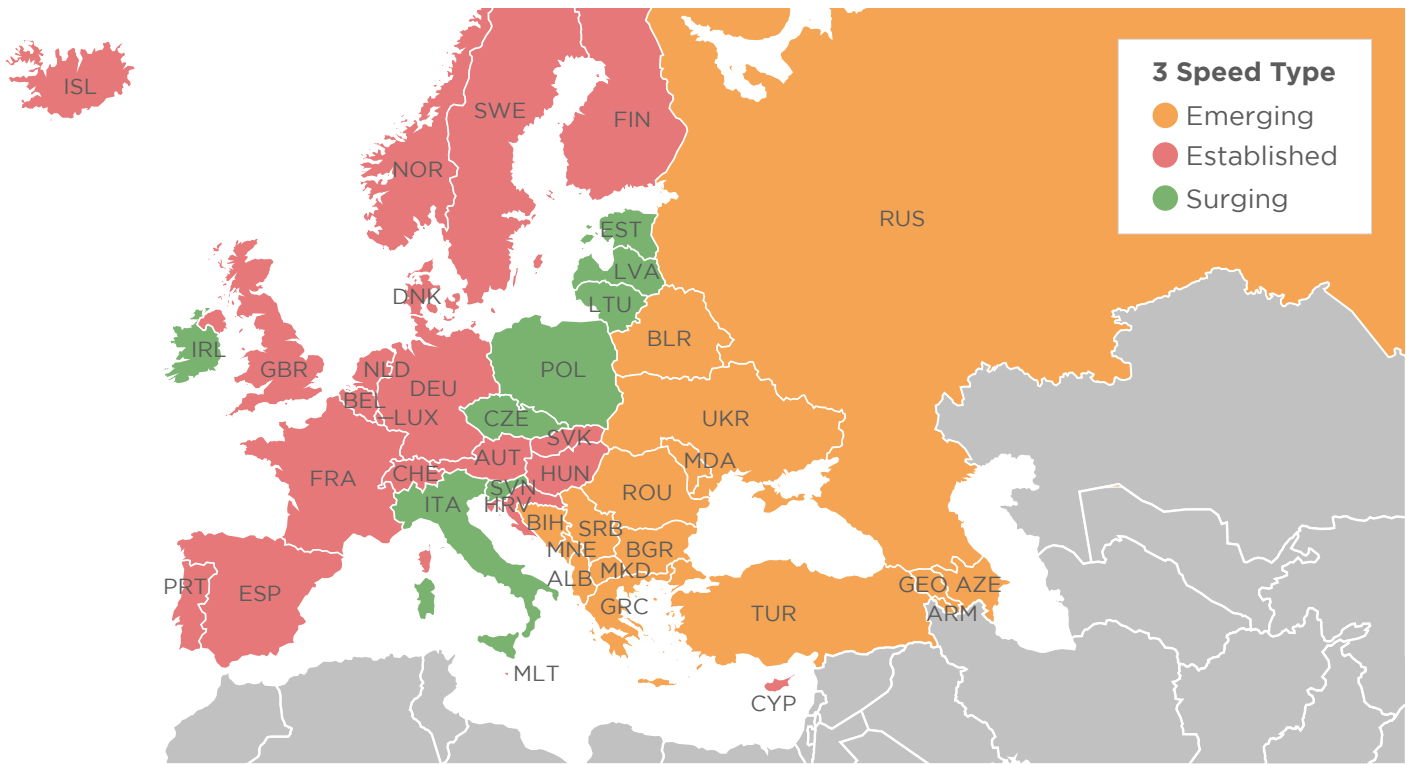
Figure 21
Three-Speed Europe



The Three Speeds of European Digital Development

Europe’s digital economy, with clear geographic and developmental patterns, is evolving at multiple speeds. Established economies (primarily Western and Northern Europe) demonstrate high digital states but slower momentum; Surging economies (including Baltic states and select Central European countries) exhibit both high scores and rapid advancement; and Emerging economies (largely Southeastern and Eastern Europe) show lower current states but promising momentum.

Figure 22
Three-Speed Europe



Established Economies: Digital Maturity with Momentum Challenges: United Kingdom, Netherlands, Germany, France, Switzerland, Norway, Finland, Denmark, Sweden, Belgium, Luxembourg, Austria, Spain, Iceland, Cyprus, Malta, Portugal, Croatia, Slovakia, Hungary

- **Tailwinds: Digital State Strengths:** Established economies occupy our framework's 'Stall Out' quadrant, characterized by high digital evolution states but comparatively lower momentum. These mature digital ecosystems have built formidable foundations in innovation outcomes, particularly excelling in patent applications and scientific publications. Their institutional frameworks demonstrate effective governance mechanisms bolstered by high tax revenue and comparatively low corruption levels. Years of investment have yielded advanced digital infrastructure with extensive connectivity and reliable services, complemented by well-developed digital payment ecosystems that enjoy high consumer trust.
- **Headwinds: Momentum Challenges:** Despite their considerable strengths, Established economies face a real danger of digital complacency. The very success of their digital ecosystems creates risks of diminishing returns on digital investments as they approach the technological frontier, where breakthrough innovations become increasingly difficult to achieve. Their growth in ICT service exports lags notably behind that of their Surging counterparts. Many of these countries also grapple with regulatory complexity that, while protective, can sometimes impede rapid digital innovation. Their aging populations, though digitally literate by global standards, often adopt emerging technologies at a more measured pace than younger demographics in other regions.
- **Potential Role Models:** The Established economies would do well to look toward Surging countries for inspiration in maintaining digital momentum. Ireland's remarkable growth in ICT service exports—measured as value capture in our framework—offers valuable lessons in digital sector specialization and for creating enabling conditions for technology companies. Estonia's pioneering digital government innovations demonstrate the potential efficiency gains available through administrative modernization. Emerging countries can also offer lessons: Romania leads in the growth of Information Technology (IT) as a field for tertiary graduates, while Ukraine has demonstrated strong growth in ICT exports.

Surging Economies: High Performance with Continued Growth: Estonia, Lithuania, Latvia, Poland, Czechia, Ireland, Slovenia, Italy

- **Tailwinds: Balanced Digital Development:** Surging economies occupy the coveted Stand Out quadrant, demonstrating high digital evolution states and strong momentum. Estonia stands at the forefront as one of Europe's digital pioneers, particularly in e-government services, where its innovations have become global benchmarks. These countries have cultivated strong innovation cultures that successfully blend institutional support with entrepreneurial drive. Their strategic digital investments yield accelerating returns, creating virtuous cycles of development. Many have implemented practical digital skills development programs that continuously feed their innovation pipelines with fresh talent and ideas. While there is room for improvement in attracting foreign investment, many of these economies are forming the foundations to transform into attractive places for investment.
- **Strategic Advantages:** Several factors enable the continued ascent of these Surging economies. For many, their geographic positioning at the intersection of Eastern and Western European markets allows them to serve as digital bridges between different economic zones. Many have successfully transformed traditional industries through digital technologies, creating hybrid strengths that combine established expertise with technological innovation. Their technical education systems consistently produce skilled digital workforces powering domestic innovation. Perhaps most importantly, some have developed agile regulatory frameworks that support innovation while maintaining necessary protections—achieving a balance that eludes many other regions.
- **Broader European Impact and a Potential Path toward a Single Digital Market:** These Surging economies play a pivotal role in Europe's broader digital landscape. Nearly all these countries border at least one country from one of the other two groups, facilitating an opportunity for knowledge transfer and practical demonstration of effective digital policies. Their policies and practices serve as emulation-worthy models for both more and less digitally mature neighbors. Czechia, Italy, and Slovenia border Established countries; Estonia, Lithuania, and Latvia border Emerging ones; and Poland borders both groups, creating natural pathways for innovation diffusion across the EU and its periphery.

Emerging Economies: Digital Potential with Implementation Challenges: Bulgaria, Romania, Serbia, Turkey, Georgia, Armenia, Azerbaijan, Ukraine, Bosnia and Herzegovina, Moldova, Albania, North Macedonia, Greece, Belarus, Russia, Montenegro

- **Tailwinds: Digital Momentum:** Emerging economies largely fall into the "Break Out" quadrant, showing promising momentum despite lower current states. These countries demonstrate rapid adoption of internet infrastructure and mobile technologies, often outpacing more developed nations in growth rates. A notable strength appears in digital financial services, where many countries show impressive development in mobile e-commerce, mobile wage receipt, and card payments per capita. Their position creates digital leapfrogging opportunities, allowing them to adopt the latest technologies without the constraints of legacy systems. Their younger, increasingly tech-savvy populations also provide natural advantages in digital adoption and innovation potential.
- **Headwinds: Implementation Challenges:** Despite their promising momentum, these countries face significant obstacles in their digital development journey. Weaker innovation outcomes, particularly in scientific publication and patent generation, suggest challenges in translating digital inputs into concrete economic benefits—at least for now. Many struggle with digital governance challenges, including limited availability of public data and concerns regarding internet freedom. Digital skills gaps persist in specialized technical fields, creating bottlenecks in the innovation pipeline. Furthermore, uneven digital adoption across geographic and demographic segments threatens to create new forms of inequality within these societies.
- **Role Models for Development:** Emerging economies can find valuable guidance by looking to several exemplars across Europe. Iceland and Estonia offer models for internet freedom and digital rights protections that balance openness with security. Poland demonstrates effective open data implementation that enhances transparency while creating new economic opportunities. Switzerland and the Nordic countries provide frameworks for scientific output and innovation ecosystems that Emerging economies might adapt to their specific contexts.

Interconnectedness and Learning Opportunities: The three-speed nature of Europe's digital landscape creates a unique ecosystem of interdependent development, with several implications for the EU's stated ambitions of transforming the zone into a single digital market. Established economies offer institutions and governance models refined over decades of digital evolution. Surging economies demonstrate practical pathways to balanced digital growth, bridging high performance with continued momentum. Emerging economies showcase innovative approaches to rapid digital adoption that sometimes bypass traditional development stages altogether.

This interconnected development ecosystem positions Europe uniquely in the global digital landscape. The continent contains within itself microcosms of nearly every stage of digital development, creating natural laboratories for policy experimentation and knowledge transfer. Despite varying transformation speeds, Europe's digital future will likely be shaped by how effectively these three groups learn from each other and collaborate on shared challenges in the global digital economy.

Regional Patterns and Insights

In this section, we present an overview of noteworthy patterns and insights at a regional level and a brief discussion of the underlying phenomena and trends. For this analysis, we classified the 125 economies in our Digital Evolution scorecard into five regions: Asia Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and Africa, and North America.

We have further grouped economies into three archetypes: Leaders, Linchpins, and Leapfrogs.

Leaders: These countries perform strongly on state scores, particularly focusing on supply and institutional metrics. They have robust digital infrastructure, supportive institutional frameworks, and a high level of digital adoption. They often lead in innovation and set standards for other countries. Examples typically include advanced economies with well-established digital ecosystems.

Leapfrogs: These countries show strong momentum scores in any or all of the four drivers (Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change) over any given time period. Leapfrogs demonstrate a commitment to close the digital gap and the potential for rapid digital transformation by adopting advanced technologies swiftly, often bypassing intermediate stages of digital development. They harness digital advancements to drive significant economic growth and increase their competitiveness.

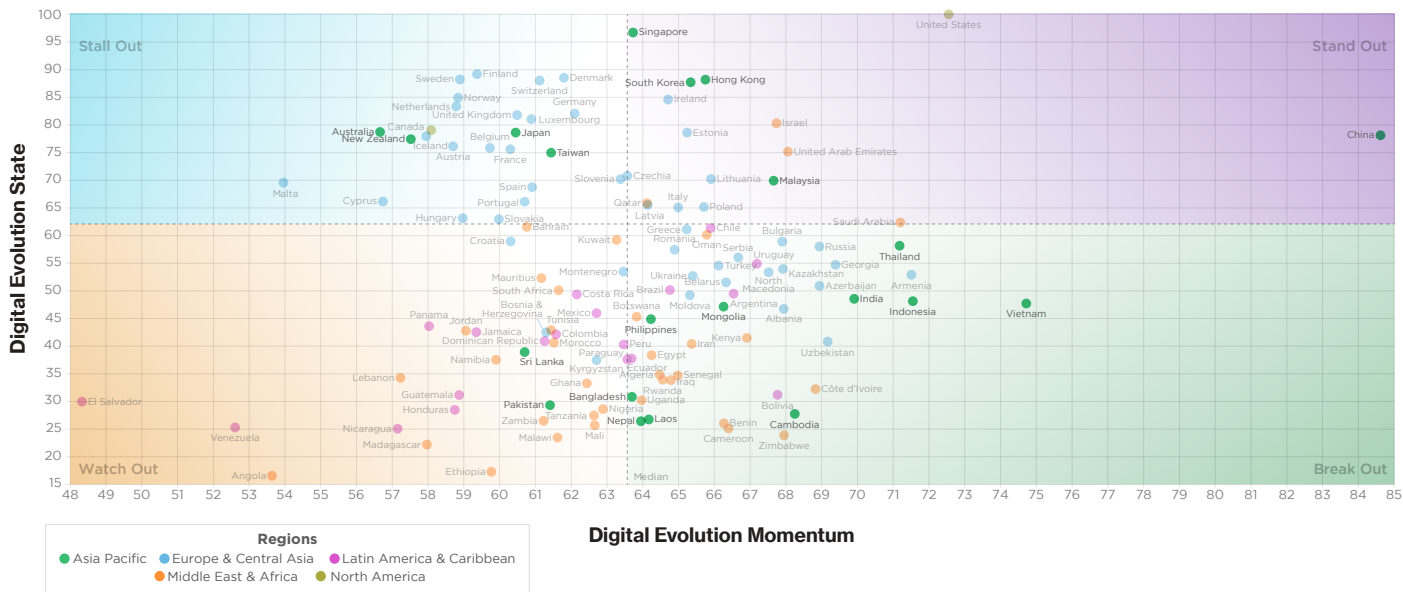
Linchpins: These countries are crucial actors in the global digital economy; they have the heft to shape their domestic and regional digital economies and societies in their likeness. Linchpins might not be the most digitally advanced globally, but they are strategically important due to the size of their digital economy or the number of users. They play a leading role in shaping the norms, rules, regulations, and standards of the global data economy.

Our [Digital Evolution interactive](#) tool allows for many more comparisons and analyses across economies by key drivers of evolution, regions, income groups, and digital evolution zones. We encourage and invite our readers to explore these analyses and visualizations.

Asia Pacific

The Asia Pacific region is advancing at a fast clip—its average momentum is faster than all other regions. The region leads in demand momentum, with digital payment uptake driving rapid growth. However, progress on digital inclusion is slowing, with other regions moving towards parity faster. The region hosts the second-highest-scoring country (Singapore) and the fastest-moving (China). While there are no doubt some digital superstars, this region expands across the Evolution map—reflecting a diverse set of journeys among the countries.

Figure 23
Digital Evolution: Asia Pacific



Leaders

South Korea: South Korea, one of five Stand Out countries from Asia Pacific, continues to reap the rewards of substantial investments in Supply and Innovation drivers. South Korea's high broadband adoption rate and government initiatives have nearly eliminated the broadband divide, with 100% of households accessing the internet and 97.6% using the internet. The rapid progress can be attributed to several government initiatives, including the Universal Service Obligation (USO), which mandated telecom companies to provide broadband to everyone, everywhere, at a minimum speed.⁷⁷ The government also fostered public-private partnerships to expand broadband access to rural areas.⁷⁸ While the closure of the broadband divide is laudable, a digital payments divide persists, with fewer rural households taking advantage of the technology than their urban peers.

The country's focus on digital infrastructure is complemented by significant investments in emerging technologies, such as 5G⁷⁹ and AI.⁸⁰ South Korea has implemented extensive e-government services, making public administration more efficient and accessible to its citizens.⁸¹ However, mobile data costs,⁸² and net neutrality regulations⁸³ remain challenging. The country's continued emphasis on technological innovation ensures it remains at the forefront of digital evolution.

Hong Kong: Hong Kong, which falls near South Korea on our Digital Evolution map, is just one of five Stand Out economies in the Asia Pacific region and boasts the highest Demand score across all economies in the Index. Strong consumer spending and a well-established financial services sector support robust ICT infrastructure and high digital adoption rates. The region's strategic location and historic open market policies have made it a hub for digital commerce and innovation. Despite these strengths, Hong Kong faces institutional challenges, which could hinder its long-term competitiveness. Freedom of expression and government accountability, efficiency of legal frameworks, and control of corporate corruption have all fallen in recent years, creating an uncertain environment for investors and talent. Nevertheless, Hong Kong's commitment to digitalization and its advanced technological infrastructure make it a regional leader.

Japan: Japan is a strong regional leader in both institutions and supply. It addresses many of its digital deficiencies and takes bold action to transform into a more digitally innovative country. A 2018 Ministry of Economy, Trade, and Industry report warned that Japan was teetering on the edge of a "digital cliff" due to businesses' low adoption rates of digital systems.⁸⁴ The Kishida government committed to boosting the country's digital transformation through investing in infrastructure improvements and appointing a digital minister, who declared a "war" on floppy disks and other overused, outdated technologies.⁸⁵ These investments are beginning to pay off, with Japan showing substantial access infrastructure improvements, including faster fixed and mobile broadband speeds. Where Japan's supply momentum is strong, its demand momentum is relatively weak, hindered by an aging population (a digital divide exists between generations) and a strong reliance on cash transactions. While cashless transactions are growing in the country, their proportion is far behind that of regional peers like South Korea and Singapore.⁸⁶

Linchpins

China: China's strong momentum continues to put the economy in a class of its own—it not only has the fastest momentum in the Index by far but also is moving fastest in Supply and Demand and follows only the United States in Innovation. As of 2023, 78%⁸⁷ of Chinese people are online, according to ITU. With over 1 billion internet users, China isn't just driving global demand—it's home to the world's largest online community.

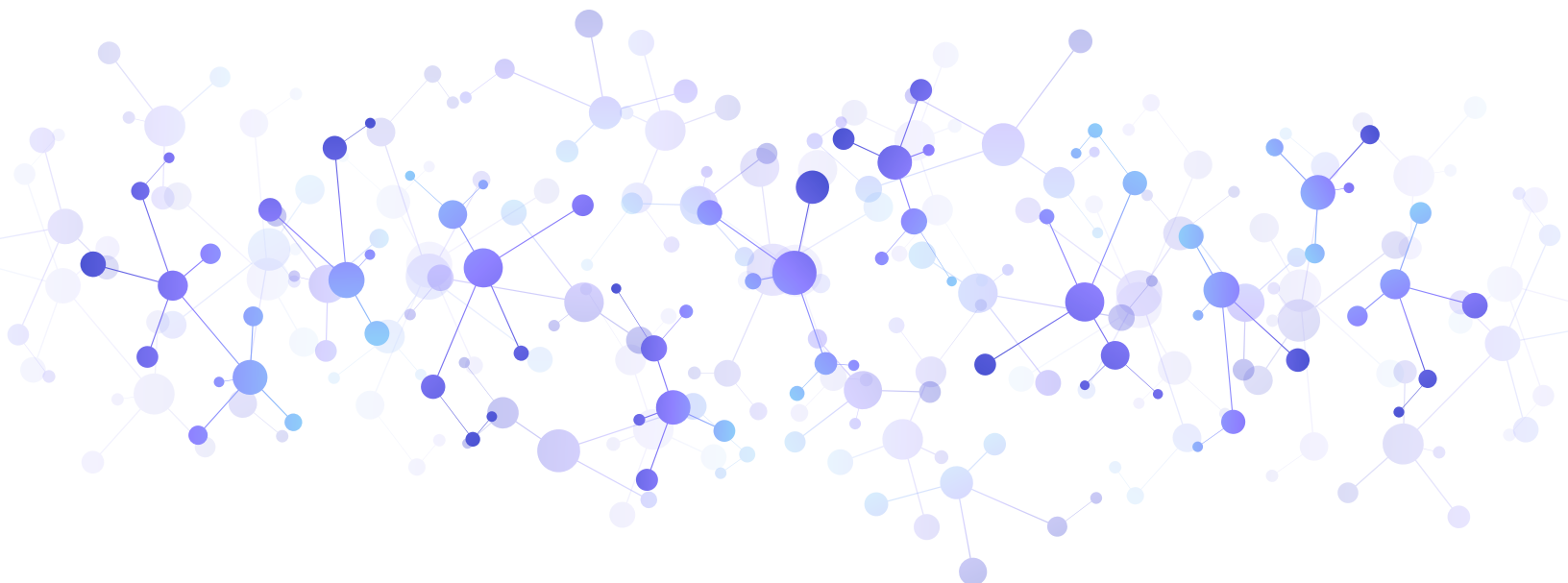
China's rapid expansion in mobile e-commerce and significant investments in AI highlight its strength in the digital economy. According to the OECD, in 2024, VCs invested USD\$16.7 billion into AI in China. This marked \$265 billion cumulatively since 2012. Similarly, in 2024, VC investment was \$2 billion into AI compute in China, marking \$40 billion cumulatively since 2012.⁸⁸ In all cases, the figure for China comfortably surpasses every country other than the United States. This focus on AI underlines technological advancement as a key driver of the digital economy.^{89,90} China's digital infrastructure is robust, reflected in high mobile penetration and extensive internet access, enabling widespread digital adoption.

A vast consumer base, strong government support, and a thriving tech industry support the country's digital ecosystem. However, despite some improvement, the digital divide between urban and rural areas and rich and poor remains stubborn. It has the largest class and urban-rural digital divides among Stand Out peers in Asia Pacific. Similarly, compared to these same peers, China lags in institutional metrics, specifically data openness and the restrictiveness of digital trade. Low trust in the quality and completeness of its statistical offerings to the public could act as a barrier to innovation—at a key inflection point as AI takes off and innovators look to publicly available datasets to solve problems. China is far from alone in moving toward a more restrictive approach to digital trade, but it remains a drag in institutional progress. A lack of transparency in the legal framework presents challenges that could affect China's digital leadership. As China continues to invest in its digital infrastructure and innovation, it remains a key player in shaping the future of the global digital economy.

India: India ranks second in having the highest number of internet users globally, and with its young population, it still has plenty of room to grow. It's the 8th fastest-moving country, performing particularly well on Innovation measures.

India's digital transformation has been driven by large-scale initiatives such as Aadhaar, the world's largest biometric identification system-enabled digital public infrastructure, which has enabled millions of citizens to access digital services; and United Payments Interface (UPI), the transformational real-time payments system, responsible for processing 84% of electronic payments in 2023.⁹¹ The country's tech industry continues to lead globally in IT services, supported by a young, tech-savvy population. However, India faces challenges in digital inclusion, particularly in getting more women and rural people online and engaged in the digital economy. As India continues to expand its digital capabilities, it remains a critical global player, particularly in the diffusion of digital public infrastructure across the Global South.

Indonesia: With the 4th highest number of internet users globally, Indonesia is becoming a key actor in the global digital economy. Through overcoming last-mile challenges in the 13,466-island archipelago, Indonesia has seen an explosion in mobile e-commerce, which is far and away the most significant indicator contributing to its high momentum. Less than 1.5% of its retail value was in mobile e-commerce as of 2014; as of 2023, it was over 30%.⁹² Indonesia's rapid growth has brought more of its population into the digital economy. In 2008, Indonesia was 5th from last in progress to closing the class digital divide, with only 5% progress to class digital parity. In 2023, Indonesia reached the middle of the global pack with 60% progress in closing the class digital divide. This reflects the second-best improvement globally in progress to digital class parity.



Leapfrogs

Vietnam: Vietnam, the second fastest-moving country in the Index, is also well-balanced across drivers—it's consistently in the top 5 fastest moving countries in Supply, Demand, Institutions, and Innovation. This rapid digital momentum is partially reflective of a fast-developing broader economy as Vietnam works to make itself indispensable in global supply chains, particularly in electronics. E-commerce within the country has grown 16-30% over the past four years, the highest growth rate in the world.⁹³ Vietnam shares some commonalities with Thailand, the other major leapfrog in the region. These countries both have a national AI strategy, show impressive growth in access and usage of the internet, and have successfully integrated the internet into their economies (e-commerce and businesses using the internet have expanded). E-commerce retail value in Vietnam reached 14% of total retail value in 2023, outpacing the global median of 8%.⁹⁴ Vietnam distinguishes itself from the other two through expanded ICT exports, which grew from 4.7% of its total goods exports in 2008 to 38.8% by 2020.⁹⁵ Vietnam's investment in education is beginning to pay off—Vietnamese students are besting their Malaysian and Thai peers and students in much more affluent countries like Britain and Canada.⁹⁶ With one of the highest female workforce participation rates and more female than male entrepreneurs,⁹⁷ Vietnam has made impressive progress in closing the gender digital divide, moving from 79% digital gender parity in 2008 to 90% in 2023. If Vietnam continues to harness digital developments equitably and effectively, its goal of becoming a rich country by 2045 appears well within reach.

Thailand: Thailand shares several strengths with its Break Out Asian peers, Indonesia and Vietnam. A national AI strategy, expanded access and use of the internet, and increased e-commerce usage all push Thailand to the right-hand side of the Digital Evolution map. Thailand's most significant growth has been in real-time payments, with the PromptPay system making it a global leader in this arena.⁹⁸ It's also buoyed by the number of people receiving their wages through a mobile phone, data traffic per mobile connection, and average bandwidth connection speed. Similar to Vietnam and Indonesia, this growth has helped lower-income residents access digital technologies—the progress to class digital parity has improved significantly, from 29% progress in 2008 to 67% in 2023.

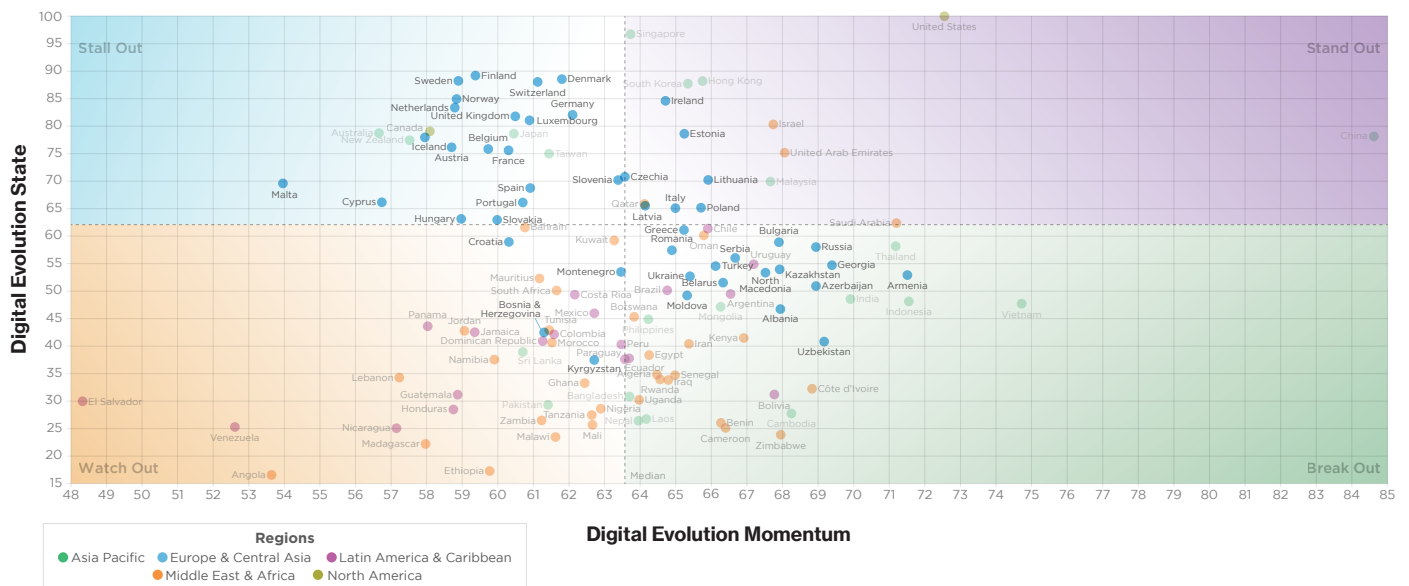
Pakistan: Pakistan has shown significant forward momentum in Supply, driven by an improvement in access infrastructure, particularly access to mobile phones. Pakistan's digital adoption is accelerating, with, according to Euromonitor, nearly half of households having access to the internet, a significant improvement since 2019, when only one-quarter had access. The government's initiatives to expand internet access and promote digital literacy have contributed to the country's digital transformation. However, Pakistan faces significant challenges, including low internet penetration in rural areas, limited digital literacy, a sizeable gender gap, and weak institutional trust. Addressing these issues will be crucial for Pakistan to fully realize its potential as an advancing digital economy in the region.

Europe and Central Asia

Europe and Central Asia, as a region, outperform in many state measures—Institutions, Supply, Demand, and the overall Digital Evolution score. It ranks number two behind North America (which only includes the US and Canada). The European countries tend to populate the top left part of the Digital Evolution map, reflecting strong state scores but slowing momentum. The Central Asian countries, on the other hand, tend to fall in the bottom right part of the chart, exhibiting strong momentum coupled with plenty of room for improvement.

Figure 24

Digital Evolution: Europe and Central Asia



Leaders

Denmark: Like in the World Happiness Report,⁹⁹ Denmark falls just a hair behind Finland for the number one spot in the region in Digital Evolution. With the strongest demand, fastest supply momentum, and second-best institutions in Europe, the Danes have plenty of reasons to be happy about their digital economy. In Denmark, 99% of households have access to 4G—this broad access and rapid deployment of 5G push them into the Stand Out zone on Supply, with rapid supply improvements.¹⁰⁰ Denmark's institutions are strong, with one of the best bureaucratic efficiency scores in the world, which is rewarded by high levels of trust in institutions and the government. Denmark achieved near-perfect (99.86%) digital gender parity, though it still has room for improvement in bringing lower-income and rural users more fully into the digital ecosystem.

Luxembourg: Luxembourg has emerged as a digital powerhouse in Europe thanks to its strategic focus on advanced technology and digital infrastructure. The country's per capita investment in AI ranks among the highest globally, reflecting its commitment to maintaining a competitive edge in the digital economy. Luxembourg's digital infrastructure is particularly noteworthy, with some of the world's largest per capita investments in AI ranking fourth.¹⁰¹ Also, 40% of Europe's Tier IV data centers are in the Grand Duchy,¹⁰² and its supercomputer MeluXina ranks among the best 50 globally.¹⁰³ The government's efforts to digitize services, including electronic tax filings, have further streamlined public services, making them more efficient and accessible. Luxembourg's strategic investments and strong institutional support position it as a leading digital nation in Europe.

Estonia: Estonia is often hailed as a pioneer in digital governance, setting a global standard for e-government initiatives. The country was one of the first to introduce internet voting, a system in 2019 that has significantly enhanced civic participation. It remains the sole European country that has internet voting.¹⁰⁴ Estonia's focus on digitalization extends beyond voting; the country has developed a comprehensive digital ecosystem that includes e-residency, allowing global citizens to start and manage businesses online with ease. Estonia's banking sector is also highly digitized, with 99% of bank transfers conducted through e-banking. This widespread adoption of digital payments is supported by a robust legal and institutional framework that ensures security and efficiency. Estonia's commitment to innovation and digital inclusivity has made it a leader in Europe and globally, with its models often studied and replicated by other nations.

Leapfrogs

Ukraine: Ukraine is rapidly evolving as a digital nation, driven by necessity and resilience in the face of ongoing conflict. The country's resilient institutions and innovation ecosystem continue to propel it forward despite the formidable challenge of war.

Ukraine's rapid digitalization has been a response to and a result of the ongoing conflict. The government's digitalization project, highlighted by the DIIA (short for "State and Me") app, has become crucial for integrating various public services into a single, accessible platform. Over 70% of the population uses the DIIA app, which carries a digital passport and a driver's license and even allows individuals to apply for construction permits and file taxes.¹⁰⁵ With 94% of Mastercard holders in Ukraine using online banking and 75% doing so via mobile devices, the country's digital financial ecosystem is robust and growing.¹⁰⁶

Ukraine was forced to innovate to survive ongoing Russian threats. Continuous cyber-attacks since the annexation of Crimea have trained and forced Ukraine to become more resistant to such threats by protecting technologies, data processing, and communications.¹⁰⁷ The IT industry is the only one to have grown amidst the war.¹⁰⁸ Possible explanations for this trend include the increased flexibility of IT employees to work anywhere, efforts to fend off disruption, and companies seeking to test their military technologies on the battlefield.¹⁰⁹ Finally, Ukraine benefits from a large pool of qualified workers, with approximately 36,000 people with technical skills graduating every year.¹¹⁰ The nation's ability to adapt and innovate under pressure highlights its potential to leapfrog into a leading position in Europe's digital economy.

Turkey: Turkey has demonstrated impressive momentum in digital adoption, particularly in the e-commerce and digital payment sectors. The country's e-commerce penetration has seen remarkable growth, tripling from 2018 to 2021, driven by an expanding internet user base and increasing consumer confidence in online transactions.¹¹¹ Turkey's digital transformation has been supported by a proactive regulatory environment encouraging innovation and the adoption of new technologies. The government has invested in expanding internet access across the country, particularly in rural areas, which has further fueled the growth of e-commerce and digital payments.¹¹² As more consumers engage with digital services, Turkey's digital economy is poised for continued expansion, making it a key contender in the region's digital landscape.

Linchpins

Germany: Germany has solidified its position as a leader in the digital economy through a combination of strategic investments and forward-thinking policies. The country's AI strategy, introduced in 2018,¹¹³ has been a cornerstone of its digital transformation, enabling Germany to stay at the forefront of technological innovation. In addition to its AI advancements, Germany has committed \$2.4 billion to developing quantum computing, positioning itself as a global leader in this emerging field.¹¹⁴ Additionally, the country provides subsidies for chip makers, such as Intel and TSMC, to build factories, amounting to an investment of \$59.5 billion.¹¹⁵ Germany's dedication to e-government is evident in its widespread adoption of electronic tax filings, making government services more accessible and efficient for its citizens. The combination of robust institutional frameworks, substantial public and private investments, and a well-educated workforce make Germany a model for digital leadership in the region.

France: With the second-highest number of internet users in the EU, France stands out for its strength in infrastructure—both the digital infrastructure that enables citizens to get online and the traditional infrastructure that makes its economy possible. Unique among European countries, its France Très Haut Débit (Very High-Speed Broadband) plan is structured to meet the challenge of providing universal access to high-speed internet coverage: private operators invest in high-density urban areas, while local authorities provide coverage in low-density rural areas with the help of government subsidies.¹¹⁶ Due to this ambitious strategy, France now boasts a median broadband speed of 226 Mbps, the highest in the EU,¹¹⁷ and is on track to reach 100% gigabit coverage by 2030.¹¹⁸ This active involvement in digital infrastructure is in line with France's proactive approach to public works overall: it has the highest tax-to-GDP ratio of the EU, and it receives high marks for the quality of traditional infrastructure such as roads, rails, and ports.

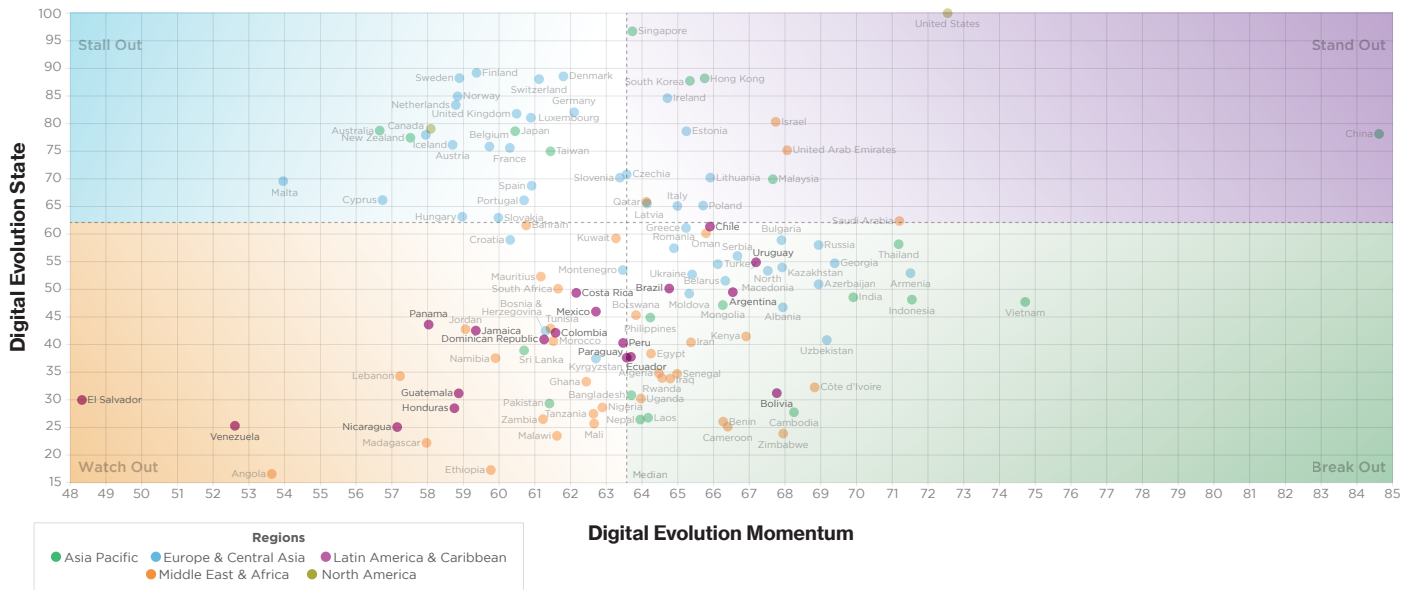
France has also become a hotspot for generative AI. It is home to Mistral AI, the highest-valued AI startup in the world, not in San Francisco,¹¹⁹ along with several other promising startups and AI research labs from established players such as Google and Meta.¹²⁰ Bolstered by a robust national AI strategy¹²¹ and a president who has for years been aiming for global AI leadership,¹²² the AI community in France is also well positioned to adapt to an evolving regulatory landscape, seeking positive relationships with the government and taking compliance into account from the start. The industry faces uncertainty amidst the country's political difficulties but feels confident in its ability to weather the storm.¹²³

United Kingdom: With high scores across Demand, Supply, Institutions, and Innovation, the UK is well-balanced across the primary drivers of digital evolution. With the third largest e-commerce market in the world (after the US and China), it punches above its weight in online shopping, surpassing countries with higher GDPs, like Germany and Japan. Britain is also joining the European Union and the United States in laying out some standards for AI by signing the first international AI treaty.¹²⁴ The UK also achieves boast-worthy marks on digital government services. However, there are some signs that, like many countries, digital inclusion is facing headwinds, with lower-income households lacking the skills, access, or resources needed to succeed in the future.¹²⁵

Latin America and the Caribbean

With all countries in the region being either in the Break Out or Watch Out zones, the Latin America and Caribbean region may not be home to the most digitally advanced countries in the world but to some of the fastest growing ones. Leaders in the region, Costa Rica, Chile, and Uruguay, have made significant advances in modernizing their ICT infrastructure and have sought to promote equal access to technology through robust institutions. Leapfrogs – Bolivia and Argentina – have experienced high levels of growth in the region due to the formation of better ICT regulation, which has led to greater internet connectivity and decreased social divisions. Brazil, the linchpin of the region, is shaping its digital economy in a unique manner: striving to expand digital payments and set the standards for AI regulation in the region.

Figure 25
Digital Evolution: Latin America and the Caribbean



Leaders

Costa Rica: In recent years, Costa Rica has become a major hub outside of Asia for packaging and testing microchips, positioning itself as a viable alternative to China, given US strategic interests.¹²⁶ The country's biggest category of exports is medical devices. It is also a leading technology hub with over 450 ICT companies.¹²⁷ Costa Rica is a beacon of democratic stability in the region, which has created a strong environment for internet freedom. The country ranks the highest in the region on internet freedoms, according to Freedom on the Net, and ranks fifth worldwide.¹²⁸ It serves as an effective model for other countries in Latin America, especially as the region continues to experience democratic backsliding.¹²⁹ Though the country's digital economy is expanding quickly, Costa Rica has significant room for improvement in developing an artificial intelligence landscape, especially given that the country has the deepest pools of skilled labor in the region.

Chile: With advanced telecommunications and ICT infrastructure, Chile boasts the fastest internet connection speed in the region. However, the country's capital investment in ICT has not kept pace with its 2022-2023 GDP growth. With a host of economic incentives, Chile is Latin America's most business-friendly country, providing a strong environment for start-ups eager to utilize technology. Although improvement is still needed, Chile has the lowest class digital divide in the region. This has been facilitated by the Chile Digital 2035 strategy, which aims to reduce digital inequality and promote digital rights.¹³⁰ A lack of talent availability challenges the country's digital landscape, specifically specialized IT professionals. If Chile continues to lack individuals with the required IT sector skills, Chile could miss out on approximately \$13 billion in growth by 2030.¹³¹ The Chilean government declared a 64% increase in the budget allocated to the digitalization of the State in 2023, and a complete digital transformation is expected to be achieved by 2027, explaining the country's high e-government indicator score.¹³²

Uruguay: Antel, Uruguay's state-owned and leading telecommunications company, is used to drive social projects fostering digital equity. Under the country's universal access plan, any household with a fixed telephone line is guaranteed 1GB of monthly traffic for free.¹³³ Additionally, the Fiber to the Home (FTTH) program allows every home in Uruguay to be connected to a fiber optic network, ensuring access for all.¹³⁴ The success of these programs is shown by Uruguay's high marks on infrastructure, which has launched the tiny country into ranking second-best in digital inclusion in the region. Although, like many countries in the region, improvement is still needed in addressing Uruguay's class digital divide, the government has pushed for an inclusive digital economy regardless of political party. For example, the Basic Educational Connectivity of Informatics for Online Learning (CEIBAL) program ensures that all students and teachers in the public education system have their own free personal computer and affirms their right to the internet.¹³⁵ Furthermore, the Uruguay Digital 2025 agenda emphasizes the importance of equity, accessibility, and digital citizenship.¹³⁶

A regional leader in institutions, Uruguay is particularly strong in the 'Institutional Effectiveness and Trust' component. The country is known to be one of the most transparent governments in South America, with strong political stability and widespread social services.¹³⁷ This effective bureaucracy, coupled with governmental support for digitalization, has led the country to consistently score highly on measures of e-government services and trust.

Leapfrogs

Bolivia: Bolivia's mobile network is expanding at the fastest rate in the region due to the country's Coverage for All program¹³⁸ and Entel's expansion of mobile communication networks to rural areas.¹³⁹ One of the main drivers of Bolivia's growth has been the country's advancements in the "ICT Regulatory Environment" cluster, which improved dramatically after 2019. This is partially due to the impact of the country's 2017 National Broadband Plan, which aims to increase broadband use, incentivize the development of broadband infrastructure, and expand national transportation networks.¹⁴⁰

To catch up with the leaders in the region, the scope for Bolivia lies in developing a robust AI policy and investing in a digital payment inclusion strategy, two areas where the country currently lags behind its regional peers.

Argentina: High inflation and economic challenges have been a drag on Argentina's economy for a long time—but digitalization is increasingly serving as a bright spot for Argentinians.

Argentina's e-government is growing fast: the Modernization and Innovation for Better Public Services national project, facilitated access to digital government services to more than 9 million citizens, accompanied by the launch of a digital government portal to provide access to more than 1,300 social services.¹⁴¹ The government is also using digital technologies to increase access to healthcare: the ongoing Strengthening the Digital Health Agenda in the Province of Buenos Aires aims to increase access to health services by implementing electronic medical records and virtual tools for health provision.¹⁴²

Mobile and telecommunication services remain unaffordable for many,¹⁴³ particularly in the context of one of the highest inflation rates in the world and a spiraling economic crisis. While there is plenty of room for improvement, Argentina ranks second-best in the class digital parity in the region.

Argentina has a national artificial intelligence strategy, the AI National Plan. This plan uses the Argentina Digital Agenda 2030 and the Science, Technology, and Innovation National Strategy as a foundation, aiming to develop AI policies that promote sustainable growth and inclusivity.¹⁴⁴ President Javier Milei aims to make Argentina the "world's fourth AI hub," promising low regulations.¹⁴⁵ The coming years will be critical in the country's AI landscape.

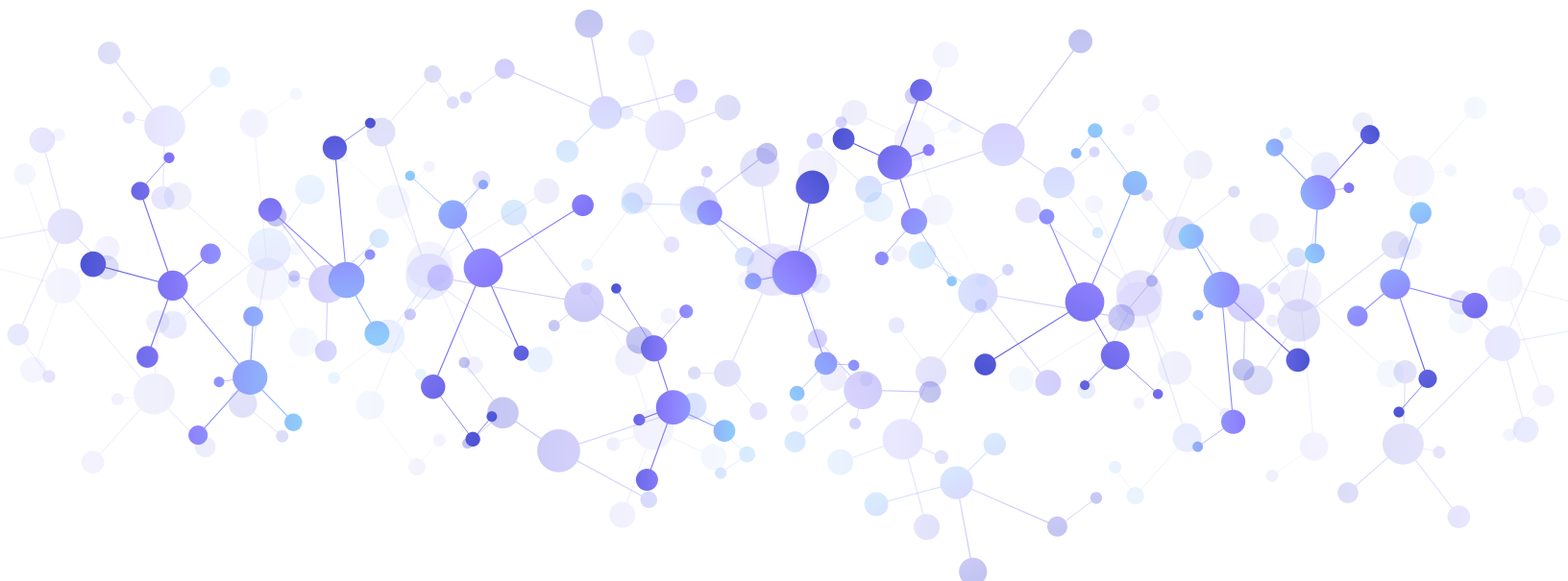
Linchpins

Brazil: In 2019, Brazil was a Watch Out country, with one of the slowest momentum scores in the Index. The country has rocketed forward to achieve Break Out status in this edition. The pandemic and the success of PIX (Brazilian instant payment ecosystem), the central bank's instant payment platform, improved digital inclusion and led to explosive growth in digital payments and e-commerce.

For years, Brazilians had little reason to ditch cash—digital payments were coupled with high fees and fraud risk. PIX came on the scene in November 2020, which allowed customers and merchants to transact via Quick Response Code (QR code).¹⁴⁶ The sign-up was easy and did not require users to share detailed bank information. The Brazilian government forced banks and fintech firms to join the platform, improving interoperability and making it simple and easy for the end consumer to use. Emergency payments during the pandemic were available through the app—30 million Brazilians received a cashless payment for the first time via the app.¹⁴⁷ PIX is now Brazil's most popular payment method, eclipsing debit cards, credit cards, and cash.

PIX indicates a broader shift towards governments creating digital public infrastructure (DPI)—where the state takes the lead in deploying technology at scale to make payments, manage medical and identity records, pay taxes, and more.

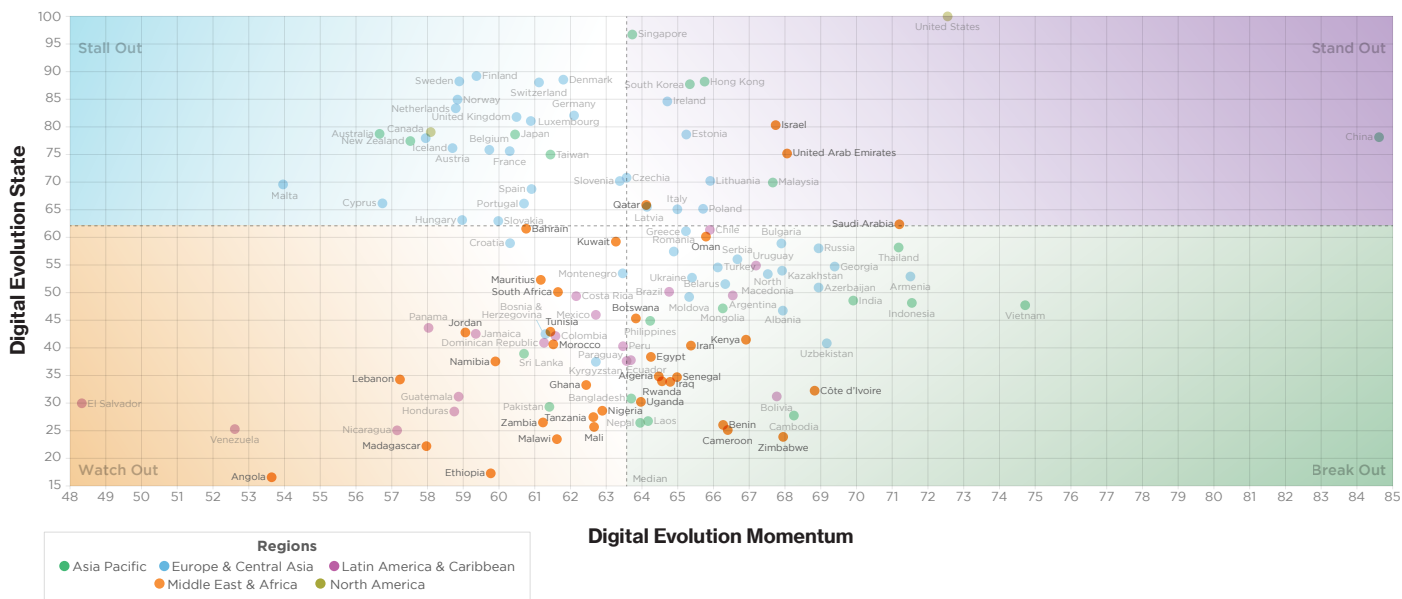
Large emerging markets such as Brazil and India have demonstrated a strong interest in digital public infrastructure (DPI). Both Brazil and India are starting to serve as useful case studies for countries aiming to enhance digital inclusion and promote data localization.



Middle East and Africa

The Middle East and Africa region is moving fast—it leads the world on momentum in digital inclusion and transaction infrastructure. Countries in the region are improving their institutions to make them more business-friendly, and while demand appears to be lagging compared to other regions, there is plenty of room for growth.

Figure 26
Digital Evolution: Middle East and Africa



Leaders

United Arab Emirates (UAE): The United Arab Emirates (UAE) is rapidly emerging as a global leader in digital innovation, consistently outperforming regional and sub-regional peers, including Saudi Arabia and Qatar. This leadership is underpinned by the UAE's robust institutional growth, characterized by strong open data inventory metrics, enhanced accessibility to government information, and the quality of government initiatives.

What sets the UAE apart is the improvement in its institutions and innovation in digital governance, evidenced by the adoption of cutting-edge technologies such as blockchain for government transactions.¹⁴⁸ As a result, the UAE has become an attractive hub for businesses from African countries looking to trade globally.¹⁴⁹

The UAE boasts the highest number of internet-connected devices per capita worldwide, driven by Dubai's status as a financial powerhouse akin to New York. This contributes significantly to the country's GDP and fosters continuous digital demand. Favorable regulatory conditions further enhance its appeal as a business destination.

Investment in technology is a cornerstone of the UAE's strategic vision. A rigorous Digital Governance Strategy targeting 2025 aims to increase advanced technology adoption within the government.¹⁵⁰ Supporting these developments is a strong digital infrastructure coupled with a focus on AI and transformative technologies, distinguishing the UAE in the global landscape.

Strategic initiatives such as the national AI strategy, smart city projects, and technology investment incentives enhance the UAE's digital capabilities. However, the country faces challenges with internet freedom.¹⁵¹

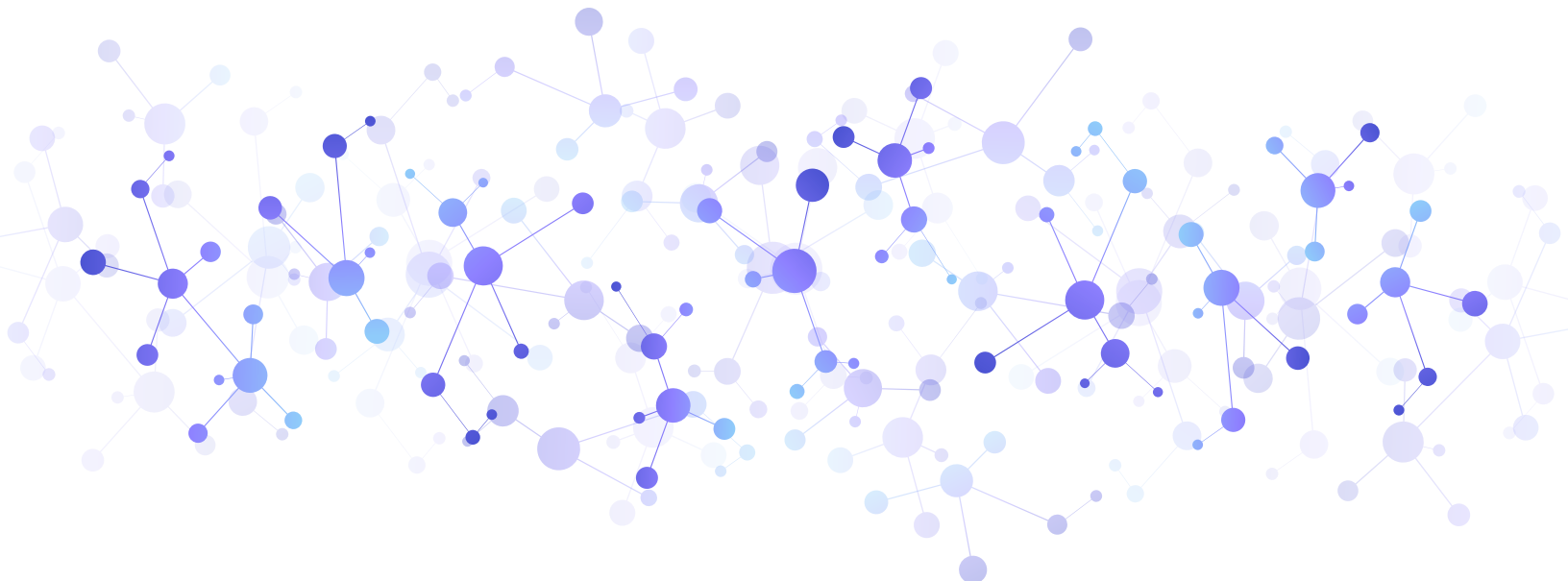
Israel: Israel's greatest strength is in Innovation, buoyed by its phenomenal figures for VC investment in AI, rivaling much larger economies such as Germany, India, and Japan, even as its overall GDP suffers the effects of the war in Gaza. Generally, it has strong showings across all three components (inputs, processes, outcomes) of Innovation, ranking in the top 10 globally with its state scores for each, backed up by above-average momentum, particularly in inputs, where its momentum is 5th globally. This reflects a strong and broad innovation foundation where inputs like talent availability and financing shine, alongside outcomes like research and development and value creation.

Linchpins

Saudi Arabia: Saudi Arabia's Vision 2030—an ambitious plan to diversify the economy away from oil dependence—has propelled the country to become a digital leader in the region, with significant improvements in 5G deployment and digital ecosystem performance. In 2019, the Kingdom ranked 24th in momentum, and catapulted itself to 6th place by 2023. Much of this progress was due to improvements in demand, buoyed by some of the fastest mobile download speeds in the region.

Innovative regulatory approaches, like the Digital Regulatory Academy, have strengthened the ICT sector, and helped to expand the digital economy in the country.¹⁵²

However, while there was notable progress in digital inclusion overall, Saudi Arabia would do well to close the gender digital divide, where it still falls below its regional Stand Out peers, Qatar and the UAE.



Leapfrogs

Egypt: Egypt's Digital Egypt initiative has significantly improved the country's digital infrastructure and regulatory environment. The growth of e-commerce and start-ups has been remarkable, but challenges remain in literacy rates, financial inclusion, and internet access.

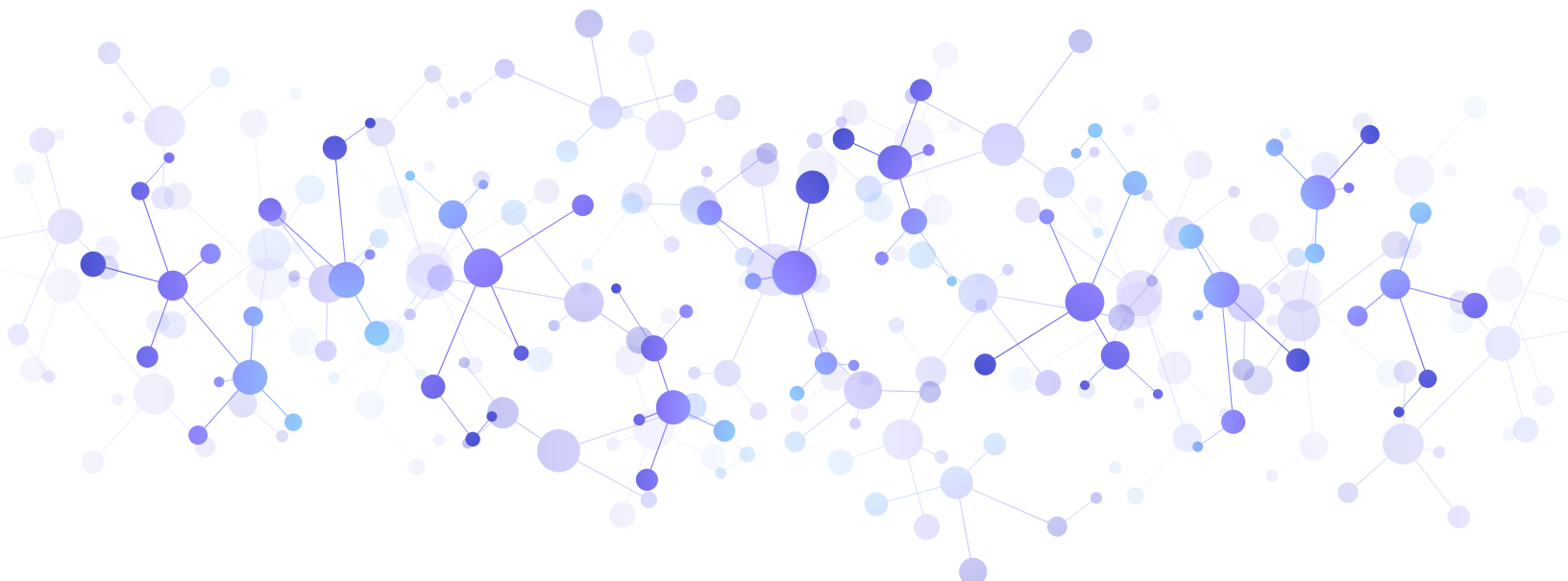
Kenya: Kenya's greatest strength is found in its supply measures, ranking third in the world for momentum. It has made great strides in transaction infrastructure and depth of credit information.

Kenya has also improved its electricity infrastructure. The country has significantly improved urban, rural, and overall access to electricity, with the respective access reaching 98%, 65.6%, and 76% in 2022, compared to 63.8%, 20.4%, and 30.3% in 2008.¹⁵³

It also ranks highly in digital payment uptake, particularly in the use of mobile digital money—with 60% of wage recipients receiving their wages through a mobile phone in 2021, Kenya is by far the regional leader in that indicator. It's also the world leader in mobile utility payments, with 84% of bill-payers making payments through a mobile phone.

While Kenya has much to be proud of digitally, there are clear areas with room for improvement. Like many lower middle-income economies in the Digital Evolution Index, Kenya is suffering from stagnation in institutional improvements such as control of corruption and voice and accountability measures. Kenya also is similar to many other countries in the Middle East and Africa, which are experiencing wider gaps in the class divide compared to other regions. Some of this is reflective of broader economic and social trends,^{154, 155} where digital technologies offer opportunities against a challenging economic backdrop.¹⁵⁶

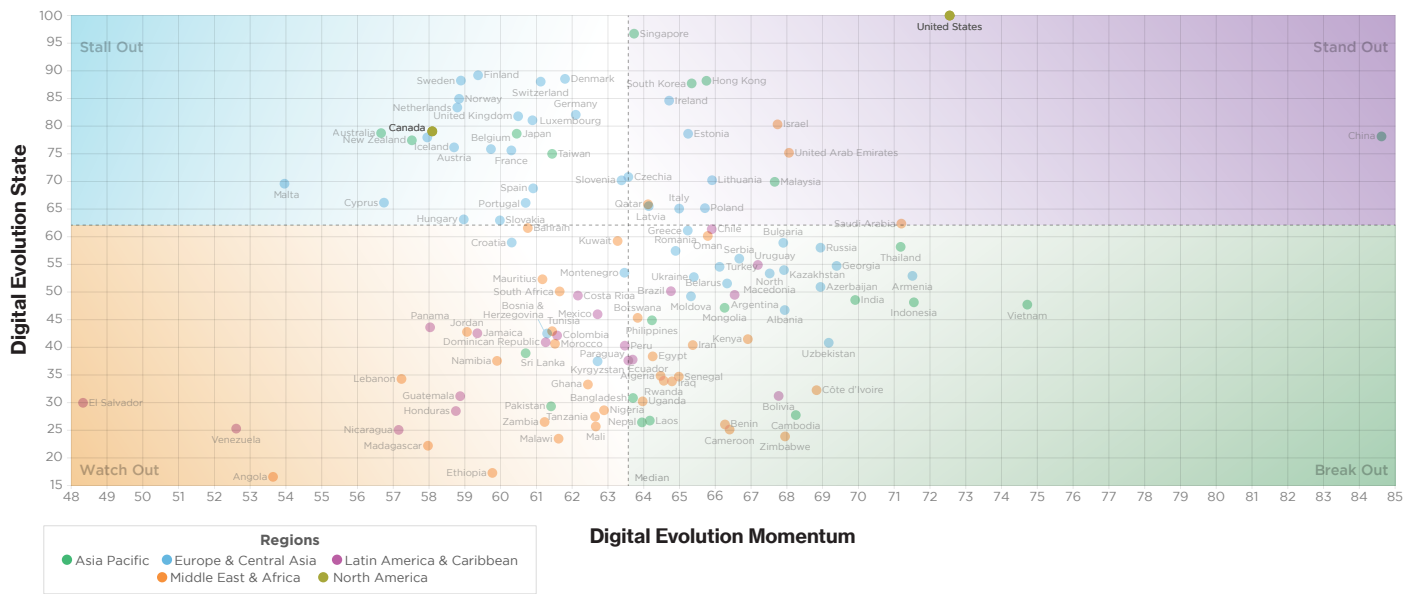
For a deeper dive on this challenge, read the "[Digital Deceleration](#)" section of the report here .



North America

The North American region comprises just two countries: the United States and Canada (Mexico is included in Latin America and the Caribbean). The US tops the Index, driven by strong innovation, and as a region, these countries lead across all four drivers: Demand, Supply, Institutions, and Innovation.

Figure 27
Digital Evolution: North America



Leaders

United States: The United States is both a leader and a linchpin. As the top-scorer in Digital Evolution, the US ranks 1st in Innovation, 4th in Supply, and 10th in Demand. It ranks 11th in Institutions, and its momentum is slowing. The US leads in digital economy metrics due to its secure internet infrastructure, strong consumer engagement, and significant investments in AI and R&D. The country's innovation ecosystem is supported by robust financial accessibility and a well-developed mobile network infrastructure.

The US has made significant progress in its class digital divide, overtaking Canada in 2023 to achieve 81% parity. Americans reached digital gender parity in 2021 and have maintained it over the past few years. For the urban-rural divide, the US still has room for improvement, having achieved just 67% progress to parity. Efforts are underway to get there—the Biden administration allocated \$42 billion to reach universal high-speed broadband connectivity by 2030.¹⁵⁷

Compared to the other main drivers, the US is ahead in innovation. Much of this progress is due to AI.

In 2023, investment in the US in AI reached over \$67 billion, nearly 9 times that in China, the second-highest recipient of AI investment.¹⁵⁸ Worldwide VC investment in generative AI exploded in 2023, with nearly \$18 billion in VC investment, over 10X the investment from 2022.¹⁵⁹ VC investment in AI compute also surged, with the US accounting for nearly \$13 billion of the over \$19 billion invested globally in 2024. Public investment in AI research has tripled since 2018, with US government agencies allocating \$1.8 billion to AI research and development in 2023.¹⁶⁰

The innovation ecosystem in the U.S. is also underpinned by financial accessibility. According to the World Economic Forum's Global Competitiveness Report, the U.S. ranks second globally for ease of access to loans. The country offers a conducive financial environment that allows startups and businesses to secure the necessary capital for developing and marketing new technologies.¹⁶¹ A well-established financial sector that includes venture capital firms, angel investors, and banks supports ongoing innovation.

The US leads in investment and outcomes as well—in 2023, sixty-one of the top AI models came from the States, with China following with fifteen models and eight models from France.¹⁶²

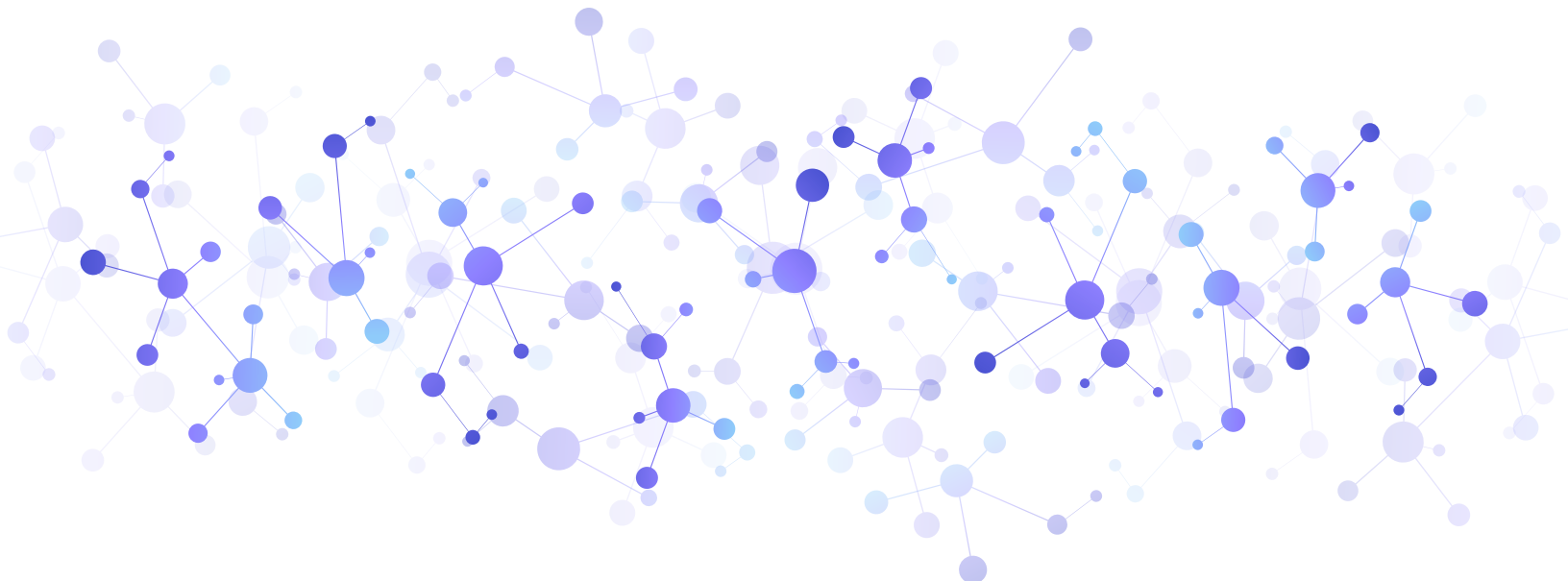
American regulators are taking note, with a notable increase in the number of AI regulations—now at 25 as of 2023 in the US. The US would do well to work closely with the public on AI regulations. Expanding regulations on this key, rapidly evolving technology in the context of dipping institutional trust serves as a way of establishing global leadership on the challenge.

Canada: Canada performs well across key drivers but falls behind the United States in both state and momentum. Strengths include good governance practices and respectable performance in digital services and R&D, but the slowing momentum should serve as a wake-up call to Canadian policymakers.

While Canada is known historically as an AI research hub,¹⁶³ as more research moves away from academia into industry, Canada would do well to make additional efforts to attract investment.

Canada seems to have little trouble attracting talent—the country went from having the third-highest AI job postings rate (as a percentage of all job postings) in 2021 to the seventh while also seeing a noticeable uptick in AI talent concentration (188% since 2016).¹⁶⁴

The US bests Canada in all types of digital inclusion, including class, gender, and rural—an obvious area for improvement.



Methodology

The Digital Evolution Index uses a total of 184 indicators to measure the state and quality of digitalization in an economy. It is structured at four levels: indicators, clusters, components, and drivers. Indicators are data points that answer a specific question. Clusters consist of aggregated groupings of normalized, standardized, and weighted indicators 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. Components are built to provide a comprehensive understanding of factors, shaping and defining index drivers.

The central hypothesis of the Digital Evolution scorecard is that four drivers of equal importance govern the digitalization of an economy: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. Our model, therefore, accords equal weights to all four drivers.

Indicator, cluster, and component weights are determined according to three factors:

- **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 primarily use secondary data, we studied the data-gathering processes deployed by the sources of said data. We assigned greater weights to indicators with more robust data collection processes. Similarly, we assigned greater weights to observational data over survey data.
- **Centrality:** The importance of the indicator within its parent cluster/component/driver. Foundational measures, on which many other measures are dependent, were weighted more highly than those that had fewer multiplicative effects.

After indicators have been aggregated into clusters, components, drivers, and final scores, final scores are rescaled to fit a 0 to 100 range.

Momentum

Momentum scores are generated using the compound annual growth rate formula (CAGR). 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 changes for a particular economy 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. After calculating index growth rates for each economy, we rescale economy CAGRs on a scale similar to 0 to 100 as the final scores. Momentum scores, like the final index scores, are relative.

Estimation of Missing Data Points

Given the index's reliance on secondary data to build the Digital Evolution scorecards, estimations were required to compensate for missing and incomplete data. We created a logic and systematic process for estimating missing data points:

1. Where observations exist for a given economy and indicator, the index relies first on Stineman interpolation to fill in missingness between observed data points. Next, NOCB (next observation carried backward) and LOCF (last observation carried forward) treatments are applied to fill in missingness outside the observed data range.
2. Where no observations exist for a given economy and indicator, the index relies on recursive rounds of targeted mean imputation to fill in missing values, whereby missing values are estimated as the average of the sample observations of the most characteristically similar economies for the same year as the missing datapoint. Estimated data points are then given similar interpolation, NOCB, and LOCF treatments.

Quality Assurance

Throughout the imputation, weighting, standardizing, and aggregation processes, we adopted several quality assurance measures to ensure the index's validity and robustness. We deployed different statistical tools throughout the process, including data cleaning, variance analysis, regression analysis, and simulations, and we stress-tested the index scores at multiple levels to produce the most comprehensive and robust numbers possible.

Any economy's scores that jumped out as outliers in the index in the quality assurance (QA) process were rigorously checked to make sure that the data in that economy are accurate and robust. This mitigates the chances of systematic errors in the process.

Economy Selection Criteria

While we would have liked for our study to cover every economy in the world, the two greatest limiting factors are data availability and data quality. Despite the constraints, we have been successful in expanding our economy coverage on the Digital Evolution scorecard by 35 economies over our previous edition—from 90 to 125. This group of 125 economies represents a wide range between developed and emerging economies and together represent over 92% of the global population.

Our selection methodology for Digital Evolution was guided by three factors weighted equally: size of economy, size of population, and data availability. We aimed to include only economies where observed values would account for no less than 45% of total indicator data, limiting estimations and ensuring the most accurate possible picture of global digital evolution.

Limitations and Future Endeavors

As with any indexing exercise, we have made a range of assumptions and simplifications in the creation of these models. We have sought to build models that are wide ranging and comprehensive. However, we would like to add the caveats that their use should be guided with the understanding that models inherently simplify what they measure, they are dependent on the quality and accuracy of the data that are fed into them, and the assumptions we built into them are subject to biases and errors despite our best efforts. Despite our numerous stages of quality assurance, human error may have crept in. We invite anyone who spots an error to kindly contact us directly.

During the process of QA, we identified potential data inconsistencies from the primary source for the indicator 'No. of POS terminals'. While we successfully addressed and corrected the data for the Philippines and Egypt, we subsequently discovered an anomaly in the Nigerian dataset. There was a significant jump in the reported number of POS terminals from 2020 to 2021 for Nigeria. Upon further investigation and cross-referencing with multiple sources, we concluded that the data point for Nigeria may be inaccurate. We contacted the publisher, Euromonitor, to alert them of the issue. Although this discrepancy does not substantially impact the overall scorecard results, we acknowledge the importance of data integrity. We are committed to rectifying this issue in future iterations of our report.

In our thirteenth year of studying the phenomenon of digitalization globally, our greatest limitations have been the availability and quality of data. Despite these limitations, we have made every effort to be broad and inclusive in our data capture and to evolve our methodology in a manner that is respectful and relevant to the evolutionary phenomenon we are trying to measure. We recognize in all humility, however, that there are many facets to and outcomes of digitalization writ large that we are yet to record and many more that the world is yet to discover. We hope to capture at least some of them, as better data become available, in our subsequent editions.

The Drivers of Digital Evolution

The Digital Evolution scorecard analyzes the underlying drivers that govern an economy's digitalization: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. To gain a comprehensive view of digital readiness and competitiveness of countries, we further divided these drivers into 13 components measured using a total of 184 indicators.

Digitalization is the outcome of the complex interplay of the four drivers and related factors often taking place in different combinations in different countries. No single trend or data related to consumer demand, government actions and policies, investments, innovation, or infrastructure can offer a measure or a complete picture of the myriad ways the internet and digital platforms are integrating into the lives of billions around the world. Insights into the drivers of digitalization help us move beyond a static snapshot and appreciate the systemic nature of forces at play. Such insights help us understand why some countries are experiencing greater momentum than others. They also outline the contributions that specific actors in the private and public space can make to unclog bottlenecks and to get innovation moving. Finding these key leverage points could propagate changes through the entire system. This systemic approach also helps explain why change may be slower than expected: The interlocking nature of these indicators could keep the status quo frozen until certain essential barriers are overcome.

Supply Conditions: How developed is the infrastructure to facilitate digital interactions and transactions? This driver measures the quality and readiness of digital and physical infrastructure such as bandwidth availability and quality of roads. Developing countries with fledgling infrastructure comprise the low end of the scores on the Supply driver.

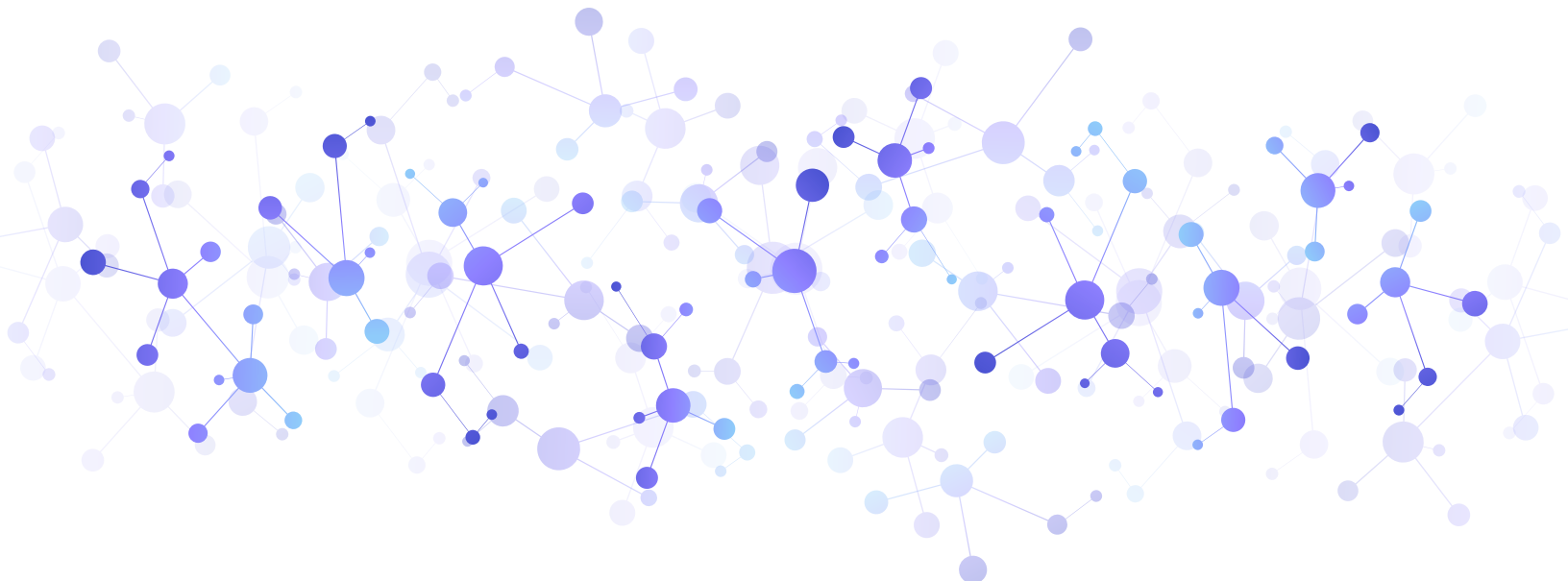
Demand Conditions: Are consumers willing and able to engage in the digital ecosystem? The indicators underpinning Demand Conditions help address additional questions, such as:

- Do consumers have the means and instruments necessary to plug into the digital economy?
- Do consumers have the willingness and continued interest to remain actively engaged in the digital economy?

While high demand is always a welcome sign, low demand scores can be interpreted as an indication of untapped market potential that investors and businesses can take advantage of in an enabling institutional environment; stagnant demand over time, particularly in advanced markets, can be a sign of market saturation pointing to a need for innovation that can help restart the engines of demand.

Institutional Environment: In addition to directly investing in infrastructure and establishing laws and regulations, government actions and policies play an essential role in either supporting or hindering the business engine that creates and distributes digital technologies. At the same time, governments are key to determining the climate for investment and innovation in digital technologies and their applications. By providing a stable environment that encourages investment and protects consumers, governments create enabling conditions or even the technologies themselves that foster digitalization. The indicators underpinning the Institutional Environment driver also help address questions, such as: Are governments taking deliberate steps towards advancing and adopting digitalization? Do they have policies and regulations in place to foster digital ecosystems?

Innovation and Change: Innovation is the key to finding new solutions to global, national, and local challenges. Innovation and the resulting change push the boundaries of the digital ecosystem and what it can do; it is in equal parts the most impactful and challenging driver to jumpstart. By breaking down the systems of innovation into inputs such as availability of talent and capital; processes, such as university and industry collaboration in R&D; and outcomes, such as new digital products and services created, we measure the vitality of innovation in a country and identify opportunities for improvement. The indicators associated with this driver focus on the core issue of: What is the extent of innovation taking place in the country's digital economy?



Glossary

Ability to Adopt: The extent to which people have the skills needed to engage online. A cluster under the component State of the Human Condition, under the driver Demand.

Ability to Demand: The extent to which people have the wherewithal to engage in consumption. A cluster under the component State of the Human Condition, under the driver Demand.

Access Infrastructure: The extent and quality of telecommunications infrastructure needed to get connected. A component under the driver Supply.

Access to Financial Institutions: The extent to which people can access traditional financial institutions. A cluster under the component Transaction Infrastructure, under the driver Supply.

Bureaucratic Efficiency: The extent to which government processes and regulations enable efficient operations for businesses and individuals. A cluster under the component Institutions and the Business Environment, under the driver Institutional Environment.

Business Practices: The extent to which businesses actively engage in using innovative practices. A cluster under the component Processes, under the driver Innovation and Change.

Class Digital Divide: The extent to which inequities in digital account ownership, online engagement, and digital payment uptake differs among the poorest 40% of the population as compared to the richest 60%. A cluster of Digital Inclusion, a component under Demand.

Cluster: A group of indicators answering a key question about Digital Evolution. Clusters form components, which form drivers.

Communications Infrastructure: The quality and state of physical and digital internet infrastructure. A cluster measure under the component Access Infrastructure, under the driver Supply.

Component: Groups of clusters answering a key question about Digital Evolution. Components form drivers.

Consumer Spending: The extent to which people are actively participating in the wider retail economy, both online and offline. A cluster under the component State of the Human Condition, under the driver Demand.

Demand: Answers the question of whether consumers are willing to and able to transact in the digital environment. One of the four main drivers of Digital Evolution.

Device Affluence: The extent to which people or households have digital devices, including laptops, desktop PCs, tablets, mobile phones, and/or smartphones. A cluster under the component Device and Broadband Uptake, under the driver Demand.

Device and Broadband Uptake: The extent to which people and households are connected to the internet and own digital devices. A component under the driver Demand.

Digital Inclusion: The extent to which inequities in digital account ownership, online engagement, and digital payment uptake exists across gender, class, and geography. A component under the driver Demand.

Digital Payment Uptake: The extent to which people have access to, and use, digital payment technologies, such as cards, or payments via mobile phone. A component under the driver Demand.

Digital Public Infrastructure (DPI): A set of foundational digital systems that forms the backbone of modern societies. DPI enables secure and seamless interactions between people, businesses, and governments.

Digitalization: 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.

Digitization: The process of converting a good or a product (example: money, music, photographs) from its physical form to digital form.

Driver: A main factor in Digital Evolution. In Digital Evolution, there are four drivers: Supply, Demand, Institutional Environment, and Innovation and Change. Together, these encompass the main factors behind and resulting from Digital Evolution.

Effectiveness of Institutions: How effective institutions are at delivering services, and maintaining security, and upholding the rule of law. A cluster under the component Institutional Effectiveness and Trust, under the driver Institutional Environment.

Electricity: The quality and availability of the electricity supply for businesses and consumers. A cluster under Access Infrastructure, under the driver Supply.

Electronic Payments: Measures the proliferation of physical support infrastructure for digital payments, including ATMs and POS terminals. A cluster under the component Transaction Infrastructure, under the driver Supply.

Financial Inclusion: The extent to which people have access to, and are actively part of, formal financial institutions. A cluster under the component Digital Payment Uptake, under the driver Demand.

Financing: The extent to which money is available for new ventures, particularly those which focus on technology. A cluster under the component Inputs, under the driver Innovation and Change.

Fixed Broadband Uptake: The extent to which businesses and consumers have wired broadband connections at home and at the workplace. A cluster of the component Device and Broadband Uptake, under the driver Demand.

Fulfillment Infrastructure: The extent to which consumers and businesses can reliably and affordably order and deliver goods. A component under the driver Supply.

Gender Digital Divide: The gap between men and women's internet usage. Historically, men are more likely to get online than women. Particularly in emerging economies, women are less likely to go online and less likely to engage extensively online. A cluster under the component Digital Inclusion, under the driver Demand.

Government Digital Uptake: The extent to which governments use technology. A cluster under Institutions and the Digital Ecosystem, under the driver Institutional Environment.

Government Facilitation of ICT: The extent to which governments prioritize technology including AI strategies and telecommunications, and implement policy around it. A cluster under Institutions and the Digital Ecosystem, under the driver Institutional Environment.

ICT Regulatory Environment: The extent to which institutions facilitate telecom competition, set and enforce clear technology best practices and regulations, and ensure equal access. A cluster under Institutions and the Digital Ecosystem, under the driver Institutional Environment.

Indicator: The base level of measure in the Digital Evolution scorecard. Measures a specific aspect of the digital world, including the percentage of people in a country with a smartphone, or R&D investment as a percentage of GDP. Groups of indicators form clusters.

Innovation and Change: Answers the question of to what extent new ideas and ventures are being created and adopted in digital commerce. One of the four main drivers of Digital Evolution.

Inputs: Inputs encompass elements needed to drive innovation and change, such as creating the right talent pool, having sufficient investment, investment flows in AI, and the creation of new ventures. A component under the driver Innovation and Change.

Institutional Effectiveness and Trust: The extent to which institutions create an environment which enables trust. A component under the driver Institutional Environment.

Institutional Environment: Answers the question as to whether government policies and regulations are facilitating the creation of digital ecosystems. One of the four main drivers of Digital Evolution.

Institutions and The Business Environment: The extent to which institutions enable business through appropriate legal protections, as well as minimizing unnecessary bureaucracy. A component under the driver Institutional Environment.

Institutions and The Digital Ecosystem: The extent to which institutions enable the use of, and themselves use, digital technologies. A component under the driver Institutional Environment.

Internet Speed: Upload and download speeds for mobile and fixed broadband. A cluster under the component Access Infrastructure, under the driver Supply.

Leaders: These are countries that perform strongly on state scores, particularly focusing on supply and institutional metrics. They have robust digital infrastructure, supportive institutional frameworks, and a high level of digital adoption. They often lead in innovation and set standards for other countries. Examples typically include advanced economies with well-established digital ecosystems.

Leapfrogs: These countries show strong momentum scores in any or all of the four drivers (Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change) over any given time period. Leapfrogs demonstrate the potential for rapid digital transformation by adopting advanced technologies swiftly, often bypassing intermediate stages of digital development. They harness digital advancements to drive significant economic growth and increase their competitiveness.

Legal Environment for Businesses: The extent to which institutions enable business through the rule of law, anti-corruption efforts, and appropriate legal protections. A cluster under the component Institutions and the Business Environment, under the driver Institutional Environment.

Linchpins: These countries are crucial actors in the global digital economy, due to the heft and size of their domestic market. Linchpins might not be the most digitally advanced globally but are strategically important due to the size of their digital economy or the number of users. They play a leading role in shaping the rules, regulations, and standards of the data economy.

Mobile Access Affordability: The affordability of mobile devices and data plans. A cluster under the component Access Infrastructure, under the driver Supply.

Mobile Access Availability: The extent to which there is telecommunications infrastructure access. A cluster under the component Access Infrastructure, under the driver Supply.

Mobile Broadband Uptake: The extent to which people connect via mobile internet, in particular through mobile broadband technologies such as 3G and 4G. A cluster under the component Device and Broadband Uptake, under the driver Demand.

Mobile Internet Gap: The mobile internet gap is the difference between the number of mobile broadband internet subscriptions and the number of mobile cellular subscriptions. In the most developed digital economies, those who have a mobile cellular plan have a mobile broadband data plan to go with it. In such a case, there is no gap. But even in some developed economies and emerging economies, not every mobile cellular subscription may have a corresponding mobile broadband subscription. For example, one may have a smartphone but because of cost or preference might not have mobile broadband data access on that phone. Similarly, one may have access to mobile internet data but be unable to get a device that can use it. Any number of reasons can exist for this gap: however, there is a marked difference in how this gap is closing across emerging economies.

Momentum: The rate at which a country's digital environment is changing over time. The Digital Evolution Index uses a compound annual growth metric based on an averaged base year of 2008/2009.

Outcomes: The extent to which new ideas including AI-related research, products, and systems are created, adopted, and exported. A component under the driver Innovation and Change.

Postal Delivery: The availability of postal services, including at-home mail delivery. A cluster of Fulfillment Infrastructure, under the driver Supply.

Processes: The extent to which there are systems in place which can facilitate the development of innovative ideas and practices. A component under the driver Innovation and Change.

Research and Development: The extent to which governments, businesses, and universities engage in research and development. A cluster under the component Process, under the driver Innovation and Change.

Rural Digital Divide: The extent to which inequities in digital account ownership, online engagement, and digital payment uptake differs between rural and urban consumers. A cluster of Digital Inclusion, a component under Demand.

Startup Capacity: The extent to which there are bureaucratic hurdles in creating a new start-up. A cluster under the component Inputs, under the driver Innovation and Change.

State of the Human Condition: The extent to which people have the means, skills, and willingness to engage online. A component under the Demand driver.

Supply: Answers the question of how developed digital and business infrastructure is. One of the four main drivers of Digital Evolution.

Talent Availability: The extent to which the right talent pool is being developed, attracted, and retained. A cluster under the component Inputs, under the driver Innovation and Change.

Traditional Transport: The quality of air transport, port, rail, and road infrastructure operations and logistic performance. A cluster under the component Fulfillment Infrastructure, under the driver Supply.

Transaction Infrastructure: The extent and quality of financial transaction means within a country. A component under Supply.

Transparency: The extent to which governments and institutions allow people and companies to express themselves freely and provide enough visibility of internal operations to limit corruption. A cluster under the component Institutional Effectiveness and Trust, under the driver Institutional Environment.

Use of Digital Money: The extent to which people use electronic payments, including card payments, to make transactions. A cluster under component Digital Payment Uptake, under the driver Demand.

Use of Mobile Digital Money: The extent to which people use mobile electronic payments, including mobile wallets, to make transactions. A cluster under component Digital Payment Uptake, under the driver Demand.

Value Capture: The extent to which innovative technologies are producing value across global digital markets. A cluster under the component Outcomes, under the driver Innovation and Change.

Value Creation: The extent to which innovative technologies are being developed domestically. A cluster under the component Outcomes, under the driver Innovation and Change.

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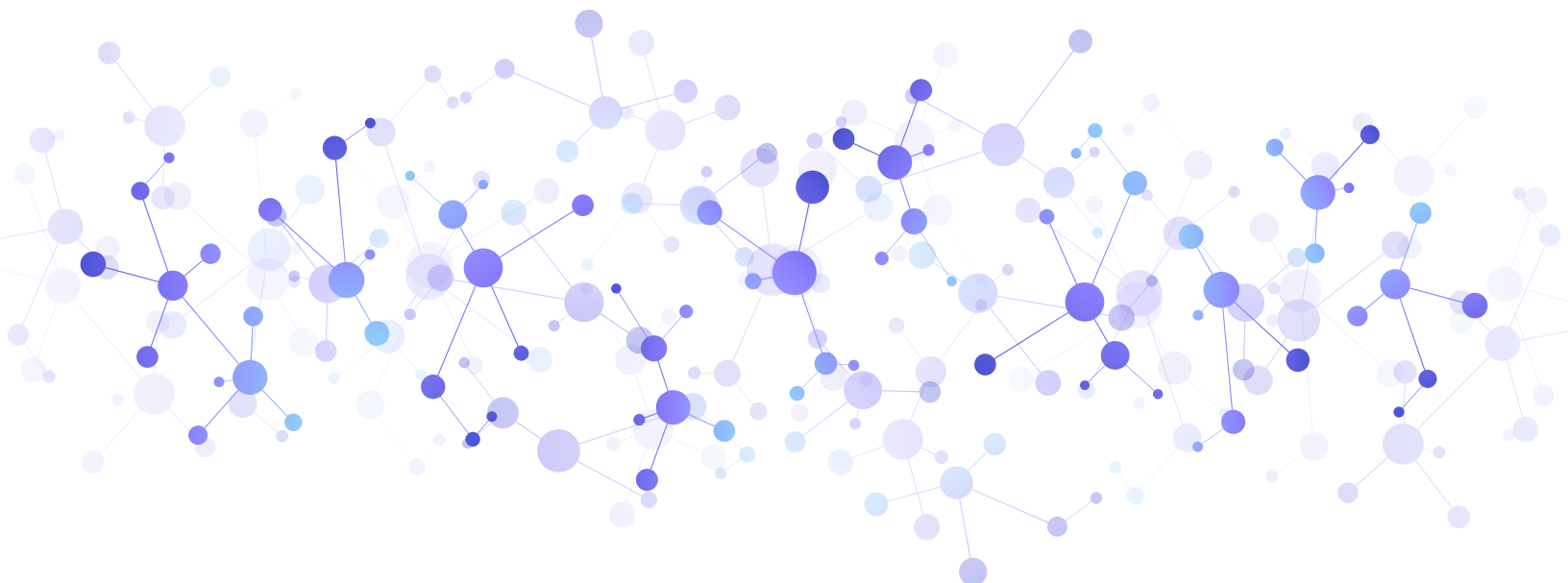
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