Latin American Subnational Innovation Competitiveness Index 2.0

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The Latin American Subnational Innovation Competitiveness Index ("LASICI") ranks the innovation competitiveness of more than 200 regions across Argentina, Brazil, Chile, Colombia, Mexico, Peru, and the United States on 13 commonly available indicators. The report provides a comparative assessment of these regions' innovation performance and offers policymakers a guide to bolstering the innovation capacity of their nations and regions.

KEY TAKEAWAYS

- The United States claims the top 28 regions, with Massachusetts, California, and Washington ranking the top three.
- The top performing Latin American regions are Boyacá, Colombia, in 29th, Mexico City, Mexico, in 33rd, and Baja California Sur, Mexico, in 38th.
- While Latin American regions lag behind U.S. regions in their overall scores, there is less variation in regional scores in Latin America.
- The highest-scoring regions in Latin America tend to be manufacturing powerhouses, such as Boyacá and Cauca, Colombia, or major autonomous cities such as Mexico City and Ciudad Autónoma de Buenos Aires (CABA).
- The future of innovation policy in Latin America and the United States will be highly dependent on how policymakers navigate trade tensions, tariffs, and the growth of artificial intelligence.
- Policymakers must continue to increase investment in research and development, education, and entrepreneurship to develop a resilient economy with greater opportunities for growth and innovation.

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INTRODUCTION

Latin America holds significant untapped potential to position itself as a driver of global growth. Accounting for 8 percent of the world's population and 7.3 percent of global gross domestic product (GDP), along with holding extensive reserves of the world's copper, lithium, gold, and other critical minerals, the region has the opportunity to become increasingly influential to global trade and supply chains in the coming decades.[1] However, this potential is not new to the region. Countries in Latin America have been stuck in the "middle-income trap" for decades, and previous efforts to upgrade their economies have been seen as a "case of frustrated development."[2]

The Americas' economies are now entering a more challenging phase. The rapidly shifting global trade environment, set into motion by the sweeping tariffs implemented by the second Trump administration, is expected to increase the cost and complexities of trade. And while Latin America's strategic resources make it a natural candidate to attract investment, the ongoing uncertainty and institutional instability appear as roadblocks. Additionally, the changing political landscape, caused by social polarization, populist movements, and the largest internal migration in the region's history, adds to the growing uncertainty surrounding the stability of these nations as economic partners and allies.

The world is also entering into an era of accelerated technological change. The rapid growth of artificial intelligence (AI) could rapidly increase the gap between rich and developing economies—Latin American countries could fall into the latter category if they continue to underinvest in innovation. On the other hand, AI has the potential to increase productivity in the region, fostering economic growth and innovation. As the Information Technology and Innovation Foundation (ITIF) highlighted in a previous report, maintaining economic strength and international significance depends significantly on promoting innovation and embracing technological progress, which are essential for achieving growth in per-capita GDP.[3]

AI has the potential to increase productivity in Latin America, fostering economic growth and innovation, and being a possible lifeboat, saving these nations from the middle-income trap.

To fully understand the dynamics of innovation in these countries, it's critical to explore the subnational factors that contribute to their landscapes. Regional differences in policy, industry, workforce skill levels, and geography—which are often hidden by broad national analyses—influence the economic success and innovativeness of a region. Latin America is one of the world's most unequal regions; this is also reflected in subnational disparities in technology adoption and global competitiveness.[4] Understanding these regional differences allows policymakers to develop more targeted strategies with a greater chance of success.

The Global Innovation Index (GII) is a prominent tool that provides comprehensive assessments of innovation performance on a global and regional scale. The GII offers a multidimensional perspective on innovation, evaluating factors such as research and development (R&D) investments, human capital, and business sophistication, which collectively contribute to a country's innovation capacity.[5] In line with the GII, ITIF has contributed significantly to the discourse on innovation competitiveness through its series of insightful subnational innovation competitiveness reports, which provide nuanced insights into the intricate relationships between innovation, economic development, and regional competitiveness, offering valuable perspectives for policymakers, businesses, and researchers alike. For instance, ITIF's "State New Economy Index" report series delves into the role of innovation in driving U.S. state-level economic growth and highlights the transformation of industries through technological advancements.[6] ITIF has further conducted analysis of the U.S. share of a variety of advanced technology industries relative to other nations, and also has conducted that analysis at a more granular level in the United States with the State Hamilton Index.[7]

The previous "Latin American Subnational Innovation Competitiveness Index (LASICI)" report, published in 2023, delves into innovation dynamics in the Latin American region, one that has been under-analyzed in comparison to other parts of the world. This study aims to once again showcase the continent's subnational innovation capabilities, opportunities, and potential future direction by examining the subnational innovation capacity of the same Latin American countries assessed in 2023—Brazil, Chile, Colombia, Mexico, and Peru—in addition to Argentina. These results are compared to U.S. states.

THE INDEX

The Latin American Subnational Innovation Competitiveness Index ("LASICI") captures the innovation performance of more than 200 regions across 7 countries: Argentina (24 provincias), Peru (24 departments), Brazil (27 states), Chile (16 regions), Mexico (32 states), Colombia (33 departments), and the United States (50 states). In this report, we refer to states, provinces, departments, and autonomous cities as regions to simplify the comparative analysis.

This report consists of 13 indicators representing the relevant determinants of a successful innovation ecosystem, grouped into three categories:

- **Knowledge Economy:** Indicators measure the educational attainment of the workforce; immigration of knowledge workers; employment in professional, technical, and scientific (PTS) activities; and manufacturing sector productivity.
- **Globalization:** Indicators measure high-tech exports and inward FDI.
- **Innovation Capacity:** Indicators measure a region's share of households subscribing to broadband Internet, expenditures on R&D, the number of R&D personnel, the creation of new businesses, patent output, the extent of progress toward decarbonization, and venture capital (VC) investment.

The most important category of the LASICI is innovation capacity, which accounts for 55 percent of the index's weight, while the knowledge economy indicators account for 33 percent of the index's weight, and the globalization indicators account for the remaining 12 percent.

Due to variations in data availability across nations and regions, some indicators may include data from varying years by country. For some indicators where subnational data was not available, proxies were created with available data. More information on the proxies used can be found in Appendix C.

Table 1: Overall and component performance in the LASICI 2.0

Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
1	95.5	Massachusetts	USA	2	93.1	26	31.8	2	81.4
2	94.1	California	USA	1	94.5	54	23.4	3	81.1
3	91.5	Washington	USA	8	83.1	37	26.1	1	83.1
4	82.5	New Jersey	USA	5	90.1	25	31.9	9	64.5
5	79.9	Delaware	USA	16	69.5	55	23.4	4	75.0
6	78.9	Connecticut	USA	11	79.3	31	28.1	8	66.7
7	76.8	Oregon	USA	25	63.3	63	22.5	5	74.5
8	76.6	Maryland	USA	3	92.1	36	26.4	12	56.6
9	73.8	Minnesota	USA	30	59.9	42	24.9	6	71.4
10	71.4	Texas	USA	10	81.6	67	22.2	14	56.3
11	70.9	New Hampshire	USA	41	54.1	43	24.5	7	70.7
12	69.4	New York	USA	12	78.4	38	26.0	16	54.2
13	67.5	Illinois	USA	14	74.9	34	27.0	17	53.2
14	66.7	Colorado	USA	22	66.7	30	28.2	13	56.5
15	63.9	Utah	USA	37	58.3	48	23.6	10	58.5
16	63.5	Virginia	USA	9	82.9	35	26.8	25	43.0
17	61.8	Michigan	USA	38	56.8	79	21.2	11	57.1
18	61.4	Arizona	USA	23	65.5	57	22.9	19	51.1
19	60.6	North Carolina	USA	20	67.0	47	23.9	21	48.8
20	59.6	Pennsylvania	USA	31	59.8	51	23.5	18	51.6
21	58.9	Ohio	USA	47	51.1	58	22.9	15	55.7
22	57.1	Rhode Island	USA	36	58.8	45	24.1	22	48.3
23	56.7	Florida	USA	15	70.9	72	21.6	30	41.6
24	54.9	Indiana	USA	43	53.9	56	23.4	23	48.3
25	53.7	Georgia	USA	29	60.4	52	23.5	26	42.8
26	52.5	Wisconsin	USA	65	45.4	65	22.3	20	50.0
27	51.7	Nevada	USA	21	66.8	110	17.1	34	38.0
28	49.1	Idaho	USA	64	45.4	92	19.8	24	45.8
29	49.0	Boyacá	COL	7	84.5	182	4.2	69	27.7
30	48.9	Wyoming	USA	28	63.1	53	23.4	42	34.4
31	48.5	New Mexico	USA	39	55.1	78	21.4	32	39.0

Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
32	48.5	Vermont	USA	59	47.4	39	26.0	28	42.1
33	48.4	Ciudad de México	MEX	32	59.7	19	39.0	49	31.2
34	48.3	Hawaii	USA	24	63.4	73	21.5	44	34.0
35	48.3	South Carolina	USA	54	49.2	80	21.1	27	42.2
36	48.1	Louisiana	USA	18	69.0	105	17.7	48	31.4
37	47.6	Missouri	USA	56	48.3	82	20.8	29	41.7
38	47.1	Baja California Sur	MEX	35	59.3	10	59.2	98	24.0
39	46.5	Kansas	USA	45	53.7	69	21.9	37	36.8
40	46.2	Iowa	USA	53	49.2	64	22.3	33	38.7
41	44.7	Quintana Roo	MEX	27	63.2	24	32.1	77	25.9
42	44.2	Guerrero	MEX	6	89.5	128	15.2	190	14.9
43	44.2	Maine	USA	61	46.9	74	21.5	36	37.5
44	44.0	Aguascalientes	MEX	70	44.3	6	67.6	80	25.7
45	43.9	Tennessee	USA	51	50.2	88	19.9	40	35.6
46	43.9	Sonora	MEX	40	54.8	8	59.5	115	21.7
47	43.7	Nebraska	USA	48	51.0	68	22.0	43	34.2
48	43.6	Oaxaca	MEX	4	90.4	147	10.5	193	14.8
49	43.2	North Dakota	USA	55	48.6	89	19.9	41	35.5
50	43.0	Cauca	COL	19	68.1	185	4.2	66	28.5
51	42.8	Oklahoma	USA	71	44.3	96	18.8	35	37.7
52	42.6	Ciudad Autónoma de Buenos Aires (CABA)	ARG	33	59.5	23	32.6	85	24.8
53	42.4	Montana	USA	72	43.9	81	21.0	38	36.8
54	40.8	Moquegua	Peru	13	75.7	151	9.2	142	19.6
55	40.1	Nuevo León	MEX	44	53.8	32	27.8	78	25.9
56	40.1	Kentucky	USA	67	45.0	50	23.5	47	32.1
57	39.9	Tarapacá	CHL	111	27.7	3	94.6	113	21.8
58	39.6	South Dakota	USA	83	37.7	85	20.3	39	36.5
59	39.4	Coahuila	MEX	60	47.2	33	27.4	59	28.8
60	39.2	Querétaro	MEX	49	50.5	21	36.9	97	24.0
61	39.0	Jalisco	MEX	58	47.9	46	24.1	60	28.8

Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
62	39.0	Alabama	USA	73	43.4	90	19.9	46	32.5
63	38.5	Tabasco	MEX	17	69.5	75	21.5	170	16.4
64	38.5	Arica y Parinacota	CHL	139	19.2	1	95.9	93	24.2
65	37.7	Alaska	USA	62	46.0	98	18.7	51	29.5
66	36.2	Metropolitana	CHL	75	41.9	59	22.8	63	28.5
67	35.7	Baja California	MEX	66	45.2	27	31.3	100	23.5
68	35.7	San Luis Potosí	MEX	52	49.6	18	39.0	149	18.8
69	35.6	Veracruz	MEX	26	63.2	99	18.5	164	16.8
70	35.5	West Virginia	USA	74	42.3	123	16.2	54	29.2
71	35.5	Morelos	MEX	46	53.6	93	19.8	118	21.6
72	35.0	Michoacán	MEX	34	59.4	139	13.0	145	19.5
73	35.0	Atacama	CHL	165	16.0	2	94.6	121	21.4
74	34.5	México (Estado de México)	MEX	63	45.6	94	19.6	84	24.9
75	34.4	Arkansas	USA	81	38.1	122	16.3	50	30.0
76	34.2	Sinaloa	MEX	69	44.8	66	22.3	92	24.3
77	33.4	Nayarit	MEX	68	44.9	29	28.3	123	21.2
78	33.3	Antofagasta	CHL	126	23.1	11	56.9	81	25.6
79	33.1	Puebla	MEX	50	50.4	130	14.9	119	21.5
80	32.9	Chihuahua	MEX	84	36.7	17	40.8	114	21.8
81	32.7	Hidalgo	MEX	42	54.0	102	18.0	153	17.9
82	32.0	Zacatecas	MEX	87	35.1	15	44.7	129	20.3
83	32.0	São Paulo	BRA	128	22.8	7	60.0	108	23.0
84	31.6	Paraná	BRA	150	18.6	5	72.0	120	21.4
85	31.5	Yucatán	MEX	77	41.0	111	17.1	99	23.9
86	31.4	Tlaxcala	MEX	85	36.6	22	33.8	116	21.6
87	31.0	Bolívar	COL	79	40.5	180	4.3	71	27.2
88	30.5	Mississippi	USA	93	33.8	124	16.0	72	26.9
89	29.5	Junín	Peru	191	9.9	155	8.7	31	41.3
90	29.2	Santander	COL	78	40.7	178	4.4	88	24.4
91	28.0	Minas Gerais	BRA	153	18.3	9	59.2	132	20.1
92	27.8	Córdoba COL	COL	95	33.7	186	4.2	76	26.5

Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
93	27.7	Chiapas	MEX	57	48.3	148	10.3	171	16.3
94	27.6	Santa Fe	ARG	102	30.3	104	17.7	90	24.3
95	27.4	Ñuble	CHL	117	26.2	83	20.6	82	25.6
96	27.1	Valle del Cauca	COL	114	27.2	176	4.5	55	29.1
97	26.8	Espírito Santo	BRA	157	17.7	12	55.6	138	19.7
98	26.8	Rio de Janeiro	BRA	130	21.8	14	45.0	128	20.3
99	26.5	Cundinamarca	COL	115	26.8	177	4.4	64	28.5
100	26.0	Biobío	CHL	125	23.1	44	24.2	89	24.4
101	25.9	Atlántico	COL	118	25.3	179	4.3	62	28.6
102	25.8	Mendoza	ARG	92	34.0	101	18.1	146	19.5
103	25.7	Valparaíso	CHL	131	21.4	40	25.6	86	24.6
104	25.5	Guanajuato	MEX	76	41.5	109	17.3	185	15.0
105	25.5	Durango	MEX	82	37.9	41	25.4	192	14.8
106	25.5	Antioquia	COL	121	24.2	175	4.7	65	28.5
107	25.2	Buenos Aires	ARG	96	33.3	106	17.5	147	19.2
108	25.0	Distrito Federal	BRA	112	27.3	129	15.1	103	23.1
109	24.9	Los Ríos	CHL	124	23.4	61	22.6	104	23.1
110	24.9	Quindío	COL	166	15.9	196	4.1	45	32.6
111	24.8	Risaralda	COL	132	21.1	187	4.2	52	29.5
112	24.8	Córdoba ARG	ARG	86	35.4	91	19.9	162	16.9
113	24.8	Santa Catarina	BRA	151	18.6	28	28.8	96	24.0
114	24.7	Tamaulipas	MEX	80	38.4	95	19.2	184	15.2
115	24.7	Tucumán	ARG	100	31.8	118	16.5	139	19.7
116	24.5	Los Lagos	CHL	123	23.9	70	21.8	112	22.5
117	24.3	Neuquén	ARG	90	34.7	97	18.7	163	16.8
118	24.1	Caldas	COL	136	19.7	188	4.2	53	29.3
119	24.1	Tolima	COL	122	24.0	184	4.2	73	26.8
120	24.1	O'Higgins	CHL	133	20.6	49	23.6	101	23.3
121	24.0	Tierra del Fuego, Antártida e Islas del Atlántico Sur	ARG	89	34.7	87	20.1	174	16.0
122	23.9	Rio Grande do Sul	BRA	154	18.2	20	38.0	130	20.2

Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
123	23.8	Sucre	COL	137	19.7	195	4.1	58	28.8
124	23.8	Jujuy	ARG	94	33.7	113	17.0	161	17.1
125	23.5	Chaco	ARG	88	35.0	127	15.4	166	16.5
126	23.5	Bogotá	COL	155	18.2	174	4.9	56	29.0
127	23.3	Lima	Peru	120	24.7	138	13.4	111	22.6
128	23.2	Aysén	CHL	152	18.5	121	16.3	83	25.2
129	23.1	Colima	MEX	116	26.7	115	16.6	127	20.4
130	23.0	Pernambuco	BRA	167	14.8	16	41.8	136	19.9
131	23.0	San Juan	ARG	103	30.1	119	16.5	152	18.3
132	23.0	Magdalena	COL	156	17.9	194	4.1	61	28.7
133	23.0	Cesar	COL	140	18.9	183	4.2	68	28.1
134	23.0	Coquimbo	CHL	134	20.6	133	14.3	91	24.3
135	22.9	Huila	COL	158	17.5	189	4.2	57	28.8
136	22.9	Maule	CHL	129	21.9	144	11.7	95	24.1
137	22.7	Río Negro	ARG	97	33.2	103	18.0	178	15.6
138	22.6	Santa Cruz	ARG	91	34.0	116	16.5	181	15.4
139	22.5	Meta	COL	159	17.5	181	4.2	67	28.3
140	22.2	Chubut	ARG	98	32.1	112	17.0	176	15.7
141	22.1	Magallanes	CHL	107	28.5	114	16.7	155	17.8
142	22.1	Catamarca	ARG	101	30.4	107	17.5	167	16.4
143	22.0	La Rioja	ARG	106	28.9	108	17.5	160	17.2
144	21.9	Amazonas BR	BRA	170	14.6	4	87.9	202	5.4
145	21.7	Norte de Santander	COL	163	16.8	191	4.2	70	27.5
146	21.7	Ica	Peru	135	20.1	150	9.2	94	24.1
147	21.5	Salta	ARG	99	32.0	117	16.5	186	15.0
148	21.5	San Luis	ARG	105	29.1	120	16.4	165	16.7
149	21.4	Corrientes	ARG	110	27.7	131	14.9	157	17.7
150	21.2	Misiones	ARG	108	28.4	134	13.8	159	17.3
151	21.1	Arequipa	Peru	138	19.5	141	12.8	110	22.7
152	20.6	La Araucanía	CHL	162	16.9	137	13.5	102	23.2
153	20.3	Entre Ríos	ARG	113	27.2	125	16.0	172	16.1

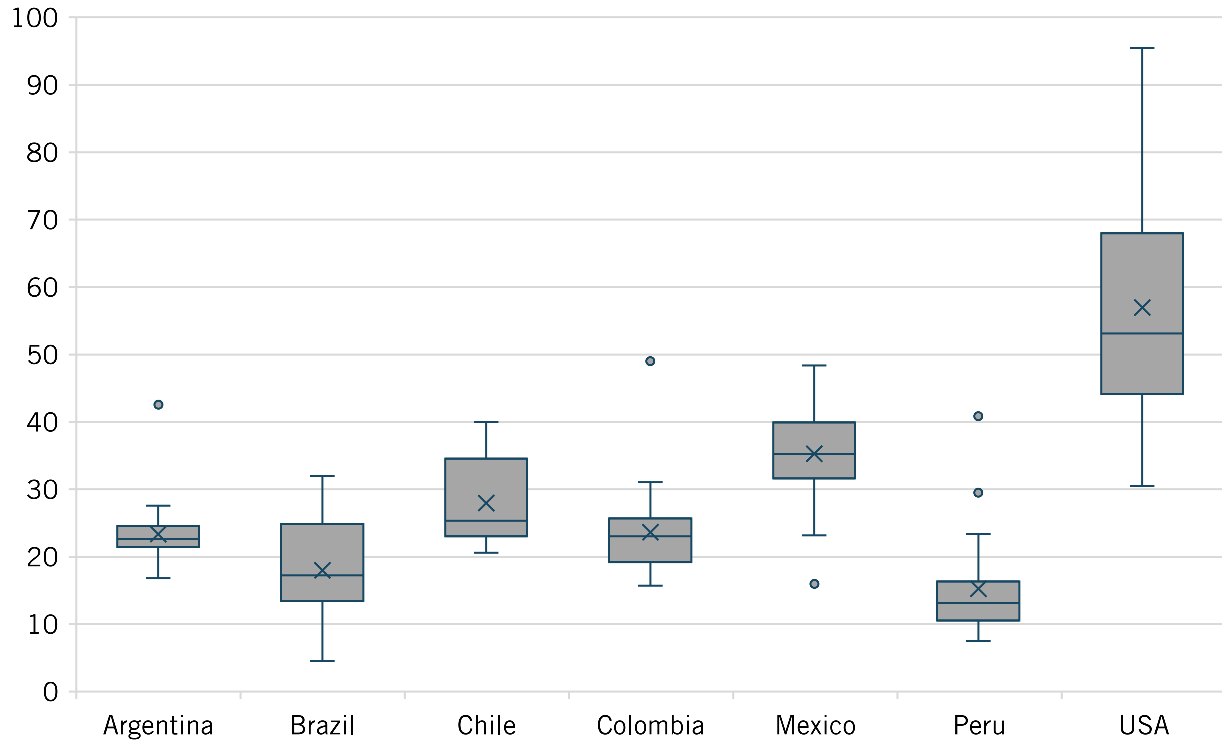
Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
154	20.0	La Guajira	COL	181	13.7	192	4.2	74	26.8
155	19.8	La Pampa	ARG	109	28.0	126	15.9	189	14.9
156	19.4	Goiás	BRA	160	17.2	60	22.7	150	18.8
157	19.4	Casanare	COL	141	18.7	190	4.2	105	23.0
158	19.4	Vaupes	COL	141	18.7	206	4.1	106	23.0
159	19.4	Guainía	COL	141	18.7	205	4.1	107	23.0
160	19.2	Caquetá	COL	188	12.3	200	4.1	75	26.6
161	19.1	Putumayo	COL	141	18.7	199	4.1	109	22.7
162	18.8	Sergipe	BRA	172	14.4	84	20.6	135	20.1
163	18.6	Ceará	BRA	171	14.4	86	20.3	137	19.9
164	18.4	San Andrés, Providencia y Santa Catalina (Archipiélago)	COL	141	18.7	201	4.1	117	21.6
165	18.0	Amazonas COL	COL	141	18.7	203	4.1	124	21.1
166	17.8	Nariño	COL	190	10.0	193	4.1	79	25.7
167	17.5	Formosa	ARG	104	29.2	135	13.8	198	11.6
168	17.2	Paraíba	BRA	175	14.3	132	14.4	143	19.6
169	17.1	Rio Grande do Norte	BRA	177	14.0	142	12.3	133	20.1
170	17.0	Guaviare	COL	141	18.7	202	4.1	141	19.6
171	16.9	Mato Grosso do Sul	BRA	161	17.1	77	21.4	180	15.5
172	16.8	Santiago del Estero	ARG	119	24.8	140	12.8	194	13.4
173	16.6	Arauca	COL	141	18.7	197	4.1	148	19.0
174	16.5	Tacna	Peru	182	13.4	146	10.5	131	20.2
175	16.0	Campeche	MEX	127	22.9	100	18.4	197	11.8
176	16.0	Bahia	BRA	180	13.7	62	22.5	175	15.9
177	16.0	Chocó	COL	197	7.6	198	4.1	87	24.5
178	15.8	Lambayeque	Peru	189	10.6	153	8.9	122	21.2
179	15.7	Vichada	COL	141	18.7	204	4.1	156	17.8
180	15.4	La Libertad	Peru	187	12.6	154	8.9	144	19.6
181	15.3	Maranhão	BRA	176	14.2	13	54.3	201	5.7

Overall Performance		Location		Knowledge Economy		Globalization		Innovation Capacity	
Rank	Score	Region	Co.	Rank	Score	Rank	Score	Rank	Score
182	15.3	Tumbes	Peru	186	12.8	170	6.1	134	20.1
183	15.0	Amapá	BRA	169	14.7	136	13.7	168	16.4
184	14.9	Alagoas	BRA	185	13.1	158	8.5	151	18.7
185	14.5	Áncash	Peru	184	13.2	152	8.9	154	17.9
186	13.6	Huánuco	Peru	200	7.1	163	7.4	126	20.5
187	13.4	Piauí	BRA	174	14.4	71	21.7	196	12.1
188	13.4	Ucayali	Peru	203	6.5	171	6.0	125	20.9
189	12.9	Madre de Dios	Peru	198	7.4	169	6.1	140	19.6
190	12.1	Piura	Peru	193	9.3	168	6.4	158	17.4
191	11.5	Cusco	Peru	192	9.4	160	7.9	173	16.0
192	10.8	Apurímac	Peru	201	7.0	159	8.2	169	16.4
193	10.6	Ayacucho	Peru	194	8.7	167	6.5	179	15.6
194	10.5	Puno	Peru	196	8.1	157	8.6	182	15.3
195	10.5	Pasco	Peru	195	8.2	149	9.3	188	15.0
196	10.3	Huancavelica	Peru	202	6.9	156	8.6	177	15.6
197	10.2	Mato Grosso	BRA	164	16.3	76	21.5	200	6.5
198	9.9	Cajamarca	Peru	199	7.1	162	7.8	187	15.0
199	9.1	San Martín	Peru	204	6.1	173	5.6	183	15.2
200	8.8	Amazonas PER	Peru	206	5.5	166	6.5	191	14.8
201	7.8	Tocantins	BRA	173	14.4	143	11.8	199	6.8
202	7.5	Loreto	Peru	205	5.5	172	5.8	195	13.2
203	5.6	Rondônia	BRA	179	13.9	161	7.8	203	5.0
204	5.6	Roraima	BRA	168	14.7	164	7.3	204	4.7
205	5.3	Pará	BRA	183	13.4	145	11.0	205	4.1
206	4.5	Acre	BRA	178	14.0	165	7.0	206	3.7

Overall Index

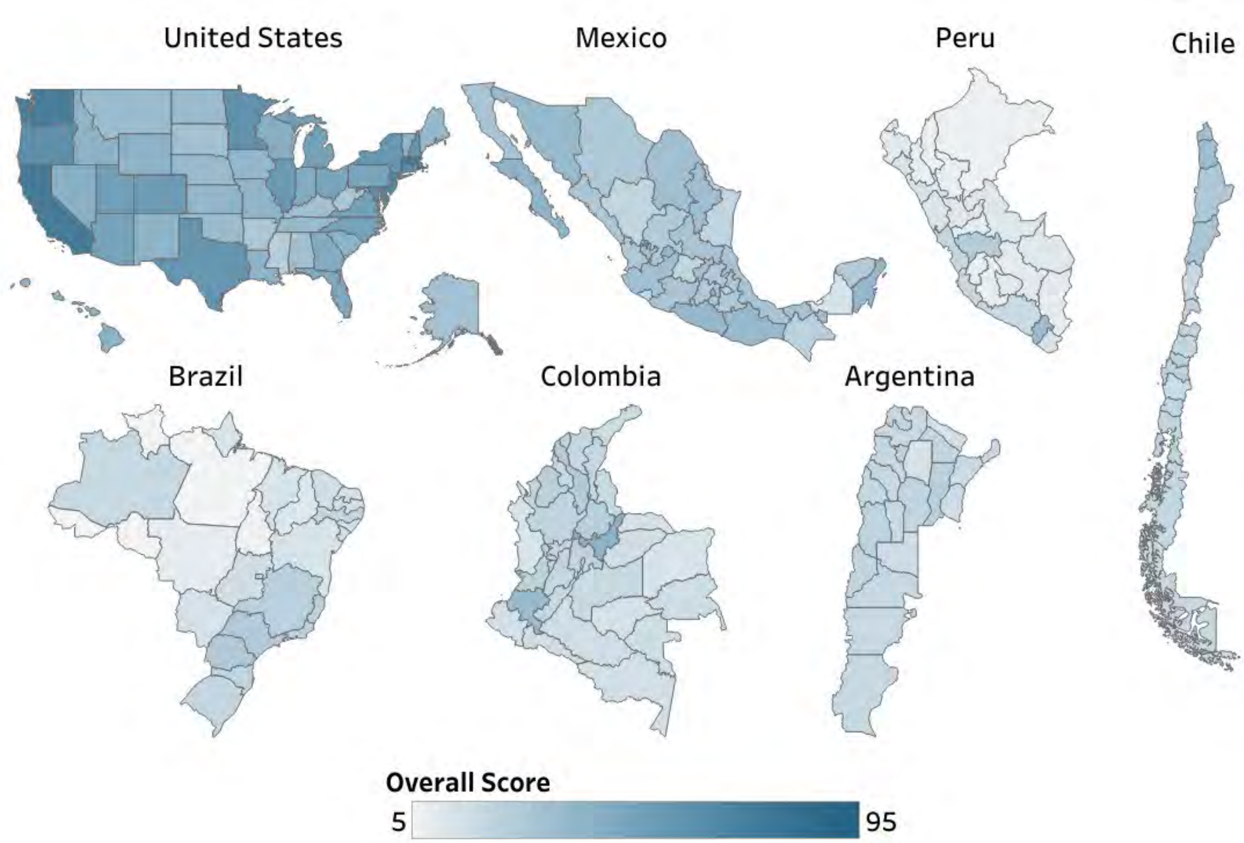
Several American states lead in this index of subnational innovation competitiveness, with 28 of its 50 states ranked higher than Boyacá, Colombia, which is the best-performing region in Latin America. (See figure 1). Compared to the United States, the Latin American countries in this study have significantly less regional variation in their scores, although many countries have seen outliers emerge since the last iteration of this report in 2023. Several of the top regions in the Latin American nations, and over half of the regions in Mexico, perform better than at least one U.S. state.

Figure 1: Maximum, minimum, quartiles, and median of Index scores[8]



Coastal states with strong innovation ecosystems and leading research universities, such as Massachusetts and California, emerge as the top performers in both the United States and the overall index. In contrast, more rural, agriculture-, or resource-dependent states like Arkansas and Mississippi rank lower, performing on par with some of the leading regions in Latin America. Across the Latin American countries analyzed, the highest-scoring regions tend to be manufacturing powerhouses, such as Boyacá and Cauca, or major autonomous cities like Ciudad de México and Ciudad Autónoma de Buenos Aires (CABA). Mirroring the U.S. pattern, regions whose economies rely heavily on agriculture, mining, or other resource-based industries consistently fall toward the bottom of the index. (See figure 2.)

Figure 2: Overall subnational innovation competitiveness scores[9]

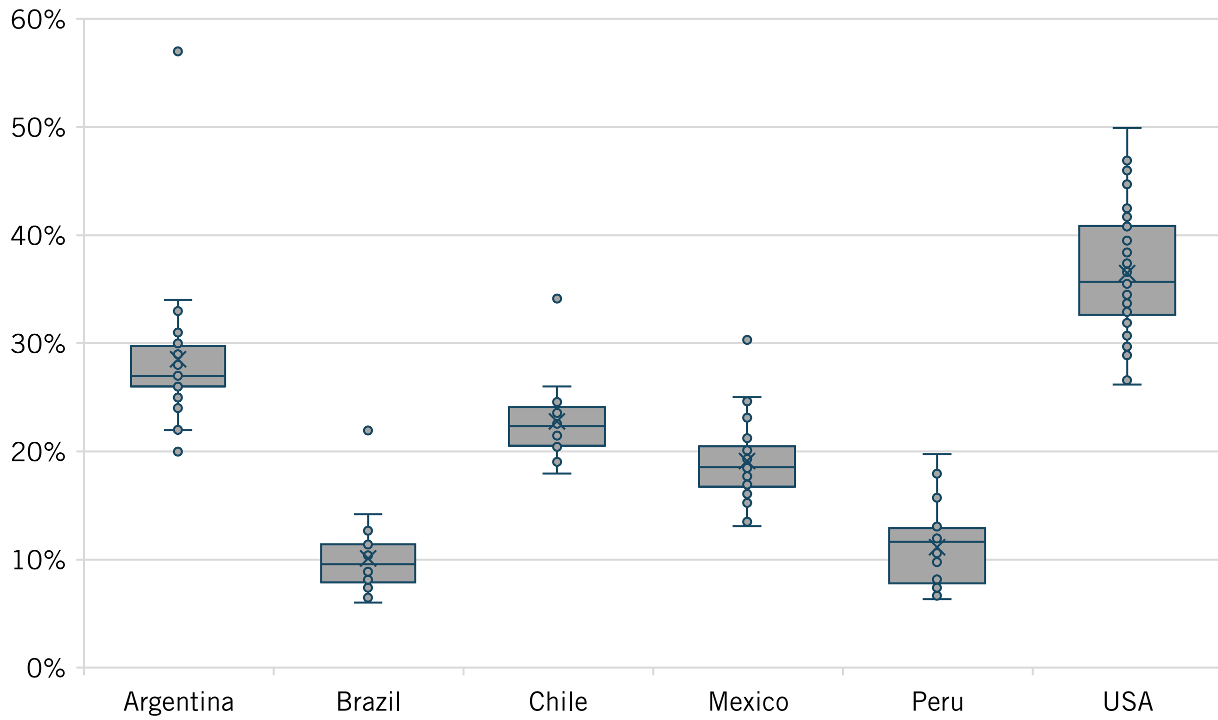


Knowledge Economy

Highly Educated Population

Why is this important? Knowledge is a fundamental innovation input, and the proportion of a highly educated population is a strong indicator of human capital.[10] In addition, higher education levels correlate with a more dynamic economy, larger disposable income to scale innovations, and economies better integrated with external supply chains.[11] Thus, this indicator measures the share of a region's 25–64-year-old ("prime age") population with a bachelor's degree (or equivalent) or higher.

Figure 3: Share of 25-64-year-old population with a bachelor's degree (or equivalent) or higher, 2020–2024[12]

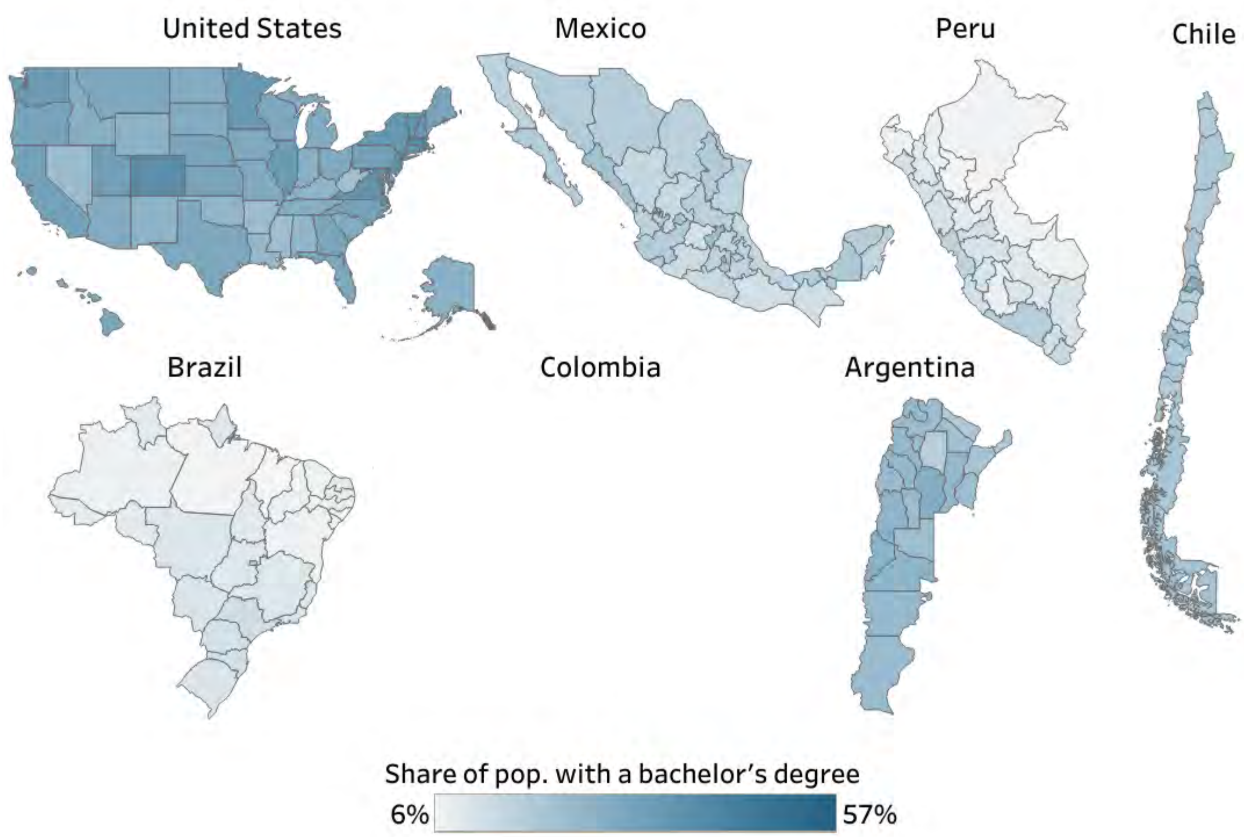


The United States, on average, enjoys a more highly educated workforce than most subnational regions in Latin America, with an interstate average of 36 percent of workers classified as highly skilled. Massachusetts—home to top universities and R&D-intensive industries—leads all states, with half its workforce highly educated. By contrast, Arkansas, Mississippi, and West Virginia, where low-knowledge sectors such as agriculture dominate, exhibit the lowest shares, at 26–27 percent.

Latin American countries exhibit two distinctive patterns. First, these countries fall into two subgroups. Argentina, Chile, and Mexico have the highest averages, with 29, 23, and 19 percent, respectively. Some subnational territories in these countries have proportions of highly educated workforces similar to that of the United States, or higher, as in the case of Ciudad Autónoma de Buenos Aires (CABA) in Argentina. By contrast, Brazil (with an average of 10 percent) and Peru (11 percent) have regions with a proportion of highly skilled workers as low as 6 percent, such as Pará in Brazil and San Martín in Peru. (See figure 3 and figure 4.)

Secondly, regions with the highest share of a skilled workforce within Latin American countries are those with dense, urban populations. Latin American countries are characterized by having a large portion of their populations living in a few metropolitan areas; the extreme cases are Argentina and Chile, with 36 and 40 percent of their respective populations living in the capital. In this context, these large urban agglomerations are those that have a more skilled workforce compared to the rest of the country. These regions appear as outliers, such as in Argentina, (CABA, with an average of 57 percent); Brazil (Distrito Federal with 22 percent); Chile (Region Metropolitana with 34 percent); and Mexico (Ciudad de Mexico with 30 percent).

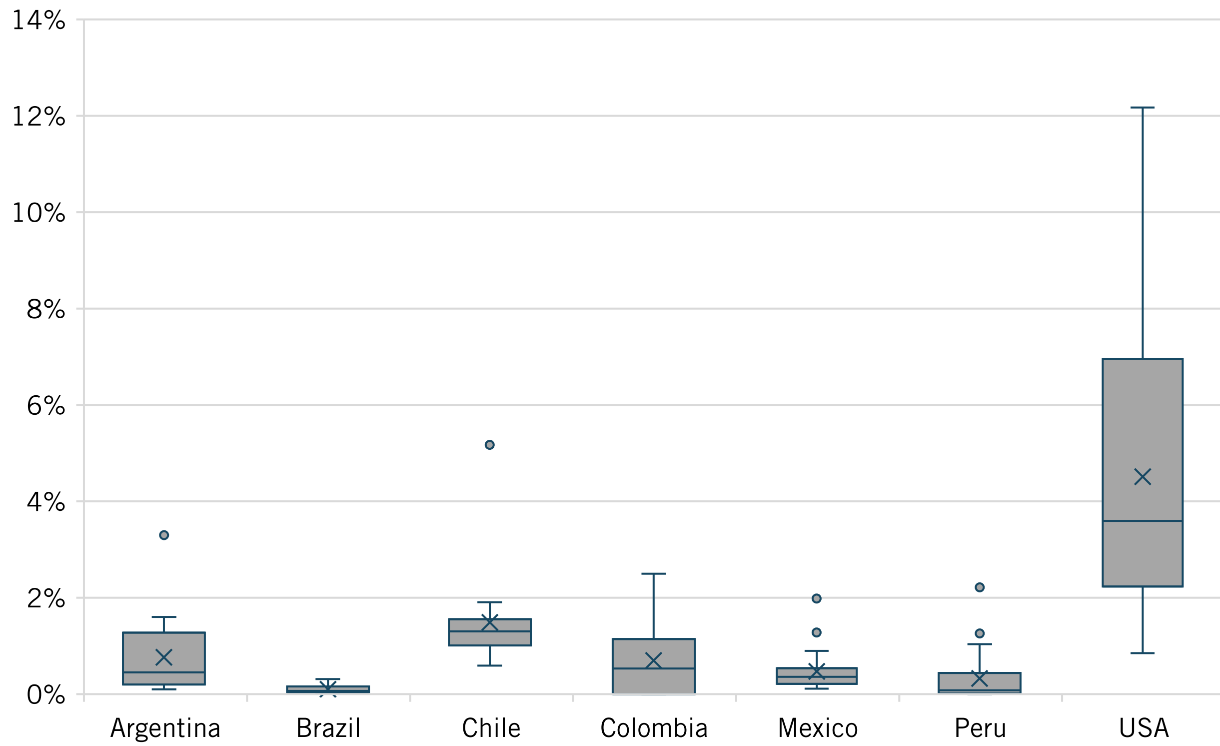
Figure 4: Performance in highly skilled workforce[13]



Skilled Immigration

Why is this important? Skilled immigration brings together workers with unique educational experiences and backgrounds as a driver of innovative ideas. Skill can be difficult to quantify; thus, this indicator instead measures educational attainment, calculated as a region's share of foreign-born workers with at least some tertiary education relative to the total regional population. A 2016 ITIF study found that foreign-born workers living in the United States are disproportionately represented among scientists and engineers who produce meaningful innovations, compared to the overall level of immigration in the United States.[14] Similarly, half of Silicon Valley's AI start-ups have foreign-born founders.[15] Highly educated immigrant populations also raise wages for both domestic- and foreign-born workers.[16]

Figure 5: Share of population that is foreign-born and has some tertiary education, 2019–2022[17]

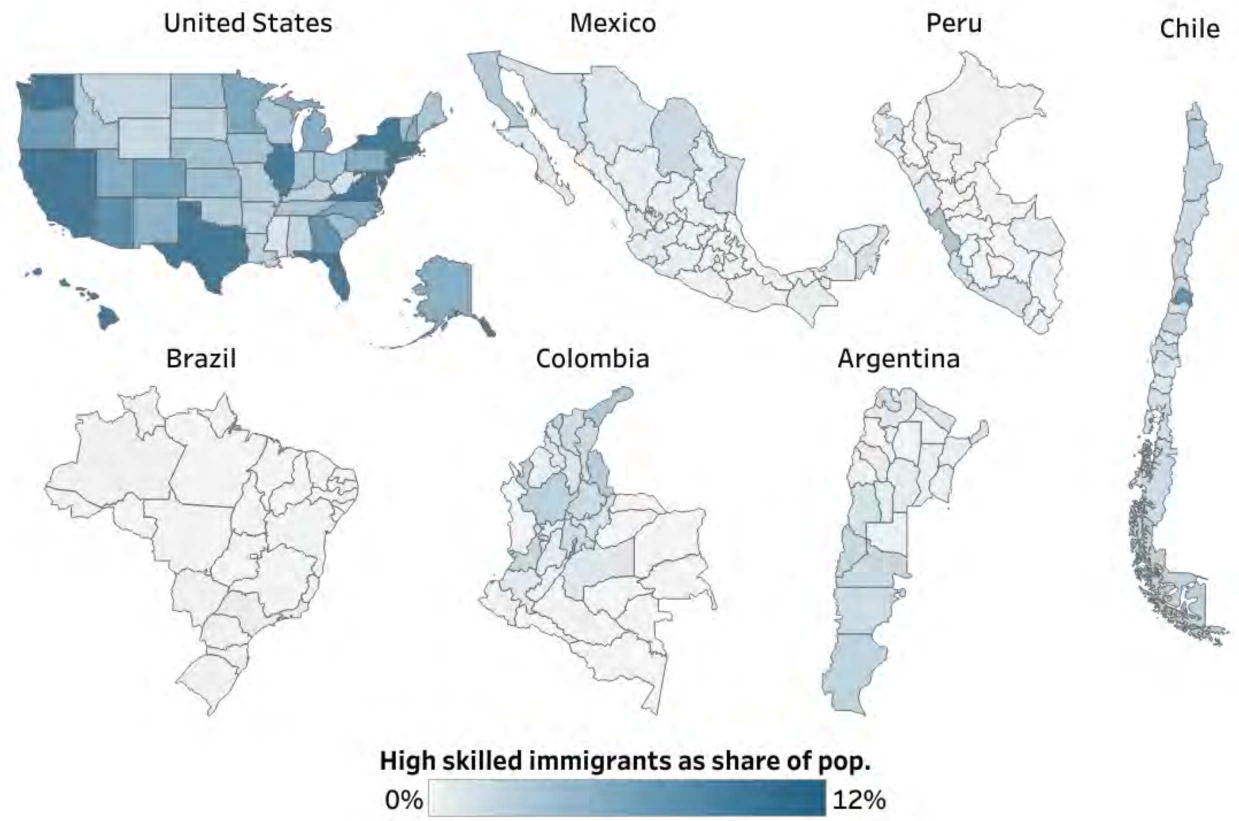


The United States exhibits the greatest number of skilled immigrants among the countries in the Index. With over 1 million international students and an abundance of high-quality universities, the country has been a strong driver of skilled immigration. This is also reflected in the job market. New Jersey, home to several migrant communities and in close proximity to several major metropolitan areas with greater high-wage job opportunities, leads the index with 12 percent, followed by California with the same ratio. Rural and low-income states with relatively smaller knowledge-intensive sectors have lower levels of skilled immigration, including Wyoming, West Virginia, and Mississippi, with 1 percent each.

Chile and Argentina both have lower levels of skilled immigration. However, each respective capital city leads the nation in this indicator. In Chile, Region Metropolitana, where Santiago City is located, has a skilled immigration population of 5 percent, while CABA has 3 percent. These regions are more globally connected and offer higher-paying wages relative to the rest of the country.

In Mexico, regions bordering the United States observe the highest levels of skilled migration. Baja California and Coahuila, both of which have a prominent advanced manufacturing sector, lead the nation, with 2 percent and 1 percent of their populations comprising skilled immigrants. (See figure 5 and figure 6.)

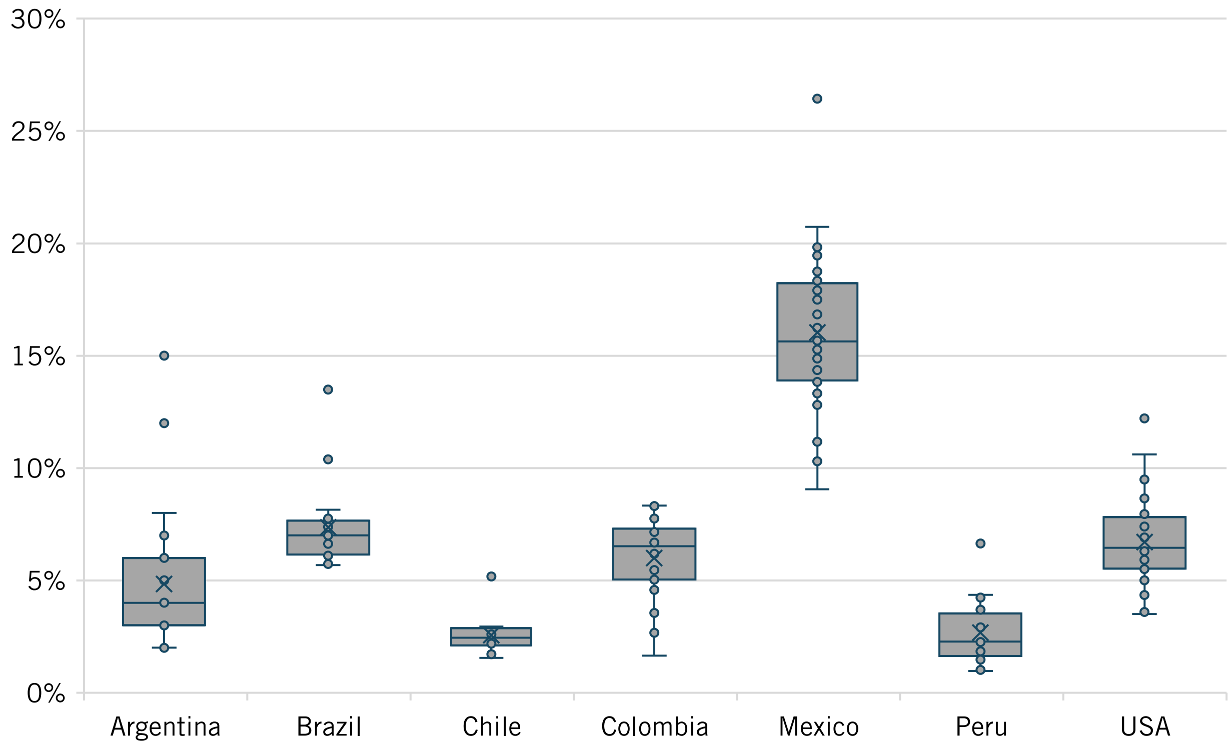
Figure 6: Performance in skilled immigration[18]



Professional, Scientific, and Technical Employment

Why is this important? This indicator measures the share of employees working in professional, technical, and scientific (PTS) activities in each region. This includes, for example, engineers, researchers, and lawyers. PTS services include those needed to facilitate the development, implementation, and commercialization of innovations. Automation and globalization also make high-value-added professional services increasingly important in the modern economy. These occupations are highly knowledge-intensive and therefore harder to offshore. States with greater concentrations in these occupations are thus more resilient.

Figure 7: Share of employees in PTS fields, 2023–2024[19]



Mexico is the outlier in the region, with shares of workers in PTS roles ranging from 9 to 26 percent. Most of the regions from the rest of the countries covered by this report, in contrast, exhibit a ratio lower than 10 percent. Ciudad de México leads the index at 26 percent, followed by Nuevo León at 21 percent, and Querétaro and Veracruz at 20 percent. The high ratios of a workforce focused on PTS activities within these regions are explained by the states' integration into North American supply chains through the United States-Mexico-Canada free trade agreement (USMCA). Ciudad de México is a banking and finance capital, while Nuevo León specializes in advanced manufacturing, and Querétaro is an aerospace hub. (See figure 7 and figure 8.)

For the rest of the countries, urban centers lead the index in employing workers in PTS roles. In Brazil, Distrito Federal and São Paulo lead the nation with 13 and 11 percent of workers, respectively. In Colombia, departments such as Antioquia, Atlántico, and Caldas (8 percent) lead the country, elevated by the innovation ecosystem in Medellín and the economic activity of the coffee belt. Virginia, with its strong innovation ecosystem and high concentration of government and defense contractors, leads the United States with 15 percent.

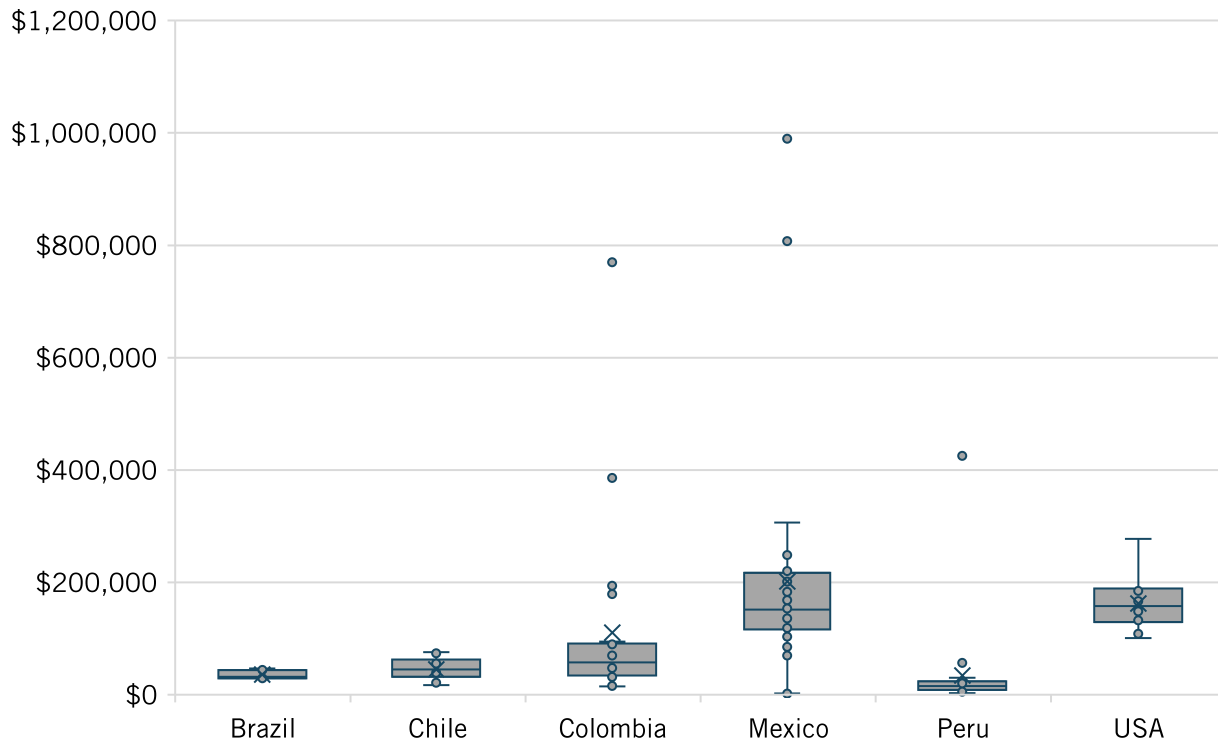
Rural regions uniformly employ the fewest workers in PTS activities. Regions highly reliant on natural resources, such as those in Brazil's north and northeast, or Santiago del Estero in Argentina, and Ñuble in Chile, have less than 5 percent of their workforce in PTS jobs.

Figure 8: Performance in PTS employment[20]

Manufacturing Labor Productivity

Why is this important? Within manufacturing, high-value-added firms are most often capital-intensive, producing more technologically complex products and organizing their workers to take better advantage of their skills. They typically are more productive, paying higher wages and generating greater value for each hour worked. All else being equal, firms with higher value-added levels are more likely to be able to meet global competitiveness challenges. In this context, gross value added (GVA) measures the contribution to GDP made by an individual producer, industry, or sector. This indicator focuses on the manufacturing sector, and it measures the average GVA per worker on a purchasing power parity (PPP) basis.

Figure 9: PPP-adjusted GVA per worker in the manufacturing sector, 2020–2024[21]



Manufacturing labor productivity is relatively standard across nations, although a clear pattern arises amongst the outliers. In Mexico, Oaxaca ($807,650) and Guerrero ($989,899), both southwestern regions, have greater manufacturing labor productivity than any other region included in the index. Both regions have relatively small manufacturing labor forces and produce high-value products, such as petroleum in Oaxaca and gold and silver in Guerrero. A similar explanation can be used to understand other outliers in the data, such as Moquegua, Peru ($425,225), which is heavily dependent on minerals and natural resources. (See figure 9 and figure 10.)

States with the greatest labor productivity in the United States are also highly concentrated in high-value industries. Louisiana and Wyoming, each with labor productivity exceeding $250,000, rely heavily on their natural gas and petroleum refining industries, while California ($277,144) boasts a strong technology and electronics manufacturing sector.

Brazil and Chile each exhibit low manufacturing labor productivity across all regions. Brazil, despite having a large manufacturing sector compared to other countries in the region, primarily focuses on low-knowledge-intensive phases, such as assembly. Chile, in contrast, is competitive in commodities such as base metals and agriculture, rather than manufacturing.

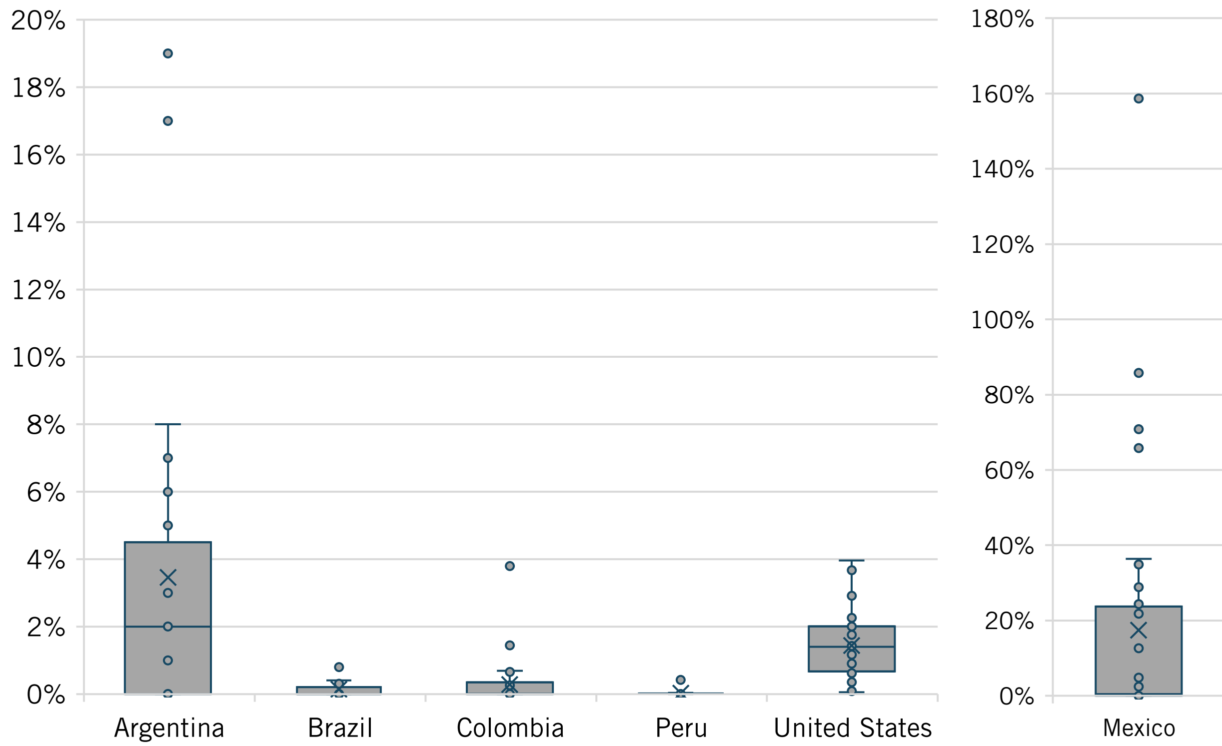
Figure 10: Performance in manufacturing labor productivity[22]

Globalization

High-Tech Exports

Why is this important? This indicator measures a region's exports in the machinery manufacturing; computer and electronic products manufacturing; and electrical equipment, appliances, and components manufacturing industries (North American Industry Classification System "NAICS" 333–335 or equivalent) as a share of GDP. These products represent high-value-added goods that are crucial in the modern global economy. Considering a region's exports of these goods as a share of its GDP shows to what extent a region has a comparative advantage in high-tech production and export. Moreover, this indicator represents a region's position in global value chains for the production of these goods.

Figure 11: Exports in NAICS 333-335 (or equivalent) as a share of GDP, 2021–2024[23]



High-tech exports in the Americas reveal Mexico as a distinctive country compared to the rest of the sample. The inter-state average of Mexico's high-tech exports as a share of GDP is 17 percent, more than five 5 higher than Argentina's 3 percent and 17 times higher than the United States' 1 percent. (See figure 11 and figure 12) The regional average for Brazil, Colombia, and Peru is close to zero. Mexico's high rate of high-tech exports is mainly driven by its northern states, which are a crucial part of the Canada-United States-Mexico supply chain. Thus, Mexico's subnational distribution of high-tech exports is concentrated in states bordering the United States, such as Chihuahua (159 percent), Baja California (86 percent), and Tamaulipas (66 percent).

Argentina has two outlier states in terms of high-tech exports: San Juan (19 percent) and Santa Cruz (17 percent). These two states have resource-intensive activities, mainly mining. The manufacturing activities captured in this indicator are likely goods and machinery complementary to the mining extraction process.

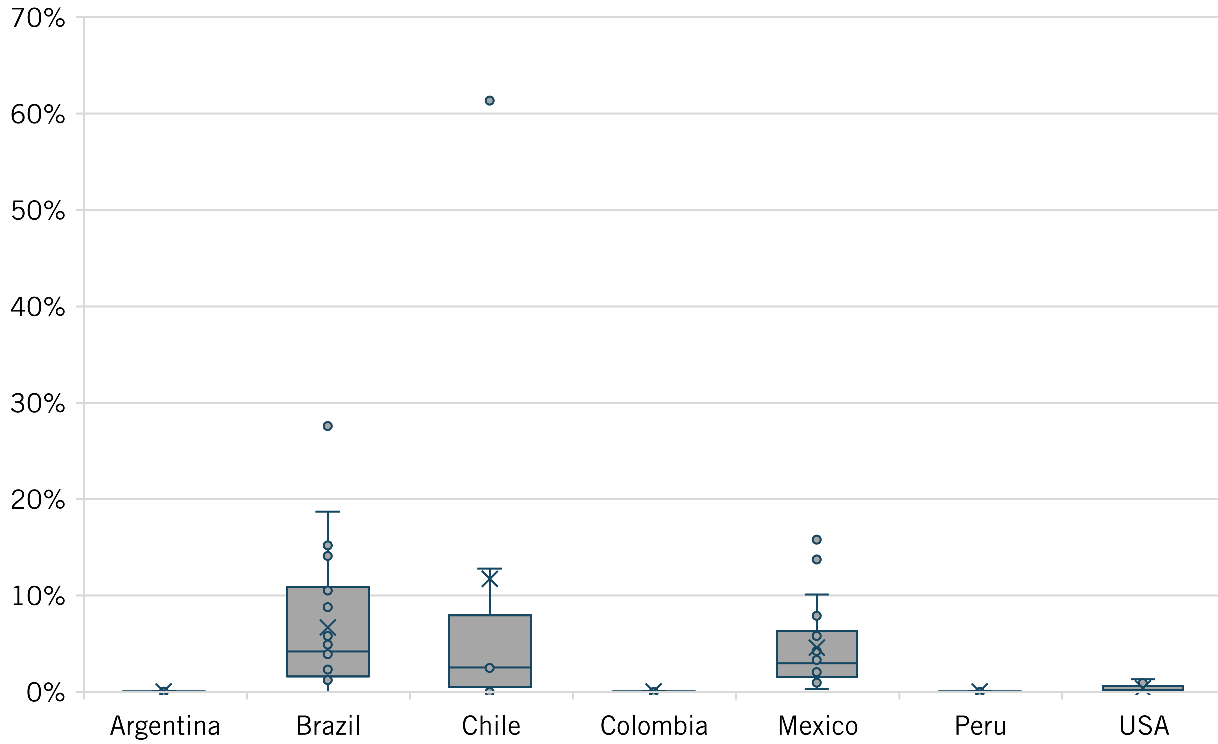
U.S. exports as a share of GDP are the lowest among Organization for Economic Cooperation and Development (OECD) members, a group of rich countries, with 11 percent of the economy's size.[24] In this context, the states within the United States average 1 percent of high-tech exports relative to GDP, and all those with the highest ratio border or are near Canada or Mexico, such as New Hampshire (3 percent), Oregon (4 percent), and Texas and Wisconsin (3 percent).

Figure 12: Performance in high-tech exports[25]

Inward FDI

Why is this important? This indicator measures the inward FDI a region receives relative to its GDP, measured as the funds an entity in the region receives from a foreign-based entity to purchase, establish, or expand enterprises. Inward FDI not only spurs domestic economic activity but also facilitates technology transfer between foreign-owned enterprises and local establishments. Foreign owners can also introduce domestic firms to new international markets and help regions carve out positions in global supply chains. Inward FDI has also been associated with greater economic growth in market economies and tends to be more productive and induce greater levels of investment by domestic firms.[26]

Figure 13: Inward foreign direct investment as a percentage of GDP, 2018–2023[27]

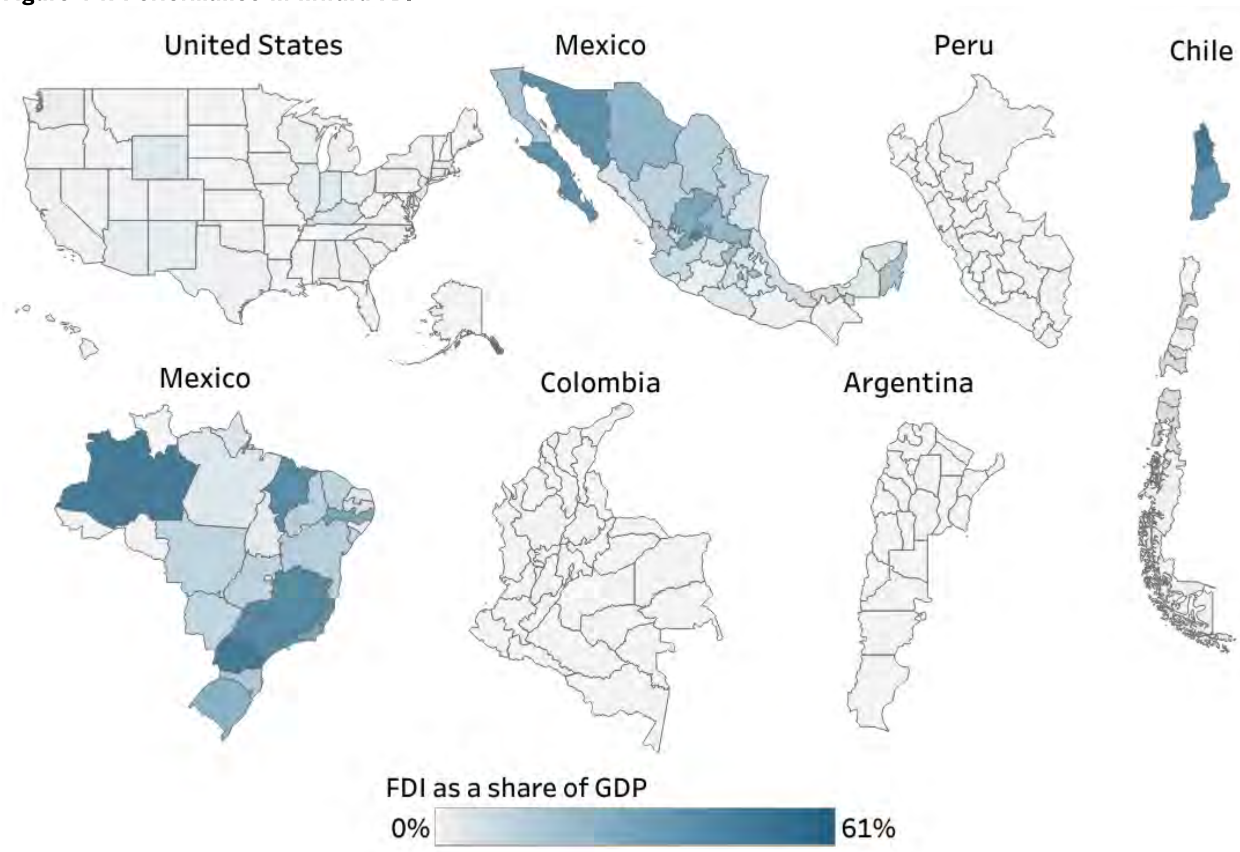


FDI is very unevenly distributed across regions within each country. In most territories, FDI as a share of GDP is well under 1 percent, indicating that most investment, if any, is domestically driven. Argentina, Colombia, Peru, and the United States, in particular, show very low subnational FDI intensity, with only a handful of states, such as New Jersey, Kentucky, and Wyoming, breaking 1 percent. In Peru, only Lima reaches an FDI intensity above 0.5 percent. Argentina's highest shares are in Buenos Aires (0.3 percent). (See figure 13 and figure 14.)

In contrast, Brazil and Mexico stand out for having several states with very high FDI-to-GDP ratios, suggesting both a greater role for foreign-owned firms and strong specialization in export-oriented industries. Brazil's Amazonas (27.6 percent) and Paraná are clear outliers, reflecting large foreign-owned automotive clusters and natural-resource-based manufacturing. Mexico's Aguascalientes (15.8 percent) and Sonora (13.8 percent) show similarly high ratios, consistent with Mexico's integration into North American supply chains under USMCA and its success in attracting FDI into automotive, electronics, and mining sectors.

In Chile, most regions have FDI intensities near or below 3 percent. However, Arica y Parinacota and Tarapacá both exceed 60 percent, implying a dependence on foreign-owned mining and extractive industries relative to their small regional GDP bases. This concentration makes these regions extreme outliers compared to the rest of Latin America.

Figure 14: Performance in inward FDI[28]

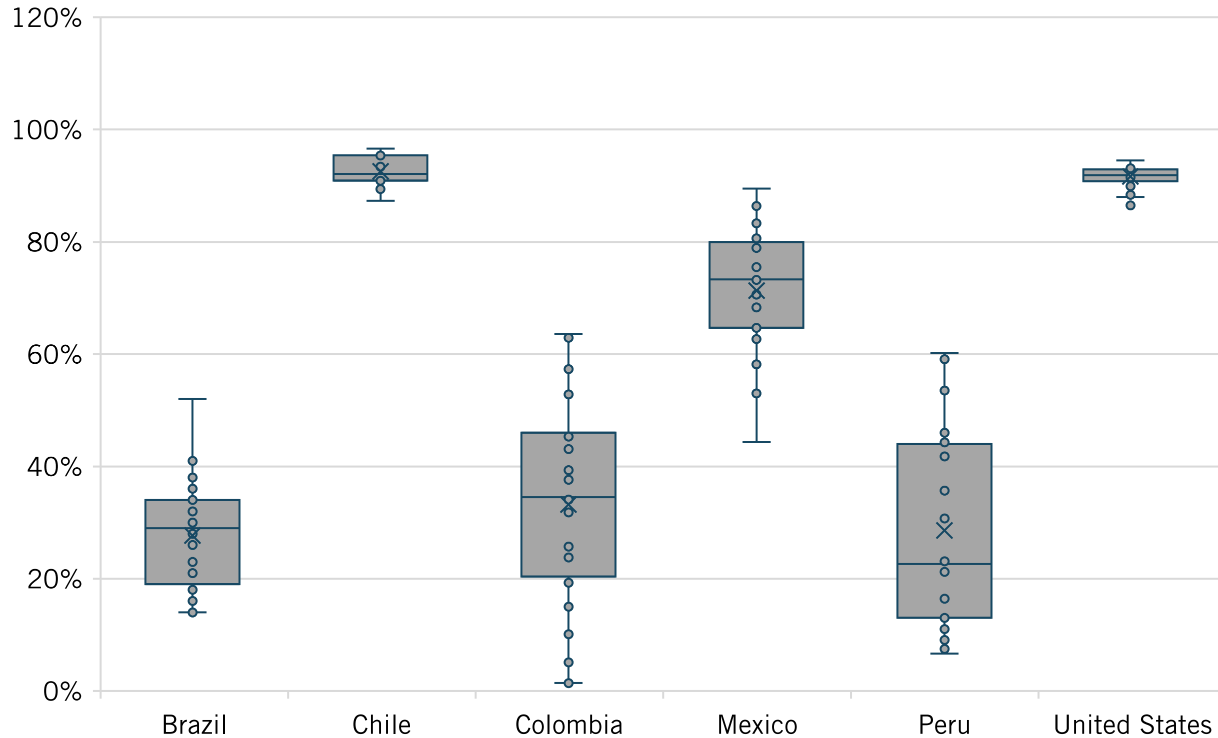


Innovation Capacity

Broadband Adoption

Why is this important? This indicator measures broadband adoption at the consumer level—that is, the share of households within each region with broadband Internet connection availability. (All measures of broadband adoption used include satellite adoption as well.) The Internet is now essential to full participation in today's increasingly digitalized global economy. Internet connectivity has positive externalities for productivity improvements and economic growth.[29] In addition, broadband adoption can enhance innovation capabilities by expanding the market reach of potential consumers, reducing transaction and information costs, and accelerating the product development process.[30]

Figure 15: Share of households that have adopted broadband Internet, 2021–2024[31]

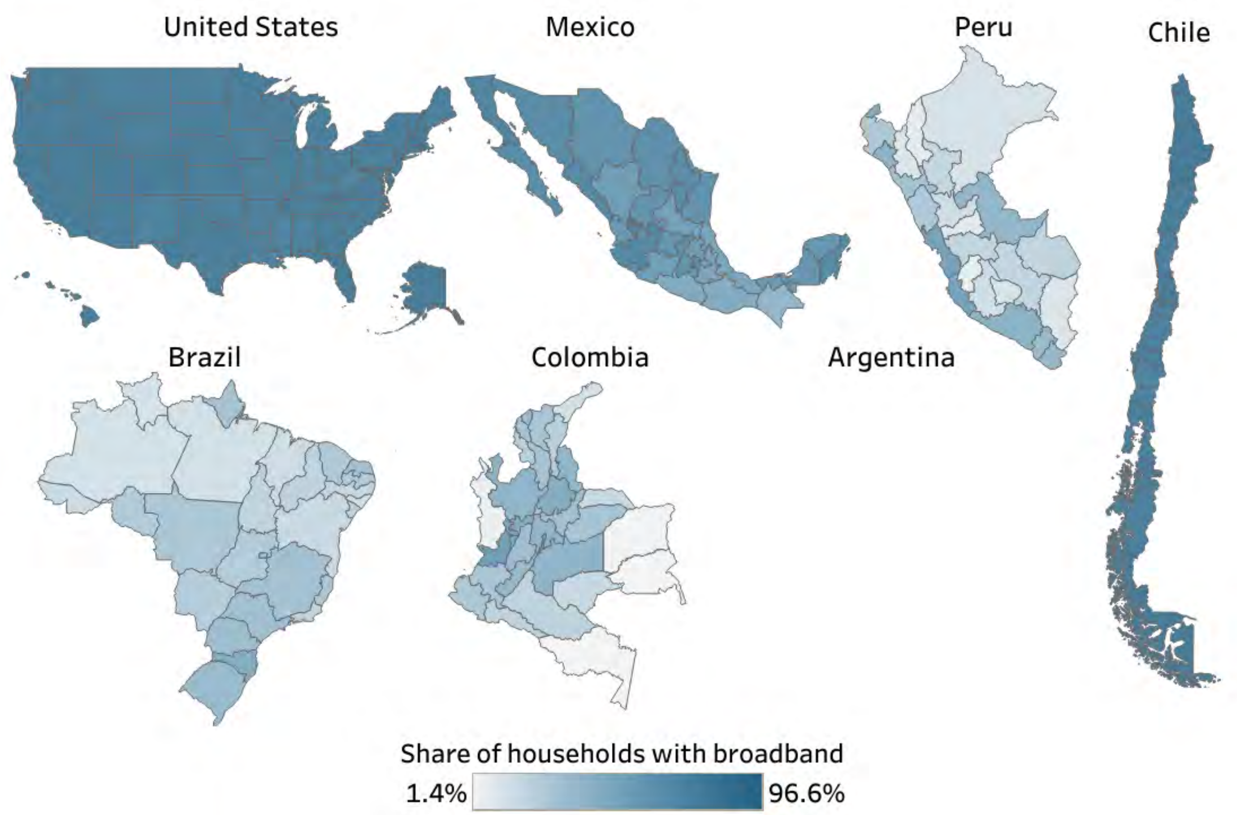


Chile, with an average of 93 percent of households with broadband connectivity across regions, and the United States (92 percent) have notably higher broadband Internet adoption rates among all the subnational regions. Ciudad de Mexico (90 percent) is the only subnational area outside these countries with a similar rate of broadband adoption. (See figure 15 and figure 16.)

The other countries analyzed show lower and more uneven household broadband adoption. In Mexico, the average is 71 percent, but southern states lag far behind—Chiapas at 44 percent and Oaxaca at 53 percent. In Colombia, where the adoption rate averages 33 percent, only Valle del Cauca (64 percent) and Bogotá (63 percent) surpass the 60 percent threshold, while Amazonas, Guainía, and Vichada remain at 2 percent or lower. Peru averages 29 percent; only Ica, Lima, and Tumbes exceed 50 percent of households. In Brazil (28 percent), Santa Catarina is the lone state above that mark.

Increasing broadband Internet penetration thus remains a significant challenge in many Latin American nations and should be viewed as a key priority for policymakers to turbocharge Latin America's ability to compete in the modern global digital knowledge economy..

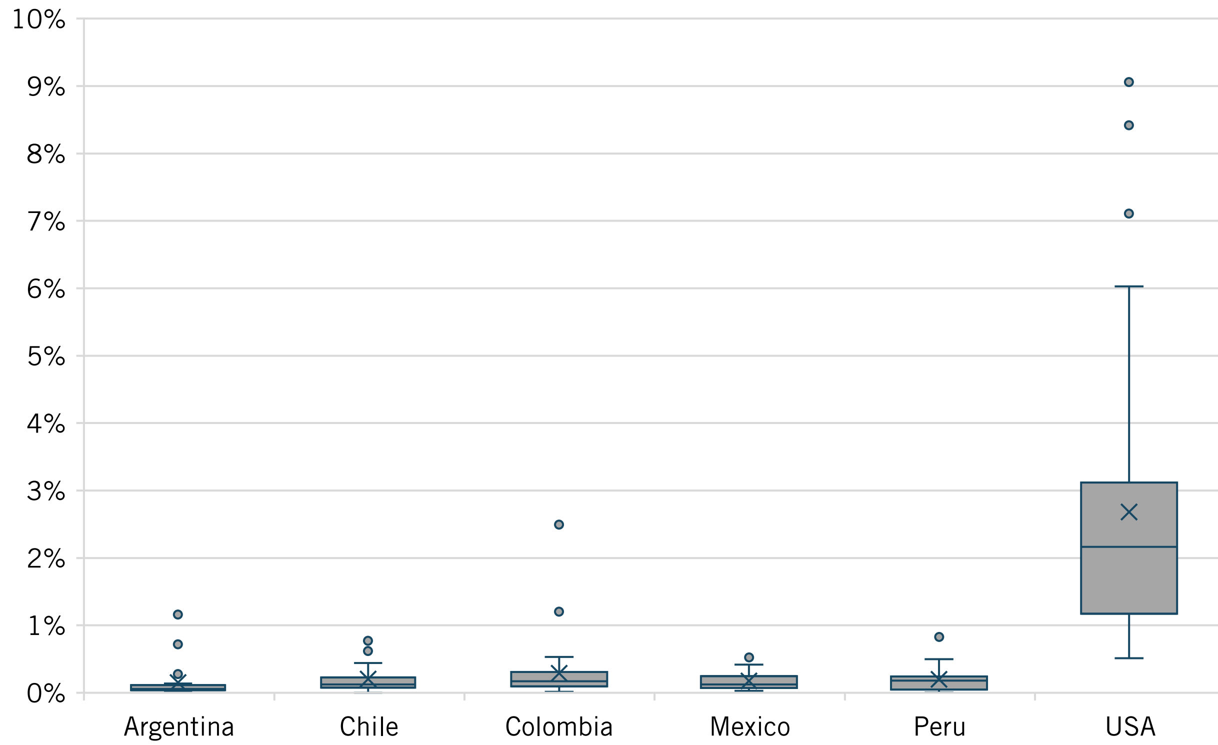
Figure 16: Performance in broadband adoption[32]



R&D Intensity

Why is this important? R&D expenditure is an innovation input, as it measures the overall investment in new knowledge and the early stages of technological development within a nation's or region's innovation ecosystem. While not all innovation is R&D-based, R&D expenditure is highly correlated with innovation performance, as it reflects the investments to advance in the scientific and technological frontiers.[33] In this context, this indicator measures R&D expenditures in a region relative to its GDP, considering all sectors: business, government, and higher education.

Figure 17: R&D expenditures as a share of GDP, 2016–2024[34]

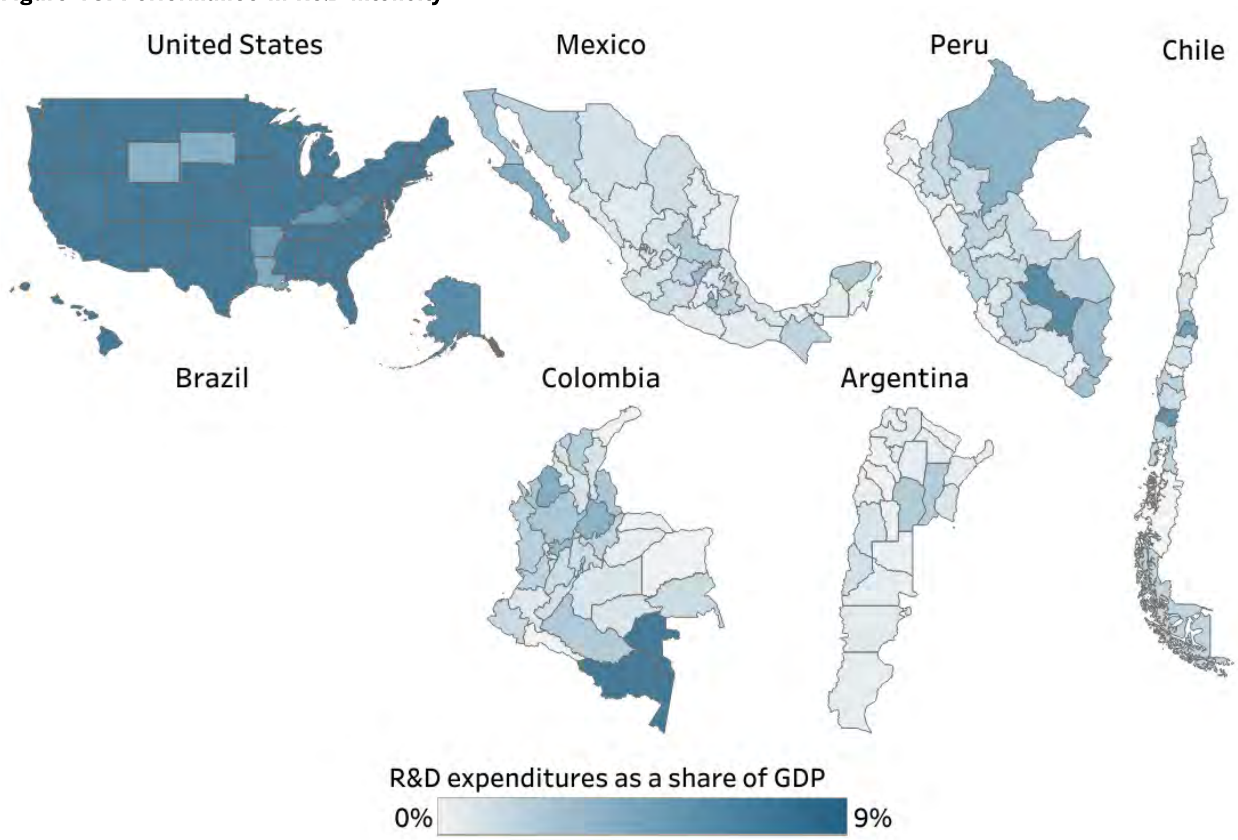


No subnational region in the Latin American countries covered in this report has a GERD that is at least half of the OECD average of 2.7 percent for 2023

The United States invests about 3.5 percent of its GDP into R&D annually, while Brazil's gross expenditure in R&D (GERD) is 1.2 percent (not shown due to a lack of subnational data), and the rest of the countries covered in this report have a GERD below 0.6 percent.[35] Differences in national GERD are also reflected at the subnational level. Notably, GERD is higher in some U.S. states, such as Massachusetts (9 percent), New Mexico and Washington (8 percent), and California (7 percent), compared to countries with historically high GERD rates, including Israel and South Korea.

In contrast, no subnational region in the Latin American countries covered in this report has a GERD that is at least half of the OECD average of 2.7 percent for 2023.[36] (Chile, Colombia, and México are OECD members themselves.) (See figure 17 and figure 18.) The contrast between rich and Latin American economies in a key innovation indicator shows how distinctly different development paths are, partially explaining the persisting productivity stagnation of the region.[37] This data also vividly shows how important it is for Latin American countries to substantially boost their R&D investments if they wish to compete more intensely in the global innovation economy.

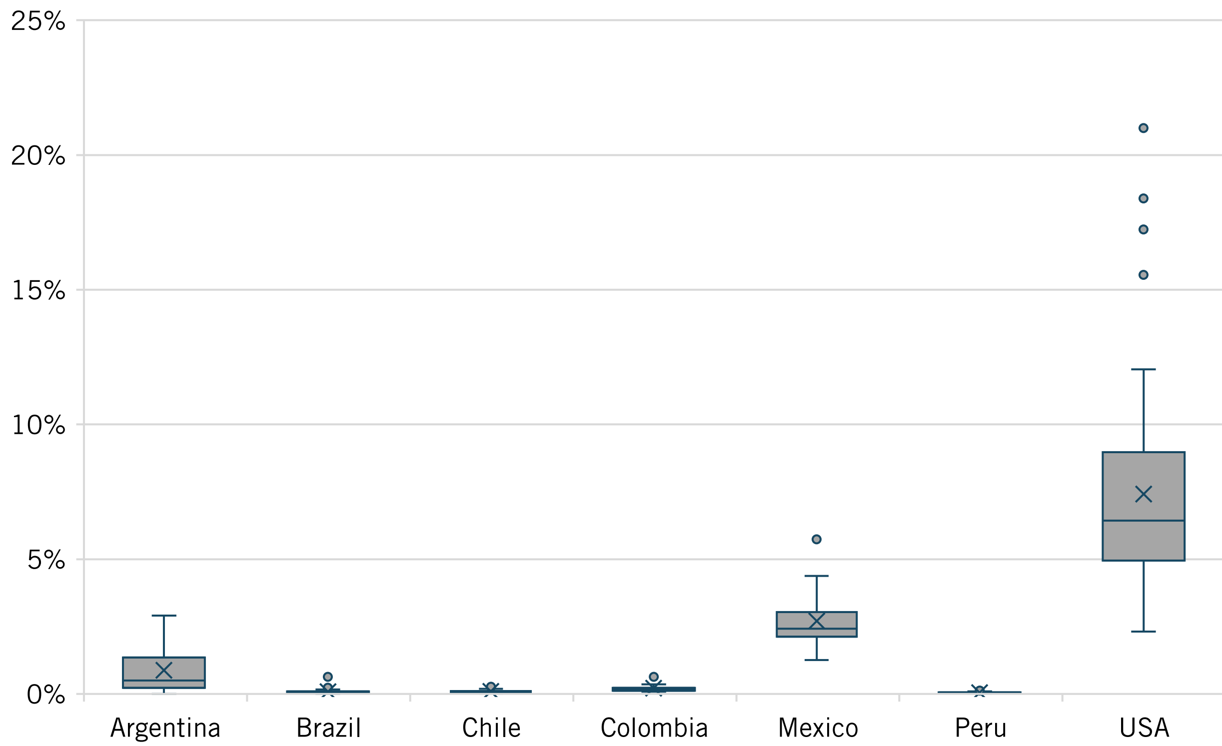
Figure 18: Performance in R&D intensity[38]



R&D Personnel

Why is this important? R&D personnel are indispensable to conducting R&D activities and turning investments into new productivity-enhancing knowledge and technologies. The R&D workforce also creates spillovers: as workers move to other jobs, their frontier knowledge is applied beyond the research itself.[39] Thus, this indicator measures the number of R&D personnel as a share of all employees in each region.

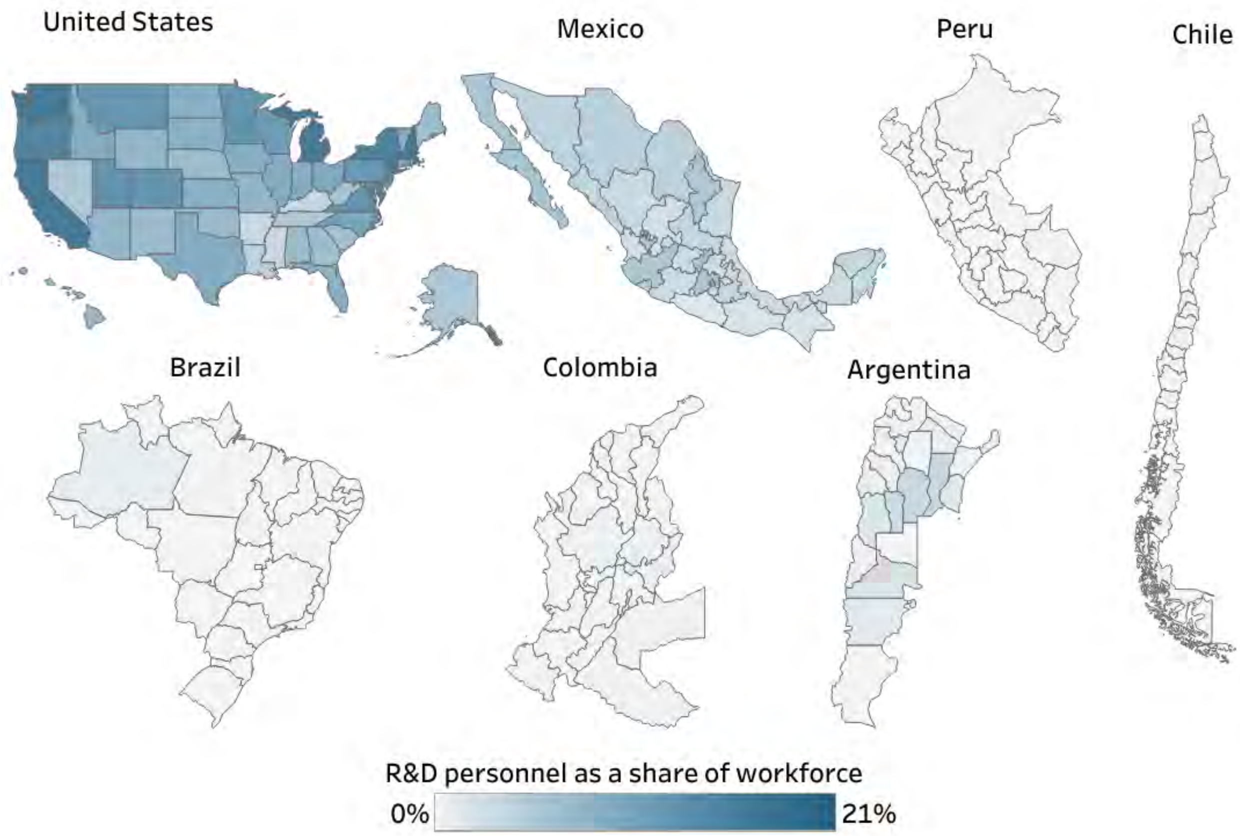
Figure 19: R&D personnel as a share of total employees, 2021–2024[40]



Correlated with the GERD indicator, the United States' R&D personnel as a share of the total workforce is significantly higher compared to the other countries covered in this study, which is also reflected at the subnational level. The states with the higher ratio of R&D personnel are Washington (21 percent), Massachusetts (18 percent), and California (17 percent).

Among the remaining countries, five states in Mexico show a relatively higher percentage of R&D personnel compared to total employees. Three of these states are in or near the capital: Ciudad de México (6 percent), and the states of México and Querétaro (4 percent); and two are close to California in the United States: Baja California and Baja California Sur (4 percent). (See figure 19 and figure 20.)

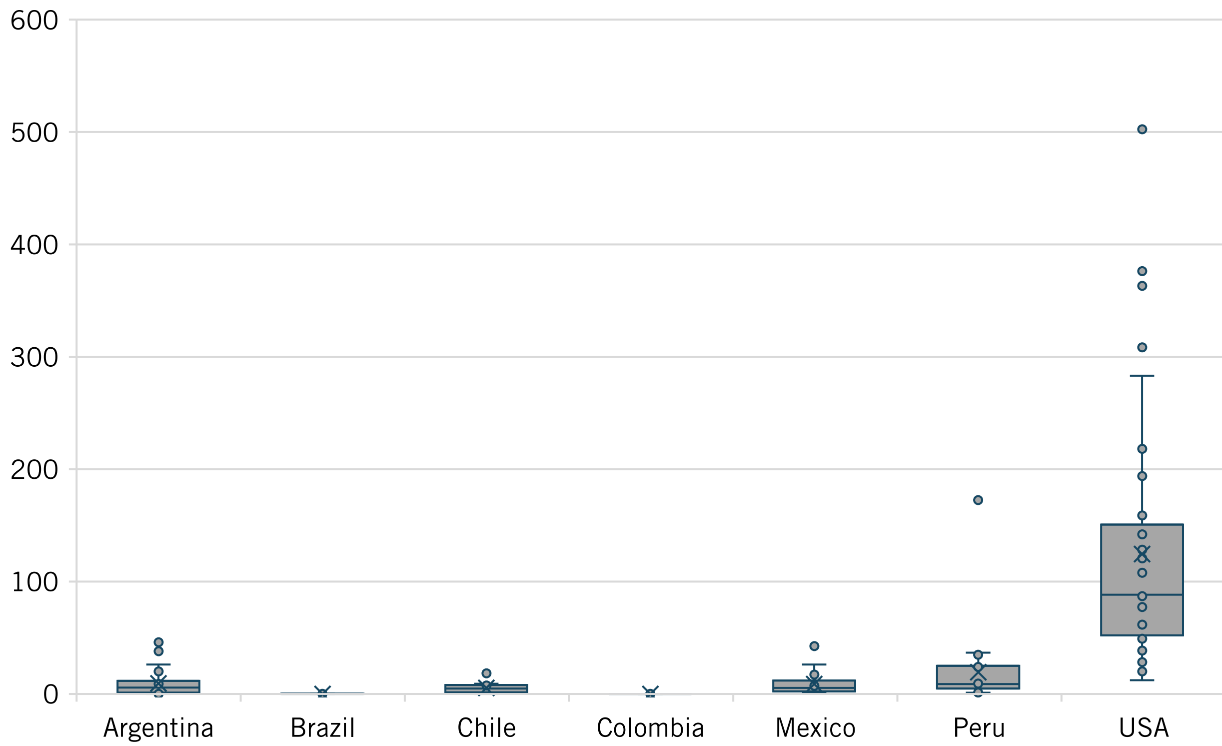
Figure 20: Performance in R&D personnel[41]



Patent Applications

Why is this important? A patent is an innovation output, used to protect or license an invention. Patents also secure private returns on investment in R&D activities, which are necessary to incentivize these activities and their socially desirable spillover effects. Patent applications per million inhabitants of a region measure the "inventiveness" of its residents. Thus, this indicator focuses on internationally filed patents to mitigate differences in patent qualifications between countries' patent offices.

Figure 21: PCT patent applications per million residents, 2015–2024[42]

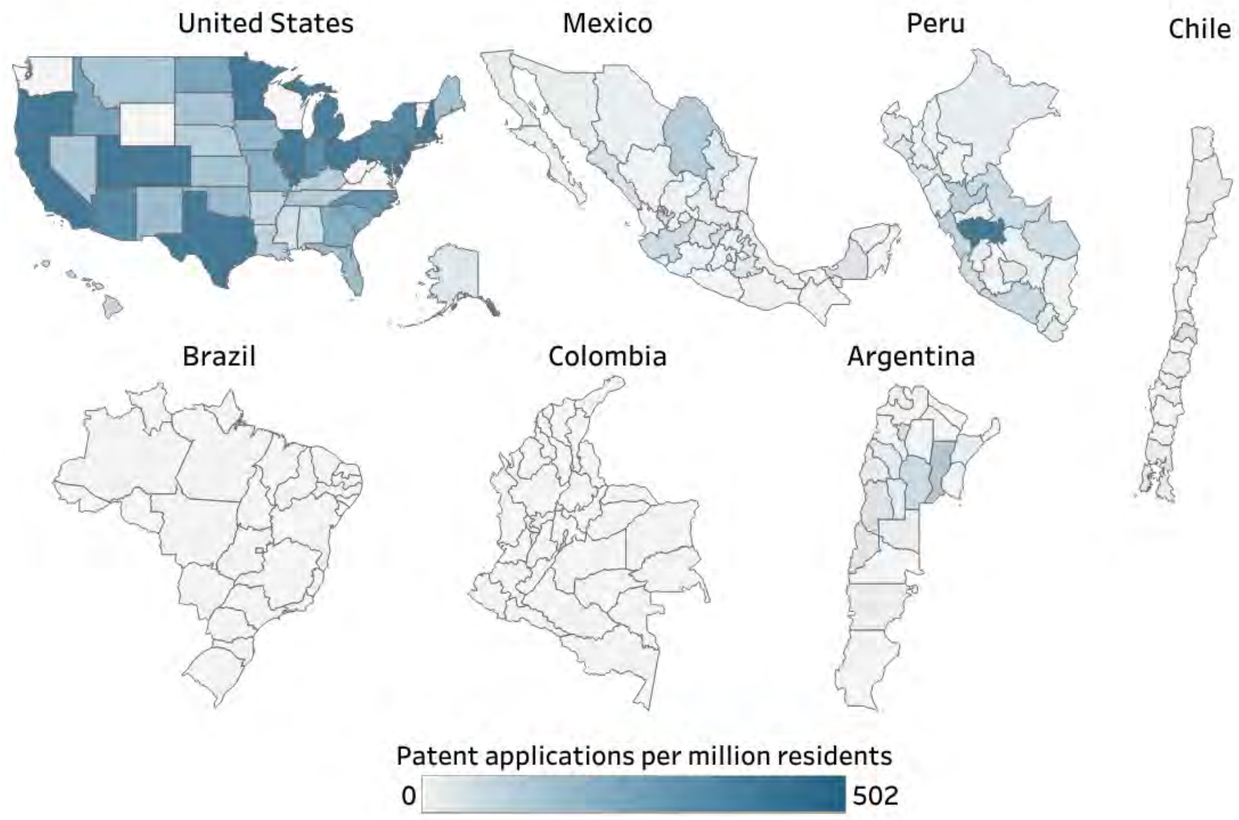


In the United States, patents per million residents are distinctively higher than those of the other countries in the Americas covered in this study, with an interstate average of 124 patent applications per million residents. The states with the higher ratio of patent applications are those with a strong university system and a prevalence of knowledge-intensive industries, such as Massachusetts (502 patents per million residents), California (380), Oregon (376), and Washington (363).

Peru's departments average 19 patent applications per million people. This figure is notably influenced by the Junín region, with a ratio of 172. This department is home to the National University of the Center of Peru, which is among the most active in submitting patent applications in the country.[43] Additionally, there are reports of patents in some niche agricultural products in Junín, such as the "maca," which likely affect this indicator.[44] (See figure 21 and figure 22.)

Patent applications per million residents among the rest of the countries covered in this report are generally lower than the U.S. state with the lowest rate in the country (Mississippi, with 20 patent applications per million). Some regions present as outliers in this group of countries, such as Santa Fe (46 patents per million) and CABA (38) in Argentina (which are driven by university research), and Coahuila (42) in México, with a robust manufacturing sector.

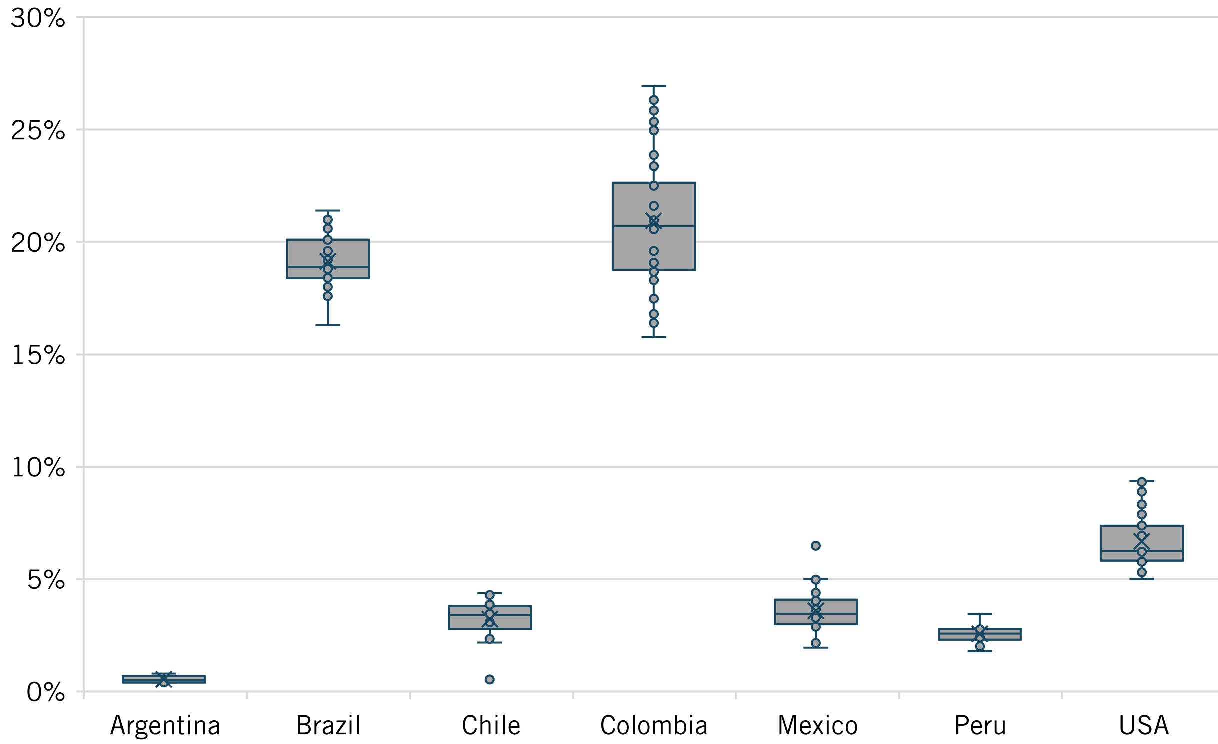
Figure 22: Performance in patent applications[45]



Business Creation

Why is this important? Newcomer firms capable of challenging incumbents are essential for a business environment that rewards innovation and competitiveness. This indicator measures the share of a region's business enterprises that were established in the previous period. The business creation indicator is limited, as it does not capture business turnover, does not differentiate among industries with low or high knowledge intensity, and does not distinguish between subsistence-driven and competition-driven new startups. Absent a better alternative at the cross-national regional level, this indicator reflects a region's overall economic resilience and regional competitiveness.

Figure 23: Economy-wide enterprise birth rate, 2017–2024[46]

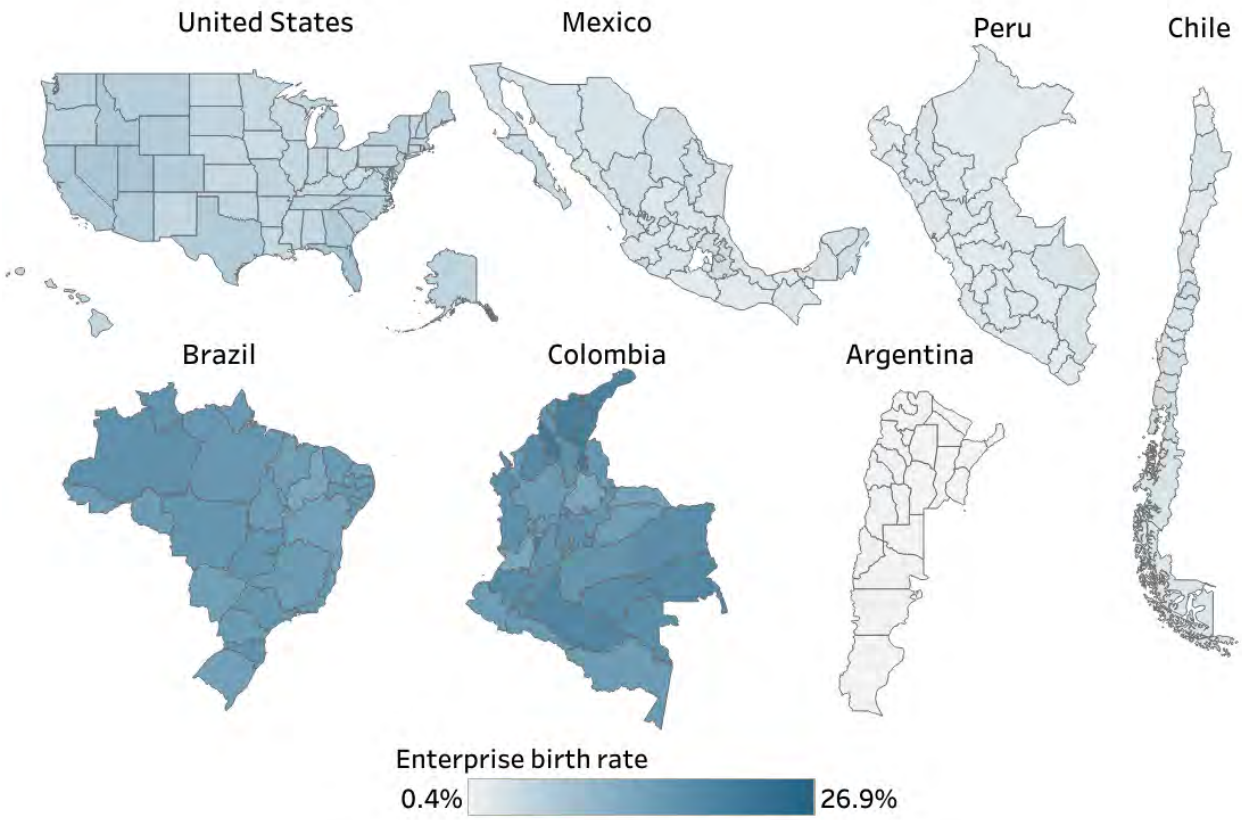


Brazil and Colombia's business creation rates are significantly higher than those of the rest of the countries in the sample, with an average of 19 percent and 21 percent, respectively. These higher rates of business creation are a sign of the limitations of the data, likely capturing the pervasiveness of subsistence businesses—i.e., mostly single-person microenterprises. In these cases, higher rates of business creation are the consequence of a weak job market, pushing workers to frequently enter and exit paid jobs, and leading to the creation of subsistence businesses in between. (See figure 23 and figure 24.)

The United States exhibits the highest business creation rates among the rest of the countries analyzed, with an average of 7 percent of businesses being new. Iowa and West Virginia, with a 5 percent average, are the U.S. states with the lowest business creation rates. Both states have strong ties with resource-based industries, and their relatively small population does not offer a significant consumer base.

Business creation in Chile, Mexico, and Peru follows similar patterns, with an average rate of 3–4 percent. Tlaxcala in Mexico, with a business creation rate of 6 percent, and Arica y Parinacota in Chile, with 1 percent, stand out as outliers at the extremes of the distribution. In contrast, Argentina has a business creation rate averaging less than 1 percent, highlighting the lack of business dynamism and stagnated competitiveness in its economy.

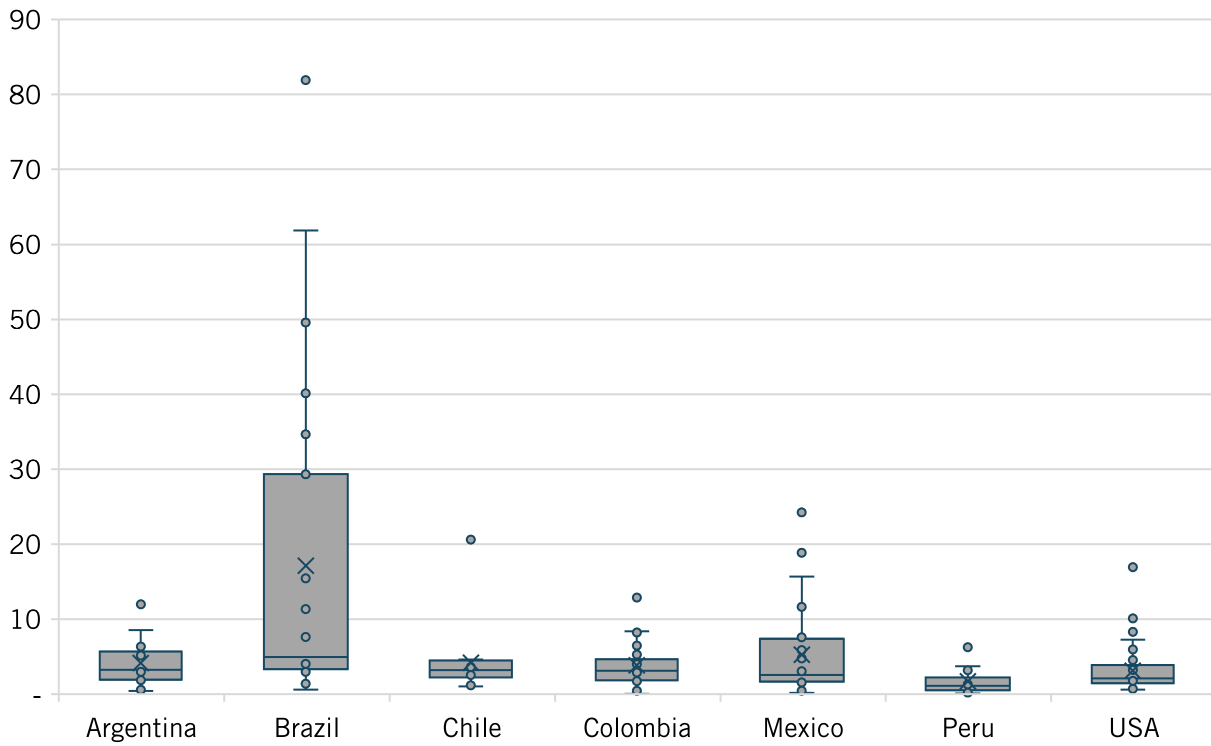
Figure 24: Performance in business creation[47]



Carbon Efficiency

Why is this important? As the world endeavors to combat climate change, decarbonization is of paramount importance. Regions' ability to innovate sustainably to achieve a reduction in and the efficient use of carbon and other greenhouse gases will determine their long-term competitiveness, as well as their national economic prosperity. This indicator measures carbon dioxide (CO_2) and other greenhouse gas efficiency per unit of output (as measured by PPP-adjusted GDP). It is noted that more-developed regions may have a slight advantage in this indicator due to their somewhat more service-oriented economies. As policymakers look to improve efficiency and reduce overall emissions, they will take their lead from those regions that are devising new solutions and innovative technologies.

Figure 25: Metric tons of CO2 emissions per $10,000 of PPP-adjusted GDP, 2018–2023[48]

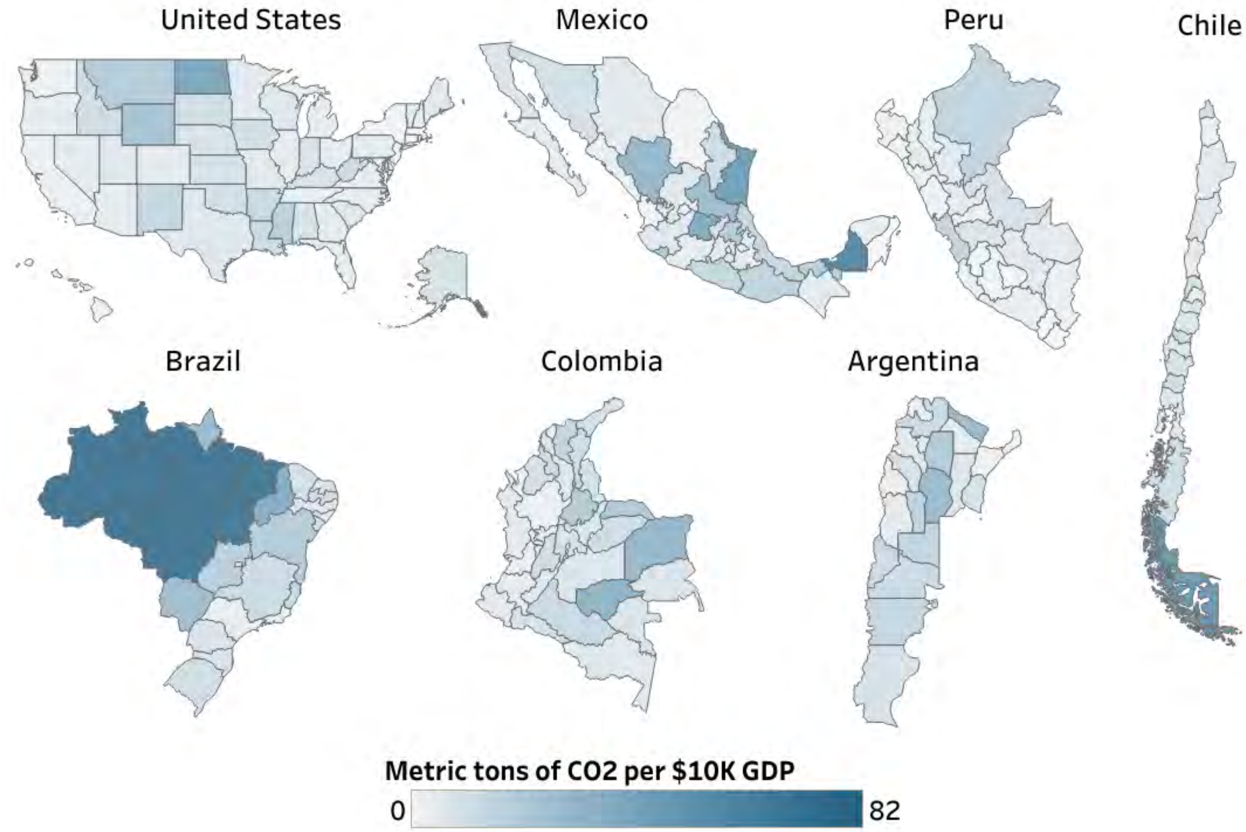


Emissions intensity is highly correlated with the socio-economic development of a region, with most urbanized and economically advanced areas showing very low CO_2 emissions per unit of GDP. For instance, Ciudad de México, Bogotá, and several Mexican states with a significant tourism sector report emissions near zero, reflecting service-heavy economies with limited manufacturing activities. Similarly, major U.S. coastal states such as California, New York, and Massachusetts have relatively low emissions intensity, driven by their high-value, low-emissions industries, such as biopharma, finance, and software development.

Conversely, sparsely populated and resource-dependent regions with low GDPs dominate the list of high emitters. For example, Brazil's Acre (82) and Rondônia (62), two of the country's poorest regions where deforestation and development contribute to industrial emissions, top the list. In Mexico, Campeche (24) is home to the Mexican state-owned petroleum corporation, PEMEX, which elevates industrial emissions, making it the highest in the country. Similarly, North Dakota

(17) and Wyoming (10) lead the United States in emissions per unit of GDP, reflecting each state's dependence on fossil-fuel industries and low GDPs. (See figure 25 and figure 26.)

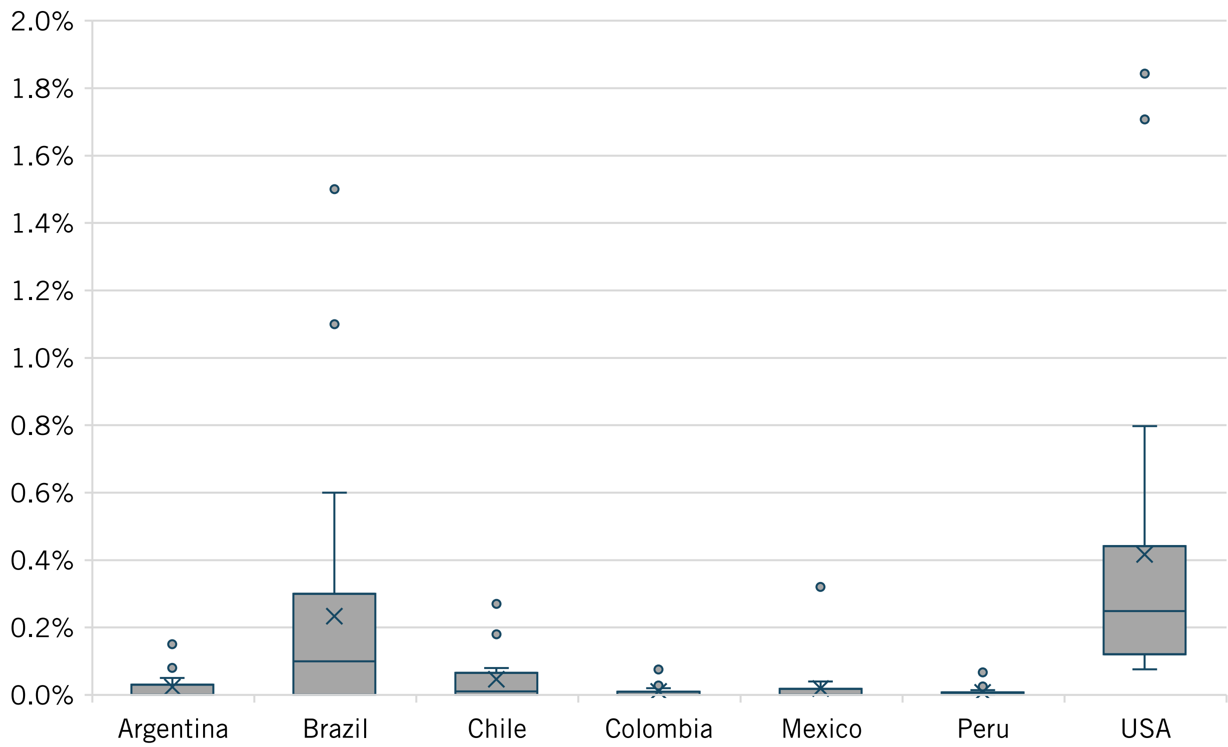
Figure 26: Performance in carbon efficiency[49]



Venture Capital

Why is this important? This indicator examines a region's total venture capital investment (measured as VC-receiving firms) relative to the size of its GDP. VC represents a form of business financing wherein investors provide funds to early-stage companies in exchange for equity in their firms. Given the considerable uncertainty regarding start-ups' success potential, VC investment assumes higher risks than other forms of investment. Accordingly, VC investment is often intended for companies with real or perceived high-growth potential, often associated with their innovative technology use or business model design. A region's receipt of VC investment reflects both the innovativeness of its start-up ecosystem as well as the commitment of its firms to lead in crucial technologies such as AI, biotechnology, clean energy, advanced manufacturing, and robotics.

Figure 27: VC investment received as a percentage of GDP, 2021–2024[50]

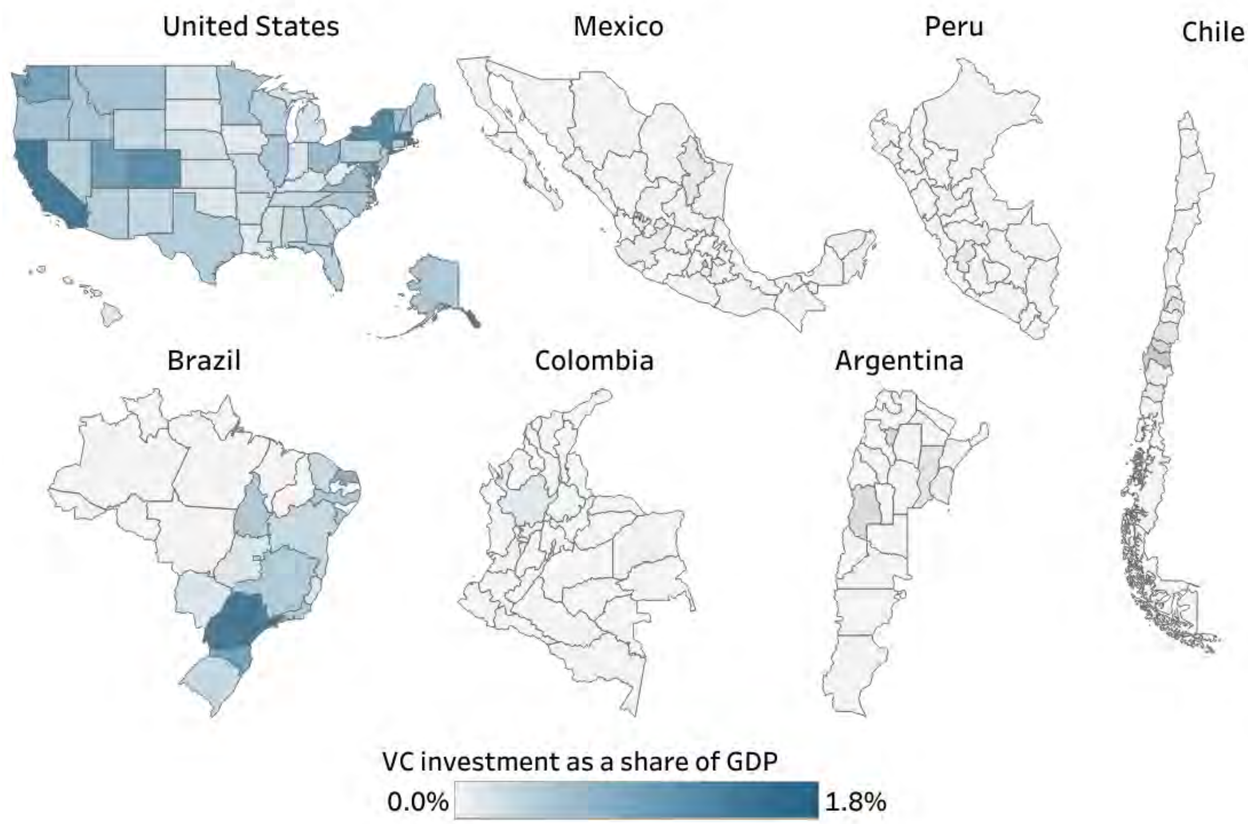


Most regions in Latin America report virtually no activity in VC investment, with any VC activity concentrated in large urban areas or near extractive activities. In Argentina, only Mendoza and Tucumán receive investment greater than 0.2 percent of GDP, indicating that the national VC ecosystem is clustered in a few entrepreneurial hubs. Colombia and Peru have virtually no measurable VC penetration outside of Bogotá and Huancavelica, Peru, each with 0.1 percent of GDP. (See figure 27 and figure 28.)

Brazil stands out as the most heterogeneous VC landscape among the Latin American countries. Paraná (1.5 percent) and São Paulo (1.1 percent) are national leaders, reflecting their status as hubs for fintech, software, and industrial innovation. Santa Catarina and Rio Grande do Norte also see VC investment greater than 0.5 percent of GDP. Though these shares are still modest by global standards, they show that Brazil's VC market has achieved a degree of growth unseen by many other countries in the region.

The United States remains the most VC-intensive market, with Massachusetts (1.8 percent) and California (1.7 percent) leading the country. Other states with strong innovation ecosystems, including New York, Washington, and Maryland, also report significant investment, indicating that capital investment continues to cluster around advanced technology industries such as biotech, software, and technology.

Figure 28: Performance in VC[51]



POLICY RECOMMENDATIONS

Argentina

Knowledge Economy

While the country has historically produced a large number of high-quality university graduates, educational performance at the primary and secondary levels remains troubling. National assessments such as *Pruebas Aprender* and international benchmarks, such as PISA, consistently reveal deficiencies in mathematics, science, and reading. Increasing investment and improving the quality of education are critical, as peer countries achieve stronger outcomes with comparable levels of spending. Argentina must expand both the number and quality of graduates in STEM fields while also addressing structural inefficiencies in higher education. Fewer than 30 percent of students complete their degrees on time, and programs designed to take four years can stretch to as many as nine.[52] This delay represents not only a waste of institutional resources but also an opportunity cost for students, who are unable to enter the job market earlier. In a rapidly evolving global economy, shorter and more practice-oriented programs—supplemented by specialized master's degrees—would better prepare graduates to adapt and innovate. Likewise, the imbalance in fields of study is concerning; only 1.9 percent of graduates earn degrees in computer science, compared with 13.4 percent in law. Such a skewed distribution undermines Argentina's ability to cultivate the workforce needed to compete in a technology-driven world.[53]

Investing in higher-quality education is essential, and the strategic use of AI offers promising opportunities. While there is no established blueprint for using AI in training, recent World Bank research demonstrates its potential: in a six-week pilot, AI-enabled interventions produced learning gains equivalent to 1.5 to 2 years of progress under a business-as-usual scenario. Remarkably, the program achieved 3.2 equivalent years of schooling (EYOS) for every $100 invested, highlighting AI's potential to deliver cost-effective, scalable improvements in educational outcomes.[54]

Investing in education, particularly at the primary and secondary levels, should be a national priority. According to the World Bank, every U.S. dollar a government invests in education yields, on average, a $20.37 increase in GDP. Indeed, recent research indicates that education investments have accounted for an extraordinary 50 percent of global economic growth over the past three decades—underscoring the central role of human capital development in driving prosperity.[55]

Globalization

Argentina must deepen its integration into international markets. Years of relative isolation have increased inefficiencies across key industries, limiting competitiveness. The pending free trade agreement with the European Union represents an important step forward. By eliminating tariffs on 90 percent of bilateral trade, the agreement would significantly reduce costs for exporters on both sides. It would also mark the largest trade pact ever negotiated by Mercosur, a group of South American countries, granting Argentina greater access to one of the world's largest markets and positioning the country to strengthen its role in global value chains.

FDI attraction is another policy need. The main program is the Régimen de Incentivo a Grandes Inversiones (RIGI), an incentive scheme, which provides long-term stability and predictability for projects exceeding $200 million. RIGI offers 30 years of legal guarantees to investors and targets strategic sectors such as industrial forestry, tourism, infrastructure, mining, technology, steel, energy, and oil and gas. Incentives include reduced corporate tax rates, accelerated depreciation, value-added tax (VAT) credits, and exemptions from import and export duties, measures designed to enhance Argentina's competitiveness and encourage large-scale, long-term capital inflows. Since its implementation, seven projects worth more than $13 billion have been approved within the first year.

The pending free trade agreement between Argentina and the EU would eliminate tariffs on 90 percent of bilateral trade, making it the largest trade pact ever negotiated by Mercosur, and allowing the country strengthen its role in global value chains.

Nevertheless, further progress is needed to strengthen institutional security and consolidate investor confidence. In this regard, the Ministry of Deregulation and Efficiency plays a critical role in sustaining pro-competition reforms by continuing to eliminate red tape that constrains business creation. Complementary labor market reforms are also essential to accelerate hiring and reduce costs for firms, while at the same time ensuring an effective social safety net for workers. Together, these measures would create a more dynamic business environment, boost productivity, and position Argentina to compete more effectively in the global economy.

Innovation Capacity

Argentina's knowledge economy already accounts for the country's third-largest export sector, yet it retains considerable room for further growth. The nation has produced more than 11 unicorns (startups with a valuation over $1 billion), and an estimated 95 percent of knowledge-based services are exported—primarily to the United States, Europe, and Asia. This underscores both the global competitiveness of Argentina's digital and innovation-driven industries and the strategic importance of policies that can expand their scale and sophistication.[56]

Argentina's investment in research and development remains low by international standards, averaging just 0.54 percent of GDP. Since 2017, public funding for R&D in universities has been steadily declining, further constraining the country's capacity to generate innovation and strengthen its knowledge economy.[57]

In addition, patent production by universities in Argentina remains very low. A key setback was the introduction of the Pautas de Examen de Patentabilidad in 2012, which made it more difficult to register patents and disproportionately affected innovation-intensive sectors such as biotechnology. This regulatory barrier has further constrained the country's ability to translate research into commercial applications and weakened the link between universities and industry.[58] Moreover, Argentina has not signed the Patent Cooperation Treaty (PCT), which allows inventors to seek patent protection across multiple jurisdictions through a single international application.

These gaps in R&D investment and intellectual property policy hinder Argentina's ability to commercialize research, attract foreign investment, and position itself as a competitive player in global innovation networks.[59] Efforts to modernize Argentina's intellectual property regime have faced pushback from local pharmaceutical companies that benefit from restrictive patentability standards. It is therefore essential that the Ministry of Deregulation and Efficiency review and update local criteria for patent approval to align with global best practices. Equally important is strengthening the role of universities in the innovation ecosystem. A system that ties university funding more closely to patent production and industry collaboration would encourage greater commercialization of research. Expanding international research partnerships, particularly in sectors where multinational firms could establish operations in Argentina, would further enhance technology transfer, attract investment, and integrate the country more deeply into global innovation networks.

Argentina's patent production is hindered by the Pautas de Examen de Patentabilidad, which makes it more difficult to register patents and disproportionately affected innovation-intensive sectors.

Argentina's innovation ecosystem also requires diversification of funding sources and stronger institutional linkages. For decades, the military has faced chronic underinvestment. Yet, strategic engagement in research and joint projects with universities, alongside greater collaboration with international partners, could provide an important channel for advancing dual-use technologies and innovation spillovers, even under current fiscal constraints.

Finally, Argentina's VC market remains highly concentrated in just a few regions, limiting opportunities for entrepreneurs nationwide. Expanding VC availability will require targeted policies, such as tax incentives for firms that invest in local venture capital funds. Such measures could help scale startups with regional and global connections, positioning them to join Latin America's growing network of high-growth companies and complement Argentina's existing knowledge economy strengths. A pro-business agenda should enable companies to invest more effectively in the skills of their employees, including greater flexibility to transfer stock as part of compensation through Employee Stock Purchase Plans (ESPPs) administered via payroll deductions. At the same time, if Argentina seeks to expand its workforce in critical industries, it must improve access to the limited number of firms currently offering high-quality training opportunities. Internships represent an important pathway, yet the existing framework—established under Law No. 26,427 and its Regulatory Joint Resolutions No. 825/2009 and No. 338/2009—is highly restrictive. The law discourages participation by imposing rigid quotas that penalize larger companies, ultimately reducing the supply of opportunities for students and limiting the development of industry-ready talent.

Brazil

Knowledge Economy

The analysis of the knowledge economy component reveals significant disparities among Brazilian states, particularly regarding the development of qualified human capital and integration into knowledge-intensive activities. The Federal District, São Paulo, Santa Catarina, and Minas Gerais lead in indicators such as a highly educated population and employment in professional, technical, and scientific roles. Conversely, states in the North and Northeast—such as Maranhão, Pará, and Alagoas—show substantially lower levels, reflecting structural challenges in education, employability, and technological capability.

To address these gaps and enhance knowledge-based competitiveness, a comprehensive strategy is essential. This includes prioritizing investment in higher education and technical training, especially in STEM; fostering partnerships between universities and industry; and implementing mechanisms to retain local talent. These efforts should be accompanied by incentives for innovation in strategic sectors, thereby fostering the development of knowledge-based local ecosystems.

Globalization

In the globalization component, there is a clear asymmetry across states in terms of international integration and capacity to attract FDI. While Amazonas, Minas Gerais, and São Paulo report higher FDI levels, most other states—especially those in the North and Northeast—remain marginal players. High-tech exports are similarly limited, with only a few isolated exceptions.

Digital connectivity, as measured by broadband adoption, shows moderate progress in Southern and Southeastern states such as Santa Catarina and Paraná, but still requires substantial expansion in more remote regions. To promote more equitable and effective global integration, a national strategy is recommended. This strategy should include incentives for high-tech exports, the universalization of broadband, the creation of special economic zones, the strengthening of Regional Investment Promotion Agencies (RIPAs), and the improvement of subnational business environments. These actions must be supported with federal, state, and municipal coordination to ensure alignment and cooperation between public and private efforts.

Innovation Capacity

The innovation capacity component reveals a landscape of both challenges and opportunities across Brazilian states. While progress has been made in business creation—particularly in the Federal District, Santa Catarina, and Goiás—indicators such as venture capital, broadband access, R&D personnel, patent applications, and carbon efficiency still reveal significant regional disparities.

R&D intensity remains uniformly low across the country, highlighting the urgent need for tailored policies to stimulate local innovation. Furthermore, the volume of venture capital is still critically limited, even in more developed centers such as São Paulo, which restricts the growth potential of innovative startups.

R&D intensity and VC investment remain uniformly low across Brazil, highlighting the urgent need for tailored policies to stimulate local innovation.

To strengthen national innovation capacity, a cohesive set of actions is recommended, including enhanced scientific and technological infrastructure, increased investment in applied research, promotion of intellectual property culture and protection, expansion of startup incubation and acceleration programs in underserved regions, and development of regional seed and venture capital funds. Sustainability practice—especially in agribusiness, mining, and the Amazon region—must also be central to Brazil's innovation agenda, ensuring responsible and inclusive growth.

Chile

A key consideration is that Chile is a unitary country, so it is still difficult to obtain disaggregated data by region. Different administrations have sought to decentralize the country while maintaining a unitary regime. The first essential step for this is to have statistics and data disaggregated at the regional level to know the conditions and particularities of each one of them.

Total factor productivity has remained stagnant for almost two decades, and since 2020 has decreased about 0.9 percent annually. Moreover, labor productivity has grown slowly in the last decade, with an average of 0.9 percent annually, after having grown at about 2.5 percent annually between 1990 and 2013. Low economic growth has also limited progress in productivity and innovation.

Knowledge Economy

Although the proportion of workers with a bachelor's degree is similar to that of OECD countries, the proportion with a master's degree or a doctorate is much lower than that observed at the international level, which means that, in the aggregate, Chile is far behind those countries in terms of advanced human capital.

In addition, there is a gap in the quality of education at all levels of training and job skills. The 2022 Programme for International Student Assessment (PISA) test (which measures the abilities of 15-year-old students to face real-life challenges) shows a relative gap of 60 points (472 OECD vs. 412 Chile) in mathematics, 28 points in reading comprehension (476 OECD vs. 448 Chile), and 41 points in science (485 OECD vs. 444 Chile) compared with the OECD average. Meanwhile, the Program for the International Assessment of Adult Competencies (PIAAC, which measures the cognitive competencies of the adult population linked to work performance) shows a gap of 42 points in reading comprehension (260 OECD vs. 218 Chile), and 49 (263 OECD vs. 214 Chile) in mathematics.

Chile needs to adopt an aggressive policy of job training and retraining in the short term. In particular, the job training system needs to be reformed, as it has not delivered the expected results. A reformed job training system must be integrated with formal education and provide flexibility, allowing workers to validate their learning and facilitate the continuation of studies in professional institutes and universities.

Chile has 35 Economic-Trade Agreements with 65 economies around the world, representing more than 88 percent of the world's GDP.

Similarly, the proportion of immigrants with higher education is relatively low. Chile has faced significant migration flows in recent years, and these new waves of migration, unlike previous ones, have lower levels of schooling. New migrants are typically employed in low-skill jobs. Thus, the adult immigrant population with higher education is less than 3 percent of the population, while the migrant population amounts to 10.5 percent.

Given the relevance and high levels of migration in recent years, progress should be made in eliminating restrictions on the hiring of foreign labor, which currently has a limit of 15 percent of the payroll. This could also help knowledge-intensive sectors attract foreign workers and enable local workers to learn from them.

Globalization

Chile has the network of Economic-Trade Agreements with the greatest access to the world's GDP, according to the OECD. In this regard, Chile has 35 Economic-Trade Agreements with 65 economies around the world, representing more than 88 percent of the world's GDP.[60] Most recently, Chile joined the Comprehensive and Progressive Agreement for Trans-Pacific

Partnership (CPTPP) in 2022. As of 2024, the total amount traded with this bloc is the highest in Chile's entire network of multilateral agreements with the world.[61] For the time being, what remains is to continue deepening trade relations between Chile and the world. For example, negotiations are currently underway to modernize the free trade agreement with South Korea to liberalize tariffs on Chilean products such as beef and certain fruits and vegetables. Chile has forged (but should expand) the partial scope agreement with India, which considers the extension of tariff preferences and regulatory considerations, among other aspects.

Chile's corporate tax rate of 27 percent is above the OECD and world average (24 percent), which disincentivizes FDI inflows. Another latent problem that has slowed down investment in the country is the worsening of "permitting," which consists of the excessive amount of paperwork required for the development of investment and infrastructure projects and the long delay in their approval. Although several bills are currently being discussed in Parliament, they are not enough to comprehensively address the problem and generate significant change. Therefore, progress must be made in reformulating the permitting system to reduce the processing times for environmental and sectoral permits effectively.

In addition, consideration should be given to establishing new special incentive mechanisms for technology companies or innovation companies that set up in Chile.

Innovation Capacity

Chile has made great progress in broadband coverage and currently maintains high broadband coverage and adoption. Aggregate data from the beginning of 2024 shows that 94.3 percent of Chilean households have Internet access.[62] The task is to continue expanding these connections to rural areas of the country.

Current R&D spending amounts to 0.3 percent of GDP. Developed countries—which are important producers of natural resources—such as Australia, Canada, and New Zealand, invest 1.8 percent, 1.6 percent, and 1.5 percent of their GDP on R&D, respectively. Similarly, these countries have between 4,500 and 5,000 workers performing some form of R&D per million inhabitants, while in Chile, there are only about 500 people per million inhabitants. Chile should move toward such levels of public and private spending and researchers dedicated to R&D. Different administrations have proposed to move toward an expenditure of 1 percent of GDP; however, this has not yet materialized. In a way, there is inertia in spending and the number of researchers, so to achieve this, it would be necessary to adopt measures to change the incentives of economic agents, which has not happened.

Current R&D investment in Chile is 0.3 percent of GDP, while other natural-resource-based developed economies invest up to 1.8 percent of GDP.

In addition, it is necessary to foster greater competition in the markets so that companies, especially leading companies, are compelled to innovate in order to remain competitive.

It is also necessary to adapt the Chilean institutions that encourage development and provide VC financing. The Chilean economic development agency, CORFO (Corporación de Fomento de la Producción), should become a more technical and autonomous body, allowing Chile to deepen the VC market, with a long-term strategic vision.

Colombia

Knowledge Economy

In Colombia, highly skilled labor remains concentrated in the main cities of the Andean region, and parts of the Caribbean and Pacific regions. The development of capabilities in other areas of the country remains limited, which might lead to widening regional disparities. This issue is closely related to low levels of tertiary education coverage throughout the country. Addressing this requires public policies that increase education investment beyond major urban centers and promote advanced training in STEM, applied sciences, and digital skills.

Strengthening a knowledge-based workforce demands expanded access to this type of training in traditionally underserved areas, along with effective decentralization of qualified human capital as a means for building a more-competitive, equitable, and technologically prepared economy.

Moreover, low labor productivity continues to be a critical barrier to competitive economic growth. In this context, accelerating digitalization across the public and private sectors is essential, not only to strengthen the ICT ecosystem but also to improve the efficiency of all economic sectors through digitization, as well as the adoption of emerging technologies such as AI, automation, robotics, the Internet of Things (IoT), and advanced data analytics.

Globalization

Colombia faces structural challenges in transitioning from an economy primarily based on raw material exports, typically with low added value, toward one focused on the production and export of technology-intensive goods and services. In this context, it is a priority to advance in the formulation and implementation of national policies that foster the development and adoption of digital technologies in all regions of Colombia, while promoting the implementation of emerging technologies such as AI.

According to the Central Bank of Colombia (Banco de la República), FDI contracted by 17 percent in 2024 compared to 2022. This decline underscores the urgent need to strengthen the country's business environment. It is essential to ensure legal certainty, regulatory stability, and coherence in public policy, which are key factors in attracting foreign investment in strategic sectors such as telecommunications, data infrastructure, and AI.

Challenges stemming from ambiguous public policies and increasing regulatory uncertainty have weakened foreign capital inflows in Colombia. FDI contracted by 17 percent from 2022 to 2024.

Moreover, challenges stemming from ambiguous public policies and increasing regulatory uncertainty have further weakened foreign capital inflows and hindered the development of a robust information and communication technologies (ICT) sector. Overcoming these obstacles requires a modern, transparent, and predictable regulatory framework, developed in coordination with stakeholders across the productive and technological ecosystem, to build trust and support long-term investment.

Innovation Capacity

Although Colombia has made some progress in recent years, significant challenges remain in strengthening its innovation capacity. A central priority must be the expansion and modernization of the country's connectivity infrastructure, including continued efforts to deploy mobile, fixed, and satellite networks, as well as serving rural and remote areas.

Accelerating the deployment of 5G technology is crucial because it acts as a vital driver of digital transformation in both the public and private sectors. Furthermore, public investment is necessary to boost the creation of new businesses, support patent development, and encourage technology transfer across various industries.

Furthermore, as Colombia advances its digital transformation agenda, it must incorporate environmental sustainability into its strategy. The energy demands of emerging technologies highlight the importance of pursuing structured and carefully planned decarbonization efforts. Improving the carbon efficiency of digital infrastructure and aligning energy policy with innovation objectives will be essential for creating a sustainable and resilient technological system transition.

Mexico

Knowledge Economy

Mexico needs to strengthen its education system to include, across all levels, the teaching of knowledge and skills aligned with the macrotrends shaping the future of workforce dynamics, such as AI, information processing, robotics, and automation. This requires teacher training and curriculum design investments so the system can anticipate and adapt rapidly to the fastest-growing jobs, such as big data specialists, fintech engineers, and software and application developers, while fostering enduring foundational skills. Also, the growing need for climate change mitigation and adaptation further underscores the importance of developing professionals with green skills. Embedding sustainability into skill development and industrial growth will position Mexico as a competitive, knowledge-based economy and a responsible global actor in addressing environmental challenges.

Besides enhancing the education system, Mexico must advance reforms that promote skill development through a Triple Helix approach—fostering collaboration between government, the private sector, and academia—while adapting this strategy to regional contexts. Persistent disparities in educational attainment and industrial specialization between the north, center, and south of the country require targeted regional innovation strategies. These strategies should identify and build upon each state's comparative advantages by mapping local educational resources and industrial networks. Therefore, aligning these insights with labor market demands, government action, and existing infrastructure will enable the creation of locally relevant skill-development programs that address regional gaps and leverage unique strengths.

The recommendation made in the 2023 LASICI report to pair technical expertise with soft skills in workforce development remains highly relevant, as labor market demands have not shifted. Employers continue to seek professionals who combine technical proficiency with adaptability, communication, and problem-solving. Expanding dual education models—through partnerships between academia and industry—offers a proven path to align classroom learning with real-world experience, ensuring that graduates are technically capable and workplace-ready.

Similarly, strengthening Mexico's entrepreneurial ecosystem remains essential. Barriers persist: access to financing is limited, bureaucratic procedures are cumbersome, and protections for tax compliance and intellectual property remain weak. Revitalizing public programs to address these gaps would stimulate high-value business creation, foster innovation, and expand participation in global markets—bringing Mexico closer to becoming a resilient, knowledge-based economy.

Finally, migration trends reveal continuity with 2023 findings: Mexico receives a steady inflow of high-skilled migrants—primarily professionals, academics, scientists, and researchers—from the United States, Spain, Colombia, Argentina, and Venezuela.[63] This is occurring alongside restrictive U.S. migration policies that are curbing Mexican outflows. These dynamics pose opportunities and challenges for Mexico's labor market absorption capacity. Mexico should design a comprehensive strategy to integrate high-skilled migrants into its economy. This could include establishing processes to recognize and validate foreign academic or technical credentials, enabling their expertise to benefit priority workforce sectors. Additionally, targeted language training, cultural adaptation initiatives, and professional networking programs would facilitate smoother integration and maximize the contributions of skilled migrants.

Globalization

Rising trade tensions and the prospect of persistent U.S. tariffs are reshaping Mexico's global economic position. Given the country's deep integration with the U.S. economy—Mexico was the United States' largest trading partner in 2024, with bilateral trade exceeding $510 billion—any change in tariff regimes has direct implications for the economy, supply chains, and investments.[64] The convergence of U.S. tariff decisions with the scheduled review of the USMCA at the end of 2025 has amplified uncertainty, creating a more adverse climate for exporters and foreign investors. This places Mexico at a critical juncture in defining its trade strategy and negotiating stance.

While northern and central states such as Nuevo León, Chihuahua, Baja California, Coahuila, Guanajuato, and Querétaro have long been integrated into export-oriented manufacturing and benefited from regional value chains, the challenge remains to extend these advantages to southern states such as Oaxaca, Chiapas, and Guerrero. Achieving this requires deliberate policy action to reduce structural disparities and enhance competitiveness. Strategic investments in highways, railways, intermodal terminals, and port facilities would physically connect the south with the country's principal economic hubs, reducing logistics costs and facilitating participation in North American value chains. These improvements can be improved by leveraging USMCA provisions on trade facilitation, customs modernization, and technical cooperation.

Energy security is equally essential for attracting industry to the south. Expanding renewable generation capacity would reduce production costs and align with Mexico's sustainability commitments. This positions the region as a competitive destination for agro-processing, textiles, automotive components, and clean technology manufacturing. However, tariff volatility underscores the need for Mexico to pursue diversification beyond North America simultaneously.[65] Strengthening trade and investment ties with the Asia-Pacific, Europe, and South America and targeted FDI promotion in underdeveloped regions can mitigate overdependence on the U.S. market.

Innovation Capacity

In the face of growing uncertainty caused by U.S. tariffs, Mexico can leverage innovation as a core pillar of its economic strategy. Rather than solely focusing on reactive trade measures, public policy should integrate a forward-looking innovation agenda that enhances resilience and competitiveness across sectors.

The federal government's recent announcement of 11 economic hubs—designed to stimulate investment and promote well-being through tax incentives—presents a strategic entry point.[66] These hubs should be explicitly structured to support innovation ecosystems. Enhanced incentives should be offered to firms implementing clean energy and sustainable technologies in high-emission states such as Campeche, Tamaulipas, and Guanajuato.

To maximize impact, these economic hubs should host dedicated innovation clusters. Concentrating talent, infrastructure, and investment in these zones fosters collaboration between researchers, engineers, and entrepreneurs. The co-location of financial incentives and innovation support services accelerates the transition of research and development outputs into commercially viable products, strengthening the region's positioning as a business-friendly destination and a center of technological leadership.

Recent reforms to Mexico's intellectual property framework add another critical support layer. The Mexican Institute of Industrial Property (IMPI) has introduced accelerated patent procedures to reduce processing times from an average of 4.3 years to 3 years or fewer, aligning with international standards.[67] Ongoing modifications to the Federal Law on Industrial Property aim to provide provisional patents, strengthen inventors' rights, and establish direct economic incentives for patenting in public research institutions. These measures could benefit large exporters and strengthen domestic industries in strategic fields such as semiconductors and pharmaceuticals.

The Mexican government's recent announcement of 11 economic hubs—designed to stimulate investment and promote well-being through tax incentives—should be explicitly structured to support innovation ecosystems, fostering collaboration between researchers, engineers, and entrepreneurs.

To close Mexico's persistent gap in technology transfer, innovation policy should directly link patenting reforms with mechanisms that ensure inventions reach the market. This requires strengthening connections with universities and research centers and expanding public-private partnership models for commercialization. In this way, future advances in intellectual property legislation can catalyze innovation-led growth across strategic industries.

Peru

Knowledge Economy

One of the structural challenges that continues to hinder Peru's ability to consolidate a solid innovation ecosystem is the limited availability of highly qualified human capital in its workforce, which continues to restrict its performance in the dimension of the knowledge economy. These gaps originate from very early ages, with high levels of anemia and malnutrition among children under five years of age, and persist throughout the school years, where performance in reading comprehension and mathematics remains insufficient. Added to this is the high socioeconomic segregation in the education system. According to PISA 2022, Peru's segregation index is among the highest in the region, reflecting low social mobility: students' socioeconomic backgrounds significantly condition their academic and professional development opportunities, limiting the emergence of a broad and diverse talent base capable of contributing to innovation.[68] Additionally, a growing problem is the high number of young people who neither study nor work—so-called "ninis" in Spanish—which represents a significant loss of productive potential and reduces the pool of human capital available for higher value-added activities and knowledge generation.

From a structural perspective, addressing these challenges requires effective policies for the comprehensive development of early childhood and the sustained improvement of educational quality, as well as reducing heterogeneity in the quality of technical and university education, narrowing the gaps between Lima and the provinces and between public and private institutions.[69] Key actions include promoting technical education in the final years of secondary education, strengthening the accreditation processes of higher education institutions. These institutionalizing mechanisms progressively reduce the gap between training supply and labor demand, including greater coordination with the productive sector through modalities such as dual training and internships, fostering the development of digital and transversal skills, and expanding financing solutions such as scholarships and student loans, prioritizing strategic sectors.[70]

On the other hand, in recent years, there has been an intensification of emigration, reflecting that the Peruvian labor market and development conditions do not provide the necessary opportunities. At the same time, Peru has not fully capitalized on the migration inflows, as a significant number of Venezuelan migrants are highly qualified professionals who could help close training gaps in strategic sectors. This dual dynamic—the loss of national talent and the underutilization of foreign talent—is a warning sign, as it implies the loss or underutilization of capacities that could enhance innovation, knowledge transfer, and the development of higher-value-added sectors.

According to PISA 2022, Peru's segregation index is among the highest in the region, meaning students' socioeconomic backgrounds significantly condition their academic and professional development opportunities.

To address this issue, it is essential to implement policies that strengthen the retention of national talent and the better utilization of foreign talent. This includes enhancing opportunities for specialization and professional development, providing competitive working conditions, recognizing degrees and certifications, and promoting linkage programs between migrant professionals and strategic productive sectors. Likewise, measures such as streamlining work permit procedures and adopting tax incentives for non-residents can encourage the attraction of foreign or repatriated professionals, within the framework of inter-institutional agreements involving academia, and the public and private sectors.

Other obstacles that continue to affect the development of a robust, innovative ecosystem are the high level of informality in the labor force and lack of safety. Informality reflects productivity gaps in the labor force and the lack of competitiveness, limiting investments to train the workforce and accelerate innovation. Therefore, in addition to reinforcing human capital formation, it is essential to promote a more favorable legal and institutional environment for the creation of formal jobs, implement active labor policies that promote youth labor insertion and training, and address productive heterogeneity by facilitating the adoption of technologies, particularly in small and medium-sized enterprises.

Crime and the increase of illegal economies create resource allocation problems with a negative impact on private investment and productivity. For example, both firms and households need to allocate a higher share of their budget to safety. Additionally, the country's higher presence of illegal economies, particularly in politics, expands the scope of clientelism and corruption, resulting in detrimental microeconomic and sectoral policies. In this context, the country requires significant efforts to combat insecurity and reduce (or eliminate) the penetration of illicit markets, thereby creating more space for innovative private decisions and public policies.

Globalization

In recent decades, Peru has been characterized by opening its economy and attracting FDI. However, to reinforce the globalization pillar, it is necessary to deepen these strategies so that they promote export diversification and the expansion of high-value-added exports. In this sense, regarding the exportable supply, transversal policies (e.g., market opening, compliance with international standards), sectoral policies (e.g., public-private coordination spaces, promotion of strategic sectors with special labor and tax regimes), and specific policies—such as gaining efficiencies in logistics services, administrative simplification, and digitization—become a relevant need.[71] Likewise, it is important to reinforce the role of the investment promotion agency to expand investment in areas of science, innovation, technology, and development;. This should be complemented with measures to improve the business environment in the country, namely: strengthen the regulatory framework, streamline bureaucratic processes, improve access to and quality of public services, and enhance operational efficiency.[72] Peru needs to resume its economic growth path through specific measures, such as institutionalizing regulatory quality and impact studies, and solving critical bureaucratic barriers in R&D sectors.[73]

Innovation Capacity

Peru's performance in terms of innovation outcomes (including patent applications) is quite modest. This occurs due to existing distortions in the research and development ecosystem, with disarticulation of innovation policies, insufficient capital, limited capabilities, and low participation of universities in commercializing research. Thus, it is necessary to advance in three priorities:

- Governance and institutional framework of the innovation system: Avoid the dispersion of initiatives based on an articulating approach between different actors and government levels. One of the important reforms that is under debate in Peru is the creation of the Science and Technology Ministry to overcome the problems mentioned, as well as the strengthening of the Productive, Innovation, and Technological Transfer Centers ("CITE").
- Increase the level of investment in R&D with a balanced participation of the various areas of knowledge in public financing.
- Promote the allocation of resources with an emphasis on strengthening science, technology, and innovation (STI) capacities.[74]

Efforts at two levels should also complement the above initiatives. On the one hand, promoting digitization and, second, the adoption of more environmentally friendly technologies. Internet connectivity in Peru is low in part due to infrastructure shortages; the government should promote the expansion of fiber optic networks, promote greater adoption of 4G and 5G technologies, and reinforce regulation.[75] Regarding green technologies, a priority aspect is to advance in the transformation of the country's energy matrix.

Furthermore, the country's digital maturity advances slowly. The government needs to foster the adoption of emerging technologies with a coordinated policy framework that incentivizes investment in digital infrastructure, promotes digital skills training aligned with labor market needs, and supports the development of innovation hubs specialized in AI and Industry 4.0. Enhancing cybersecurity, ensuring platform interoperability, and facilitating technology transfer through public–private partnerships will also be critical to boost productivity and stimulate high-value innovation.

United States

Knowledge Economy

Investment in R&D and education are the pillars from which the United States has become the most innovative and economically successful country in the world. However, these pillars are now under threat. President Trump has proposed a $12 billion cut to the budget of the Department of Education, significantly curtailing investment on programs geared toward making higher education more accessible.[76] The administration's proposed cuts to federal research funding, much of which is directed toward extramural research (research conducted outside of federal facilities), will impact funding for university research, an area in which U.S. investment has been stagnant over the past decade.[77] Rather than cutting these vital programs, policymakers must take a renewed interest in the downstream effects of education and research funding. Direct government support for advanced research in strategic areas, such as nuclear power or AI, would incentivize highly focused research at top institutions. Additionally, making a concerted effort to provide specialized research grants to states and universities that have fewer PhD candidates and have a smaller R&D workforce can attract innovative thinkers to locations that, so far, lack an innovative environment. University research has a clear and positive effect on economic growth, with the societal rate of return ranging from 30 to 100 percent, leading to more technical innovations, start-ups, and productivity growth.[78]

Currently, 49 percent of all STEM master's degrees and 57 percent of all STEM doctoral degrees in the United States are earned by international students, a large share of whom remain in the country after graduation and strengthen the U.S. skilled workforce.

Additionally, the United States should be streamlining the process of skilled immigration, making it easier for immigrants looking to pursue education and careers in STEM fields to move to the United States. Currently, 49 percent of all STEM master's degrees and 57 percent of all STEM doctoral degrees are earned by international students, a large share of whom remain in the United States after graduation.[79] Limiting the flow of skilled immigration into the United States will reduce the skilled workforce of the United States, impacting global competitiveness in advanced industries.

Globalization

Though President Trump's sweeping tariffs are designed to "bring manufacturing back" to the United States, the long-term impacts of Trump's tariffs are yet to be seen. While these policies have encouraged some technology firms to make investment announcements—although many of these are yet to be seen—they have also triggered both direct and indirect retaliation. Direct measures include reciprocal tariffs, such as those China threatened following President Trump's announcement of Liberation Day, which could choke the United States' critical mineral supply. Indirect responses are also emerging, such as countries recalibrating their trade networks to lower their dependence on the U.S. supply chain.[80] Additionally, the Trump administration is implementing distortive measures that increase the government's role in the market—such as taking a stake of 10 percent of the chipmaker Intel and requiring chipmakers AMD and Nvidia to pay a 15 percent tax on their sales to China—setting a dangerous precedent of state intervention.[81]

To overcome the uncertainty caused by these trade barriers, state policymakers should create policies that incentivize foreign and local investment in state-specific industries. For example, New York's Green CHIPS Act, which provided $10 billion in tax credits to firms opening semiconductor fabs in the state, was used to attract high-value, advanced manufacturing to the state of New York.[82] Similar programs can be undertaken in other states, focusing on industries in which a state is already specialized, such as biotechnology in Massachusetts, shipbuilding in Mississippi, or aerospace in Kansas and Oklahoma.

Innovation Capacity

The United States should implement several policies to bolster its innovation capacities and grow its advanced industry capabilities, first and foremost of which is ensuring research funding is not cut any further by the federal government. U.S. investment in research is already below that of comparable nations, ranking 11th out of 33 countries in federal R&D intensity, and with the cuts outlined by Trump's proposed budget for fiscal year 2026, that ranking is poised to fall to 21st.[83] Instead of cutting federal R&D, Congress should increase federal investment in university research and double the R&D tax credit from its current rate of 20 percent to 40 percent. Doing so would not only increase federal R&D but also attract investment from the private sector.

The United States should also protect its successful patent system, a cornerstone of the country's technological leadership. Some Trump administration officials have announced plans to change the current system by increasing revenue from patents to help cover the budget deficit. Two ideas have been examined. The first is taxing patents based on their values, which would result in an impossible-to-calculate task, disproportionately affect startups, and ultimately hamper innovation.[84] The second proposal is to impose fees on patents resulting from federal R&D grants to universities, which would reduce the incentives for university-industry collaborations and lead to fewer patents.[85]

U.S. investment in research is already below that of comparable nations, ranking 11th out of 33 countries in federal R&D intensity, and with the cuts outlined by Trump's proposed budget for fiscal year 2026, that ranking is poised to fall to 21st.

Most states have economic development programs that emphasize growth in advanced technology sectors, while the federal government has its own set of fragmented programs that incentivize economic development, including regional technology hub programs under the Economic Development Administration, the Department of Defense, the National Science Foundation (NSF), and the Small Business Administration, leading to a fragmented set of policies for state specific economic growth. Together, these programs invest in advanced industry promotion and innovation in 48 different states, with multiple "hubs" covering the same technology areas.[86] This fragmentation has been unsuccessful. Congress should instead empower NSF's Technology, Innovation, and Partnership (TIP) Directorate to be the leading coordinator over all these hub programs, ensuring that funding is allocated in a way that strategically targets states and industries that are poised for growth and investment, rather than casting a wide net of technology dispersion grants. Strategic investment in technology hub programs will also increase the amount of VC invested in each state. Although every state cannot create another Silicon Valley, each state has innovative industries it can capitalize on to attract capital investment.

Moreover, to empower the TIP program, Congress should fully fund it at the levels specified under the CHIPS and Science Act. Supplying the $20 billion appropriated in 2022 would ensure that federal R&D dollars are used on translational research with a high technology readiness level.[87]

CONCLUSION

As global trade barriers rise and political and economic uncertainty continue to spread, countries must craft policies that strengthen their resilience and competitiveness in the innovation economy. For Latin American nations, such efforts are critical to escaping the middle-income trap and remaining competitive in a fragmented global marketplace. Policymakers should pair national strategies with targeted, region-specific policy plans to address subnational challenges and to foster advanced manufacturing, nurture a skilled workforce, and develop competitive capabilities. These strategies include investment in STEM education, incentivizing R&D spending, ensuring a barrier-free patent system, and attracting high-skilled foreign professionals and foreign investment. This report has highlighted 13 different indicators that together help to measure subnational competitiveness in the innovation economy. By analyzing this index, policymakers can accrue suggestions on the specific policies they should pursue, with special attention to underdeveloped or lagging regions.

APPENDICES

Appendix A: Composite and Category Scores Methodology

For each indicator, regions' scores were converted to a standardized score, which was capped at ±3 to avoid an outlier performance on a single indicator from too heavily influencing the composite score. For composite and category scores, a weighted-average capped standardized score (WACSS) was calculated for each indicator, wherein the weights used are those listed in the table below (normalized such that an indicator's applied weight is equal to its listed weight divided by the sum of the listed weights—i.e., applied weights sum to one). For the composite score, this was calculated by including all indicator weights; for the category scores, this was done by including only the weights for the indicators that fall under that category. WACCS are rescaled to a 100-point scale via min-max normalization, in which the "maximum" parameter is the maximum WACCS plus one-quarter standard deviation of WACCS, and the "minimum" parameter is the minimum WACCS minus one-quarter standard deviation of WACCS.

Mathematically, the WACCS of region s is calculated as:

$$WACSS_s = \sum_i \omega_i CSS_{s,i}$$

wherein i denotes the indicator, $CSS_{s,i}$ denotes the capped standardized score for region s in indicator i, and ω_i is the applied weight of indicator i, defined as:

$$\omega_i = \frac{(listed\ weight)_i}{\sum_i (listed\ weight)_i}$$

such that:

$$\sum_i \omega_i = 1.$$

The scaled score for region/UT s is then calculated as:

$$Score_s = \frac{\left[WACSS_s - \left(min_{WACSS} - \frac{1}{4}\sigma_{WACSS}\right)\right]}{\left[\left(max_{WACSS} + \frac{1}{4}\sigma_{WACSS}\right) - \left(min_{WACSS} - \frac{1}{4}\sigma_{WACSS}\right)\right]} \cdot 100$$

Appendix B: Indicator Methodologies and Weights

Table A1: Indicator weights and descriptions

Indicator	Weight	Years	Description	Category
Broadband Adoption	0.75	2021–2024	Share of households subscribing to broadband Internet	Innovation Capacity
Business Creation	0.50	2017–2024	Enterprise birth rate in share of employer enterprises	Innovation Capacity
Carbon Efficiency	0.50	2018–2023	Metric tons of CO_2e emitted per $10,000 of PPP-adjusted GDP	Innovation Capacity
High-Tech Exports	0.75	2021–2024	Exports in NACIS codes 333–335 (or equivalent) as a share of GDP	Globalization
Highly Educated Population	1.00	2020–2024	Share of 25–64-year-old population with a bachelor’s degree (or equivalent) or higher	Knowledge Economy
Inward FDI	0.75	2018–2023	FDI inflow as a share of GDP	Globalization
Manufacturing Labor Productivity	1.25	2020–2024	PPP-adjusted GVA per worker in the manufacturing sector	Knowledge Economy
Patent Applications	1.25	2015–2024	PCT patent applications per million residents	Innovation Capacity
Professional, Technical, and Scientific Employment	1.25	2023–2024	Share of employees in professional, technical, and scientific activities sector	Knowledge Economy
R&D Intensity	1.50	2016–2024	R&D expenditures as a share of GDP	Innovation Capacity
R&D Personnel	1.50	2021–2024	R&D personnel as a share of total employees	Innovation Capacity
Skilled Immigration	0.50	2019–2022	Share of population that is foreign born and has at least some tertiary education (ISEC 5–8)	Knowledge Economy
Venture Capital Received	0.75	2021–2024	Venture capital investments received as a share of GDP	Innovation Capacity

Appendix C: Estimation Methodologies for Unavailable Data

Subnational-level data was not available for all indicators and countries. To bridge this gap, we used proxy indicators that are available on the subnational level, and we assumed that they correlate with the original indicator. For instance, if R&D intensity data is only available on a national level, a proxy was developed using university budgets on the subnational level. The share of university budgets per region was calculated and multiplied by the national R&D intensity to develop an estimate for R&D intensity at the subnational level. The national-level R&D intensity data ensures that the estimated regional high-tech export measures are in line with national performance.

For Argentina, this report built several proxies:

- High-Tech Exports was built using official data for industrial-based manufacturing, which is a broader term than NAICS codes 333–335.[88]
- Highly Educated Population was built using Census data for population over 14 years old, and proxied for the population within the 25–year–old range.[89] The share of the highly skilled population was used based on the share of graduates by province.
- Inward FDI was proxied using the Central Bank's 2024 data for FDI at the country level, broken down by sector.[90] Then, using the Ministry of Economy's sectoral data by province and Argendata's GDP data by province, FDI was weighted based on the sector's share within a province and the province's share relative to the total economy.[91]
- Patent Applications indicator was proxied using WIPO's total patents for Argentina, and the provincial disaggregation was estimated based on patents at the university level.[92]
- Professional, Technical, and Scientific Employment data was available based on CIUU rev.3 sectors, so the CIUU codes were proxied to fit into the NAICS categories covered in this indicator.[93]
- R&D Intensity was proxied based on the total GERD for Argentina, and disaggregated at the provincial level based on the proportion of federal funds for universities.[94]
- R&D Personnel was built using official science and technology indicators for total R&D employees at the national level, and the share of total R&D personnel expenditure among enterprises at the subnational level.[95]
- Skilled Immigration was proxied using the national average of the migrant population's education level.[96]
- Venture Capital Received indicator was built using the 2024 Annual Report of Investments and Capital Markets in Argentina; as Buenos Aires and CABA appear as a single unit, the aggregated data was split in half for each.[97]

Additionally, Inward FDI was proxied for Peru and Colombia. The indicator was proxied for Peru using FDI by activity type (InvestPeru data) and GDP by sector and department (INEI data). FDI activities were proxied by economic sector, and FDI by department was calculated by weighting the department's sector intensity relative to the sector's FDI share.[98] The indicator was proxied in the same way for Colombia using FDI by activity type (OECD data) and GDP by sector and department (OECD Regions and Cities database).[99]

These estimations allow for capturing parts of the innovation competitiveness metrics of regions despite the unavailability of the exact original indicator.

Subnational data or proxy data was not available for Argentina for the manufacturing labor productivity and broadband adoption indicator, Brazil for the R&D intensity indicator, for Chile for the high-tech exports indicator, and for Colombia for the highly educated population indicator.

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The Global Trade and Innovation Policy Alliance (GTIPA) is a global network of independent think tanks that are ardent supporters of greater global trade liberalization and integration, deplore trade-distorting "innovation mercantilist" practices, but yet believe that governments can and should play important and proactive roles in spurring greater innovation and productivity in their enterprises and economies. Visit gtipa.org.

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