

Knowledge Economy Index (KEI) 2008 Rankings

The World Bank's [Knowledge Assessment Methodology](http://www.worldbank.org/kam) (KAM: www.worldbank.org/kam) produces the [Knowledge Economy Index \(KEI\)](#) -- an aggregate index representing the overall preparedness of a country or region towards the Knowledge Economy (KE). The KEI is constructed as the simple average of 4 sub-indexes, which represent the following 4 pillars of the knowledge economy¹:

- Economic Incentive and Institutional Regime (EIR)
- Education and Training
- Innovation and Technological Adoption
- Information and Communications Technologies (ICT) Infrastructure

The EIR provides incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship. An educated and appropriately trained population can create, share, and use knowledge well. An efficient innovation system of firms, research centers, universities, think tanks, consultants, and other organizations can tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology. A modern and accessible ICT infrastructure can facilitate the effective communication, dissemination, and processing of information.

Denmark – the most advanced knowledge economy

This year, Denmark retains its leading position as the world's most advanced knowledge economy. With a 2008 KEI of 9.58, it ranked 1st place as it did in 1995. *Table 1* presents the rankings for 140 countries based on the Knowledge Economy Index (KEI) 2008. Although its KEI ranking remains the same, Denmark saw measurable improvement in the education and EIR pillars: the education pillar index rising from 9.61 ranking 9th in 1995 to 9.80 to rank 1st in 2008, and the EIR pillar index growing from 9.57 ranking 3rd in 1995 to 9.66 second only to Singapore in 2008. However its performance in the ICT pillar fell from the 5th position in 1995 to the 6th, and the innovation pillar remained at 4th place compared with 1995 rankings.

The improvement in the education pillar is largely attributed to its increase in tertiary enrollment rates. Its tertiary enrollment rate rose from 48.17 (normalized score 9.28) to 79.94 (normalized score 9.53). Despite large improvements in telephone, computer and internet penetration, the normalized scores of all three ICT variables fell, especially that for Internet penetration, which fell from 9.43 in 1995 to the most recent of 9.07. The abatement of Denmark's ICT pillar reflects that other countries have made even larger improvements in their ICT infrastructure over the same time period.

¹ Each of the pillar sub-indexes are in turn based on three indicators that proxy the performance of the pillar. For details, please refer to the [KAM Users Guide](#).

Table 1
Knowledge Economy Index (KEI) 2008 Rankings

Country	2008 Rank	KEI 2008	1995 Rank	change from 1995	Country	2008 Rank	KEI 2008	1995 Rank	change from 1995
Denmark	1	9.58	1	0	Tunisia	71	4.73	86	15
Sweden	2	9.52	6	4	Panama	72	4.69	51	-21
Finland	3	9.37	2	-1	Georgia	73	4.69	70	-3
Netherlands	4	9.32	4	0	Peru	74	4.64	73	-1
Norway	5	9.27	5	0	Mongolia	75	4.5	95	20
Canada	6	9.21	10	4	Colombia	76	4.42	67	-9
Switzerland	7	9.15	7	0	China	77	4.35	97	20
United Kingdom	8	9.09	8	0	Guyana	78	4.31	59	-19
United States	9	9.08	3	-6	Philippines	79	4.25	71	-8
Australia	10	9.05	11	1	Venezuela, RB	80	4.23	65	-15
Ireland	11	8.92	15	4	Namibia	81	4.19	81	0
Austria	12	8.89	12	0	Sri Lanka	82	4.16	91	9
Iceland	13	8.88	21	8	Albania	83	4.04	93	10
Germany	14	8.87	13	-1	Egypt, Arab Rep.	84	4.03	83	-1
New Zealand	15	8.87	9	-6	Botswana	85	3.96	78	-7
Belgium	16	8.73	14	-2	Dominican Republic	86	3.92	100	14
Taiwan, China	17	8.69	24	7	El Salvador	87	3.91	85	-2
Luxembourg	18	8.65	18	0	Azerbaijan	88	3.81	87	-1
Japan	19	8.56	17	-2	Kyrgyz Rep.	89	3.74	88	-1
France	20	8.47	16	-4	Paraguay	90	3.62	82	-8
Estonia	21	8.34	29	8	Ecuador	91	3.46	79	-12
Slovenia	22	8.25	26	4	Morocco	92	3.45	92	0
Spain	23	8.24	22	-1	Bolivia	93	3.42	80	-13
Singapore	24	8.24	20	-4	Iran, Islamic Rep.	94	3.39	104	10
Israel	25	8.22	19	-6	Uzbekistan	95	3.28	89	-6
Hong Kong, China	26	8.2	23	-3	Algeria	96	3.25	108	12
Italy	27	7.86	25	-2	Cape Verde	97	3.24	94	-3
Hungary	28	7.85	33	5	Indonesia	98	3.23	96	-2
Czech Republic	29	7.83	31	2	Honduras	99	3.21	98	-1
Lithuania	30	7.68	44	14	India	100	3.12	105	5
Korea, Rep.	31	7.68	28	-3	Guatemala	101	3.11	107	6
Latvia	32	7.64	43	11	Vietnam	102	3.02	110	8
Cyprus	33	7.55	32	-1	Swaziland	103	2.93	84	-19
Portugal	34	7.52	27	-7	Syrian Arab Republic	104	2.9	106	2
Greece	35	7.38	30	-5	Nicaragua	105	2.87	102	-3
Poland	36	7.38	37	1	Kenya	106	2.82	113	7
Slovak Republic	37	7.33	34	-3	Tajikistan	107	2.79	99	-8
Barbados	38	7.25	40	2	Senegal	108	2.63	112	4
Croatia	39	7.19	45	6	Zimbabwe	109	2.51	101	-8
Chile	40	6.92	36	-4	Ghana	110	2.5	117	7
Bulgaria	41	6.8	39	-2	Uganda	111	2.46	122	11
United Arab Emirates	42	6.66	46	4	Madagascar	112	2.37	127	15
Romania	43	6.37	57	14	Mauritania	113	2.35	130	17
Uruguay	44	6.35	41	-3	Tanzania	114	2.28	123	9
Qatar	45	6.15	50	5	Pakistan	115	2.24	119	4
Dominica	46	6.07	n/a	n/a	Lesotho	116	2.15	111	-5
Costa Rica	47	6.06	38	-9	Benin	117	2.1	118	1
Malaysia	48	6.06	48	0	Nigeria	118	2.04	124	6
Bahrain	49	6.02	35	-14	Yemen, Rep.	119	1.8	129	10
Kuwait	50	6.01	52	2	Mali	120	1.78	125	5
Ukraine	51	5.8	54	3	Mozambique	121	1.71	132	11
Trinidad and Tobago	52	5.64	47	-5	Angola	122	1.7	137	15
Turkey	53	5.61	58	5	Cameroon	123	1.69	126	3
Brazil	54	5.57	64	10	Burkina Faso	124	1.64	128	4
South Africa	55	5.55	49	-6	Nepal	125	1.61	115	-10
Jordan	56	5.53	63	7	Malawi	126	1.55	120	-6
Armenia	57	5.51	75	18	Lao PDR	127	1.53	136	9
Argentina	58	5.49	42	-16	Bangladesh	128	1.49	133	5
Mexico	59	5.45	55	-4	Myanmar	129	1.48	131	2
Thailand	60	5.44	53	-7	Rwanda	130	1.34	139	9
Russian Federation	61	5.4	56	-5	Ethiopia	131	1.18	138	7
Oman	62	5.37	72	10	Djibouti	132	1.15	109	-23
Macedonia, FYR	63	5.33	68	5	Eritrea	133	1.07	121	-12
Mauritius	64	5.18	62	-2	Sierra Leone	134	0.91	134	0
Saudi Arabia	65	5.15	74	9	Bosnia and Herzegovina	n/a	n/a	90	n/a
Jamaica	66	5.04	60	-6	Serbia and Montenegro	n/a	n/a	69	n/a
Moldova	67	5.04	77	10	Haiti	n/a	n/a	114	n/a
Kazakhstan	68	5.01	76	8	Cote d'Ivoire	n/a	n/a	116	n/a
Belarus	69	4.93	61	-8	Sudan	n/a	n/a	135	n/a
Lebanon	70	4.86	66	-4	Zambia	n/a	n/a	103	n/a

Source: KAM 2008 (www.worldbank.org/kam)

Nordic Countries - The top 5 knowledge economies

The Nordic countries remain among the best performers in the KEI. Sweden is ranked 2nd, with Finland and Norway following closely at the 3rd and 5th places, respectively. The four KE pillars in these countries are all well developed in a balanced manner. These countries are characterized by their strong performance in the education pillar - all rank within the top 7 places, and to a lesser extent in the innovation and EIR pillars – all rank within the top 13 spots.

Compared to 1995, Sweden jumped from 6th place (KEI 9.48) to 2nd place (KEI 9.52) in 2008 due to improvement in the EIR, education and ICT pillars, while Finland fell by one position and Norway remained the same. In 2008, Finland ranked within the top 5 for the EIR, innovation and education pillars, but its ICT pillar ranked 21st due to a relatively weak showing in all 3 ICT variables. In contrast, Sweden, with continued strong improvements in telephone, computer and internet penetration, is ranked 1st on the ICT pillar. With its innovation pillar ranked at 13th, Norway is the only top 5 knowledge economy with an innovation pillar below the top 10 positions.

Table 2
KAM 2008 Knowledge Indexes
Top 10 and Selected High Income Economies

Country	KEI		Economic Incentive Regime Index		Innovation		Education		ICT	
	Rank	KEI	Rank	Index	Rank	Index	Rank	Index	Rank	Index
Denmark	1	9.58	2	9.66	4	9.57	1	9.8	6	9.28
Sweden	2	9.52	13	9.18	2	9.79	7	9.4	1	9.69
Finland	3	9.37	5	9.47	3	9.66	3	9.78	21	8.56
Netherlands	4	9.32	12	9.18	6	9.48	9	9.26	5	9.36
Norway	5	9.27	10	9.25	13	9.06	5	9.6	11	9.16
Canada	6	9.21	6	9.42	8	9.43	8	9.26	16	8.74
Switzerland	7	9.15	4	9.5	1	9.89	32	7.69	3	9.52
United Kingdom	8	9.09	9	9.28	11	9.18	15	8.54	4	9.38
United States	9	9.08	14	9.16	7	9.45	13	8.77	13	8.93
Australia	10	9.05	19	8.66	19	8.72	4	9.64	10	9.16
Iceland	13	8.88	16	8.92	28	7.98	6	9.44	9	9.18
Taiwan, China	17	8.69	24	8.35	10	9.24	30	7.91	8	9.26
Japan	19	8.56	34	7.71	12	9.15	14	8.71	19	8.66
Estonia	21	8.34	18	8.68	34	7.49	21	8.27	14	8.9
Korea, Rep	31	7.68	59	5.57	23	8.47	27	7.97	17	8.71

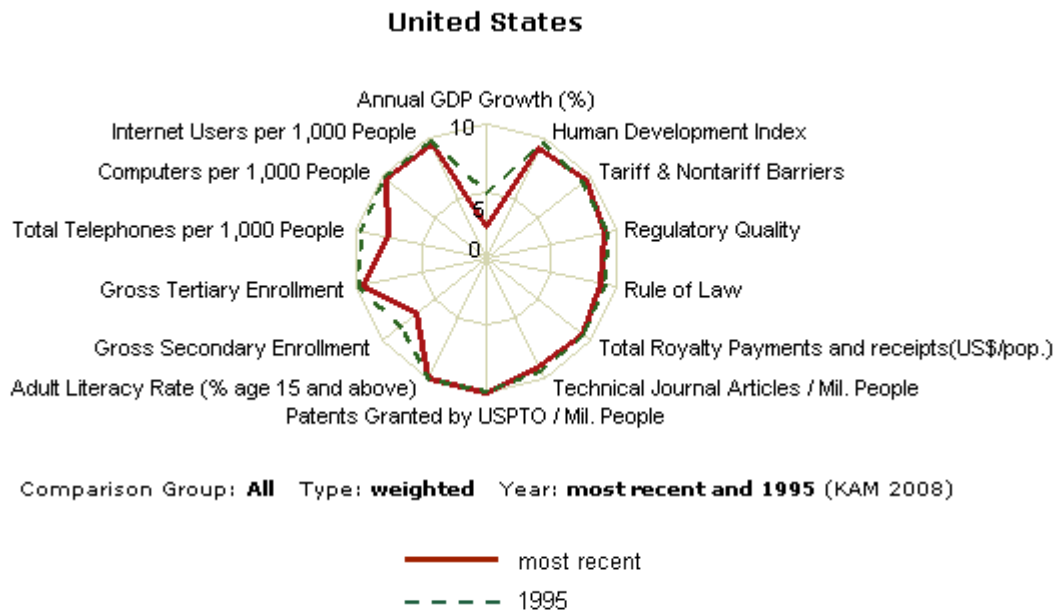
Source: KAM 2008 – reconstructed from “KEI and KI indexes” mode (www.worldbank.org/kam)

Performance of the United States and other Leading Knowledge Economies

The United States has seen its competitive position in terms of KEI eroded by weakening in all of the 4 pillar indices. Its KEI has fallen from 3rd place to the 9th position in the current 2008 rankings. It remains relatively strong in the innovation pillar (ranked 7th), which is buttressed by an exceptionally large number of USPTO patents (ranked 1st) and science & technical journal articles and high levels of royalty payments and receipts. With the exception of the innovation pillar, all other pillars currently rank below the top

10. The relative slower advancement of all 3 ICT indicators has led to the US falling from being number 1 in ICT in 1995 to the current ranking of 13. Similarly, the education pillar has exhibited a decline with the weakening of two education indicators, gross secondary and tertiary enrollment rates, leading to a fall of 1 position to rank 13th (Figure 1).

Figure 1
The United States as a Knowledge Economy
(1995 and most recent year)



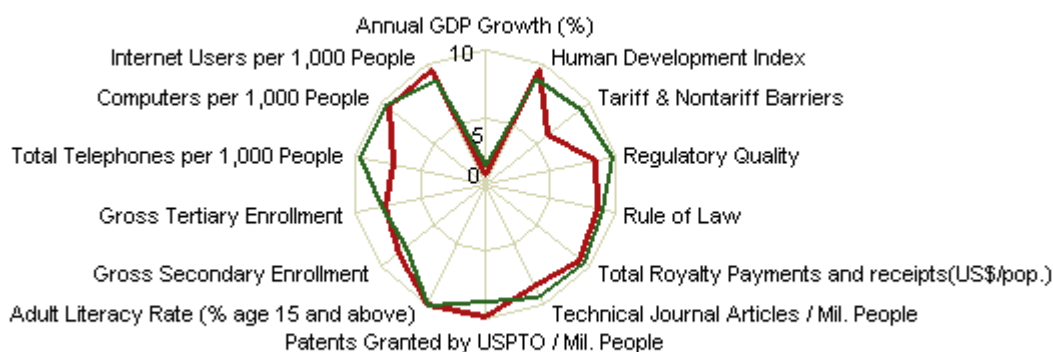
Note: All variables have been normalized to take values from 0 (least favorable) to 10 (most favorable).
Source: KAM 2008 – “Basic scorecard” mode (www.worldbank.org/kam)

Similarly, the KEI of Japan has weakened, falling 2 places to rank 19th. The EIR is Japan’s weakest pillar, with the sub-index dropping 10 notches from 1995 and being ranked 34th in 2008, predominantly due to high trade barriers. Japan’s strongest pillar, the innovation pillar, also saw a slight regress of 3 places to the 12th position in the 2008 rankings.

In contrast, the KEI ranking of United Kingdom remained unchanged at 8th place. The ICT pillar jumped 10 places to rank 4th, mainly contributable to the remarkable development in its telephone and computer penetration. The EIR continues to be the stronghold of the UK’s economy with the ranking at 9th place unchanged from 1995. Because of large regresses in the normalized values of gross secondary and tertiary enrollment rates (Figure 2), which fell respectively from 9.71 to 7.65 and 9.35 to 7.98, the UK’s education pillar index fell 9 places to the 15th position in 2008.

Figure 2
United Kingdom and Japan - Knowledge Economy Indicators
(Most recent year)

Japan, United Kingdom



Comparison Group: **All** Type: **weighted** Year: **most recent** (KAM 2008)

Note: All variables have been normalized to take values from 0 (least favorable) to 10 (most favorable).
 Source: KAM 2008 – “Basic scorecard” mode (www.worldbank.org/kam)

Estonia, a new high-income country, with advancement in all of four pillar indices, has risen from 29th place to 21st in the 2008 KEI rankings. The ICT registered the greatest progress among the four pillars, jumping 11 positions to the 14th place, mainly due to the increase in the number of users of telephones and computers. The EIR, bolstered by improvement in the rule of law and reduction of trade barriers, advanced 8 places to rank 18th. In addition, progress in all three variables of the innovation pillar has led to the increase of the ranking of the pillar by 6 positions to the 34th place.

Iceland has seen the greatest improvement in rankings among the top 20 countries in the current KEI, jumping 8 spots to the 13th place with KEI rising from 8.43 in 1995 to the current 8.88. It has made progress in the EIR and education pillars. The EIR pillar jumped a whopping 17 spots to the 16th position, mainly due to improvements in the regulatory quality and rule of law. In addition, improved gross secondary and tertiary enrollment rates have contributed to the progress in the education pillar, which advanced 11 spots to the 6th place.

With a KEI of 8.67 in 2008, Taiwan (China) is ranked 17th, a jump of 7 spots from 1995. It is highly competitive in the ICT and innovation pillars, ranking 8th and 10th respectively in the world. The other two pillars have also exhibited measurable growth: progress in tertiary enrollment rate has led to the rise of 3 positions for its education pillar; and greater advancement has been seen in the EIR mainly because of the progress in the reduction of trade barriers.

The Republic of Korea saw improvements in its innovation and ICT pillars, but these were more than offset by a weakening in the EIR and education pillars. Overall, this led to a fall in its KEI ranking of 3 positions to 31, which is below its fellow high-income Asian competitors – Hong Kong (China), Japan, Singapore, and Taiwan (China).

Transitioning Knowledge Economies: the BRICs

Table 3 presents selected middle and low income countries in terms of their performance on the KEI and the other KAM knowledge indexes. Brazil with a current KEI of 5.57, has moved up by 10 spots since 1995 to be ranked 54th. Its education pillar leaped an astounding 33 places, thanks to the strong growth of the gross secondary enrollment rate. The EIR is Brazil’s weakest pillar which is primarily due to relatively high trade barriers.

Table 3
KAM 2008 Knowledge Indexes –Selected Middle and Low Income Economies

Country	KEI Rank	KEI	EIR Rank	Economic Incentive Regime Index	Innovation Rank	Innovation Index	Education Rank	Education Index	ICT Rank	ICT Index
Hungary	28	7.85	23	8.39	26	8.14	33	7.62	40	7.25
Mexico	59	5.45	63	5.38	52	5.82	73	4.85	59	5.77
Ukraine	51	5.8	78	4.06	53	5.77	29	7.91	63	5.45
Tunisia	71	4.73	65	5.26	70	4.58	88	4.1	72	5
Kyrgyz Rep.	89	3.74	101	3.25	110	2.7	50	6.25	108	2.75
Senegal	108	2.63	77	4.07	105	2.77	123	0.92	109	2.75
Lao PDR	127	1.53	132	1.08	137	1.43	107	2.01	126	1.59
Serria Leone	134	0.91	134	0.87	131	1.7	129	0.67	140	0.39
BRICs										
Russian Federation	61	5.40	124	1.55	38	6.89	37	7.09	55	6.08
Brazil	54	5.57	73	4.30	49	6.07	54	5.84	54	6.08
China	77	4.35	80	4.01	64	5.12	87	4.11	84	4.16
India	100	3.12	91	3.67	81	3.97	105	2.26	112	2.59

Source: KAM 2008 – reconstructed from “KEI and KI indexes” mode (www.worldbank.org/kam)

Ranked at the 61st position for the KEI, Russia’s overall performance was primarily held back by its weakness in the EIR pillar, which, with a value of only 1.55, had slid 12 places to the 124th place. Weak performance of all three EIR variables reflects the all round non-conducive institutional environment for the knowledge economy. In terms of education, lower adult literacy and secondary enrollment rates has led to the pillar’s drop of 12 spots to the 37th place. Unlike the EIR and education pillar, the innovation pillar has registered sizable improvement, moving up 17 spots, mainly due to an increase in royalty payments and receipts.

India’s KEI has climbed up 5 spots to rank 100th in the 2008 KEI rankings. Because of growth in USPTO patents, India’s innovation pillar has leaped up 13 places to rank 81st. India’s EIR and education pillars have also registered slight improvement,

moving up 6 and 2 spots, respectively. On the other hand, India's ICT penetration has not been improving as rapidly, which has resulted in it falling 7 spots to 112th, compared to 1995.

With significant improvements in all four pillars, China has markedly improved in the past few years, jumping an impressive 20 spots to rank 77th in terms of the KEI, which is the largest progress (the same progress as Mongolia) in the KEI rankings among all countries since 1995. Among the pillars, ICT has made the largest improvement, which due to rapid increase in telephone, computer and Internet penetration, has jumped an astonishing 28 positions to rank 84th with the pillar index going from 2.74 to the current 4.16. Significant progress in the reduction of trade barriers has also led to a 21 spot climb for the EIR pillar to the 80th position in 2008.

Other Middle Income Economies

Hungary, ranked 28th with a 2008 KEI value of 7.85, kept its leading place in the upper middle-income group. While there was a small slide in its education and ICT rankings, Hungary's innovation and EIR pillar saw improvements, particular the latter, which raised 20 positions since 1995 to the 23rd place, predominantly due to the reduction of trade barriers.

Mexico, with some regress in the EIR, education and innovation pillars, slid 4 places to rank 59th. With exception of ICT pillar, which stayed at rank 59th, its overall competitive performance is dragged lower by the other three pillars. For instance, mostly due to the actual decline of royalty payments and receipts from 1995, the rank of the innovation pillar dropped from 43rd in 1995 to current rank 52nd.

Ukraine, with a KEI value of 5.80 that ranked 51st, occupies the first place among lower middle-income group countries. It draws its advantage mainly from its education pillar, ranked 29th, because of its strong performance in adult literacy and tertiary enrollment rates, the latter of which is the highest among the lower middle-income country group. Its EIR pillar moved up an impressive 30 places, mainly due to substantial improvement in the reduction of trade barriers.

Tunisia has been improving since 1995 with its KEI of 4.73 is ranked at 71st, up by 15 positions from 1995. All of its four pillars have progressed, of which EIR and innovation pillars jumped more than 10 places. Its large improvement in rule of law has led to the EIR pillar climbing 11 positions to be ranked at the 65th position. Similarly, strong performance in the publication of scientific and technical journal articles has contributed to the improvement of innovation pillar.

Low Income Economies

The Kyrgyz Republic, whose KEI is 3.74 ranked at 89, stands out as the second highest-ranking low-income country after Mongolia, and draws its greatest competitive advantages from the education pillar. This pillar ranks 50th, which is exceptional for a low-income country, and is due to relatively high adult literacy and tertiary enrollment rates.

Senegal, ranking at the 108th position for the KEI, has the EIR pillar as its strongest pillar. With relatively high regulatory quality and rule of law compared with other low-income countries, Senegal's EIR pillar is ranked 77th, an improvement of 28 spots since 1995.

Lao PDR, with improvements in all of the four pillars, has displayed large progress in its KEI ranking with an increase of 9 positions to rank at 127. Its strongest pillar- education pillar jumped 10 spots to the rank 107, mainly due to the increase of gross tertiary enrollment rate which has tripled since 1995.

Because of the weak showing in all four pillars, Sierra Leone unfortunately ranks as the weakest economy in terms of the KEI, which is at 0.91. Its weakest pillar, the ICT pillar, slid back 20 positions to rank the last one out of 140 countries. Similarly, the EIR pillar fell 8 spots to 134th position.

Economies with Large Improvements & Regressions

Among the 140 countries included in the KAM, Mongolia, along with China, saw the greatest improvement since 1995. With a KEI of 4.50, it climbed 20 positions to rank 75 becoming the most advanced knowledge economy among the low-income countries. Significant improvements made in adult literacy rate, gross secondary and tertiary enrollment rates has led to Mongolia's education pillar leaping an impressive 36 spots to rank 47th. In addition, the reduction of trade barriers and the advancement in regulatory quality have led to substantial strengthening of the EIR pillar. The ICT pillar moved up 20 positions, mainly due rapid increase in computer penetration (table 4).

Table 4
Improvements in KEI Rankings - Top 15 Countries

Country	KEI Rank Change	KEI 2008 Rank	KEI 2008	EIR Rank Change	EIR 2008 Rank	Innovation Rank Change	Innovation 2008 Rank	Education Rank Change	Education 2008 Rank	ICT Rank Change	ICT 2008 Rank
Mongolia	+20	75	4.50	+25	66	-13	124	+36	47	+20	79
China	+20	77	4.35	+21	80	+21	64	+6	87	+28	84
Armenia	+18	57	5.51	+64	56	+6	48	+8	46	-15	90
Mauritania	+17	113	2.35	+38	86	+8	129	+4	122	+8	107
Tunisia	+15	71	4.73	+11	65	+11	70	+8	88	+8	72
Madagascar	+15	112	2.37	+57	68	-18	111	-4	127	-3	130
Angola	+15	122	1.70	+16	120	+3	115	+10	124	+9	121
Lithuania	+14	30	7.68	+8	31	+18	44	+15	20	+26	31
Romania	+14	43	6.37	+10	46	+11	58	+1	49	+19	46
Dominican Republic	+14	86	3.92	+36	74	-5	103	-6	86	+22	80
Algeria	+12	96	3.25	+7	114	+9	91	+4	93	+7	97
Latvia	+11	32	7.64	+9	29	+31	46	+14	18	+17	32
Uganda	+11	111	2.46	+7	79	+8	108	+7	118	+18	120
Mozambique	+11	121	1.71	-3	103	+11	128	+5	133	+2	129
Brazil	+10	54	5.57	-6	73	+3	49	+33	54	+9	54

Source: KAM 2008 – reconstructed from “KEI and KI indexes” mode (www.worldbank.org/kam)

Apart from Mongolia, some other low-income countries have also seen measurable improvement in terms of the KEI since 1995. Mauritania's KEI ranking has increased by 17 positions to 113, mainly because of the significant advancement in the EIR, which is the strongest pillar. Madagascar also benefited from remarkable improvement in the EIR pillar, jumping impressive 57 positions. Uganda's ICT pillar, climbing 18 positions, made major contribution to its KEI, which jumped up 11 places to rank 111.

Other big gainers are mainly middle-income countries. Up 18 positions at 57th place, Armenia's KEI has benefited from remarkable progress in the EIR pillar.² Angola has increased 15 positions thanks to the developments in all four pillars, especially the EIR and education pillars. Lithuania jumped 14 positions largely attributable to its notable improvement in the ICT and innovation pillars. While its innovation and education pillars retreated a little since 1995, the Dominican Republic has moved up 14 places largely because of significant progress in the EIR pillar, which climbed 36 positions to rank 74. In addition, the balanced improvements in all four pillars led to Algeria's KEI ranking climbing 12 places. Latvia increased 11 positions mostly due to its substantial strengthening of the innovation pillar.

Table 5
Decreases in KEI Rankings - Top 15 Countries

Country	KEI Rank Change	KEI 2008 Rank	KEI 2008	EIR Rank Change	EIR 2008 Rank	Innovation Rank Change	Innovation 2008 Rank	Education Rank Change	Education 2008 Rank	ICT Rank Change	ICT 2008 Rank
Djibouti	-23	132	1.15	-43	128	-19	138	+2	131	-28	125
Panama	-21	72	4.69	-7	62	-7	60	-16	72	-40	102
Guyana	-19	78	4.31	-65	117	-10	73	+8	56	-11	77
Swaziland	-19	103	2.93	-53	113	1	72	-11	113	-6	104
Argentina	-16	58	5.49	-62	112	-5	40	+5	42	-6	57
Venezuela, RB	-15	80	4.23	-51	139	+9	55	+6	63	-8	64
Bahrain	-14	49	6.02	-14	48	-39	78	-6	55	-7	41
Bolivia	-13	93	3.42	-60	109	-5	100	+4	77	-8	99
Ecuador	-12	91	3.46	-43	122	-14	89	-18	92	0	74
Eritrea	-12	133	1.07	-46	135	+1	135	+1	126	-12	131
Nepal	-10	125	1.61	-20	118	-4	125	+1	115	-10	135
Costa Rica	-9	47	6.06	-17	49	-3	47	-4	66	-12	51
Colombia	-9	76	4.42	-22	87	-1	77	-3	74	-16	76
Tajikistan	-8	107	2.79	+24	116	-19	118	-13	59	-33	133
Zimbabwe	-8	109	2.51	-21	140	-5	79	-9	104	+9	98

Source: KAM 2008 – reconstructed from “KEI and KI indexes” mode (www.worldbank.org/kam)

Table 5 presents the countries with the 15 largest decreases in KEI rankings between 1995 and 2008. Note that more than half of these countries are from Latin America. Guyana, Venezuela, Ecuador, Argentina, Costa Rica, Bolivia and Colombia all slid back by 9 or more positions. These countries are largely similar in terms of the large deteriorations in the EIR pillar, which played the dominant role in the weakening of KEI.

² Which is partly attributed to significant improvement in regulatory quality and partly to the availability of data for trade barriers in the most recent year, but not available for 1995.

Although Bolivia, Guyana, Argentina and Venezuela saw gains in the education pillar, these were more than offset by the worsening of the EIR pillar. Panama, an exception of Latin America countries, lagged behind mainly due to large regression in its ICT pillar. Similar to Latin America countries, Djibouti, Swaziland, Eritrea, Nepal and Zimbabwe also experience huge decrease in their EIR ranking, moving down 20 positions or more. In sharp contrast to the Latin American countries, Tajikistan saw an improvement in the EIR pillar but weakening in the innovation, education and ICT pillars. Bahrain, in addition to a strong decline in the EIR pillar, also had a significant weakening in the innovation pillar.

The Knowledge Economy and Long Term Economic Growth

Table 6 presents the distribution of KEI rankings by quintile and countries' income group for KEI 2008 and 1995, by the number of countries and the shares of the number. As can be seen, country KEI rankings are, to a very large extent, positively correlated with income categories. For 2008, all except one of the 39 high-income countries included in the KAM fall in the fifth and fourth quintiles. Similarly, all but one of the upper-middle-income countries are situated in the fourth and third quintiles, while the most of the lower-middle-income countries lie in the third and second quintiles. Lastly, most of the low-income countries lie in the second and first quintiles.

The distribution for 1995 paints a very similar picture: all high income countries ranked in the higher quintiles, majority of the middle countries were in middle quintiles and most of the low income countries were in the lower quintiles. However, in every income category other than the high-income group, there were a number of “over-achieving” countries that had KEI rankings that were higher than the norm for countries in the same income category. More specifically, there was one upper-middle-income country in the fifth quintile of the KEI 1995 rankings, which was dominated by high-income countries. Similarly, there were 10 lower-middle-income countries in the fourth quintile where majority higher middle income countries are ranked. Lastly, there were 3 low-income countries in the 3rd quintile where a large number of the lower middle countries are ranked.

What is more important is that most of these “over-achieving” economies have experienced sustained economic growth over the past decade, so much so that most of them have migrated into the next higher income category. Slovenia, the only upper-middle-income country in 1995 with KEI rankings in the fifth quintile, has experienced sustained economic growth over the past decade and has graduated into the league of high-income countries. Similarly, among the 10 lower-middle-income countries in the fourth quintile, 8 of them have graduated into to higher income categories. One of these 8 countries, Estonia, has acquired a high-income status since 1995; while the other 7 countries, the Slovak Republic, Poland, Bulgaria, Costa Rica, Latvia, Lithuania and Panama, have since then migrated into the upper-middle-income grouping. In the same light, the 3 low-income countries that were ranked in the 3rd quintile in 1995, Guyana, Georgia and Armenia, have since then achieved lower-middle income status.

The above suggests that heavy investors in knowledge, after accounting for the initial level of economic development, tend to demonstrate an enhanced and sustained rate of economic growth. More scientific statistical cross-country regressions yield the same results. There exists a positive correlation between the KEI in 1995 and the rate of future economic growth. More specifically, a unit increase in the 1995 value of the KEI tends to increase, on average, a country's 1996-2006 average growth rates by roughly 0.4 percentage points.

Table 6
Distribution of Country KEI rankings by Quintile and Income Group
(2008 and 1995)

2008	5th (Top) Quintile	4th Quintile	3rd Quintile	2nd Quintile	1st (Bottom) Quintile	Income Group Total
No. of Countries						
High Income	27	11	1	0	0	39
Upper Middle Income	0	15	9	1	0	25
Lower Middle Income	0	1	16	18	4	39
Low Income	0	0	1	7	22	30
Quintile Total	27	27	27	26	26	133
Share of number of countries in quintile(%)						
High Income	100.0	40.7	3.7	0.0	0.0	
Upper Middle Income	0.0	55.6	33.3	3.8	0.0	
Lower Middle Income	0.0	3.7	59.3	69.2	15.4	
Low Income	0.0	0.0	3.7	26.9	84.6	
Quintile Total	100.0	100.0	100.0	100.0	100.0	
1995	5th (Top) Quintile	4th Quintile	3rd Quintile	2nd Quintile	1st (Bottom) Quintile	Income Group Total
No. of Countries						
High Income	26	5	0	0	0	31
Upper Middle Income	1	12	5	0	0	18
Lower Middle Income	0	10	19	14	1	44
Low Income	0	0	3	12	25	40
Quintile Total	27	27	27	26	26	133
Share of number of countries in quintile(%)						
High Income	96.3	18.5	0.0	0.0	0.0	
Upper Middle Income	3.7	44.4	18.5	0.0	0.0	
Lower Middle Income	0.0	37.0	70.4	53.8	3.8	
Low Income	0.0	0.0	11.1	46.2	96.2	
Quintile Total	100.0	100.0	100.0	100.0	100.0	

Note: Only countries which have both 1995 and 2008 KEI scores are included.