

Insight Report

The Human Capital Report 2016



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Preface

KLAUS SCHWAB

Founder and Executive Chairman, World Economic Forum

The Fourth Industrial Revolution will lead to profound shifts across all industries, reshaping production, consumption, transportation and delivery systems, among other factors. At the same time, the very nature of work is changing, in part due to new technologies and their subsequent impact on business models, and in part because of new platforms that allow talent to connect to markets in wholly new ways.

Managing these transitions for optimal outcomes for our societies will require visionary leadership and a wide range of new knowledge and skills. The development of relevant talent will determine whether we all partake in the opportunities of the Fourth Industrial Revolution or experience its disruptions as bystanders. Much as these new technologies are disrupting labour markets, they also provide the potential to change how we learn throughout our lifetimes, how we educate the next generation and how we re-train those that are facing declining returns to their skills. They are also providing robust new data and metrics that allow us to understand the changes underway and manage them better.

This year's *Human Capital Report* aims to combine public international statistics, qualitative perception data and big data metrics to provide a comprehensive picture of the situation today as well as the opportunities for the future. The Human Capital Index quantifies how 130 countries are developing and deploying their human capital, and tracks progress over time. It takes a life-course approach to human capital, evaluating the levels of education, skills and employment available to people in five distinct age groups. In addition to the Index, the *Report* also explores skills in-depth through a unique partnership with LinkedIn and the emerging shape of the labour market on digital platforms, using data from Care.com, Didi Chuxing, Uber and Upwork.

The leadership of governments, business leaders and educational institutions, and collaboration between them, is vital to strengthening the global talent value chain. The World Economic Forum's System Initiative on Education, Gender and Work provides a platform for dialogue and collaboration between these stakeholders as well as a hub for the latest insights on the issue. In addition to the *Human Capital Report*, the Initiative provides a range of other tools for mapping current outcomes, forecasts and best practices, shedding light on the talent system broadly as well as specific aspects of it. The Initiative also serves as a platform to act on these findings, by engaging leaders in public-private partnerships to address education, gender and employment issues across regions and industries. Additionally, the Initiative offers a space for dialogue between leaders to develop trust and manage change.

We would like to express our appreciation to Till Leopold, Vesselina Ratcheva, Richard Samans and Saadia Zahidi for their leadership of this *Report*, and to the broader Education, Gender and Work team for their support to this project. We appreciate the unique data collaboration with LinkedIn, under the direction of Lutz Finger, as well as the input from other partners. Finally, we welcome the leadership and guidance of the Partners and Stewards of the Education, Gender and Work System Initiative and their commitment to addressing talent issues globally.

Investing in human capital goes beyond an economic necessity: it is the basis for all individuals to live up to their full potential. It is our hope that this latest edition of the *Report* and the platform offered by the Education, Gender and Work System Initiative will serve as a catalyst for unified leadership to positively shape the future of this system, unlocking the world's latent talent, and, as such, ensure the progress of economies and societies alike.

The Human Capital Report 2016

MEASURING HUMAN CAPITAL

A nation's human capital endowment—the knowledge and skills embodied in individuals that enable them to create economic value¹—can be a more important determinant of its long-term success than virtually any other resource. This resource must be invested in and leveraged efficiently in order for it to generate returns—for the individuals involved as well as an economy as a whole. Because human capital is critical not only to the productivity of society but also the functioning of its political, social and civic institutions, understanding its current state and capacity is valuable to a wide variety of stakeholders.

The Human Capital Index seeks to serve as a tool for capturing the complexity of education, employment and workforce dynamics so that various stakeholders are able to make better-informed decisions. Last year's edition of the World Economic Forum's *Human Capital Report* explored the factors contributing to the development of an educated, productive and healthy workforce. This year's edition deepens the analysis by focusing on a number of key issues that can support better design of education policy and future workforce planning.

The global human capital landscape is becoming ever more complex and evolving ever more rapidly. Approximately 25,000 new workers will enter the labour market in the developing world every day until 2020, and more than 200 million people globally continue to be out of a job; yet, simultaneously, there is an expected shortage of some 50 million high-skilled job applicants over the coming decade. We also still live in a world in which there are 90 million children without access to primary school, 150 million children unable to attend secondary school and hundreds of millions of young people who cannot afford to go to university, while the world is experiencing a shortage of 4 million qualified teachers per year.²

A new wave of technological innovation—a Fourth Industrial Revolution—will bring radical change to industries and labour markets worldwide.³ For example, some of the fastest adopters of industrial robots now are emerging economies such as China and the Republic of Korea. With a 24-hour working day, the payback period is now 1.5 years in China, versus 10 years not long ago.⁴ Though countries such as Singapore have had 30 years to develop through a strategy of continuous skills upgrading via export manufacturing in global value chains, China successfully did the same over the past 20 years. Countries in South Asia and Sub-Saharan Africa might have a remaining window of opportunity of at most 10 years before technology permanently closes the door on such strategies.⁵

At the same time ubiquitous mobile internet is leading to the emergence of a truly global labour market for the first time. Digital talent platforms have the potential to empower millions of poor and marginalized workers to access the global labour market as never before. This new jobs landscape—where work is global, even if workers are not—can create opportunities for developing countries to leapfrog technological development stages by equipping their workforces to directly tap into the global labour market.

Above all, the transition from education to employment has become fraught with uncertainty around the world. There is a pressing need to break down the divide between ministries of labour and education, and between the global education and employment conversations. Business has a critical role in stepping up investment in education, as well as clearly spelling out desired curriculum outcomes. As today's economies become ever more knowledge-based, technology-driven and globalized, and because we simply don't know what the jobs of tomorrow will look like, there is also a growing recognition that we have to prepare the next generation with the capacity for lifelong learning.⁶ The idea of a one-time education providing people with a lifelong skillset is a thing of the past.

The Human Capital Index takes a life-course approach to human capital, evaluating the levels of education, skills and employment available to people in five distinct age groups, starting from under 15 years to over 65 years. The aim is to assess the outcome of past and present investments in human capital and offer insight into what a country's talent base will look like in the future. The Index provides country rankings that allow for effective comparisons across regions and income groups. The methodology behind the rankings is intended to serve as a basis for time-series analysis that allows countries to track progress, relative to their own performance as well as that of others. Supplementing the Index, the Country Profiles, available on the *Report* website, provide detailed, indicator-level information for all countries included in the Index.

As a special feature of this year's *Report*, our analysis also makes use of a range of unique data on newly emerging digital labour markets and the platform economy, in collaboration with LinkedIn and a number of other partner companies.

In pointing to learning and employment outcome gaps, demographic trends and untapped talent pools, it is our hope that this *Report* can support governments, businesses, education providers and civil society institutions identifying key areas for focus and investment. All of these entities have a stake in human capital development, whether their primary goal is to power their

businesses, strengthen their communities or create a population that is better able to contribute to and share in the rewards of growth and prosperity. The *Report* also aims to foster public-private collaboration between sectors—as practically demonstrated by its innovative data partnership—ultimately reframing the debate around employment, skills and human capital from today’s focus on problems and challenges towards the opportunities for collaboration that fully leveraging the human capital potential residing in people’s skills and capacities can bring.

Methodology

The Human Capital Index is among the set of knowledge tools provided by the World Economic Forum as part of its System Initiative on Education, Gender and Work. The System Initiative produces analysis and insights focused on forecasting the future of work and skills across countries and industry sectors as well as best practices from businesses that are taking the lead in addressing skills gaps and gender gaps. The System Initiative also creates dialogues and public-private collaboration on education, gender and work in several regions of the world and within industry groups.

The Human Capital Index ranks 130 countries on how well they are developing and deploying their human capital potential. The Index assesses Learning and Employment outcomes on a scale from 0 (worst) to 100 (best) across five distinct age groups to capture the full demographic profile of a country:

- 0–14 years – the youngest members of the population for whom education is assessed among the most critical factors
- 15–24 years – youth for whom factors such as higher education and skills use in the workplace are assessed
- 25–54 years – the bulk of the labour force, for whom continued learning and employment quality are assessed
- 55–64 years – the most senior members of most workforces for whom attainment and continued engagement are assessed
- 65 and over years – the oldest members of the population, for whom both continued opportunity and health are assessed

The generational lens sheds light on age-specific patterns of labour market exclusion and untapped human capital potential. In total, the Human Capital Index covers 46 indicators. Values for each of the indicators come from publicly available data compiled by international organizations such as the International Labour Organization (ILO); the United Nations Educational, Scientific and Cultural Organization (UNESCO); and the World Health Organization (WHO). In addition to hard data, the Index uses a limited set of qualitative survey data from the World Economic Forum’s Executive Opinion Survey. The methodology also allows for comparisons within a country as well as between countries. For a detailed explanation of the Index methodology, please refer to the Technical Notes on the *Report* website.

This chapter consists of three core sections. The first section covers the overarching results of the Human Capital Index, paying particular attention to high-performing and major economies. This section also examines the results through the prism of regional and income groupings, placing economies’ performance in context. Sections two and three review the two horizontal sub-themes of the Index—Learning and Employment—and consider their variation by age group segments as well as how to prepare for the future.

Specifically, the second section explores the gap between average Learning scores of those over and under age 25, with a focus on skills diversity upon graduation from university and as an aspect of the skills gained at work. The section’s exploration of skills for the future of work considers different strategies for expanding and nurturing talent as well as hiring pools.

The third section considers the structure of the global workforce across the age group spectrum and highlights particular trends in types of employment across geographies. It highlights the effects of technological disruptions on both regular and own-account work, putting a specific spotlight on “gig workers”.

RESULTS AND ANALYSIS

Long-term human capital investment and planning is not just crucial at the individual country level, but increasingly demands political leadership at the highest international level to move beyond zero-sum competition and prepare the world’s workforce for the challenges of the 21st century. Issues of global talent mobility and migration call for a coordinated approach to minimize risks and unlock opportunities for individuals and economies as a whole. Many education systems and skills accreditation standards remain primarily national in outlook. Moreover, equipping nations’ young and working-age populations with the education and skills to thrive in the Fourth Industrial Revolution will require collaboration beyond industry sectors and borders. The Human Capital Index seeks to serve as a benchmarking tool for such efforts so that various stakeholders are able to take better-informed decisions.

Detailed results for all 130 countries ranked by the Index are shown in Table 1 (pages 4–5). The appendix provides a full overview of the structure of the Human Capital Index. Please refer to the *Report* website, for comprehensive ranking tables by age group, regional group and income group. Also available on the *Report* website are individual Country Profiles providing detailed, indicator-level results and information for all countries included in the Index, as well as a Country Profile User’s Guide and Technical Notes on the Index methodology.

Top Ten

This year’s edition of the Human Capital Index sees no new entrants to or dropouts from its top 10 list, although there are some notable rank changes. The Index continues to be dominated by smaller European countries, particularly the Nordics and Benelux states, with two countries from the East Asia and the Pacific region and one country from the North America region also making the cut. The leaders of the Index are high-income economies that have placed

importance on high educational attainment and putting a correspondingly large share of their workforce in high-skilled occupations.

The top three remains unchanged from last year, with **Norway** (2) and **Switzerland** (3) almost drawing level this year and gaining ground on **Finland's** (1) top position. All three countries are effectively developing and utilizing about 85% of their full human capital potential.

For the second year running, **Finland** (1) is the best-performing country in the world when it comes to building and leveraging its human capital potential, taking the top spot on the 0–14, 15–24 and 25–54 Age Group pillars, and scoring in the top 10 for the remaining age groups. The country benefits from a well-educated young population with a near-universal basic education survival rate and the highest score for the quality of primary schools. Its 25–54 age group core working population shows the highest tertiary educational attainment rate in the Western Europe region and fourth best overall in the world. Based on the World Economic Forum's Executive Opinion Survey, Finland is also the country with the highest overall score on the Ease of finding skilled employees indicator, with even its 55–64 and 65 and over age groups possessing the world's third highest attainment rate of tertiary education, highlighting the continuing long-term benefits of past human capital investments.

Norway (2) follows Finland in second place on the overall Index with a strong performance across all age groups, although it does not make it into the top 10 in the 0–14 Age Group pillar. The country possesses similar strengths as its Nordic neighbour and also the lowest unemployment rate in the Western Europe region for its 25–54 prime working age group.

The top three is completed by **Switzerland** (3), which benefits from the very high quality of its primary schools and of the education system as a whole—ranking first in the world this year on the latter—but also from a strong rate of vocational training and high level of skill diversity. Switzerland is also the best performing country on the Staff training, third best on the Economic complexity and third best in the world on the High-skilled employment share indicators.

Japan (4) rises one rank in this year's Index on the back of its strong performance in the 55–64 and 65 and Over Age Group pillars—taking the top spot on both and boosted by the longevity and education of its older population. However, the country is held back by relatively low labour force participation in the prime working age group, in particular due to the country's employment gender gap. It has achieved near-universal basic education and has a tertiary education attainment rate of over 50% for its working age population, ranking it first in the world. With the world's highest aged-dependency ratio and second-highest healthy life expectancy, there is greater room for potential by closing the gender gap and tapping into the skills of the older workforce, particularly as labour force participation falls from 85% in the 25–54 Age Group to 71% for the 55–64 Age Group.

New Zealand (6), the other country in the top 10 from the East Asia and the Pacific region, rises three ranks this year and places in the top 10 for all age groups

except for the 25–54 Age Group pillar, due in particular to a comparatively lower Economic complexity indicator score and labour force participation rate. It ranks second on the 55–64 Age Group pillar due to its high educational attainment and the age group's active participation in the labour force.

Sweden (5) also rises one rank in this year's Index, slightly outperforming its neighbour **Denmark** (7), although both countries have strong results across all age group pillars.

The Netherlands (8) and **Belgium** (10) maintain their respective rankings. Both countries have strong scores in the younger age group pillars but are penalized by relatively low labour force participation and a relatively high unemployment rate among the 55–64 and 65 and over age groups, despite strong health and education results.

Canada (9), the only North American country in the top 10, drops five ranks this year—due to a multi-year data update concerning the country's 15–24 Age Group pillar—but maintains a strong showing particularly in the three older age groups. With the world's highest tertiary education attainment rates in the 55–64 and 65 and over age groups, a 65 and over age group labour force participation rate of 14%, and a healthy life expectancy above 70, Canada enables older workers who choose to remain active to do so, pointing to a high-skilled and productive 'silver' workforce in the country.

Major Economies

While the Index demonstrates that many smaller economies perform exceptionally well with regard to nurturing and deploying their human capital potential—in fact dominating the top 10 of the Index—a sizeable share of the global workforce lives and works in a comparatively small number of major economies. Between them, the countries featured in this section of the *Report* make up 75% of the world's population and contribute 85% of global gross domestic product (GDP). Like the wider geographic regions in which they are located, these countries exhibit a broad range of overall success in leveraging their human capital potential.

Following **Japan** (4) and **Canada** (9), **Germany** (11) and **Singapore** (13) are two notable risers in this year's Human Capital Index on the back of strong performances on staff training, high rates of high-skilled employment and economic complexity, low rates of young people not in employment, education or training (NEET) and high healthy life expectancy among their older populations. While Germany ranks high on the Skill diversity (8th) indicator and the overall quality of its education system, it is held back by a low ranking on its basic education survival rate (89th). Both countries are tapping about 80% of their human capital potential.

Though **France** (17) performs strongly on the core working age 25–54 Age Group pillar (12th), it suffers from a high youth unemployment rate (placing it 95th in the world) and a 35% drop in labour force participation between the 25–54 and 55–64 age ranges. It is immediately followed in the Index by **Australia** (18), which ranks 5th in the world on the 15–24 Age Group pillar due to high tertiary enrolment rates and low numbers of young people not in employment, education or training. More than 90%

Table 1: Human Capital Index 2016, detailed rankings

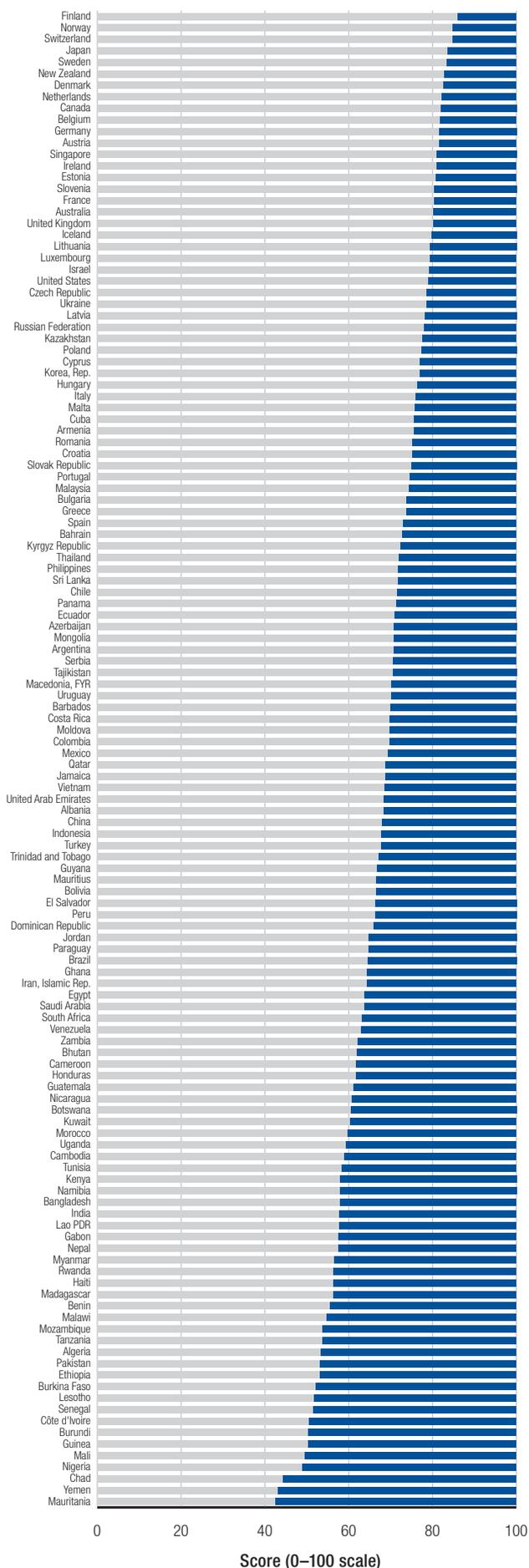
Country	Overall index		0–14 Age Group		15–24 Age Group		25–54 Age Group		55–64 Age Group		65 and Over Age Group	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Finland	85.86	1	98.17	1	85.35	1	81.24	1	83.90	7	72.95	9
Norway	84.64	2	94.69	11	84.72	2	80.11	4	85.34	3	74.53	2
Switzerland	84.61	3	95.76	7	83.34	4	80.51	2	83.54	8	73.28	7
Japan	83.44	4	95.78	6	77.26	19	79.13	5	85.72	1	75.61	1
Sweden	83.29	5	93.25	14	81.03	9	80.17	3	84.58	4	70.43	16
New Zealand	82.79	6	95.20	9	82.25	7	76.25	17	85.70	2	74.07	3
Denmark	82.47	7	91.77	22	81.89	8	78.17	8	83.99	6	74.04	4
Netherlands	82.18	8	92.81	17	83.70	3	77.58	10	81.06	13	69.59	18
Canada	81.95	9	93.46	13	77.74	16	77.61	9	84.22	5	73.05	8
Belgium	81.59	10	95.29	8	78.25	13	77.55	11	78.33	27	68.32	23
Germany	81.55	11	89.56	38	79.78	10	78.39	7	83.31	9	73.54	6
Austria	81.52	12	92.29	20	82.41	6	76.75	15	79.06	23	72.00	12
Singapore	80.94	13	95.81	5	76.12	25	78.70	6	75.17	39	60.59	52
Ireland	80.79	14	95.87	4	75.84	29	76.32	16	78.16	28	67.77	26
Estonia	80.63	15	95.09	10	77.35	18	74.02	24	82.98	10	71.77	13
Slovenia	80.33	16	92.90	16	79.13	12	75.30	20	77.04	32	71.39	14
France	80.32	17	93.07	15	76.00	26	77.32	12	77.59	30	66.32	31
Australia	80.08	18	91.36	24	82.56	5	74.33	22	80.85	15	67.27	27
United Kingdom	80.04	19	91.91	21	76.64	22	76.78	14	79.07	22	66.43	30
Iceland	79.74	20	93.85	12	79.63	11	75.78	18	74.62	40	60.30	54
Lithuania	79.34	21	92.38	19	75.87	28	74.25	23	81.24	12	68.30	24
Luxembourg	79.28	22	91.33	26	73.46	36	77.24	13	75.74	36	66.45	29
Israel	78.99	23	89.56	37	76.75	21	75.39	19	79.78	20	67.05	28
United States	78.86	24	88.97	39	75.99	27	74.91	21	80.62	16	70.32	17
Czech Republic	78.45	25	89.66	36	77.49	17	73.72	25	78.43	25	68.38	22
Ukraine	78.42	26	90.73	28	78.04	15	71.83	32	79.14	21	72.21	10
Latvia	78.13	27	88.79	41	76.24	24	72.79	27	80.58	17	72.10	11
Russian Federation	77.86	28	86.95	53	78.21	14	72.74	28	80.46	18	71.14	15
Kazakhstan	77.57	29	91.01	27	75.45	30	70.91	36	80.95	14	68.78	21
Poland	77.34	30	90.66	29	74.67	34	72.53	29	76.12	34	65.61	32
Cyprus	76.97	31	91.33	25	71.05	52	73.36	26	74.23	45	63.98	36
Korea, Rep.	76.89	32	90.34	31	75.39	32	71.68	34	78.42	26	61.64	45
Hungary	76.36	33	87.56	45	73.00	41	71.72	33	78.11	29	68.83	20
Italy	75.85	34	92.77	18	71.82	49	69.25	39	75.95	35	62.95	41
Malta	75.66	35	87.49	47	73.31	37	72.09	31	73.22	50	63.13	39
Cuba	75.55	36	96.87	2	75.00	33	67.80	47	72.49	54	50.94	81
Armenia	75.39	37	87.49	48	69.96	56	68.76	43	81.84	11	74.01	5
Romania	74.99	38	87.30	51	72.42	42	69.01	42	77.47	31	68.18	25
Croatia	74.99	39	90.64	30	72.06	46	69.17	40	72.54	53	62.68	42
Slovak Republic	74.94	40	85.01	60	72.36	43	71.13	35	76.58	33	65.36	33
Portugal	74.39	41	88.91	40	72.16	45	70.46	37	68.10	70	58.98	58
Malaysia	74.26	42	87.51	46	76.78	20	72.13	30	70.03	65	42.36	106
Bulgaria	73.66	43	78.49	83	73.26	40	70.21	38	80.27	19	69.43	19
Greece	73.64	44	88.43	42	71.18	51	68.33	45	71.42	56	60.37	53
Spain	72.79	45	87.31	50	69.07	60	68.35	44	71.06	59	58.02	63
Bahrain	72.69	46	90.11	33	66.47	70	69.08	41	69.33	68	51.35	79
Kyrgyz Republic	72.35	47	83.64	67	74.44	35	65.13	52	75.58	37	65.01	35
Thailand	71.86	48	81.71	74	73.31	39	67.91	46	70.71	62	58.65	60
Philippines	71.75	49	81.41	75	71.01	54	66.62	49	74.46	42	65.34	34
Sri Lanka	71.69	50	91.44	23	67.12	65	62.34	66	72.91	51	63.47	37
Chile	71.45	51	83.17	70	73.31	38	64.60	54	74.55	41	61.50	47
Panama	71.18	52	79.64	80	72.02	47	66.16	50	75.27	38	63.44	38
Ecuador	70.84	53	85.57	58	76.25	23	60.58	76	73.49	48	61.75	43
Azerbaijan	70.72	54	83.18	68	61.65	87	66.66	48	78.85	24	60.93	50
Mongolia	70.71	55	87.42	49	66.84	67	63.19	63	73.64	46	59.81	56
Argentina	70.70	56	83.65	66	69.74	57	64.21	59	72.82	52	61.59	46
Serbia	70.54	57	88.22	43	65.17	75	64.67	53	70.00	66	54.91	69
Tajikistan	70.53	58	87.17	52	63.06	81	65.42	51	74.40	43	53.96	71
Macedonia, FYR	70.01	59	86.60	54	67.03	66	62.17	67	71.09	58	61.21	49
Uruguay	69.96	60	78.74	81	71.03	53	64.42	57	74.32	44	63.06	40
Barbados	69.78	61	95.92	3	55.62	108	63.96	60	63.30	82	50.71	83
Costa Rica	69.72	62	79.72	78	71.92	48	64.54	55	70.89	61	58.26	61
Moldova	69.67	63	82.97	71	68.83	62	62.95	65	73.51	47	58.69	59
Colombia	69.58	64	78.42	85	71.43	50	64.26	58	72.40	55	61.40	48
Mexico	69.25	65	82.03	73	68.60	63	63.60	62	69.35	67	58.06	62

(Cont'd.)

Table 1: Human Capital Index 2016, detailed rankings (cont'd.)

Country	Overall index		0–14 Age Group		15–24 Age Group		25–54 Age Group		55–64 Age Group		65 and Over Age Group	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Qatar	68.64	66	90.31	32	65.95	72	59.55	82	67.93	71	51.30	80
Jamaica	68.62	67	84.92	61	61.52	88	64.54	56	64.27	78	55.89	67
Vietnam	68.39	68	77.21	89	75.43	31	61.19	70	70.92	60	59.64	57
United Arab Emirates	68.25	69	89.84	35	60.84	90	61.75	68	67.29	73	47.90	89
Albania	68.23	70	90.03	34	62.03	85	59.46	83	67.45	72	55.83	68
China	67.81	71	82.80	72	69.55	58	63.79	61	61.61	87	43.38	100
Indonesia	67.61	72	84.08	63	68.51	64	60.83	73	63.66	80	51.57	77
Turkey	67.57	73	85.09	59	72.34	44	58.21	86	63.30	81	53.66	74
Trinidad and Tobago	67.04	74	86.42	55	60.80	91	61.72	69	62.90	84	48.83	86
Guyana	66.67	75	83.17	69	60.62	93	60.52	77	67.20	74	56.39	66
Mauritius	66.53	76	85.89	57	64.04	79	58.98	85	63.94	79	50.45	84
Bolivia	66.47	77	78.46	84	64.19	78	60.87	72	70.22	64	56.93	65
El Salvador	66.31	78	77.00	90	70.85	55	60.13	81	66.72	75	53.88	72
Peru	66.31	79	74.79	94	66.14	71	60.73	75	73.25	49	60.29	55
Dominican Republic	65.88	80	74.31	96	64.74	76	60.89	71	71.34	57	60.62	51
Jordan	64.70	81	86.26	56	65.27	74	55.91	94	56.65	101	47.41	91
Paraguay	64.62	82	70.50	102	64.63	77	60.23	80	70.44	63	61.72	44
Brazil	64.51	83	71.51	100	69.28	59	60.31	78	65.79	76	52.42	76
Ghana	64.26	84	75.28	93	60.65	92	60.77	74	65.64	77	52.42	75
Iran, Islamic Rep.	64.16	85	87.86	44	66.65	69	53.60	106	56.57	102	44.67	96
Egypt	63.72	86	80.25	77	62.41	83	58.09	87	62.62	85	43.17	101
Saudi Arabia	63.69	87	78.24	86	66.77	68	57.49	89	61.23	91	44.95	95
South Africa	62.97	88	73.89	97	59.47	95	63.08	64	62.42	86	35.43	117
Venezuela	62.94	89	77.00	91	65.45	73	56.80	90	60.87	94	46.22	94
Zambia	62.06	90	68.06	108	61.94	86	60.29	79	63.17	83	50.93	82
Bhutan	61.83	91	81.09	76	57.46	102	56.52	91	53.50	109	44.63	97
Cameroon	61.64	92	70.28	104	60.95	89	59.30	84	61.10	92	47.81	90
Honduras	61.60	93	75.96	92	63.28	80	54.18	101	61.53	89	49.87	85
Guatemala	61.07	94	68.57	107	68.96	61	54.56	99	61.46	90	53.73	73
Nicaragua	60.60	95	69.10	106	55.25	110	56.07	93	69.28	69	57.74	64
Botswana	60.50	96	78.69	82	57.23	103	55.29	97	54.08	108	42.06	107
Kuwait	60.27	97	83.82	65	51.79	115	52.83	108	57.19	99	42.68	105
Morocco	59.65	98	77.36	88	57.10	104	51.88	113	58.60	97	48.38	88
Uganda	59.28	99	65.06	119	62.78	82	57.97	88	60.27	95	39.54	111
Cambodia	58.88	100	69.44	105	55.60	109	55.38	96	59.81	96	48.41	87
Tunisia	58.24	101	83.89	64	58.21	98	48.55	115	48.19	118	35.82	116
Kenya	57.90	102	67.94	109	54.64	113	56.47	92	56.75	100	40.94	108
Namibia	57.90	103	71.04	101	47.03	125	53.80	104	61.58	88	54.37	70
Bangladesh	57.84	104	77.88	87	58.16	99	47.21	122	57.58	98	46.92	92
India	57.73	105	84.91	62	56.46	106	48.11	119	46.48	120	33.74	119
Lao PDR	57.66	106	73.81	98	58.92	96	53.74	105	49.05	116	32.62	122
Gabon	57.48	107	72.79	99	50.67	119	52.61	109	61.05	93	42.92	103
Nepal	57.35	108	74.56	95	62.11	84	52.51	110	44.53	124	30.86	123
Myanmar	56.52	109	67.80	110	56.27	107	53.18	107	54.70	107	39.77	110
Rwanda	56.27	110	66.93	113	58.47	97	55.06	98	46.84	119	34.02	118
Haiti	56.24	111	65.54	116	57.91	100	53.83	103	51.32	111	40.59	109
Madagascar	56.17	112	63.98	120	55.19	111	54.04	102	56.16	104	43.98	98
Benin	55.38	113	66.34	114	51.39	116	55.53	95	52.69	110	30.68	124
Malawi	54.64	114	57.50	127	51.36	117	54.52	100	55.81	106	51.38	78
Mozambique	53.64	115	61.72	123	52.93	114	51.36	114	51.07	112	43.47	99
Tanzania	53.56	116	53.03	129	59.87	94	52.29	111	55.99	105	46.59	93
Algeria	53.22	117	79.67	79	55.04	112	44.36	126	43.65	125	19.94	129
Pakistan	53.10	118	67.16	112	51.29	118	48.15	118	50.85	113	39.13	112
Ethiopia	53.02	119	65.25	118	57.75	101	46.38	124	48.52	117	42.74	104
Burkina Faso	52.11	120	62.28	122	46.82	126	51.91	112	46.25	121	37.51	114
Lesotho	51.62	121	67.56	111	49.95	120	47.88	120	41.33	127	33.73	120
Senegal	51.49	122	63.90	121	44.22	129	48.45	116	50.36	114	42.97	102
Côte d'Ivoire	50.34	123	65.30	117	49.04	122	47.62	121	41.34	126	28.49	125
Burundi	50.17	124	65.57	115	48.81	123	44.23	127	56.25	103	27.40	127
Guinea	50.17	125	58.16	126	47.82	124	48.43	117	50.12	115	38.17	113
Mali	49.37	126	61.66	124	49.89	121	44.83	125	44.98	123	36.57	115
Nigeria	48.86	127	53.19	128	56.58	105	46.96	123	45.71	122	32.62	121
Chad	44.23	128	52.03	130	44.38	128	43.96	128	37.28	128	27.87	126
Yemen	42.98	129	70.40	103	45.36	127	33.25	130	25.82	130	17.79	130
Mauritania	42.33	130	59.57	125	38.85	130	38.02	129	34.54	129	24.21	128

Figure 1: Distance to the ideal score, 2016



of its employment share is in medium- and high-skilled occupations.

The **United Kingdom** (19) exhibits a high tertiary attainment rate (33%) and high-skilled employment share (48%) for its 25–54 core working age group, but ranks 46th on the Incidence of overeducation indicator and 33rd for its vocational enrolment rate, indicating that there might be room for improvement with regard to recognizing alternative education paths.

The **United States** (24) trails Europe’s three biggest economies largely due to relative weaknesses in primary and secondary enrolment rates and the quality of primary education. However, the United States also records an impressive tertiary enrolment rate (4th globally), a continuation of the high proportion of those who already attained tertiary education across the country’s older age groups.

The **Russian Federation** (28), too, benefits from very high levels of primary, secondary and tertiary education attainment across all of its age groups, but has a low healthy life expectancy of only 61 years (86th globally) and underperforms with regard to the employment dimension.

Korea, Rep. (32) ranks second in the world for its near-universal tertiary enrolment rate. Unlike for the other top performers in the East Asia and Pacific region, however, business perceptions of the overall quality of its education system are undistinguished (59th), and the country also ranks comparatively low in the ease of finding skilled employees and its labour force participation rate, due in part to a rather large employment gender gap. Like the major economies ranked ahead of it, the Republic of Korea scores in the mid-70% range of the Index.

Italy (35) is held back by a low youth labour force participation rate (123rd) and high youth unemployment rate (122nd) for its 15–24 Age Group pillar, and scores poorly on the quality of its on-the-job staff training (119th). The country does, however, perform rather better on the secondary enrolment and basic education survival rates of its younger 0–14 age group as well as on the skill diversity of its graduates. **Spain** (45), shares the overall human capital profile of its Mediterranean neighbours and reports the second highest 15–24 age group unemployment rate measured in the Index (53.2%), despite its exceptionally high level of graduates’ skill diversity (1st globally).

Several of Latin America’s major economies are in the mid-range of this year’s Index. **Chile** (51) benefits significantly from a well-educated and healthy older population that remains economically active well into the age of 55–64, compared to other countries in the region. Its 25–54 prime working age group also boasts the highest tertiary education attainment rate in Latin America (10th globally), with one in three people in this age group having completed university. In line with this, Chile’s 15–24 age group continues to have a very high university enrolment rate (8th), with a diverse range of subjects studied.

Argentina (56) shares the former’s high tertiary enrolment rate. Both countries, however, also exhibit a rather high unemployment rate in the 15–24 age group.

Colombia (64), performs best when it comes to the educational attainment and tertiary and vocational

enrolment of its 15–24 age group. However, the country also exhibits a big skills mismatch, with one in three 15–24 year-old Colombians currently classified as overeducated for their work. The country comes in one rank ahead of **Mexico** (65), which rounds out the better-performing countries in the region, although with some distance behind the top group. This is mostly due to a relatively less well-educated population across all age pillars. More positively, Mexico reports a relatively low level of unemployment, even among its youth. Both countries are falling just short of maximizing 70% of their human capital potential.

The **United Arab Emirates** (69) ranks well ahead of other major economies in the Middle East and North Africa region, benefitting significantly from the strong perceived quality of its primary schools (13th) and overall education system (12th); but it also reports some of the lowest tertiary and vocational enrolment rates in the Index in the 15–24 age group.

China (71) similarly ranks in the mid-range of the overall Index scores, well ahead of the other BRICS nations except for the Russian Federation. Its younger population fares significantly better than its 55–64 and 65 and over age groups as a result of increasing educational attainment in the population. It also scores comparatively well on the Ease of finding skilled employees (39th), Vocational enrolment (29th) and Economic complexity (18th) indicators, setting the country up well for the future.

Rounding off the upper midfield of the Index with scores in the high 60% range are **Indonesia** (72), which has exhibited a rapid expansion of educational attainment similar to China across its younger age groups and good grades for local staff training (31st globally), and **Turkey** (73), which has strong tertiary and vocational enrolment rates among its 15–24 age group. Both countries are held back, however, by comparatively low labour participation rates for their 25–54 prime working age population (ranking 100th and 120th, respectively), due in large part to significant employment gender gaps.

Brazil (83), the Latin American region's largest economy, ranks in the lower half of the Index, with a poor performance on the Basic education survival rate (98th) and Quality of primary education (118th) indicators for its 0–14 age group in particular. Local businesses perceive it as very difficult to hire skilled employees (114th), although the country scores comparatively better on the quality of its on-the-job staff training and a low unemployment rate for its core 25–54 and older age groups.

Egypt (86) and **Saudi Arabia** (87), the Middle East and North Africa region's two most populous economies, are nearly tied in the Index. While Egypt ranks somewhat better on vocational enrolment, the overall quality of Saudi Arabia's education system (42nd) is perceived as much better than Egypt's (126th), which ranks near the bottom on this indicator. Both countries suffer from high youth unemployment rates and have high employment gender gaps, despite good rankings for tertiary enrolment and attainment and skill diversity, pointing to both countries' additional untapped human capital potential.

Immediately following is **South Africa** (88), the Sub-Saharan African region's second largest economy.

The country has the highest share of its workforce in high-skilled occupations on the continent (49th overall). However, based on business executives' perceptions in the country, South Africa is ranked 101st for its ease of finding skilled employees and also receives poor marks for the quality of its education system (125th) and struggles with achieving universal primary and secondary school enrolment. While staff training in the country is well regarded (19th globally), the country ranks third in the region overall, four ranks behind **Ghana** (84), with an overall human capital score in the lower 60% range.

India (105) ranks at the top of the bottom quartile of the Index. Although the country's educational attainment has improved markedly over the different age groups, its youth literacy rate is still only 90% (103rd globally), well behind the rates of other leading emerging markets. India also ranks poorly on labour force participation, due in part to one of the world's largest employment gender gaps (121st). More positively, it receives solid rankings on Quality of education system (39th), Staff training (46th) and Ease of finding skilled employees (45th) indicators, suggesting a primary avenue for improvement for the country consists in expanding access to its numerous learning and employment opportunities.

Joining India at the bottom-range of the Index are South Asia's two other most populous nations, **Bangladesh** (104) and **Pakistan** (118), due to poor performances on educational outcomes throughout all the Age Group pillars, and despite a comparatively high tertiary attainment rate among the former's older population.

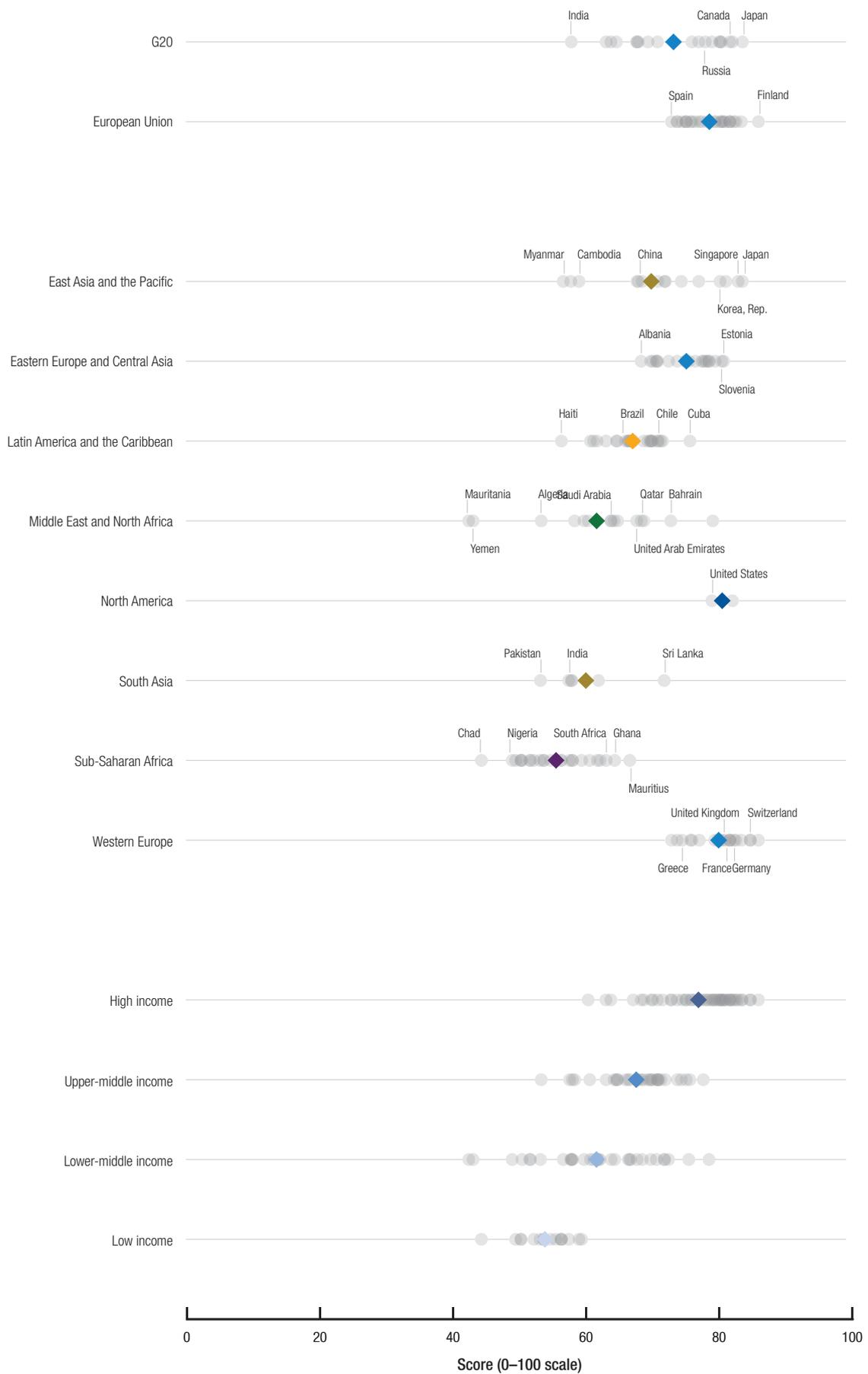
The lowest-ranked major economy in the Index—ranked fourth from the bottom, ahead only of Chad, Yemen and Mauritania—is **Nigeria** (127), Sub-Saharan Africa's largest economy and most populous country. It suffers from the second lowest primary school enrolment rate globally (65%), and a high incidence of child labour. At 15%, the tertiary attainment rate (65th overall) of its 25–54 age group is a relative highlight, as are the business perceptions of the quality of its staff training (59th).

RESULTS BY REGION AND INCOME GROUP

The Human Capital Index shows that all countries can do more to nurture and fully utilize their human capital potential. Across the Index, there are only 19 nations that have tapped 80% of their human capital potential or more. In addition to these 19 countries, 40 countries score between 70% and 80%. A further 38 countries score between 60% and 70%, while 28 countries score between 50% and 60% and five countries remain below 50%.

At a global level, only one region—North America—narrowly passes the 80% threshold. Two regions—Western Europe and Eastern Europe and Central Asia—score in the 70% to 80% range and three others—East Asia and the Pacific, Latin America and the Caribbean, and the Middle East and North Africa—in the 60% to 70% range. Two regions—South Asia and Sub-Saharan Africa—have not yet crossed the 60% average threshold. However, as illustrated in Figure 2, there is a wide variety of effective human capital utilization in every world region, with both success stories and underperforming countries in each.

Figure 2: Human Capital Index 2016, by region, income and political grouping



Source: Human Capital Index 2016.

East Asia and the Pacific

East Asia and the Pacific, jointly with South Asia the world's most populous region, scores towards the middle of the range of the Human Capital Index results, with an overall average score of 69.75. The gap between the best and worst performers in the East Asia and the Pacific region is the second largest of any region, reflecting in part the different stages of economic development of the 15 countries from the region covered in the Index, but also the varying degrees of human capital outcomes even between countries with similar income. Scores for the region's 0–14 Age Group pillar are much higher relative to other pillars, reflecting the region's remarkable progress between generations.

The best-performing countries in the region, such as **Japan** (4), **Singapore** (13) and the **Korea, Rep.** (32) are global strongholds of human capital success, while countries such as **Cambodia** (100), **Lao PDR** (106) and **Myanmar** (109) trail the region despite a relatively solid performance relative to their income levels. ASEAN economies such as **Malaysia** (42) and the **Philippines** (49) are not too far behind their northern neighbours, while **China** (71) scores near the regional and overall Index average with regard to its human capital performance.

Over half of the countries in the region have achieved near-universal primary school enrolment rates; yet, on average, over 20% of the region's 0–14 age group is not enrolled in secondary education. Among its 25–54 age group core working population, the average labour force participation rate is 83%. **Singapore** (13) has the highest proportion of high-skilled employment, at 55% of its workforce (2nd in the world), with a regional average of 22%. The region includes five countries that are ranked in the top 10 for the highest healthy life expectancy.

Eastern Europe and Central Asia

The Index covers 22 countries from Eastern Europe and Central Asia. At an overall average score of 75.02, the region ranks in third place globally, after North America and Western Europe. It includes several remarkable success stories with regard to successful human capital potential maximization, including **Estonia** (15) and **Slovenia** (16), which both score above the 80% threshold, and the **Czech Republic** (25), **Ukraine** (26), the **Russian Federation** (28), **Kazakhstan** (29) and **Poland** (30), which all score within the top 30. Ukraine's performance is particularly remarkable relative to its GDP per capita levels.

Most countries in the region are close to having achieved near-universal basic education enrolment; however, some, such as **Macedonia, FYR** (59) and **Romania** (38), still lag behind. The bottom-ranked countries in the region, **Moldova** (63) and **Albania** (70), are also held back by the persistence of issues such as child labour.

In general, countries in the Eastern Europe and Central Asia region benefit from formally well-educated older populations—a legacy of the region's former heavily state-led school systems—but underperform with regard to labour force participation. Several countries in the region also have a relatively low healthy life expectancy.

Latin America and the Caribbean

The 24 countries ranked by the Index in the Latin America and the Caribbean region score in the middle range of the Index—just behind the East Asia and the Pacific region—with an overall average score of 66.95. However, scores for the region's 65 and Over and 55–64 Age Group pillars tend to be much higher than for their peers in the East Asia and the Pacific region; are practically tied between the regions for the 25–54 age group; and lag behind the East Asia and the Pacific region's younger population in terms of its human capital performance. To some extent, this hints at the rise of East Asia and some missed opportunities in the Latin America and the Caribbean region.

With the exception of **Cuba** (36) and **Haiti** (111), the gap between the best and worst performers in the region is much smaller than for any other region. The better performing countries in the region, such **Chile** (51) and **Argentina** (56), seem to share similar strengths and weaknesses, passing the 70% overall human capital maximization threshold. By contrast, **Brazil** (83) somewhat lags behind the regional average.

Several countries in the region have not yet achieved universal primary school enrolment, while, on average, 20% of the region's children do not finish basic education. On the plus side, there is no observable gender gap in education. Many countries in the region are facing high youth unemployment rates in the 15–24 age group. More positively, unemployment in the 25–54 core working age group tends to be in the single digits, and high-skilled employment is in the range of 20%. Labour force participation in the region begins to decline markedly for the 55–64 age group, while at the same time there is also a relatively large share of people in the 65 and over age group that continues to work past their countries' years of healthy life expectancy, indicating some challenges with the region's social welfare net.

The bottom ranks of the region are made up of **Venezuela** (89)—whose performance is particularly disappointing in light of its level of economic development—and the group of Central American nations, such as **Honduras** (93), where incomplete primary education and child labour remain a problem.

Middle East and North Africa

The Middle East and North Africa region comprises 15 countries that had enough data for coverage in the Index. Out of these, only one—**Israel** (23)—makes it into the top 30 of the Index. The gulf states **Bahrain** (46), **Qatar** (66), and the **United Arab Emirates** (69) outperform the rest of the region in terms of making the best use of their human capital potential and score in the mid-range of countries ranked in the Index overall. However, relative to their income levels these countries have additional opportunities to further boost their human capital performance.

The North African nations **Morocco** (98), **Tunisia** (101) and **Algeria** (117) make up the lower end of the regional rankings, ahead of **Yemen** (129) and **Mauritania** (130).

The Middle East and North Africa is one of the most disparate regions in the Index—spanning three income group levels and ranging in age group average scores from those that are in line with other high-income economies in Western Europe and elsewhere to those more in line with

G20

Hosted in 2016 by China, the G20 group of countries continues to place efforts to promote and deploy human capital high on its agenda. The private sector, too, continues its efforts under the umbrella of the B20 Employment Taskforce.⁷ Among the G20, **Japan** (4) is the country with the highest human capital performance, followed by **Canada** (9) and **Germany** (11). **Saudi Arabia** (87), **South Africa** (88) and **India** (105) make up the lower ranks of the group. With a group average score of 73.09 the G20 as a whole has ample opportunity to learn from each other's diversity of experiences across member states. Six of the G20 countries are effectively utilizing 80% of their human capital potential or more, five are scoring in the 70% to 80% range and seven are scoring in the 60% to 70% range. **Japan** (4), the highest-ranked country, has maximized 26 percentage points more of its human capital potential than **India** (105), the lowest-ranked one.

European Union

The 28 member states of the European Union collectively achieve a group average score of 78.48, with 12 member states passing the 80% threshold and 16 member states making use of 70% to 80% of their full human capital potential. With the Nordics and Benelux states making up the top five, **Germany** (11) and **Austria** (12) are the highest-ranked countries behind the top group. The highest-scoring new members states are **Estonia** (15) and **Slovenia** (16), taking 9th and 10th place in an EU-only ranking, behind **Ireland** (14) and ahead of **France** (17). The other new member states make up the lower half of the European Union human capital league table, marginally ahead of **Greece** (44) and **Spain** (45). Despite generally strong overall human capital performances, many European Union countries are experiencing structural difficulties with regard to high youth unemployment. Perceptions also vary regarding the quality of member states' education systems, staff training and ease of finding skilled employees (median rank: 42nd). In June 2016 the European Union launched a new Skills Agenda for Europe, stating that "90% of all jobs will soon require some level of digital skills; yet, today, 40% of Europeans have none."⁸

the worst-performing countries in Sub-Saharan Africa. For example, **Saudi Arabia** (87), whose GDP per capita is nearly fivefold higher, performs at a comparable level to **Egypt** (86), highlighting that economic factors alone are an inadequate measure of a country's ability to successfully leverage their human capital potential. While the region's overall average score of 61.54 masks some of these significant differences in countries' circumstances, it also points to opportunities for countries to learn from one other across the region.

Several critical issues affect the 0–14 age group in certain countries in the Middle East and North Africa region. Gender gaps in secondary school participation and high incidence of child labour in some countries of the region risk leaving a lasting impact on the workforce of the next generation. Youth unemployment continues to be widespread among the 15–24 age group in the region, reaching its highest levels at 33% in **Jordan** (81) and 38% in **Tunisia** (101). Additionally, due to low rates of female participation, the region's 25–54 prime working age group exhibits some of the lowest labour force participation rates in the Index.

North America

With an average score of 80.41, North America is the strongest regional performer on the Human Capital Index, with **Canada** (9) ranking in the top 10. The **United States** (24) lags behind its northern neighbour on the 0–14 Age Group pillar, revealing relative weaknesses in primary and secondary enrolment rates and the quality of primary education. However, the United States also records an impressive tertiary enrolment rate (4th globally). In both Canada and the United States this trend is a continuation of the high proportion of those who have already attained tertiary education across the older age groups.

In both countries, more than 40% of the 25–54 age group is employed in high-skilled occupations (ranking

16th and 22nd, respectively), with the **United States** (24) trumping **Canada** (9) in economic complexity by leveraging more sophisticated knowledge and skills. Despite strong results in education outcomes, labour force participation indicators across all Age Group pillars rank in the middle range of the Index. However, with a 65 and over age group labour force participation rate of 14% and 19%, respectively, and a healthy life expectancy above 70, the region has a relatively high-skilled and productive 'silver' workforce.

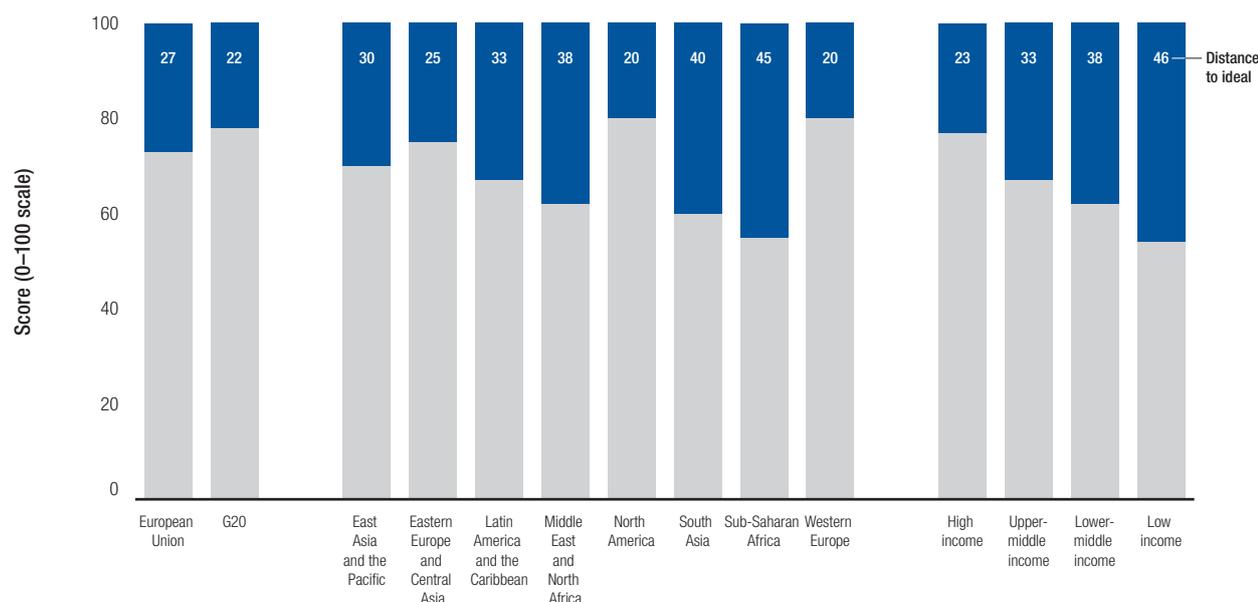
South Asia

The Index covers six countries from the South Asia region: **Sri Lanka** (50), **Bhutan** (91), **Bangladesh** (104), **India** (105), **Nepal** (108) and **Pakistan** (118). The overall average score for the region is 59.92—behind the Middle East and North Africa and ahead of Sub-Saharan Africa—and all but the top two have yet to reach the 60% threshold with regard to optimizing their human capital potential.

The bright spot for the region, **Sri Lanka** (50), benefits from strong educational enrolment and basic education completion rates as well as positive perceptions of the quality of its primary schools and education system overall (23rd on both). However, it underperforms when it comes to translating the potential of its young population to the workforce, with one in four young people not active in employment, education or training.

The region's most populous countries—**Bangladesh** (104), **India** (105) and **Pakistan** (118)—are held back by insufficient educational enrolment rates and poor-quality primary schools. The youth literacy rate in the three countries stands at 83%, 89% and 75% respectively, far behind other emerging markets as well as their own

Figure 3: Distance to the ideal, by region, income and political grouping



Source: Human Capital Index 2016.

lower-middle income group's average. All three countries' educational performance is somewhat better at the tertiary level, despite rather low levels of skill diversity among their university graduates, indicating a strong specialization in a limited number of academic subjects. All three countries also exhibit significant employment gender gaps, exacerbating the difficulty of finding skilled employees, which is ranked low in all countries except India, which ranks 45th on this indicator.

Sub-Saharan Africa

On the Sub-Saharan African continent a cluster of countries, including **Mauritius** (76), **Ghana** (84), **South Africa** (88) and **Zambia** (90), score in the 60–70% range with regard to their effective overall human capital potential utilization—placing them ahead of the Middle East and North Africa regional average and on a par with the lower half of the Latin American and East Asia and the Pacific regions. Other economies, however, such as **Ethiopia** (119) and **Nigeria** (127) face a range of human capital challenges, including low survival rates for basic education. With an overall average score of 55.44, the Sub-Saharan African region is the lowest-ranked region in the Index.

In total, the Index covers 26 countries from the region, of which five are from the upper-middle income group, eight from the lower-middle income group and the remaining 13 from the low-income group. Despite this high regional diversity the Sub-Saharan African region exhibits a number of similar patterns across all age groups.

Ghana (84) and **Zambia** (90) owe their comparatively strong performance in large part to the significantly improved educational attainment of its younger generations. However, both countries still have room for further improvement in primary school enrolment and even more so with regard to

Ghana's 21% and Zambia's 40% incidence of child labour—some of the worst in the region and globally.

Uganda (99) illustrates a number of trends that are also shared by its East African neighbours **Kenya** (102), **Rwanda** (110) and **Tanzania** (116). With a very low NEET rate as well as low tertiary enrolment, the majority of Uganda's 15–24 age group has an early start into the workforce, having a high labour force participation rate (4th globally). The possible downside to this is indicated by the country's 73% incidence of undereducation, the second highest measured in the Index. Encouragingly, there has been an increase in vocational enrolment in recent years.

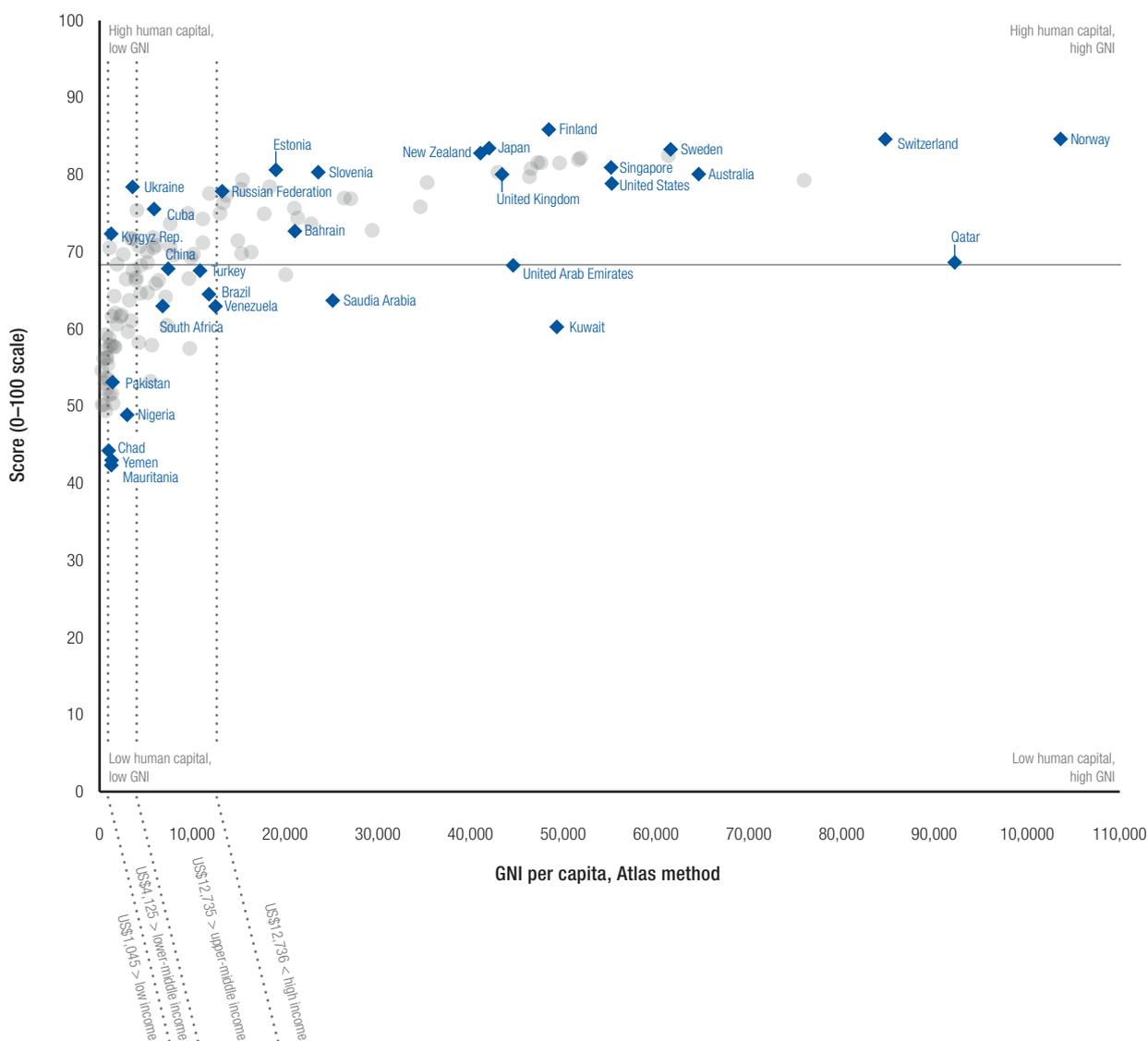
The region has high labour force participation in the 65 and over age group, with all but four countries ranked in the top 30. Yet given the age group's low educational attainment and a healthy life expectancy below 60 years for all countries in the region except Mauritius, this almost certainly reflects activity due to economic necessity and lack of an adequate welfare or pension system. Before discounting this observation as a pure negative, however, it should be noted that this older generation nevertheless continues to provide its younger peers with its knowledge and experience.

Western Europe

Rankings in Western Europe are dominated by the Nordic and Benelux countries—**Finland** (1), **Norway** (2), **Sweden** (5), **Denmark** (7), **Netherlands** (8) and **Belgium** (10)—as well as **Switzerland** (3)—which collectively take the region's top spots. Finland's performance is particularly remarkable, given the much higher GDP per capita levels of the region's two runners-up.

Germany (11), **France** (17) and the **United Kingdom** (19) make up the mid-range of the regional league table,

Figure 4: Relationship between GNI per capita and the Human Capital Index 2016, overall



Source: Human Capital Index 2016 and World Bank.

and the Mediterranean countries—**Italy** (34), **Portugal** (41), **Greece** (44) and **Spain** (45)—the bottom ranks.

The overall average score of the region is 79.86, the second highest after North America, and 12 out of the 20 Western European countries covered by the Index have crossed the threshold of effectively utilizing at least 80% of their full human capital potential. The region shows fairly high homogeneity in human capital in contrast to regions such as East Asia and the Pacific or Middle East and North Africa.

Generally, most of the region is performing below the world average for the 15–24 Age Group pillar on four indicators: Labour force participation rate, Unemployment rate, Long-term unemployment rate and Incidence of overeducation, highlighting some of the structural challenges facing the region. The Mediterranean countries, in particular, continue to be affected by high levels of youth unemployment—reaching 52% in **Greece** (44) and 53% in **Spain** (45), the third and second highest rates measured in the world—but also by high levels of unemployment among

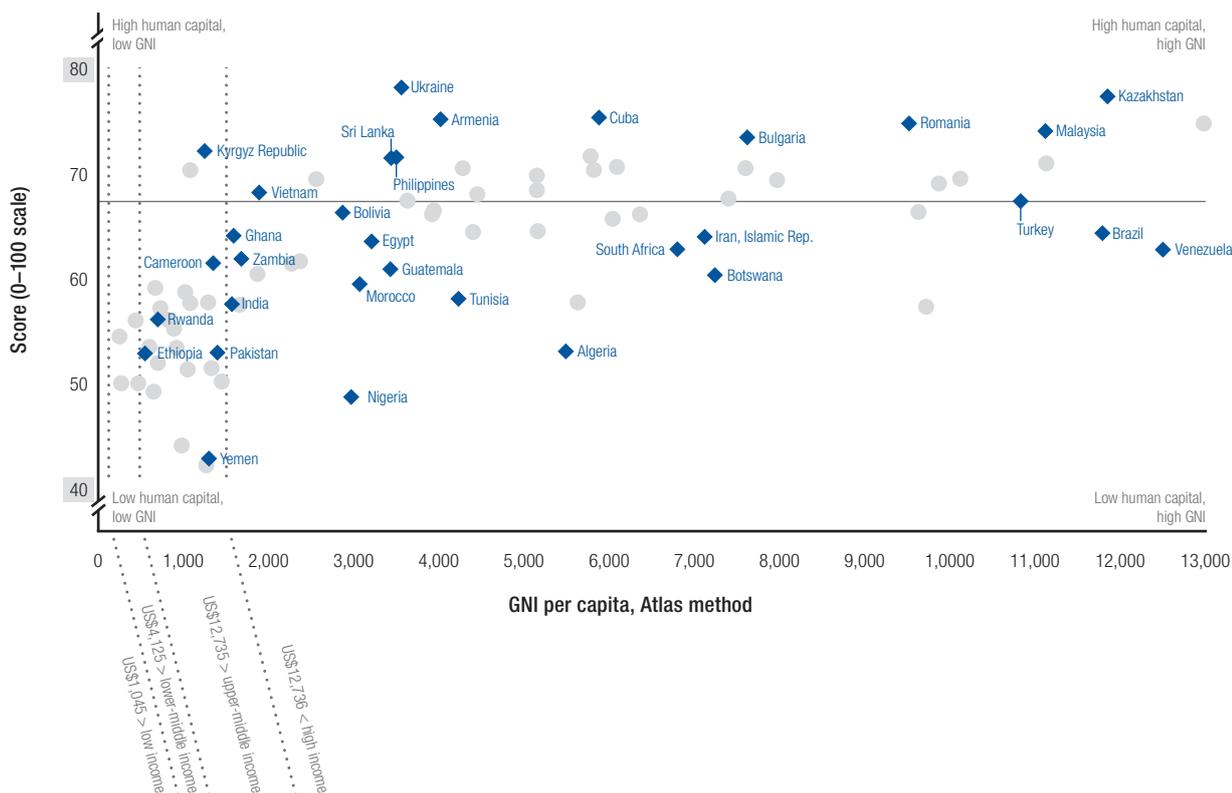
the 25–54 prime working age group. About half of the youth unemployment in both countries is long term, risking a lasting impact on the workforce of the next generation. More positively, the long-term human capital potential of the Western Europe region is nevertheless substantial, encompassing a well-educated older population with high tertiary attainment among its 55–64 Age Group as well as a high healthy life expectancy.

HUMAN CAPITAL AND GROSS NATIONAL INCOME

The Human Capital Index finds a clear correlation between an economy’s income level and its capacity to develop and deploy human capital—countries with higher gross national income (GNI) and GDP per capita have on average higher scores. However, there are significant differences and overlaps within and between income brackets, with some lower-income countries far outperforming richer ones.

Out of the 49 economies covered by the Index in the **high income** bracket (those with a GNI per capita above US\$12,736), all 19 economies passing the 80% human

Figure 5: Relationship between GNI per capita and the Human Capital Index 2016, low and middle-income countries



Source: Human Capital Index 2016 and World Bank.

capital optimization threshold belong to this group, while 22 high income economies score in the 70% to 80% range and eight in the 60% to 70% range.

Among the 32 countries covered by the Index in the **upper-middle income** bracket (those with a GNI per capita between US\$4,126 and US\$12,735), 12 countries score within the 70% to 80% tier, 16 countries within the 60% to 70% tier and four have not yet crossed the 60% threshold.

Within the **lower-middle income** group (countries with a GNI per capita between US\$1,046 and US\$4,125), six out of 33 countries covered by the Index score above 70%, 14 countries score in the 60% to 70% range and 13 have not crossed the 60% threshold.

Finally, none of the 16 **low income** economies (those with a GNI per capita under US\$1,045) covered by the Index have yet maximized 60% of their human capital potential or more, although **Uganda** (99) and **Cambodia** (100) come close.

Figures 4 and 5 display the correlation between GNI per capita levels and performance on the Human Capital Index. For example, **Australia** (18) and **Estonia** (15) are practically tied in their human capital outcomes but record very different GNI per capita levels. Conversely, despite very similar GNI per capita levels, **Ghana** (84) significantly outperforms **Nigeria** (127), indicating that human capital investment and planning can make a difference to a nation's human capital endowment regardless of where it

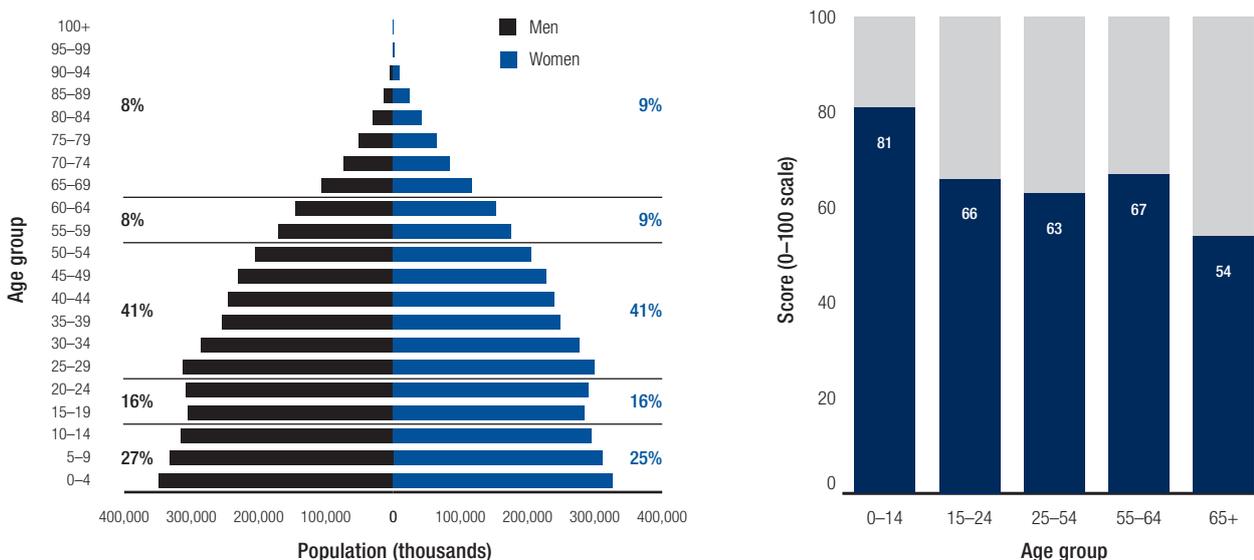
falls on the global income scale. Creating a virtuous cycle of this nature should be the aim of all countries.

GLOBAL HUMAN CAPITAL TRENDS

As of the start of 2016, the world's population is estimated at about 7.4 billion people. Out of these, just over two fifths (41%) fall within the prime working age group of 25–54 year-olds, 16% fall within the 15–24 age group and 26% are aged under 15. At the upper end of the world population pyramid, 9% of the world's people fall within the 55–64 age group and 8% are aged 65 and over (see Figure 6). Aiming to be as representative of each segment of the global population as possible, these percentage distributions are also used as pillar weights in constructing the Human Capital Index.⁹

Going beyond national population averages, our data highlights the unequal development and deployment of human capital across the age-group spectrum (see Figure 6). On average, the world has developed 81% of the human capital potential of the youngest members of the global population for whom the Index assesses education among the most critical factors. This is in line with recent massive investment pushes in this age bracket—such as the former United Nations Millennium Development Goals and UNESCO's Education for All agenda—and places the 0–14 age group significantly ahead of other parts of the global population with regard to its realized human capital potential.

Figure 6: Global population distribution and Human Capital Index average scores by Age Group pillar, 2016



Source: Human Capital Index 2016 and UN Population Division.

However, in the 15–24 age group, for whom the Index emphasizes factors such as workplace relevant skills and a successful education-to-employment transition, countries have on average only leveraged 66% of young people’s human capital potential, pointing to a disconnect between learning and employment in many economies around the world.

Moving on to the next stage within the Index’s life-course approach to human capital analysis, countries on average only make use of 63% of the full human capital potential of their 25–54 year-old prime working age population. As discussed above, at the regional and individual country level, there is, however, a wide divergence around the world in human capital outcomes for this age group, for whom the Index emphasizes continuous learning opportunities in the workplace and employment quality. High-performing countries, such as the Nordics and Switzerland, have maximized more than 80% of the human capital of their prime age population; 16 countries in the Index have yet to cross the 50% threshold.

Finally, the world’s older workforce—for whom the Index assesses both continued opportunity and health and quality of life—is the most underinvested-in segment of the global population, with human capital optimization ranging from 67% on average in the 55–64 age group to only 54% on average in the 65 and over age group.

Our analysis shows that—in addition to measures such as bringing young people into work and preparing the next generation of workers in countries with high youth unemployment—human capital investment must also continue building up the human capital potential of the population above age 25 or risk neglecting, on average, 58% of a nation’s total talent. This is particularly true for advanced, ageing economies with a very different population pyramid from the young, emerging world. In fact, the declining share of the youth cohort in ageing

economies implies that relying wholly on today’s students to meet future skills requirements of the Fourth Industrial Revolution is not going to be enough to stay competitive, since older age groups will continue to form the bulk of these countries’ workforces for a long time to come. With rapidly rising healthy life expectancies, life-long learning and re-skilling of existing workforces will become much more important. Equally important will be the removal of unconscious biases and unintentional disincentives against hiring and retaining older workers.¹⁰ Similarly, barriers to women’s employment throughout the life-course need to be addressed through both public policy, particularly an improved care infrastructure, and private sector efforts.

MAXIMIZING LEARNING AND EMPLOYMENT IN THE FOURTH INDUSTRIAL REVOLUTION

The Human Capital Index is composed of two horizontal sub-themes: **Learning** and **Employment**.

The Employment theme spans, among other things, economic participation, overeducation and undereducation relative to available job opportunities and the nature and quality of employment in each country. The Learning theme points to the transition from primary through to vocational and tertiary level education, the quality of that education, as well as opportunities for learning in the workplace—whether through formal courses or the day-to-day, on-the-job acquisition of tacit know-how in a complex working environment.¹¹ (For full details of the Index structure, please refer to Table A1.)

Countries should aim to maximize human capital outcomes across both themes. The challenge lies not only in equipping a nation’s workforce with timely and relevant knowledge and skills but also in deploying these skills in high-quality jobs throughout all age groups.

As illustrated in Figure 7, the Index reveals uneven levels of Learning and Employment outcomes across the

world.¹² Broadly speaking, economies fall into four groups. First, countries such as **Finland** (1) have developed and deployed their human capital across both dimensions, maximizing their human capital potential. Second, economies such as **Rwanda** (110) and **Vietnam** (68) are doing well on deploying their workforce but could radically improve their Index performance and boost their human capital potential by further improving Learning outcomes to keep pace with the requirements of a complex modern economy. Third, a number of countries, such as **Saudi Arabia** (87) and **Korea, Rep.** (32), have well-educated populations and perform well across the Learning theme but could do more to also leverage this accumulated human capital potential across the Employment theme. Often, additional progress could be made through more inclusive labour markets, including for women, youth and older people. Finally, in economies such as **India** (105) and **Nigeria** (127) efforts are needed to simultaneously improve the development as well as deployment of the nation's human capital potential across the Learning and Employment dimensions for all age groups.

The World Economic Forum's *Future of Jobs Report*,¹³ among a range of other research, has highlighted that perhaps 60% of children entering primary school today might ultimately work in job types that currently don't yet exist. This will create opportunities for countries to improve their performance in unexpected ways while cautioning others against resting on their past successes.

For example, the learning and employment landscape of the Fourth Industrial Revolution will increasingly be shaped not only by technology-enabled education but also by the emergence of digital talent platforms, amplifying people's potential to develop and deploy their skills and experience beyond geographic boundaries while enabling employers to engage and integrate a globally dispersed workforce.¹⁴

Moreover, as both the demand and supply of skills and jobs migrate to a digital environment, there is a new horizon for understanding Learning and Employment. The emergence of digital talent platforms and advances in big data analytics increasingly make it possible to complement standardized international statistics to understand a country's evolving skills requirements and labour market changes in near-real time.¹⁵

Accordingly, the following two sections of the *Report* look at the results of the Human Capital Index—first, with a focus on Learning, then, with a focus on Employment, contextualizing each theme with unique data compiled for this *Report* in collaboration with LinkedIn and other World Economic Forum partners.

LEARNING THROUGH THE LIFE-COURSE

Focusing on the Index's Learning theme, the average score for the under 25 age group (combining the 0–14 and 15–24 Age Group pillars) is 73, while for those above that age (combining the 25–54, 55–64 and 65 and Over Age Group pillars) it is 51. Particularly in developing countries, recent human capital investment in education has mostly been successful at improving the skills and capabilities of the younger generations—dramatically so in terms of enrolment in education, if not always as consistently in terms of education quality.¹⁶ However,

Figure 7: Distance-to-ideal gap for the Employment theme and for the Learning theme

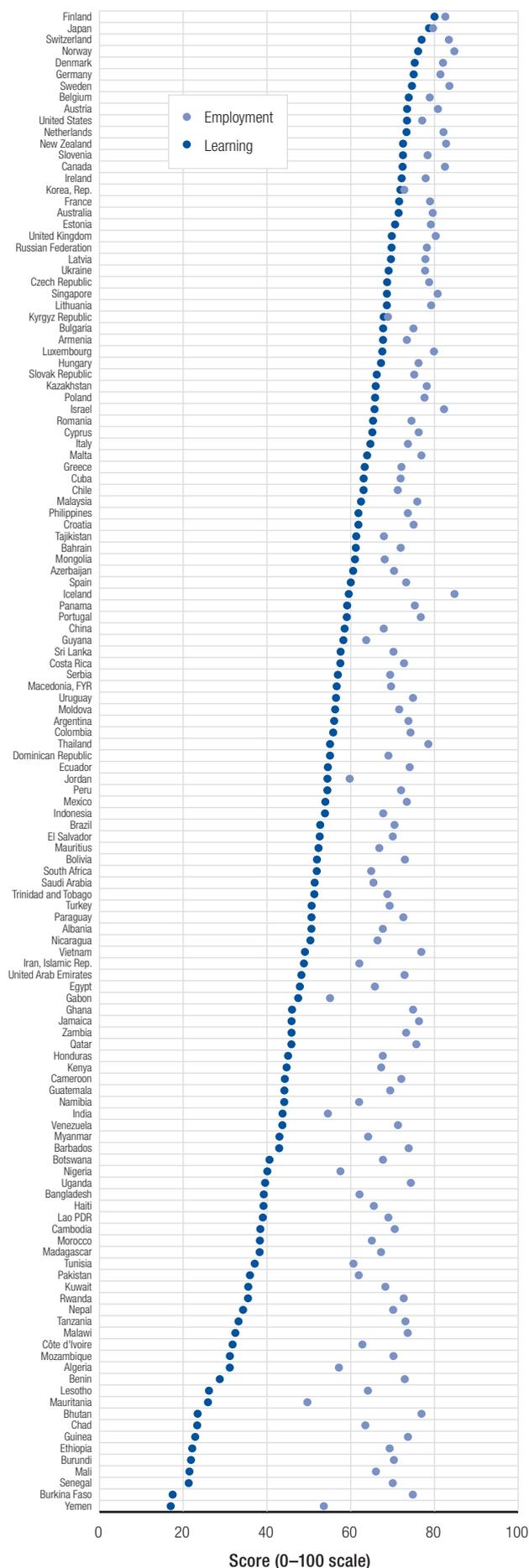
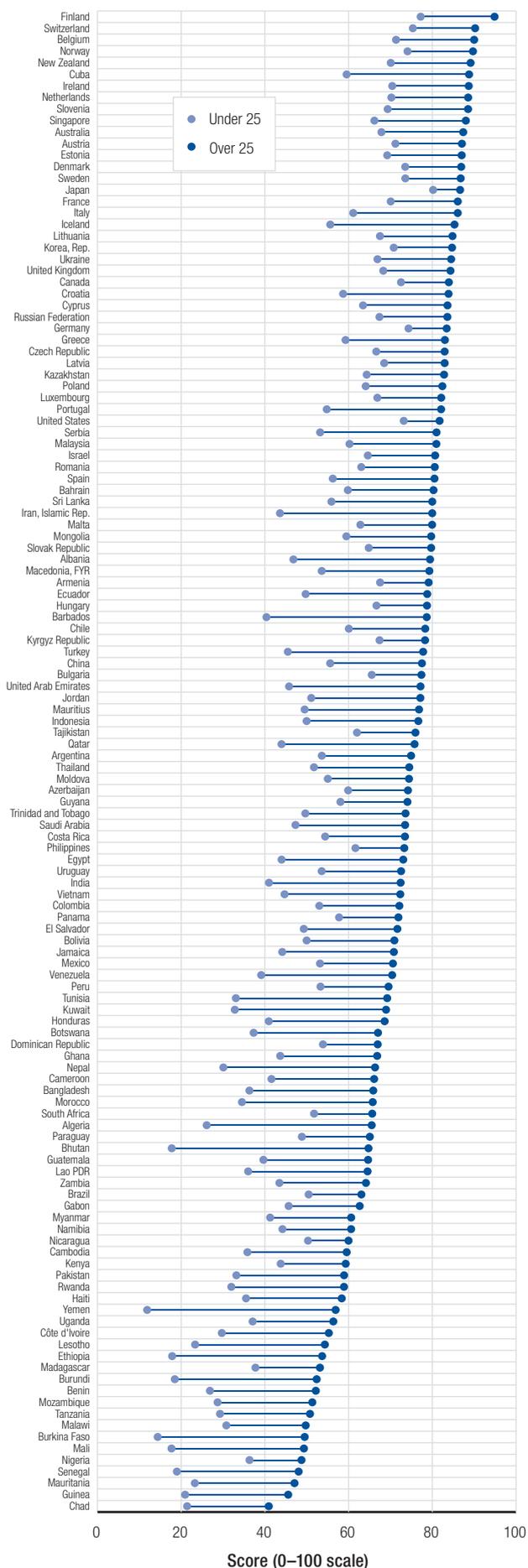


Figure 8: Gap between Learning theme score average, below and above age 25



many education systems around the world continue to operate on an assumption of front-loading students' learning in life, leaving older generations behind with the one-time educational attainment they achieved in their own youth, which contributes to global skills gaps and mismatches. The 22-point Learning score gap between younger and older generations highlights the effects of such front-loaded education systems across the globe. To balance the scales, a wider portfolio of lifelong learning opportunities, as well as flexible and modular learning approaches, is needed.

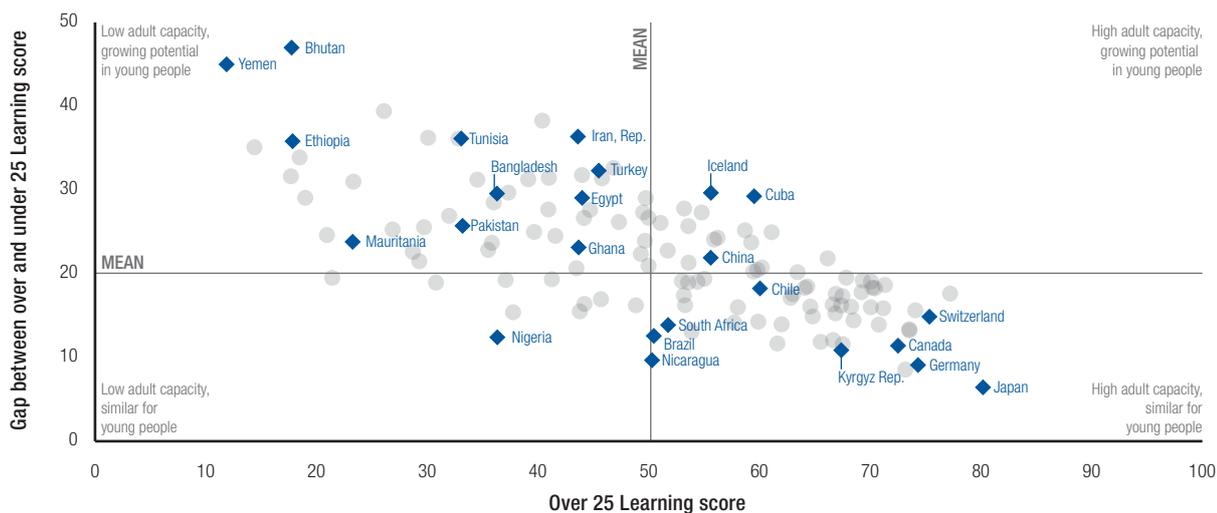
Figure 8 illustrates these points. For countries like **Japan** (4) and the **United States** (24), the comparatively small Learning score gap between the under 25 and over 25 age groups points to previously already high educational attainment levels in the older generations. However, for countries such as **Brazil** (83) and **South Africa** (88) the small Learning score gap between the under 25 and over 25 age groups points rather to a lack of progress in improving educational attainment across generations. In yet other cases, large Learning score gaps point to especially large improvements across generations—notably in the cases of **Yemen** (129) (which moves from 12 in the over 25 age groups to 57 in the under 25 age groups), **Iran, Islamic Rep.** (85) (44 in the over 25 age groups to 80 in the under 25 age groups), **Ethiopia** (119) (18 to 53) and **Iceland** (20) (56 to 85).

Policy-makers as well as business and civil society leaders everywhere will increasingly need to consider the preparedness of different age groups in the population for being re-skilled to meet the skills challenges presented by the Fourth Industrial Revolution. As Dorn and Autor note, “because occupations typically expand by hiring young workers and contract by curtailing such hiring ... [in-demand] occupations will ‘get younger’ while shrinking occupations will ‘get old.’”¹⁷ Accordingly, well-qualified young people are uniquely positioned to meet the demand for newly emerging high quality job types in their country, whether at the vocational or tertiary level.¹⁸ Equipping older workers to do the same, however, will require a focus on continuous lifelong learning and skills upgrading.

Among promising approaches, new digital learning platforms enable high-quality, low-cost learning content to be scaled through personalized, adaptive learning and blended learning technologies. As highlighted in the World Economic Forum's recent *New Vision for Education Report*, digital learning platforms increasingly cover the entire range of the life-course, ranging from children's apps and gamified learning; through online university course learning; to self-paced, casual adult upskilling; to formal technology-enabled on-the-job training.¹⁹ To reach their full potential, these new technologies will need to avoid replicating the silos that often exist between different modes and levels of learning in their offline counterparts in traditional education systems. They will also need to develop new forms of widely recognized accreditation and certification, for example by linking courses completed on online learning platforms such as Lynda.com and Coursera to learners' online professional profiles.

Figure 9 groups countries ranked in the Human Capital Index into four quadrants. Those countries in the top right quadrant, such as **China** (71) and **Iceland** (20) started out from a solid learning capacity already

Figure 9: Inter-generational progress in Learning theme score averages



Source: Human Capital Index 2016.

present in their older generations, which has significantly improved even further for their next-generation workforce. Those countries in the bottom right quadrant—mostly mature economies such as **Japan** (4) and **Switzerland** (3)—had already reached a very high learning capacity in the past generation so that the improvements of the current youth cohort appear less dramatic. By contrast, economies falling within the top left quadrant have made very significant learning capacity gains in their young generation from a low base. It is in these economies—such as **Bhutan** (91), **Tunisia** (101), **Ghana** (84) or **Turkey** (73)—that the successful leveraging of the full human capital potential of the younger generations will be especially crucial to reaping the opportunities of the Fourth Industrial Revolution. Finally, countries in the bottom left quadrant, such as **Nigeria** (127), have so far failed to improve the human capital potential inherent in the learning capacity of their young people from their existing low base in the older generation—raising concerns about these countries’ future human capital trajectory.

Understanding skills diversity

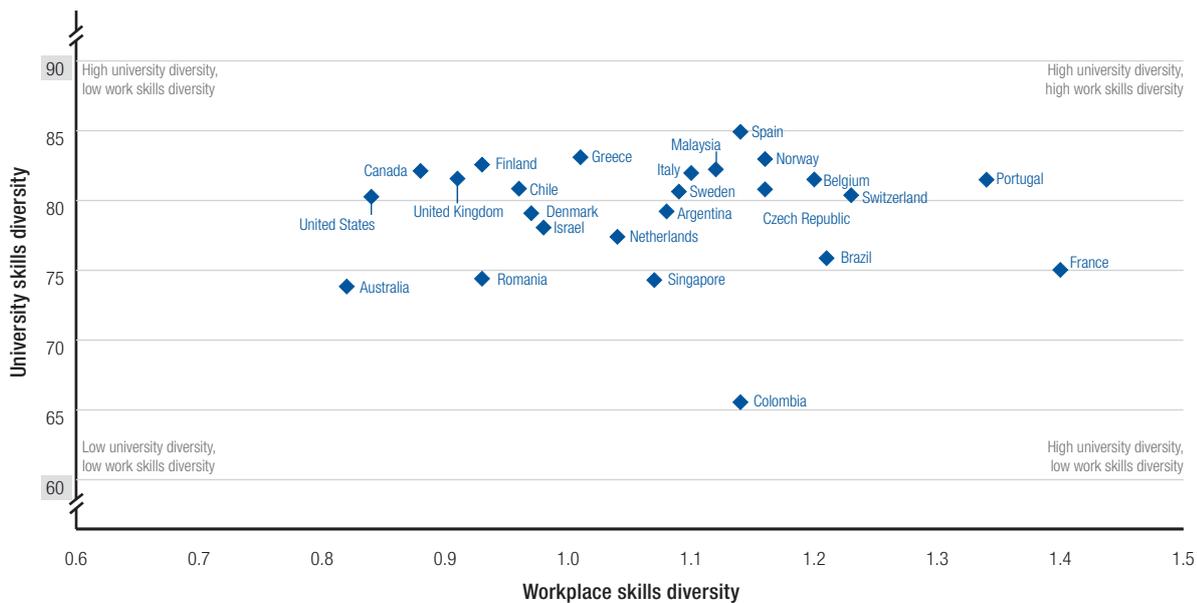
As today’s economies become ever more knowledge-based, technology-driven and globalized—and because we simply don’t know what the jobs of tomorrow will look like—there is a growing recognition that, in addition to increasing educational attainment, it also matters for countries to have at their disposal a diversified pool of different kinds of skills in their labour markets. For example, in the near future, most new jobs will have a technology component to them. This does not mean, however, that all young people everywhere should simply move into core science, technology, engineering and mathematics (STEM) fields or computer programming. As highlighted by the Forum’s *New Vision for Education Report*, among other recent research, what will increasingly be needed in the 21st century is good training in basic

technology competence, asking the right questions, critical thinking, analysing concepts and leading a purposeful life—creativity, collaboration and non-cognitive skills.²⁰ Knowledge of traditional arts and humanities subjects is highly relevant to this, making obsolete past notions of a dichotomy between humanities and sciences. The Human Capital Index takes this into account by compiling a unique skill diversity metric—a measure of the breadth of skills available in an economy or country—based on the degree of diversification of subjects studied in a country’s higher education system.

However, different types of skills are acquired not just during formal education but, importantly, also through on-the-job learning. Data generated by digital talent platforms and professional networks presents novel opportunities to understand the existing skills pool of a country, complementing information about a country’s workforce with potentially more depth, nuance and timeliness than most publicly available international statistics currently can.

For example, LinkedIn’s more than 430 million members record the skills they acquire and use during the course of their professional life on the platform. Currently there are more than 150,000 skills phrases that are self-reported by LinkedIn’s members, which the company has grouped into a dynamic taxonomy of 35,000 standardized skills using modern big data algorithms. Using the composition of these skills across various countries as a base, LinkedIn has created a unique measurement of workplace skills diversity for this *Report*.²¹ We find that—based on LinkedIn’s membership profiles—countries such as **France** (17) and **Switzerland** (3) have access to a considerably more diversified skills pool in their workforce than **Romania** (38) or the **United Kingdom** (19). Despite its renowned education system, **Finland** (1), too, underperforms when it comes to workplace skills diversity, potentially affecting the country’s resilience in a rapidly changing jobs landscape. By contrast, economies

Figure 10: Skills diversity in education and in the workplace



Human Capital Index 2016 and LinkedIn.

such as **Brazil** (83) exhibit a comparatively high degree of workplace skills diversity.

As presented in Figure 10, complementing the core indicator data of the Human Capital Index derived from conventional international statistics with the information generated by digital talent platforms also enables us to identify whether a larger share of the skills pool of any given country is acquired during formal education or on-the-job. While in countries such as the **United States** (24) the young population comes out of the formal education system with broad skills diversity, there is evidence of a much more concentrated set of skills used at work—implying generally narrow specialization in the workplace and, perhaps, fewer workplace learning opportunities.

Portugal (41) does well in skills diversity in education and the workplace while **Australia** (18) performs comparatively poorly in both. Finally, in countries such as **Colombia** (64), while the education system imparts a relatively concentrated set of skills—more than half of all Colombian students graduate in business or a social science subject, while only 4% graduate in natural sciences—there is much greater skills diversity in the workplace, implying a higher level of learning on the job, as well as staff training and other human capital investment by companies.

This data also helps illuminate the practical relevance of these aggregate country-level findings for business, policymakers and employees. Whereas employers and job seekers generally rely on formal education degrees and job titles to determine fit for a role—and national and international statistics agencies similarly capture a country’s human capital endowment in this way²²—the LinkedIn data reveals that understanding an economy’s human capital base at the actual skills level is crucial because formal qualifications alone are often insufficiently meaningful and job titles may imply very different skills requirements in different industries and geographies.²³ Therefore, skills are

a foundational block in formulating future workforce and human capital strategies.

Figures 11(a) to (d) illustrate these points through the case of LinkedIn members with the job titles: (a) Care Manager, across the Hospitals & Healthcare and Non-profit industries; (b) Product Development Engineer, across the Automotive and Semiconductor industries; (c) Data Analyst, across the Market Research and Oil & Energy industries; and (d) Data Analyst, across the Financial Services and Consumer Retail industries.

For example, whereas there is some overlap between the skillset of care managers across the two industries, the non-profit sector version of the role requires a much stronger skillset related to crisis intervention whereas the profile of the same role in the hospitals & healthcare industry is more focused on healthcare management. Similarly, the skills profile of product development engineers in the automotive and semiconductor industries differs greatly. The higher the skills overlap between two industries, the easier it is to transfer between them. For example, there is little skills overlap between LinkedIn members with the job title “data analyst” in the market research and oil & energy industries. By contrast, data analysts in the financial services and consumer retail industries exhibit very similar skills.

Practically, this degree of detailed skills information can help business, policymakers and employees in two distinct ways. First, it reduces skills gaps by helping employers—and employees—understand better how far they can cast their net when job searching and recruiting and which set of skills may be most transferable across industry boundaries. For example, an employer in the financial services industry facing a gap in data analyst roles can reasonably expect to consider applicants from the consumer and retail industry given the overlapping skillsets despite the different

Figure 11(a): Skills diversity of the care manager job title across industries

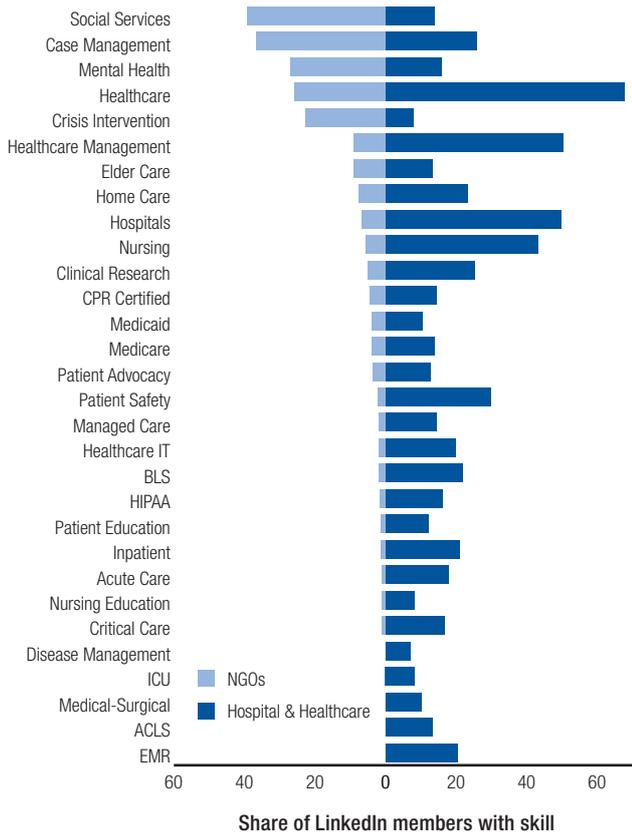


Figure 11(b): Skills diversity of the product development engineer job title across industries

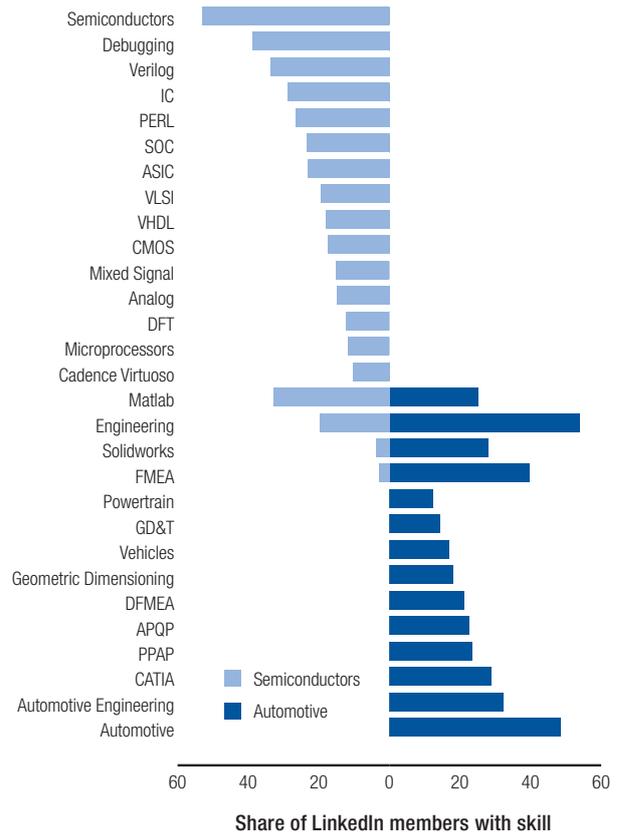


Figure 11(c): Skills diversity of the data analyst job title across industries

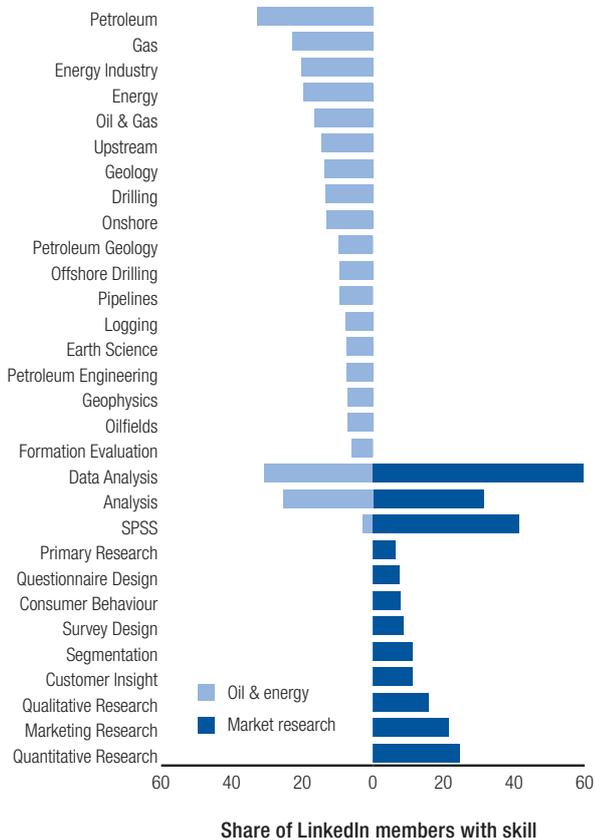


Figure 11(d): Skills symmetry of the data analyst job title across industries

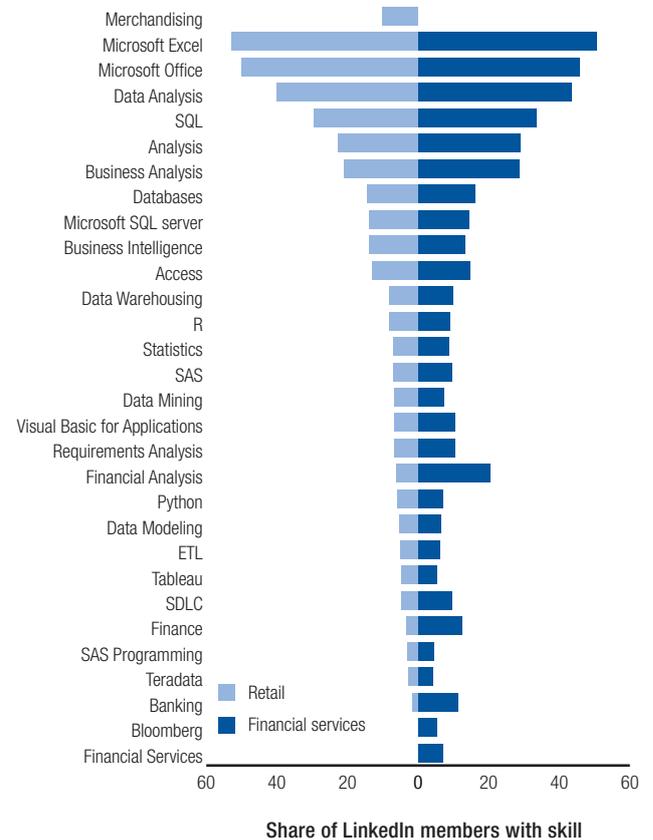


Table 2(a): Job titles with high skills transferability across industries

High skills transferability	Skills-transferability score
HR Business Partner	0.94
Web Developer	0.92
Digital Marketing Specialist	0.91
Network Engineer	0.90
Network Administrator	0.90
Accountant	0.90
Web Designer	0.87
Registered Nurse	0.87
Financial Controller	0.87
Software Developer	0.86
Lawyer	0.85
Graphic Designer	0.85
System Administrator	0.84
Journalist	0.84
IT Project Manager	0.82
Financial Analyst	0.82
Bookkeeper	0.82
Social Media Manager	0.80
Psychologist	0.80
Software Engineer	0.78

Source: LinkedIn.
 Note: For each job title, a lower score indicates that different industries require **different** skill sets; a higher score indicates that different industries require **similar** skill sets. Scores normalized on a scale from 0 to 1.

Table 2(b): Job titles with low skills transferability across industries

Low skills transferability	Skills-transferability score
Deputy	0.11
Consultant	0.14
Superintendent	0.17
Technologist	0.18
Contractor	0.19
Technician	0.20
Project Manager	0.22
Lecturer	0.22
Inspector	0.22
Engineer	0.27
Doctor	0.27
Designer	0.28
Coach	0.28
Strategist	0.29
Mechanic	0.29
Sales Representative	0.31
Product Manager	0.31
Developer	0.31
Author	0.31
Investigator	0.33

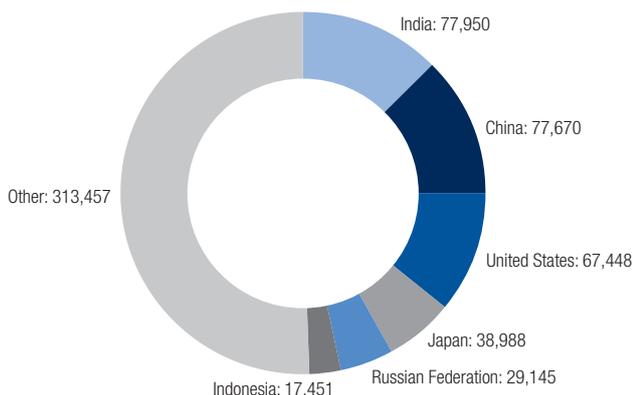
Source: LinkedIn.
 Note: For each job title, a lower score indicates that different industries require **different** skill sets; a higher score indicates that different industries require **similar** skill sets. Scores normalized on a scale from 0 to 1.

Figure 12: The hundred largest talent flows between countries



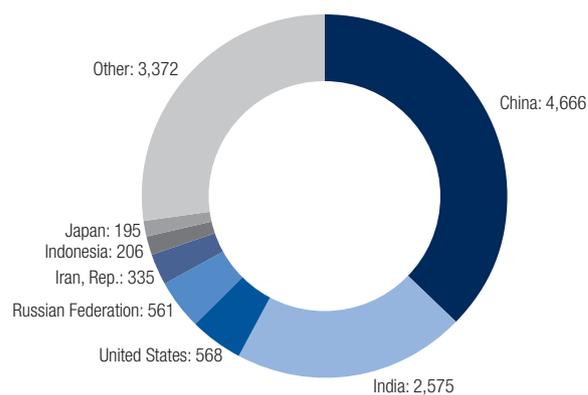
Source: LinkedIn.

Figure 13: Global distribution of tertiary degree holders



Source: Human Capital Index 2016 and UNESCO.
Note: Values in thousands.

Figure 14: Global distribution of recent graduates, STEM subjects



Source: Human Capital Index 2016 and UNESCO.
Note: Values in thousands.

industries, as per Figure 11 (d), increasing the size of the firm’s potential talent pool and likely reducing time-to-hire.

Second, more specific assessments of the level of skills transferability between selected industries and selected professions could be used to inform reskilling and upskilling strategies, or even facilitate the wholesale retraining and redeployment of workers from one job function or industry to another based on skills-adjacency in industries disrupted by the Fourth Industrial Revolution.²⁴ In the long term, countries can build resilience to labour market disruptions and changing job requirements by amplifying the diversity of their national skills base. Table 2 specifies the level of skills transferability for current job titles and roles across different industries (see Table 2).

Preparing talent for the future

The degree of skills diversity varies country-by-country. However, just because a country has an abundance of a certain in-demand skill now, there is no guarantee that it will continue to do so indefinitely in the future. Data from LinkedIn’s Economic Graph²⁵ makes it possible to visualize the inflow and outflow of human capital between countries—as workers with in-demand skills go where there is opportunity—to identify the specific skillsets countries are gaining and losing in the global marketplace for talent (Figure 12). A mapping of this kind of skills flows between countries is an opportunity for governments, businesses and employees alike to understand skills hotspots in near real-time.

As the Fourth Industrial Revolution disrupts firms’ business models and economies’ development strategies, countries will require larger pools of particular groups of relevant skills to guarantee their long-term economic success. One set of skills that will be in high demand over the coming years is related to science, technology, engineering and mathematics (STEM), and one measure of the future-readiness of industries and countries will be the breadth and depth of these skills within their overall skills pool. The Human Capital Index reveals that a significant

share of the world’s total graduate pool in STEM subjects—combining the Engineering, Manufacturing, Construction and Natural Sciences fields of study, per UNESCO’s classification—is produced by a relatively small number of countries, not surprisingly those with larger populations (see Figures 13 and 14). While proportionality to local population is also still an important factor in influencing demand, in a world with increasingly mobile talent, someone coming out of university with in-demand talent in any part of the world can become a potential recruit for anyone across the globe, giving rise to new global patterns of physical and digital talent mobility.

Economic Graph data analysed by LinkedIn for this *Report* shows how countries are gaining or losing in-demand skills, reflecting in part declining opportunity within some countries as well as growing demand in others—and vice versa for net inflows of specific skills. For example, **Australia** (18), **Chile** (51) and the **United Arab Emirates** (69) are all leading their regions in gaining technology-related skills while Mediterranean countries such as **Greece** (44)—but also **Canada** (9) and **Finland** (1)—are losing them (Table 3).²⁶

To prepare talent for the Fourth Industrial Revolution, businesses must re-think their role as a consumer of ‘ready-made’ human capital and instead work with educators and governments to help education systems keep up with the needs of the labour market. Some companies understand this and are already investing in the continuous learning, re-skilling and up-skilling of their employees, but most employers still expect to obtain pre-trained talent from schools, universities and other companies. One important part of the solution is to look beyond formal qualifications, job titles and functions to reveal implicit skills and possibilities for re-skilling and up-skilling, especially in areas where there are global skills shortages and hence unmet demand.

For example, globally, only about 84,000 of LinkedIn’s 430 million members have the job titles Data Analyst or Data Scientist, a highly in-demand job function for which

Table 3: Economies gaining and losing technology-related skills

Economies gaining skills		Economies losing skills	
Australia	Oracle	Greece	Strategy
	Web Services		MySQL
	XML		Construction
	SQL		Linux
	Java		Change Management
	Software Project Management		SQL
	C#		Risk Management
	JavaScript		Telecommunications
	Microsoft SQL Server		Team Management
	Agile Methodologies		Business Analysis
Chile	MySQL	Canada	Matlab
	Engineering		Strategic Partnerships
	SQL		Statistics
	Management		Salesforce.com
	HTML		Facebook
	Java		Critical Thinking
	Teamwork		Integrated Marketing
	Project Management		SEO
	AutoCAD		Construction Safety
	Project Planning		Python
United Arab Emirates	C	Finland	User Experience
	JavaScript		Online Advertising
	Java		E-commerce
	SQL		Online Marketing
	C++		Mobile Applications
	Matlab		Digital Marketing
	HTML		Start-ups
	Microsoft SQL Server		Security
	Talent Acquisition		Web Design
	Mechanical Engineering		Financial Analysis

Source: LinkedIn.

Note: Ranked by net movement of skill as a fraction of countries' total talent pool for that skill.

employers and countries frequently report shortages.²⁷ However, there currently are an additional 9.7 million LinkedIn members who have one or more of the primary skills or sub-skills to be qualified data analysts listed on their profiles, of which 600,000 have at least five of these skills or more (see Table 4).²⁸ Clearly, while having one or even five related skills does not make one a data scientist, it is likely that a large percentage of this population—especially those who already have a significant bundle of related skills—could learn the additional skills necessary with a comparatively modest amount of supplemental training.

By creating greater transparency around skills, it becomes possible to engage a part of the workforce that may not even realize that they have adequate skills

to retrain relatively quickly. This is particularly relevant for activating the human capital potential of parts of the population that are in occupations that are at risk of being left behind by the Fourth Industrial Revolution, including many that are held in the majority by specific demographic groups such as women, youth and older workers.²⁹

EMPLOYMENT THROUGH THE LIFE-COURSE

Within the Index's Employment theme, two measures are key to understanding human capital under-investment and under-utilization through lost employment opportunities across the age group spectrum of the global population: the economically inactive part of the population and the unemployed population.

Table 4(a): LinkedIn members by job title with data specialism

Job Title	LinkedIn members worldwide with job title
Data Analyst	60,273
Data Scientist	12,680
Database Analyst	4,357
Business Data Analyst	1,709
Senior Data Scientist	1,691
Sr. Data Analyst	1,131
Data Analysis	1,118
Master Data Analyst	1,001

Source: LinkedIn.

The economically inactive population includes those not looking to join the labour force for the time being—including individuals who are not of a working age, students enrolled in full-time education, the elderly, primary caregivers in families who take on this responsibility full-time, as well as those who are unable to work due to ill health and those who have abandoned their attempts to find work in the labour market out of an expectation that they won't find any. The economically active population includes those in any kind of work: part-time or full-time, short-term or long-term, as well as individuals actively looking for work—the unemployed. Despite some internationally coordinated efforts at better measurement, the informal labour market, care work, short-term work and own-account work remain inadequately reflected in conventional labour statistics.

Along the world population's globally aggregated life-cycle, a series of peaks and troughs can be observed. Among those under age 25, we see high levels of economic inactivity, mostly relating to study and transition-to-work patterns. The expectation that young people should work between the ages of 18 and 24 varies by economy, and this is reflected in the Index's data. We observe some of the highest unemployment rates globally

Table 4(b): LinkedIn members with data analysis skills

Number of data related skills	LinkedIn members worldwide with number of skills or more
10	37,689
9	60,419
8	98,284
7	169,351
6	305,266
5	576,310
4	1,097,849
3	2,065,318
2	3,870,376
1	9,708,214

Source: LinkedIn.

among young adults in countries such as **Serbia** (57), **South Africa** (88), **Spain** (45) and **Tunisia** (101). Only 38 economies in the Index have youth unemployment rates in the single-digits, with **Qatar** (66) and **Japan** (4) particularly notable in this regard.

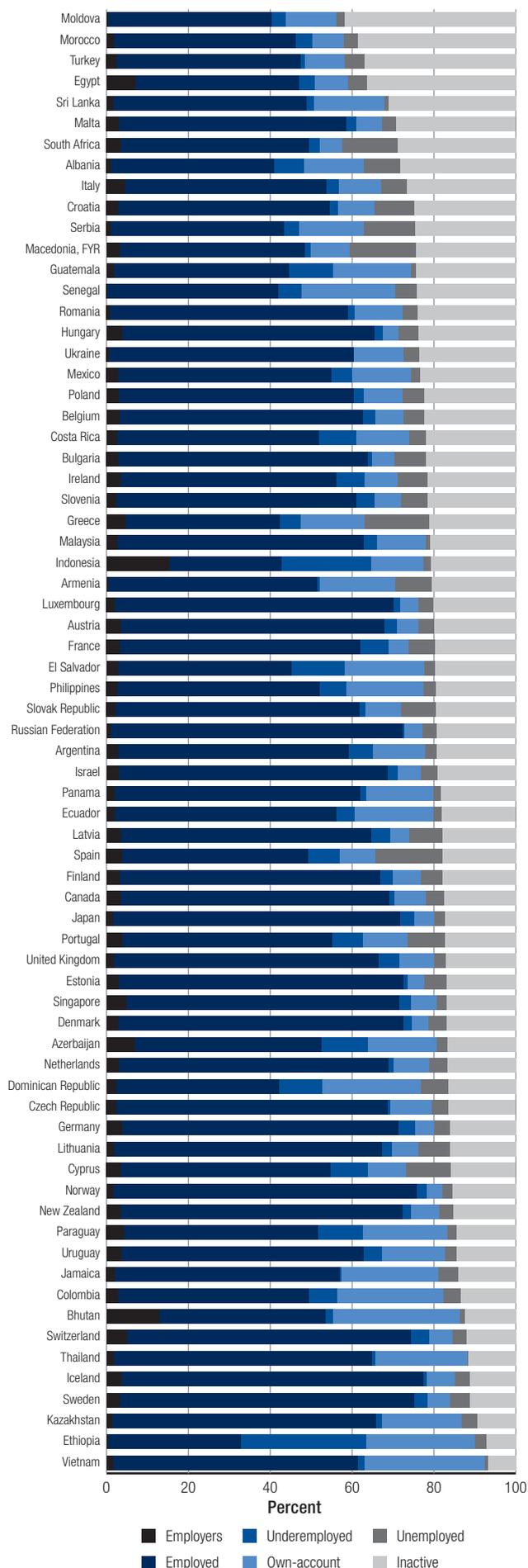
On the other end of the age group spectrum, after the age of 54 we observe a sharp rise in the global economically inactive population—with notable exceptions, for example, in **Iceland** (20) and **Switzerland** (3). Most countries see a more dramatic drop in economic activity after the age of 65, corresponding to the legal retirement age in many economies. Nevertheless, about a quarter of the world's population age 65 and over remains active in the labour force. In predominantly lower-income economies, such as **Malawi** (114), older people often work past their country's healthy life expectancy out of economic necessity. By contrast, in higher-income economies such as **New Zealand** (6), a significant share of older workers remains economically active, corresponding to higher life expectancies, enabling their country to leverage the human capital potential of an experienced 'silver' workforce. Among a cluster of countries—principally in the Middle East and North Africa but also, for example, in **Korea, Rep.** (32)—low workforce participation during the prime working

Table 5: Global population by workforce participation status and age

Age group	Employed labour force, % of economically active population	Unemployed labour force, % of economically active population	Economically inactive population, % of total population
15-24	32.36	13.72	53.92
25-54	73.16	5.58	21.26
55-64	56.12	3.72	40.16
65+	25.78	2.94	74.22

Source: Human Capital Index 2016 and ILOSTAT.

Figure 15: Distribution of the working age population by employment status, selected countries



Source: Human Capital Report 2016 and ILOSTAT.

age of 25–54 is related to women’s low participation in the labour market.

Across all age groups, a particular case is presented by those considering themselves underemployed—people who would be willing and available to work additional hours but who have failed to obtain such work under prevailing labour market conditions. This ranges from one in three young people age 15-24 in countries such as **Ethiopia** (119), **Indonesia** (72) and **Paraguay** (82) to about 10% of the total older workforce in many European countries.

Types of employment

Full-time work for a single employer is one of a number of avenues through which people earn their livelihood and develop their human capital potential. It is, however, far from the only form of employment. Some people form companies and become employers themselves. Others take part in freelance or limited-time contract work across a wide range of sectors. Especially in the developing world, many people contribute to a family business, often in agriculture.

On average, based on the available data from the Human Capital Index, we estimate that, globally, around 53% of the working age population are employees of some kind—whether working formally for others, working for others without a formal contract in the informal economy or contributing to a family business.³⁰ Another 13% are self-employed, own-account workers, 4% are unemployed and 20% are inactive—having dropped out of, or never entered, the labour market (Figure 15).

Regular employment is highest in countries such as **Sweden**, **Iceland**, **Switzerland** and **Germany**. More than a quarter of all workers in **Bhutan** (91), **Vietnam** (68) and **Colombia** (64) are own-account workers. In addition, 30% of workers in **Ethiopia** (119) and 22% in **Indonesia** (72) are underemployed while in countries such as **Morocco** (98), **Turkey** (73), **Egypt** (86) and **South Africa** (88) around a third of the population is economically inactive.

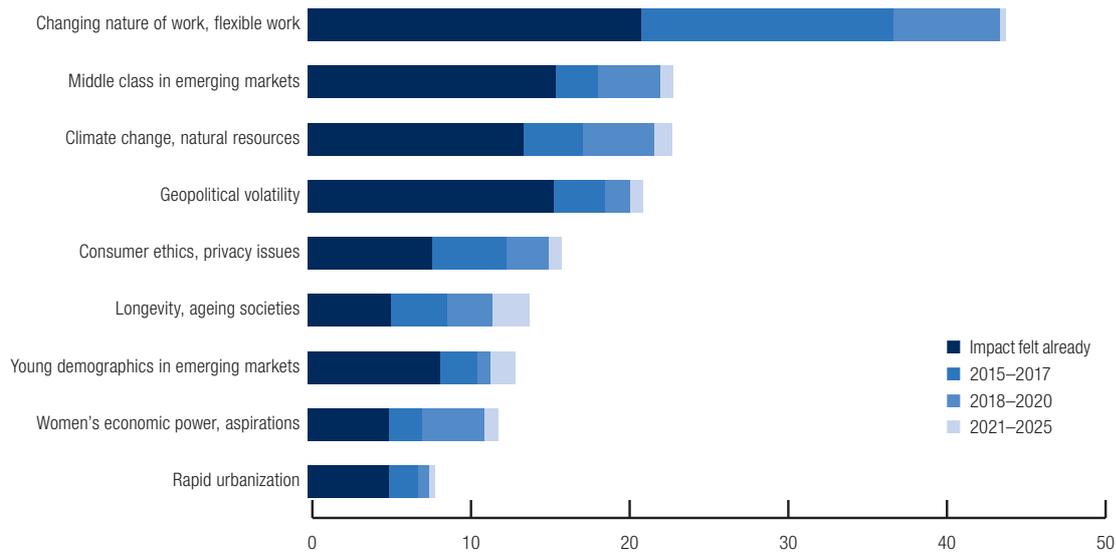
Digitization of labour markets

Advances in technology are leading to a reformulation of the global work landscape. As revealed in the World Economic Forum’s recent *Future of Jobs Report*, digital disruptions, together with demographic and socio-economic drivers of change are transforming traditional employment. Some disruptions to industries will necessitate a shift in employees’ skillsets, while others will lead to wholly new jobs or make particular roles redundant. A number of these disruptions are impacting the nature of what it means to be an employee, as work begins to be outsourced in new formats. The Future of Jobs Survey data revealed that global business leaders perceive changing work environments and flexible working arrangements to be a key disruption—on average, ahead of drivers of change such as machine learning and automation—and as one that is already felt across countries and industries (Figure 16).

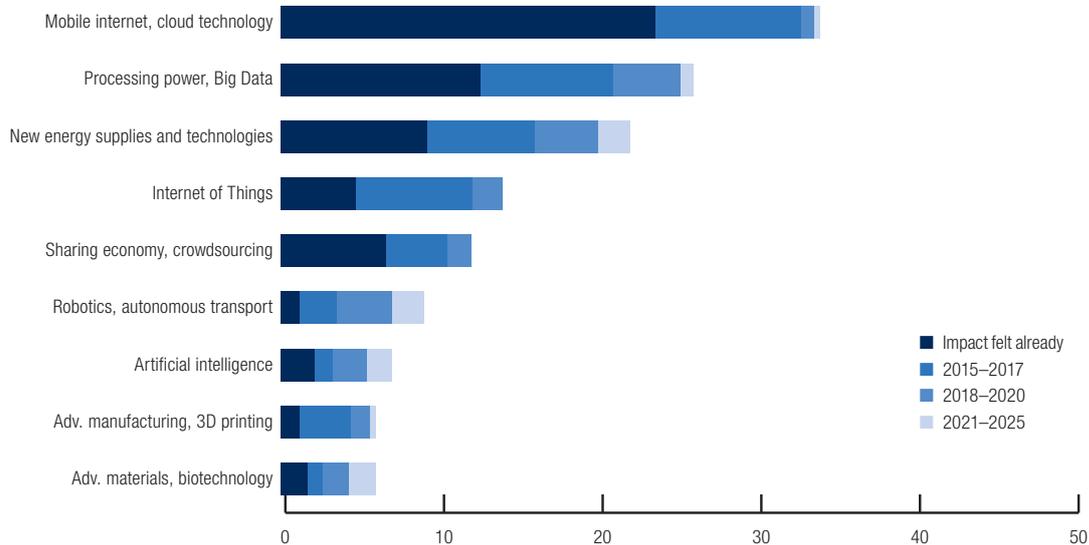
Own-account workers, in their reformulated role within the disrupted labour market, have been re-imagined as the “contingent workforce”, “on-demand workforce”, “online platform economy”, “alternative work arrangements” and “gig economy”. The ways in which workers engage with those formats vary from moonlighting to full-time freelance work, as well as, in some cases, building a business.

Figure 16: Drivers of change, time to impact on business models
Share of respondents, %

DEMOGRAPHIC AND SOCIO-ECONOMIC



TECHNOLOGICAL



Source: Future of Jobs Survey, World Economic Forum.
Note: Names of drivers have been abbreviated to ensure legibility.

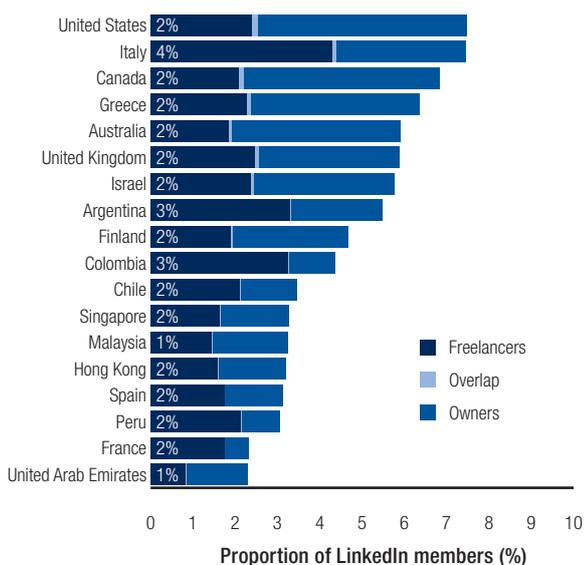
Some workers enter these new digital landscapes by choice, others more by necessity—seeking to supplement their income. Moreover, a growing number of participants in these roles are those previously outside the labour force due to not being able to find work suiting their circumstances.

Both the real and perceived blurring of boundaries between traditional and own-account work as well as the growth of own-account work through digital platforms has given rise to many uncertainties in modern labour markets—and many new opportunities, if managed well. Using both public and private data from a selection of digital talent platforms, we aim to shed light on some of these unknowns and identify potential opportunities.

First, although digital formats for connecting people to work are relatively new, the act of ad-hoc work or self-employment is not. With a global average of 13% own-account workers, the world working-age population is

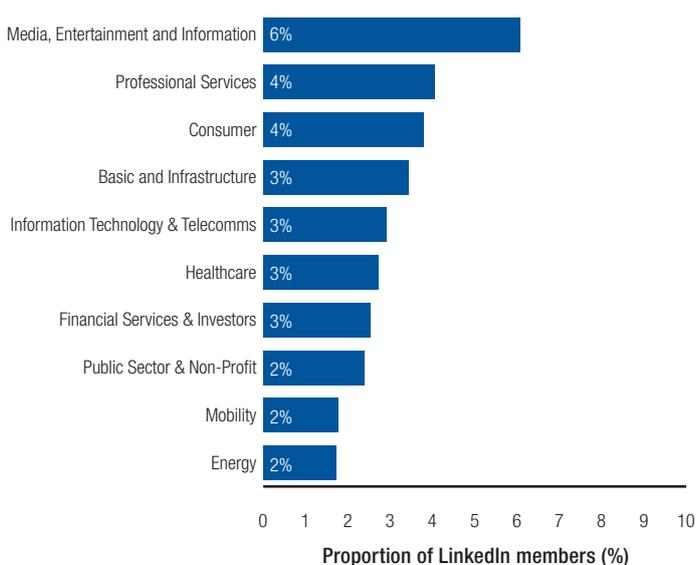
already deeply engaged in analogue formats of on-demand work. As Figure 15 highlights for economies where this data is available, these figures vary significantly by economy. Workers enter into formal agreements either directly or through traditional talent platforms, including staffing firms, to provide their skills and services and this is still the majority of own-account work in most countries. Emerging digital platforms have begun to provide potential workers with easy access to an online marketplace—in effect, a newly digitized labour market. This type of work can range from being based on long-term relationships to short-term gigs and can fall under various regulatory classifications.³¹ Economic Graph data analysed by LinkedIn for this *Report* indicates that in each country, between 1.8% to 2.6% of members identify themselves as being part of the analogue or digital on-demand economy (Figure 17). Searching the public information listed on members' profiles for various keywords

Figure 17: Freelancers and owners across economies, distinction and overlap



Source: LinkedIn.

Figure 18: Share of freelancers in selected industries



Source: LinkedIn.

Note: Industry averages based on countries shown in Figure 17.

to identify gig-economy workers, LinkedIn also analysed the on-demand economy at an industry level. As illustrated in Figure 18, as seen through the prism of LinkedIn’s membership, the freelancer economy is most prevalent in the Media, Entertainment and Information industry, at 6%, specifically in writing and editing (21%) and graphic design (14%).

Second, own-account work is growing, including own-account work enabled by digital platforms, but digital formats remain a small portion of own-account work. Some of the fastest growing new opportunities for work in countries such as the **United States** (24) are on such platforms.³² Recent research by Harvard economist Lawrence Katz and Princeton’s Alan B. Krueger finds that “all ... net employment growth in the U.S. economy from 2005 to 2015 [9.4 million jobs] appears to have occurred in alternative work arrangements.”³³ However, these arrangements for the most part did not involve work arranged through online gig-economy platforms, which Katz and Krueger estimate to actually only account for 0.5% of the U.S. labour force in 2015. Similarly, De Groen and Maselli estimate that, as of 2015, digital talent platforms accounted for a small fraction of total employment across the European Union.³⁴ However, both sets of researchers acknowledge that the gig workforce is growing rapidly, with some estimates suggesting that 40% of U.S. workers—about 60 million people—might be accessing work opportunities through digital talent platforms by the year 2020. According to the U.S. Congressional Research Service, “to date, no large-scale official data have been collected; and there remains considerable uncertainty about how to best measure this segment of the labour force.”³⁵ LinkedIn’s data was able to shed some light on whether online gig-economy workers represent a new form of work or a continuation and digitization of existing analogue forms of own-account work. LinkedIn specifically analysed the overlap between

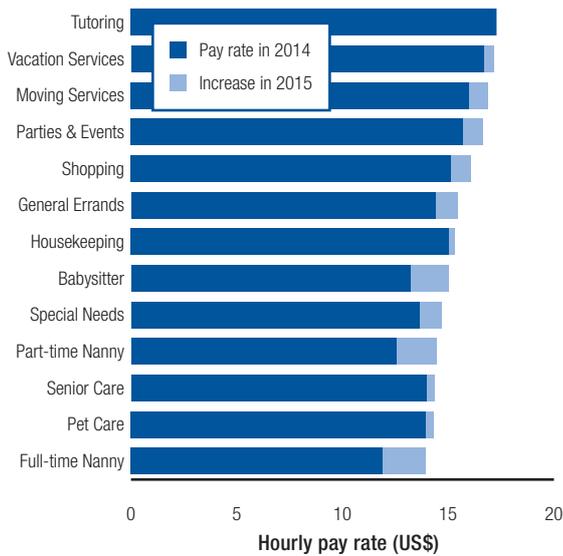
members who identify themselves primarily as gig-economy workers and those who call themselves “owners” or “entrepreneurs.” As can be seen in Figure 17, within the LinkedIn membership, there is little overlap between the two, providing further support for the hypothesis that growth in the online gig economy is thus far primarily the result of connecting those who were previously own-account workers.

Third, digital platforms are prevalent in both the developed, emerging and developing world, where the number of own-account and informal workers are traditionally higher. In **China** (71), Didi Chuxing,³⁶ the country’s largest on-demand transportation platform, is currently utilized by some 13.3 million registered drivers (as of April 2016, a 600% year-on-year growth rate), accounting for 4.2% of overall mobility industry employment in China. Of these, 1.86 million drivers (14%) are women, and also include other demographic groups such as formerly laid-off workers and small business owners. Seventy-five percent of drivers use the platform part-time, driving less than four hours per day, while 78.1% reported a more than 10% income increase—and 39.5% a more than 30% income increase—from using the platform. Countries such as the **Philippines** (49) and **Kenya** (102) have staked large parts of their human capital development strategies on digital business process outsourcing (BPO). Companies such as Sama³⁷ have successfully pioneered business models linking low-income populations in parts of Africa and South Asia to digital work.

Fourth, digital work platforms can span a range of both high-skilled, high-paid work and low-skilled, low-paid work as well as varied durations of tasks and relationships associated with them. The selection of platforms highlighted below represent a very wide-range of skills between them.

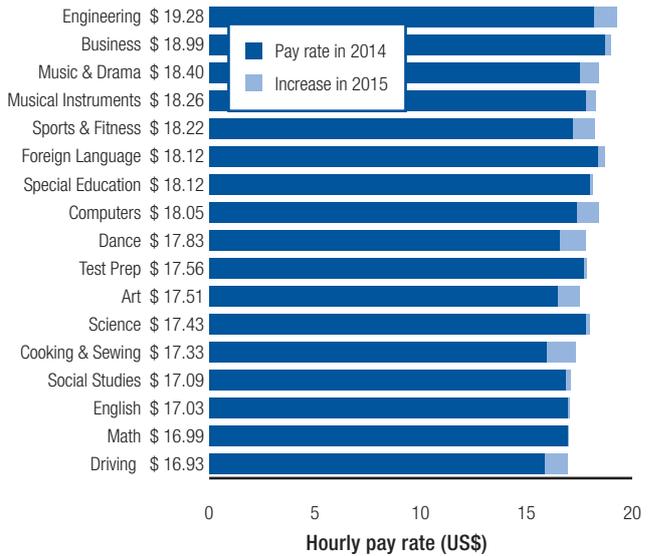
Less evident but equally illuminating is the range of skills and pay rates within some of these platforms. For

Figure 19: Average hourly pay rate (US\$) for care roles (Care.com)



Source: Care.com

Figure 20: Average hourly pay rate (US\$) for tutoring (Care.com)



Source: Care.com

Table 6: Overview of digital talent platforms

Digitized labour markets in:	Mobility	Knowledge Work	Care
Example:	Uber	Upwork	Care.com
How many providers	Over 1 million drivers	12 million freelancers	8.9 million caregivers
How many clients	—	5 million clients	11 million families
Where	Approximately 70 countries	Freelancers from more than 180 countries; top earning: United States, Ukraine, Pakistan, India and Philippines; top commissioning: United States, United Kingdom, Canada, Australia	16 countries spanning North America and Western Europe United States represents 85% of platform members
Full-time / part-time	50% of drivers work on average less than 10 hours per week*	—	41% full-time care 59% part-time care
Demographics of providers	22% in 50-64 age band; 36% economically inactive before joining; 49% worked as drivers before; 14% female, 37% college-educated; 74% motivated by maintaining a steady income	High-skilled: 27% have a masters degree or higher; range across the working age population and retirees; valuing opportunity for flexibility; 60% started freelancing more by choice than necessity*	94% female, 61% college-educated; experienced care professionals moonlighting, college students 'doing errands'
Demographics of clients	—	Clients range from sole proprietors to Fortune 500 companies. 50% of clients are start-ups.	82% female; just above the median United States income
Range of services	Transportation services encompassing cars with varying levels of luxury, car pooling	Any knowledge-based worked that can be done online: digital development, graphic design, content writing, customer support and others	Childcare to senior care, pet care, housekeeping and a variety of other services
Most in-demand category	UberX*	Web, mobile and software development (hourly rates up to US\$150 and more)	Childcare (hourly rate of US\$14.32)
Skills with high relative increase in demand	—	Developers with skills in: AngularJS; Node.js; WooCommerce (eCommerce)	Full-time and part-time nannies, childcare

Source: Uber, Upwork, Care.com

Note: U.S. figures only where indicated by an asterisk (*).

Table 7: In-demand skills and service functions on Upwork

Upwork category	In-demand	Fastest growth
Web, mobile and software development	Developers (front- and back-end) with skills in: Android and iOS; HTML5, jQuery and Javascript; PHP	Developers (front- and back-end) with skills in: AngularJS; Node.js; WooCommerce (eCommerce)
Graphic design and creative content	Graphic, web and logo designers; Illustrators	UX and UI designers; 3D modelers
Advertising, sales and digital marketing	Internet researchers; SEO and SMM marketers; lead-generation specialists	B2B marketers; pay-per-click advertising specialists; Email and marketing automation experts

Source: Upwork.

example, Care.com data shows not only the rates for what was in the past often informal labour—pet care, babysitting, etc. (Figure 19)—but also reveals the pay premium placed on work such as tutoring over traditional care roles (Figure 20).

Online labour markets, crowdsourcing and e-lancing platforms are also creating fluidity in organizational boundaries. Though in the beginning they mostly involved data entry and unskilled work, such platforms now increasingly involve advanced highly-developed specialist skills as well (Table 7).

Finally, online labour markets—cross-sectoral talent platforms such as LinkedIn, Njorku or Dajie and industry-focused talent platforms such as Care.com, Didi, Uber and Upwork—are all shedding new light on information that is either wholly or partly missing from most international and national statistics. For example, the online gig economy provides some transparency on the work of those that were engaged formerly in weakly formalized contingent and own-account work labour markets, such as those in the care economy. Additionally, in the earlier section on learning we outline some of the findings on skills that are currently blind spots in international statistics. To the extent that digital talent platforms make large segments of the labour market more easily visible and measurable, often for the first time, there is unprecedented opportunity for smart regulation.

CONCLUSIONS

Globally, nearly 35% of our human capital potential remains undeveloped, due to lack of learning or employment opportunities or both. The Human Capital Index reveals specific gaps in each country and points to the future outlook for major economies. It finds that many of today's education systems are disconnected from the skills needed to function in today's labour markets. While current education systems seek to develop cognitive skills, non-cognitive skills that relate to an individual's capacity to collaborate, innovate, self-direct and problem-solve are increasingly important. Current education systems are also front-loaded in a way that is not suited to current or future labour markets. In many countries, education investments have not resulted in labour market returns for individuals and their families, due to unemployment, underemployment or large demographic segments remaining economically inactive. In others, regardless of education levels, work may be precarious, may insufficiently tap into existing

knowledge or may not invest in the lifelong learning and retraining that must take place simultaneously throughout the work life cycle.

Technological change may be further exacerbating some of these challenges, but it is also providing a unique new opportunity to address and transform these concerns, both in learning and employment. These developments imply that we need to rethink how the world's human capital endowment is invested in and leveraged for social and economic prosperity and the well-being of all. Governments, business leaders, educational institutions and individuals must each understand the magnitude of the change underway and fundamentally rethink the global talent value chain. In order to be proactive in our response to the future needs of economies, societies and individuals, we must re-think what it means to learn, what it means to work and what is the role of various stakeholders in ensuring that people are able to fulfil their potential.

The potential for technology to transform educational access and quality has been well documented. In addition, in a world where 13% of the working age population are own-account workers, 4% are unemployed, a further 7% are underemployed and 20% are inactive (in addition to 3 out of 4 increasingly healthy, and in many cases highly skilled, over 65 year-olds)—in all, some 44% of the world's working age population, or 2 billion people—new technologies may also present an enormous opportunity to unlock and nurture the human capital potential of a sizeable share of the population around the globe. A wide range of research has shown the existing and potential benefits in the form of flexibility, accessibility, transparency and scale provided by new formats of employment. For workers, technology is lowering the access threshold to employment and multiplying opportunities to form new client-provider relationships and find new work. For employers, digital labour markets are expanding access to fresh talent. Yet well-founded concerns also remain about the fragmentation of work and its effects on income equality, income security and social stability, amongst other areas of concern.

Much of the focus of recent policymaking in labour markets has been on the challenges of managing new formats of work. Updated social safety nets and modern forms of unionization—such as digital freelancers' unions³⁸—are also beginning to emerge in some countries to complement new models of work. It will be important for legislators to develop agile, thoughtful and forward-thinking governance to manage and regulate the rapidly emerging

digital labour market as well as the disruptions to traditional forms of work, for optimal socio-economic results. It is also imperative that, in parallel, policymakers work with other stakeholders to deliver on the promise of technology for education and lifelong learning.

Businesses—whether traditional or new—will need to be a part of designing a new social contract, including re-thinking their role as a consumer of ‘ready-made’ human capital. Companies will need to rethink jobs as bundles of skills and invest in the lifelong learning, re-skilling and up-skilling of their present employees in addition to working closely with education systems to support the development of both general and specialized employability skills. In addition, while business cycles can naturally lead to peaks and troughs in employment, any socially responsible business in today’s deeply interconnected and transparent world must consider how it can contribute to mitigating unemployment and enhancing people’s abilities to earn a livelihood.

While much has been written about the various positive and negative employment scenarios that may emerge from the current wave of technological change, these forecasts are highly dependent on the actions we take today to leverage opportunities and mitigate risks. The private sector and public sector, along with other stakeholders, will need to work together to lead adaptation to the new world of learning and work. The World Economic Forum’s platform aims to provide this space, complementing the analysis in this *Report* and other insight tools, with a space for dialogue and action that is critical to our collective future.

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- 7 See B20 Employment Taskforce, <http://en.b20-china.org/taskforce/34> (accessed June 2016).
- 8 See European Commission, "Ten actions to help equip people in Europe with better skills", Press Release, Brussels, 10 June 2016, http://europa.eu/rapid/press-release_IP-16-2039_en.htm (accessed June 2016).
- 9 This is, however, a simplifying assumption, since countries' exact population distributions tend to bifurcate into those that are ageing and those experiencing a "youth bulge", with a small cohort of countries undergoing a demographic transition with the potential of a reaping a temporary "demographic dividend" (whereby the share of the prime working age population expands before the older age groups do so as well). In practice, the share of under 25 year-olds in our sample countries ranges from 68.2% in Uganda to 23.1% in Germany, while the share of over 65 year-olds ranges from 26.9% in Japan to 1.2% in the United Arab Emirates. For a detailed discussion of index construction and weighting decisions, please refer to the Technical Notes on the *Report* website.
- 10 Some companies are already operating in age-friendly ways. This includes recognizing the value of employees of all ages, creating working cultures that provide access to and sustain employees regardless of age, and keeping opportunities available and open for learning and mentoring. Many companies have also realized the market opportunities presented by longevity, in particular the tech savvy nature of the elderly and their participation in the digital economy.
- 11 See Hausmann, R., C. Hidalgo, et al., "The Atlas of Economic Complexity", *Centre for Economic Development at Harvard University*, <http://atlas.cid.harvard.edu>.
- 12 In calculating countries' sub-scores in the Learning and Employment themes, the overall global population weighting (see Figure 6) is applied to the simple average of the indicator scores across the horizontal themes in each Age Group pillar. Countries are required to have at least 50% indicator coverage for both the Learning and Employment theme in order to be included in the graphs and analysis.
- 13 See World Economic Forum, *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, 2016.
- 14 See SHRM Foundation, "Engaging and Integrating a Global Workforce", report prepared by the *Economist Intelligence Unit*, February 2015.
- 15 For an introductory overview of this dynamic and fast-evolving field, please refer to Einav and Levin, 2014; Manca, 2016; Carnevale et al., 2014; Reamer, 2013; and Wright, 2012.
- 16 See Winthrop, 2015; Angrist et al., 2013; and Rissing et al., 2005.
- 17 See Dorn, D. and D. Autor, "This Job is Getting Old: Measuring Changes in Job Opportunities Using Occupational Age Structure", *NBER Working Paper 14652*, 2009, and Infosys, *Amplifying human potential: Education and skills for the fourth industrial revolution*, 2016.
- 18 The issue is less about vocational training versus university education—but rather about reforming education systems in general to combine theoretical knowledge with practical application and lifelong learning by default; see Hanushek, E., Woessmann, L. and L. Zhang, "General Education, Vocational Education, and Labor-Market Outcomes over the Life-Cycle", *IZA DP No. 6083*, 2011.
- 19 See World Economic Forum, *New Vision for Education: Unlocking the Potential of Technology*, 2015, and World Economic Forum, *New Vision for Education: Fostering Social and Emotional Learning through Technology*, 2016.
- 20 See World Economic Forum, *New Vision for Education*, *op. cit.*, and OECD, *Universal Basic Skills: What Countries Stand to Gain*, 2015.
- 21 To calculate skills diversity, LinkedIn applied the inverse methodology of the Herfindahl-Hirschman index for industry concentration; thus, the higher the number, the more diverse the composition of the skills. The ratio is the number of LinkedIn members with a given skill divided by all LinkedIn members for that given country with any skill. To ensure skill data is representative LinkedIn implemented three thresholds: the following thresholds: 10% to 50% membership coverage relative to the country's population; countries with a population of more than 5 million.

NOTES

- 1 This updated definition of human capital comes from Bean, C., *Independent Review of UK Economic Statistics*, March 2016, p 104. It goes on to add: "Perhaps more so than in the past, human capital is a key driver of a successful economy, as routine tasks are automated and the premium paid to creativity rises."
- 2 See Varkey GEMS Foundation, 2013 and Winthrop, R., 2015.
- 3 See Schwab, K., 2016 and Ross, A., 2016.
- 4 See Citi GPS: Global Perspectives & Solutions, *Technology at Work 2.0: The Future Is Not What It Used to Be*, January 2016.
- 5 See World Bank, *World Development Report 2016: Digital Dividends*, 2016.
- 6 See Acemoglu, D., et al, 2012.

- 22 See Boarini, R., M. Mira d'Ercole and G. Liu, "Approaches to Measuring the Stock of Human Capital: A Review of Country Practices", OECD Statistics Working Papers, 2012/04, Organisation for Economic Co-operation and Development, 2012, <http://dx.doi.org/10.1787/5k8zlm5bc3ns-en>.
- 23 Clear differentiation between job titles and skills should be a foundational block in formulating future workforce and human capital strategies. LinkedIn analysed the skills associated with every job title in every industry, using a variant of Term Frequency Inverse Document Frequency to identify the most "characteristic" skills for each title by finding the most common skills within an industry title pair and normalizing them by how frequently those skills appear in all industry titles. In order to protect members' privacy, LinkedIn only used frequent and standardized skills in the study. Additionally, to ensure skills data is representative, LinkedIn implemented the following thresholds: 10% to 50% membership coverage relative to the country's population; countries with a population of more than 5 million.
- 24 See Broadbent, 2015.
- 25 The vision of LinkedIn's Economic Graph is to create "a digital map of the global economy that includes every member of the global workforce and their skills, all open jobs, all employers, and all education institutions"; see <https://www.linkedin.com/company/linkedin-economic-graph>.
- 26 Skills migration is an excellent way to model varying inflows and outflows of talent over time across geographies. The methodology is as follows: Timeline: March 2015–2016; skills only considered if added before migration and have moved at least 500 times globally; members who have been out of school for at least one year before move, to account for the fact that many students move to study, and then return home after school.
- 27 See Burning Glass Technologies, 2015.
- 28 The investigation of how many potential Data Scientists there are on LinkedIn was driven by an analytics of their respective skills. The primary skills associated with the titles Data Scientist and Data Analyst are: Statistical Analysis, Data Mining, Machine Learning, Mathematics, and Database Management & Software. As higher level skills taxonomy, LinkedIn used a clustering algorithm that brings similar skills together.
- 29 See UNCTAD, 2016; and Jeon, 2014.
- 30 Also refer to ILO, 2015; and Rizzo, et al., 2015.
- 31 See Capelli, et al., 2013.
- 32 See Katz and Krueger, 2016; Manyika et al., 2015; Upwork and Freelancers Union, 2015.
- 33 See Katz and Krueger, 2016.
- 34 See De Groen and Maselli, 2016.
- 35 See Congressional Research Service, 2016.
- 36 <http://www.xiaojukeji.com/en/index.html>
- 37 <http://www.samagroup.co>
- 38 See Upwork and Freelancers Union, 2015.

Appendix: Technical Notes and User's Guide

A complete Technical Note and User's Guide describing the Human Capital Index methodology and data sources used in this *Report* and a full set of Country Profiles are available at <http://reports.weforum.org/human-capital-report-2016>.

Technical Notes

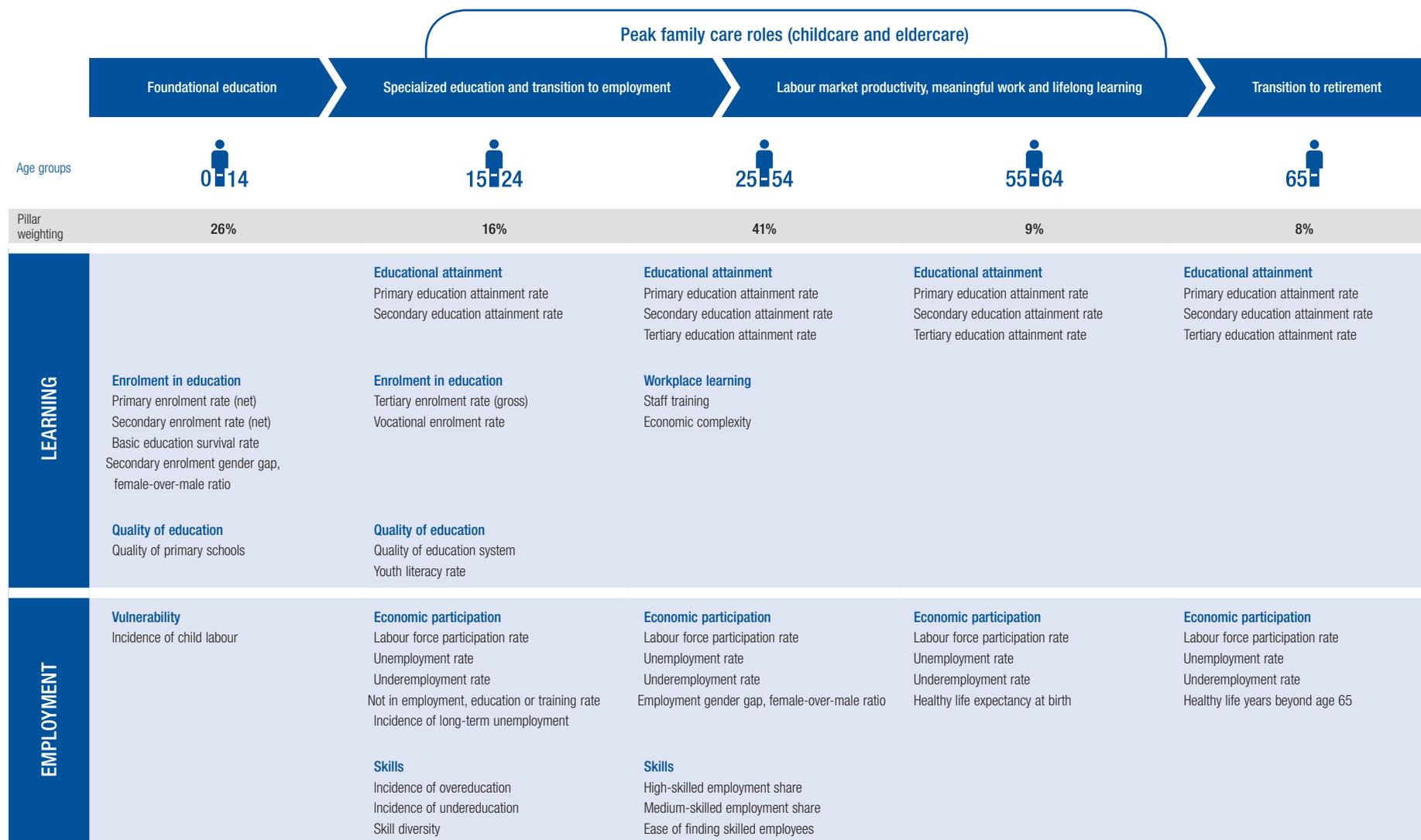
The Technical Note includes details on the following topics:

- Detailed structure of the Human Capital Index 2016
- Data standardization methodology used in the Index
- Considerations on data weighting and missing data
- Comparisons with the 2015 edition of the Index

User's Guide

The User's Guide includes details each of the 46 indicators of the Index as well as how to read the Country Profiles.

Appendix: Structure and Weighting of the Human Capital Index, 2016



System Initiative Partners

The World Economic Forum would like to thank the Partners of the System Initiative on Education, Gender and Work for their guidance and support to the System Initiative and this *Report*.

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- Alcoa
- Alghanim Industries
- AlixPartners
- A.T. Kearney
- The Bahrain Economic Development Board
- Bank of America
- Bloomberg
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- Centene Corporation
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- Johnson Controls
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- Microsoft Corporation
- Nestlé
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- Ooredoo
- Pearson
- PwC
- Renault-Nissan Alliance
- The Rockefeller Foundation
- Saudi Aramco
- Siemens
- Tata Consultancy Services
- Tupperware Brands Corporation
- Uber
- Workday
- WPP
- Zain

To learn more about the commitment of our System Initiative Partners to addressing talent issues globally, please refer to the *Report website*.

System Initiative Stewards

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- **Abdulla Bin Mohammed Al-Thani**, Chairman, Ooredoo
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