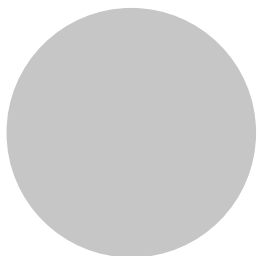


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Preface



Robert E. Moritz
Global Chairman, PwC

The past year has been extremely challenging for many people around the world. The COVID-19 pandemic is a human tragedy, and the measures necessary to tackle it have had a devastating impact on economies, disrupting the livelihoods of millions of people. The pandemic has exposed structural weaknesses in institutions and economies and has widened inequalities. People who were already disadvantaged have been hit particularly hard.

Even before COVID-19, the rise of automation and new technologies was transforming the world of work, resulting in an urgent need for large-scale upskilling and reskilling. Now this need has become even more important. As outlined in the World Economic Forum's *Future of Jobs Report 2020*, half of all employees around the world will need reskilling by 2025 – and that number does not include all the people who are currently not in employment.

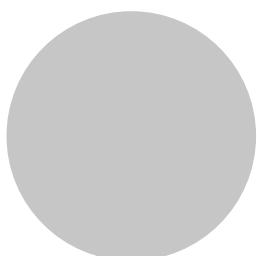
A year ago, at the World Economic Forum Annual Meeting 2020 in Davos-Klosters, the Forum launched the Reskilling Revolution platform, an ambitious effort to bring together governments, business, online learning platforms and civil society organizations to provide better education, skills and jobs for 1 billion people by 2030. *Upskilling for Shared Prosperity* – released during Davos Agenda week – makes the economic case for upskilling, particularly as economies consider how best to allocate funding for the recovery, and highlights certain challenges, including the disconnect between current education programmes and the skills that employers need now and in the future. The report sets out the advantages of nurturing aspirations and developing the kinds of skills that people will need throughout their lives. It

also offers recommendations for businesses and policy-makers, and shares examples of successful collaborations that can be replicated and scaled.

At the heart of the report is a realization that our economies are no longer delivering what people need and require systemic reform. And by giving *all* people opportunities to build the skills they will need to fully participate in the future workplace, we can start to create more inclusive and sustainable economies and societies where no one is left behind.

This, in turn, will lead to a prosperity dividend. We've used economic modelling to estimate the amount of GDP growth we can expect from a productivity uplift if countries upskill their citizens in line with OECD industry best practice. But while GDP is the most widely used economic measure today, it does not give a complete picture of how an economy is doing. It does not show, for example, the extent to which people have good, fulfilling jobs and which parts of the population are excluded. In parallel, therefore, the World Economic Forum is working on a Dashboard for the New Economy, one that includes targets for prosperity, planet, people and institutions.

This report is a call to action – a call for leaders from across sectors and geographies to work together to turn this crisis into an opportunity. If we are to realize the ambitions set out in this publication, stakeholders from all parts of society have a role to play – from governments and non-governmental agencies, to businesses and educators, to individuals themselves. We hope this report will inspire you to join a movement for widespread access to upskilling.



Saadia Zahidi
Managing Director, World Economic Forum

Executive summary

The profound effects of technological progress on the world economy, taken together with globalization and demographic change, have led to a pressing societal problem: how to equip people with the skills they need to participate in the economy – now and in the future. Governments, businesses and educational institutions are not currently helping people acquire the skills they need to succeed. Millions of people are already being left behind because of volatile market conditions, the effects of COVID-19, or because they work in industries that are being replaced by new sectors. All of this highlights a critical need for reskilling and upskilling. There is an enormous opportunity to reconfigure the world of work at this critical juncture and embark on an upskilling revolution that will give people across the world the ability to participate fully in the future of work, whatever that might be.

The COVID-19 pandemic and its effect on ways of working and the global economy have further

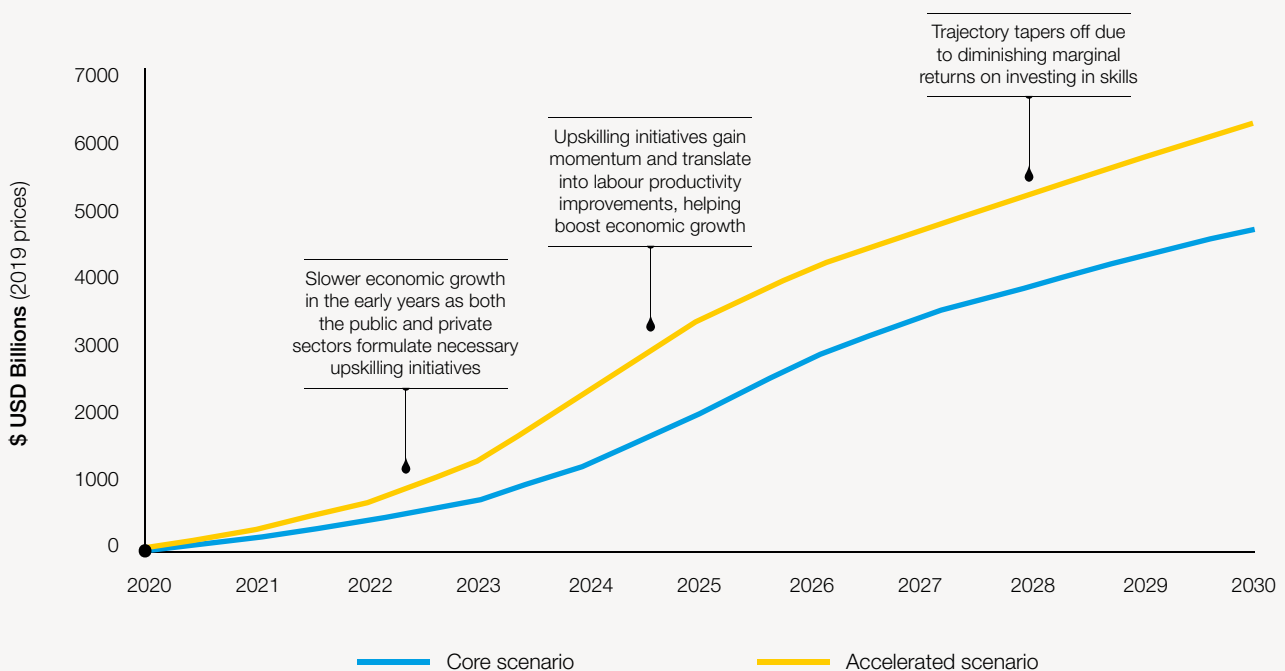
exposed the inadequacies of our current economic structures to address this growing mismatch between people's current skills and those needed for the jobs at the heart of the Fourth Industrial Revolution.

This report is a call to action for wide-scale upskilling. It provides a quantitative analysis of the impact upskilling can have on economic growth. Gross domestic product (GDP) has been used for this analysis because it is the most widely used economic measure today. But GDP does not tell the full story. That is why the research is complemented with a qualitative analysis that looks at the need for new economic thinking underpinned by the development of good jobs – work that is safe, paid fairly, reasonably secure and motivating, and that emphasizes the uniquely human skills and traits of workers, thus delivering higher levels of productivity.

The report's key findings include:

1. Wide-scale investment in upskilling has the potential to boost GDP by \$6.5 trillion by 2030 (Figure 1).

FIGURE 1 Additional GDP potential due to upskilling, 2020-2030 (2019 prices, billion \$)



Source: PwC data analysis, December 2020

Two scenarios were modelled, based on countries taking steps to reduce skills gaps in line with Organisation for Economic Co-operation and Development (OECD) industry best practice:

1. The **accelerated scenario** assumes skills gaps are closed by 2028. This would add \$6.5 trillion to global GDP by 2030.
2. The **core scenario** assumes the skills gaps are closed by 2030. This would add \$5 trillion to global GDP by 2030.

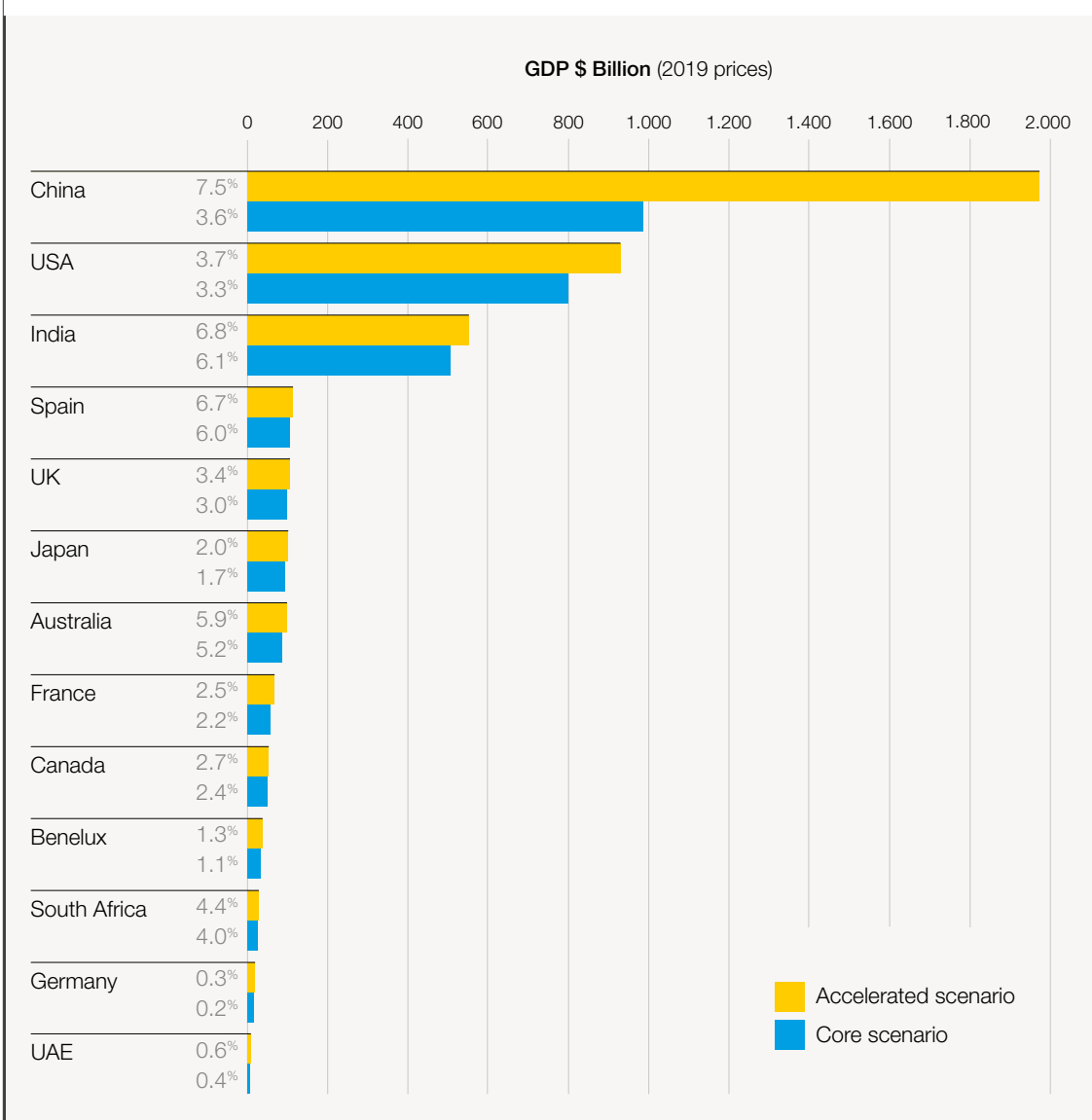
All estimates are conservative because they only reflect closing currently observable skills gaps. Note

that other benefits of upskilling exist that are not captured quantitatively. These are related to, for example, innovation and the creation of new types of jobs.

These economic gains would take the form of skill enhancement, leading to the improved matching of people's skills with the jobs created by the Fourth Industrial Revolution – boosting global productivity by 3%, on average, by 2030. These results are based on 2019 economic forecasts and do not reflect the shorter-term impacts of COVID-19 on the various sectors (see the appendix for a detailed discussion of PwC's global Computable General Equilibrium model and the report's methodology).

2. Regions and economies with the biggest gains are those in which the skills gaps are larger and the potential is greatest to improve productivity through skills augmentation aligned with new technology.

FIGURE 2 Additional GDP potential due to upskilling, by country, 2030 (2019 prices, billion \$, % relative boost to country GDP)



Source: PwC data analysis, December 2020

Less developed economies as well as countries with larger skill gaps could see greater gains as a percentage of GDP. The biggest gains would be, for example, in China, the United States, India, Spain and South Africa (Figure 2).

It is likely that China might achieve the more accelerated scenario. In 2019, it committed to spending \$14.8 billion to train 50 million people by 2022.

The Sub-Saharan Africa and Latin America regions could see over 7% additional GDP by 2030 if they start investing in upskilling now. Both regions are characterized by a high proportion of youth, high inequality and underdeveloped business and consumer sectors. Upskilling's potential to transform lives and livelihoods in these regions is compelling.

3. Progress on reversing polarization and reshaping the workforce is feasible.

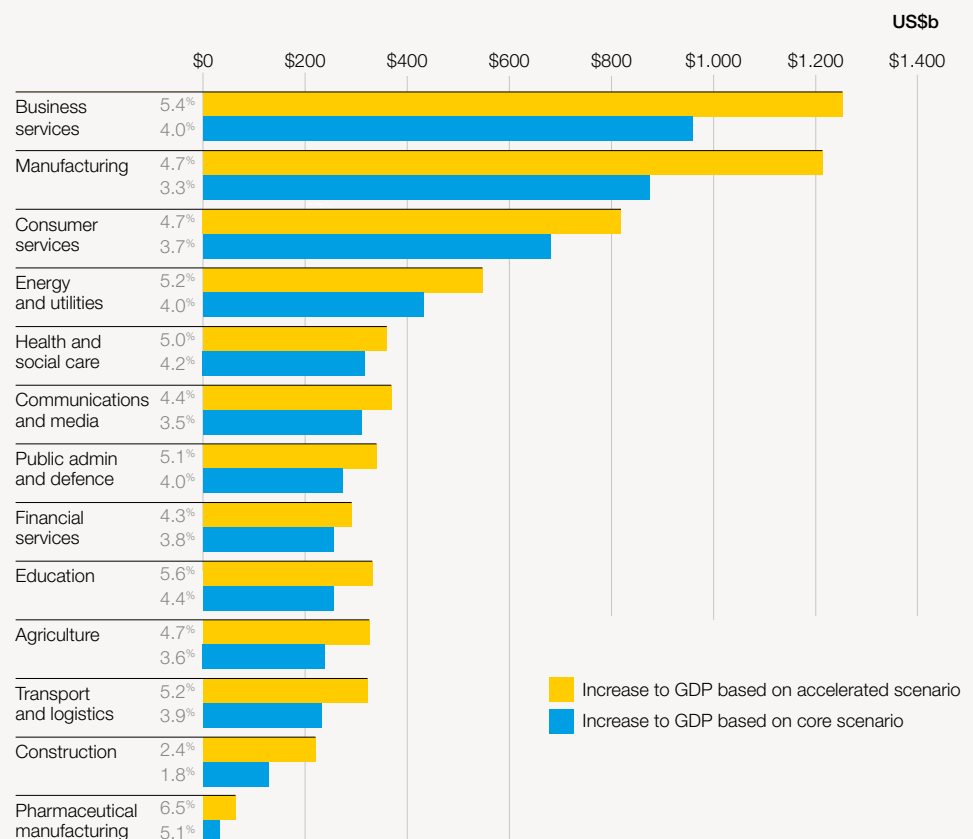
As the Fourth Industrial Revolution reshapes the future of jobs, 38% of the additional GDP that could be gained through upskilling will be created in the business services and manufacturing sectors under the accelerated scenario (Figure 3).

Other sectors that have suffered from low-wage growth and output for decades could reap significant benefits, which can help reduce inequality and polarization. For example, health and social care could add \$380 billion additional GDP through upskilling by 2030 under the accelerated scenario. These gains could be felt across all regions, although some countries, including the United States, will see greater gains.

Upskilling could also help countries with high levels of inequality see the quality of the jobs created increase, as the scope to shift from low-cost labour to technology-augmented jobs is greater. This, coupled with upskilling people, could help improve wages and livelihoods.

In agriculture and construction, improved productivity could reduce the total number of jobs and the costs of production, but upskilled populations employed in these sectors could see significantly improved job quality. Upskilling those who might have worked in lower quality jobs in these sectors would allow them to enter the newly expanding markets of tomorrow – including in business services and the public sector – and support their transition to employment with greater opportunity.

FIGURE 3 Additional GDP potential due to upskilling, by global sector, 2030 (2019 prices, billion \$, % relative boost to sector GDP)



Source: PwC data analysis, December 2020

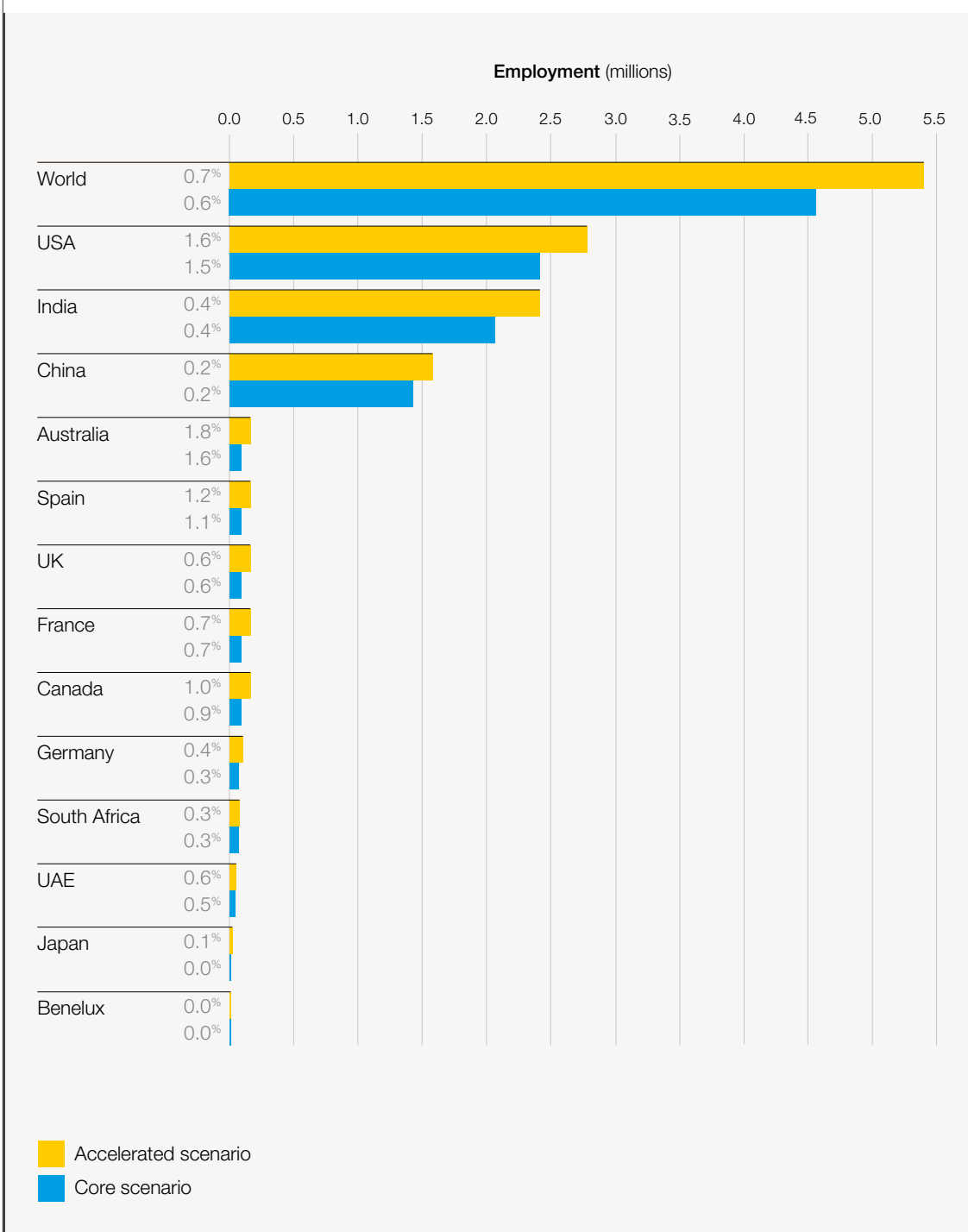
4. Upskilling could lead to the net creation of 5.3 million new jobs by 2030.

Upskilling could propel the transition to an economy where human labour is increasingly complemented and augmented – rather than replaced – by new technology, thus improving the overall quality of jobs. The number of jobs that require creativity, innovation and empathy will rise, as will the need for information technology skills.

According to the World Economic Forum's *Future of Jobs Report 2020*, employers expect that, by 2025, the percentage of jobs that are no longer

relevant or could be replaced by automation will decline from 15.4% of the global workforce to 9%, and that currently emerging professions will grow from 7.8% to 13.5% of the total employee base over the same period. In the majority of business sectors, companies state that skills gaps are the prime reason there are barriers to adopting new technologies that would increase productivity. Not surprisingly, countries with the largest workforces would see the largest gains: the United States, India and China (Figure 4).

FIGURE 4 Additional employment potential due to upskilling, by country, 2030 (millions of jobs, % relative boost to country employment)



5. COVID-19 has accelerated the need for action.

COVID-19 has accelerated the need to implement an ambitious global upskilling agenda because it is forcing digitalization and automation at a more rapid pace. Rising to this challenge could result in faster progress and even larger economic benefits by 2030. This is captured in the report's accelerated scenario.

The issue of how to share the costs of upskilling has not been solved. Learning has a large opportunity

cost. While there is unlikely to be an optimal one-size-fits-all approach to funding national upskilling initiatives, policies such as Singapore's SkillsFuture may hold lessons for others.¹ The economic model used for this research quantifies the benefits of closing the skills gaps of an economy by making assumptions about aggregate productivity gains across sectors that are net of the costs of upskilling.

A call to action

Unemployment is expected to rise as economies continue to experience the effects of the pandemic. That is why all stand to benefit from a common vision across governments, industries and the education sector to develop comprehensive national upskilling agendas. The pandemic provides an opportunity to reform education systems and rethink skills training to benefit more people. To do this,

however, governments, industries, trade unions and education institutions will need to work together.

Based on the analysis and extensive expert consultations, this report identifies four key areas that demand new approaches to upskilling and urgent action by governments, businesses and other stakeholders:

1

All stakeholders: Build a strong and interconnected ecosystem committed to a comprehensive upskilling agenda and give people the opportunity to participate

- Map the evolving job landscape and forecast future skills demand
- Collectively determine a set of indicators that measure the quality of employment at the industry, national and subnational levels
- Establish a common research framework to understand the dynamics and projections of labour markets and skills mismatches
- Identify policy levers that succeed in guiding labour market transformation and the provision of good jobs

2

Government: Adopt an agile approach to driving national upskilling initiatives, working with business, non-profits and the education sector

- Prioritize funding for upskilling in national recovery plans
- Recognize the economic, skill-building and inclusion potential from government-sector employment and associated supply chains
- Support and provide incentives for green investments and technology innovation
- Nurture a pipeline of industrial investment projects via a “bottom-up” approach
- Encourage broad transparency of the types of skills and jobs that each economy is most likely to need in the medium and longer term

3

Business: Anchor upskilling and workforce investment as a core business principle and make time-bound pledges to act

- Develop a clear “people plan”, using a people-centric approach in which technology is aligned to the needs of workers and society
- Make long-term commitments to upskilling employees
- Promote multidisciplinary collaboration (with diversity of perspectives) across internal and external stakeholders
- Work with labour representatives to ensure good jobs and agree to worker’s forums and common standards

4

Education providers: Embrace the future of work as a source of reinvention to normalize lifelong learning for all

- Prioritize vocational and higher education curricula that are “just in time” rather than “just in case”, working with business
- Scale up the provision of self-directed learning and nano-degrees for lifelong learning
- Build bridges between national qualification systems and lifelong learning so skills are recognized globally
- Connect schools and places of learning with each other globally

The aim of this report, itself part of the broader effort of the World Economic Forum’s [Reskilling Revolution platform](#), is to provide a strong call to action for change. In particular, the [Closing the Skills Gap Country Accelerators](#) offer a model for

country-level public-private collaboration to address reskilling and upskilling at scale across an economy. They are currently active in 10 economies through the Reskilling Revolution platform.

Structure of this report

Chapter 1 looks at how a new upskilling narrative has evolved and why COVID-19 has accelerated the need for business, government and the education sector to take action to ensure people are prepared for the Fourth Industrial Revolution. Chapter 2 discusses the impact of upskilling on economic growth and shows how investing in the development of skills across geographies and sectors can reshape economies. Chapter 3 describes the wider social effects of upskilling beyond productivity and investigates how

employability can create more inclusive economies. This chapter also highlights new economic thinking about the creation of good jobs and the need to adopt more inclusive economic models. The report closes with a call to action and roadmap of how businesses, governments and the education sector can collaborate in ecosystems that put people and their development centre stage. Finally, an appendix provides a detailed discussion of PwC’s global Computable General Equilibrium model and the report’s methodology.

1 A new upskilling narrative

1.1 Introduction

≈40%

of workers will require
reskilling of up to six
months

The profound effects of technological progress on the world economy, taken together with globalization and demographic change, have led to a pressing societal problem: how to equip people with the skills they need to participate in the economy – now and in the future. Currently, there is a stark mismatch between people's current skills and the skills needed for jobs that will be created from and become more prevalent because of the changes brought about by the Fourth Industrial Revolution. Governments, businesses and educational institutions are simply not helping people acquire the skills they need to succeed.

Millions of people could be left behind if and when the industries they work in today are replaced by new sectors that require new skills. These skills mismatches not only have a severe human cost; they could result in falling incomes and a negative impact on government revenues and social safety net spending.

For many years, businesses have struggled to find the skilled workers they need. For example, PwC's [23rd Annual Global CEO Survey](#) found that three-quarters of all respondents said finding the right skills was a threat to their businesses. According to the World Economic Forum's [Future of Jobs Report 2020](#), companies estimate that, by 2024, around 40% of workers will require reskilling of up to six months, and 94% of business leaders report that they expect employees to pick up new skills on the job – a sharp uptick from 65% in 2018.

At the same time, too many people cannot get good jobs because they lack the right skills,² and lower-skilled jobs are increasingly threatened by automation. Skills gaps are likely to increase unless the next generation and those workers at most risk of losing their jobs to new technology acquire the skills required for the jobs of the future. While certain higher-skilled workers have seen their pay increase, many others have seen median wages stagnate and their jobs security become more precarious.³

This could lead to increased polarization within the workforce. This data was compiled before the onset of COVID-19. The pandemic will almost certainly leave long-term impacts on both the social and economic landscape if business leaders and policy-makers do not take actions that help people develop skills for the future and find good jobs.

There is an enormous opportunity to reconfigure the world of work at this critical juncture and embark on an upskilling revolution that will give people across the world the ability to participate fully in the future of work, whatever that might be.

The economic modelling to measure the impact of upskilling shows that there could be measurable and attainable economic growth from solving these important problems. Indeed, by focusing on scalable, global upskilling, the world economy could see a potential boost to GDP of \$5 trillion by 2030 under the core scenario described in the Executive Summary, or \$6.5 trillion under the accelerated scenario. More importantly, people would be equipped to fully participate in the economy, which has the potential to reduce inequality and lead to greater social stability.

The issue of how to share the costs of upskilling is one that has not been solved. Learning has a large opportunity cost. While there is unlikely to be an optimal one-size-fits-all approach to funding national upskilling initiatives, policies such as Singapore's SkillsFuture⁴ and Denmark's "flexicurity" may hold lessons for others. The economic model used for the research in this report quantifies the benefits of closing the skills gaps at the national level by making assumptions about aggregate productivity gains across sectors that are net of the costs of upskilling. A limitation of the model is that it does not reveal how the cost of upskilling is shared across people, firms and the government. Yet investing in the educational inputs of upskilling itself will, of course, add to GDP.

1.2 The upskilling solution

In this report, upskilling refers to the expansion of people's capabilities and employability so they can fully participate in a rapidly changing economy.

This report argues that people should be given the opportunity to upskill: not only will upskilling help with economic inclusion and social cohesion, it will also pave the way to accelerate economic recovery. To support this argument, the report provides both a qualitative and – based on PwC's

global Computable General Equilibrium model – quantitative examination of how upskilling may reshape economic growth and prosperity over the next decade to 2030. The analysis thus complements and may be read in parallel with the Forum's *Future of Jobs 2020 Report* and other recent Insight Reports produced by the World Economic Forum's Shaping the Future of the New Economy and Society platform.⁵

2 The economic case for upskilling

The benefits to society of upskilling at scale will be visible in the well-being of the generations who will be able to participate in the economy and find meaning in the work they do throughout their lives. The economic case for upskilling can be made by measuring the economic impacts of investing in developing the skills that enable people to thrive in the types of jobs and employment opportunities that will be useful for success in the Fourth Industrial Revolution. The quantitative estimates developed for this report show the impact of upskilling on GDP, the most widely used economic measure available today. However, it is important to note that GDP does not tell the full story.

Before the COVID-19 pandemic, it was estimated that businesses would invest over \$4 trillion in technology in 2021, following a trend of annual spends of more than \$3 trillion over the prior three years (the 2021 spend has now been revised down to \$3.7 trillion).²⁴ Despite this, overall workforce productivity growth remains low.²⁵ Upskilling has the potential to transform whole economies and its impacts can create positive ripple effects throughout the global economy because of productivity increases.

Business and consumer services, along with manufacturing, stand to gain the most from

upskilling. But as this report demonstrates, sectors that are currently characterized by large numbers of low-wage workers, including health and social care services, could benefit greatly from a surge in upskilling. In addition, workers in industries that are seeing less demand for skilled workers (e.g. agriculture and construction) can reskill people for jobs in thriving sectors where there may also be significant potential to improve working conditions. This chapter discusses illustrative results from a variety of countries and regions, and highlights industries that are poised to undergo the most significant changes from upskilling.

The analysis uses a tailored Computable General Equilibrium (CGE) model, which focuses on 12 countries and 8 regions.²⁶ In addition, the report applies the model to 13 industry sectors, covering diverse public and private economic activities.²⁷ The estimates also take into account some of the displacement effects of labour moving across different sectors of the economy, and captures the economic value added across value chains.

Two scenarios were modelled to show how prioritizing upskilling can spur growth:

Note: The OECD industry best practice baseline does not mean that the skills gap is reduced to zero. See the appendix for details.

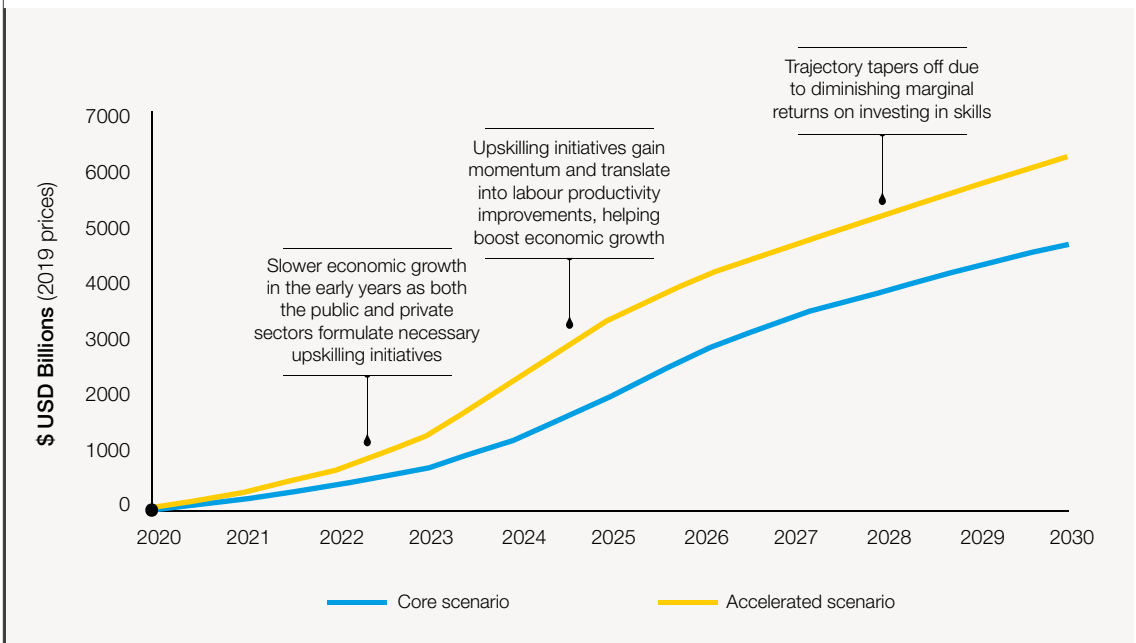
Core scenario	Accelerated scenario
Countries upskill their workforces in line with OECD industry best practice by 2030. This reduces the skills gap – the number of workers who cannot participate effectively in the economy because they lack skills. The global economy would gain \$5 trillion.	Countries upskill their workforce in line with OECD industry best practice by 2028. By reducing the skills gap two years earlier than under the core scenario, the potential productivity gain increases by 10 percentage points by 2030. The global economy would gain \$6.5 trillion.
Other studies have calculated larger aggregate GDP improvements from upskilling. These include a technology skills study by Accenture, which estimates that if skills development continues to lag behind technological progress, the G20 economies could lose up to \$11.5 trillion in cumulative GDP.²⁸ However, the modelling approach in this report only considers the impact of labour productivity uplifts as the proxy for upskilling. In addition, it only focuses on closing the current skills gap; it does	not measure how upskilling will help support new technology-enabled jobs but instead acts as a positive baseline calculation. The sections that follow in this chapter present the results using the accelerated scenario by default; results using the core scenario are referenced explicitly. The appendix includes details on PwC's global Computable General Equilibrium model and the report's methodology.

2.1 Developing skills of the global workforce for shared prosperity

To quantify the results of upskilling, the model assumes how far countries are able to close their current skills gaps. It then defines the size of the productivity gains from upskilling using evidence from previous country and sectoral studies.²⁹

Finally, the model computes how such increased productivity translates into aggregated national gains in income (GDP) by quantifying indirect impacts across sectors of the economy.

FIGURE 5 Additional GDP potential due to upskilling, 2020-2030 (2019 prices, billion \$)



Source: PwC data analysis, December 2020

Reaching the accelerated gain in GDP depends on the government and the private sector working quickly and effectively to target skills that are most in demand in their respective industries and economies by 2028. These productivity benefits would be the result of businesses in different sectors having access to the skills they need to innovate and grow – and the subsequent multiplier and spillover effects on other sectors that are linked through supply chains.³⁰

GDP impacts would follow an “S shaped” pattern over the next 10 years (Figure 5). In the early years, economic growth would be slower due to the lag between upskilling initiatives and increased labour productivity across the workforce. As new

upskilling initiatives roll out, economic growth would likely gain momentum. Eventually, closer to 2030, productivity would plateau as a larger proportion of the workforce gains the ability to adapt to the demands of the labour market: lifelong learning will be an integral part of the new economic system so it will be harder to distinguish a return on investment linked to upskilling.

Importantly, these estimates are conservative, since they only reflect closing current skills gaps. Developing transferable skills, such as adaptability and creativity, would bring extra benefits by preparing people to not only meet the skills that are in demand today but also those that will be in demand in the future.³¹

2.2 The benefits of upskilling across the world

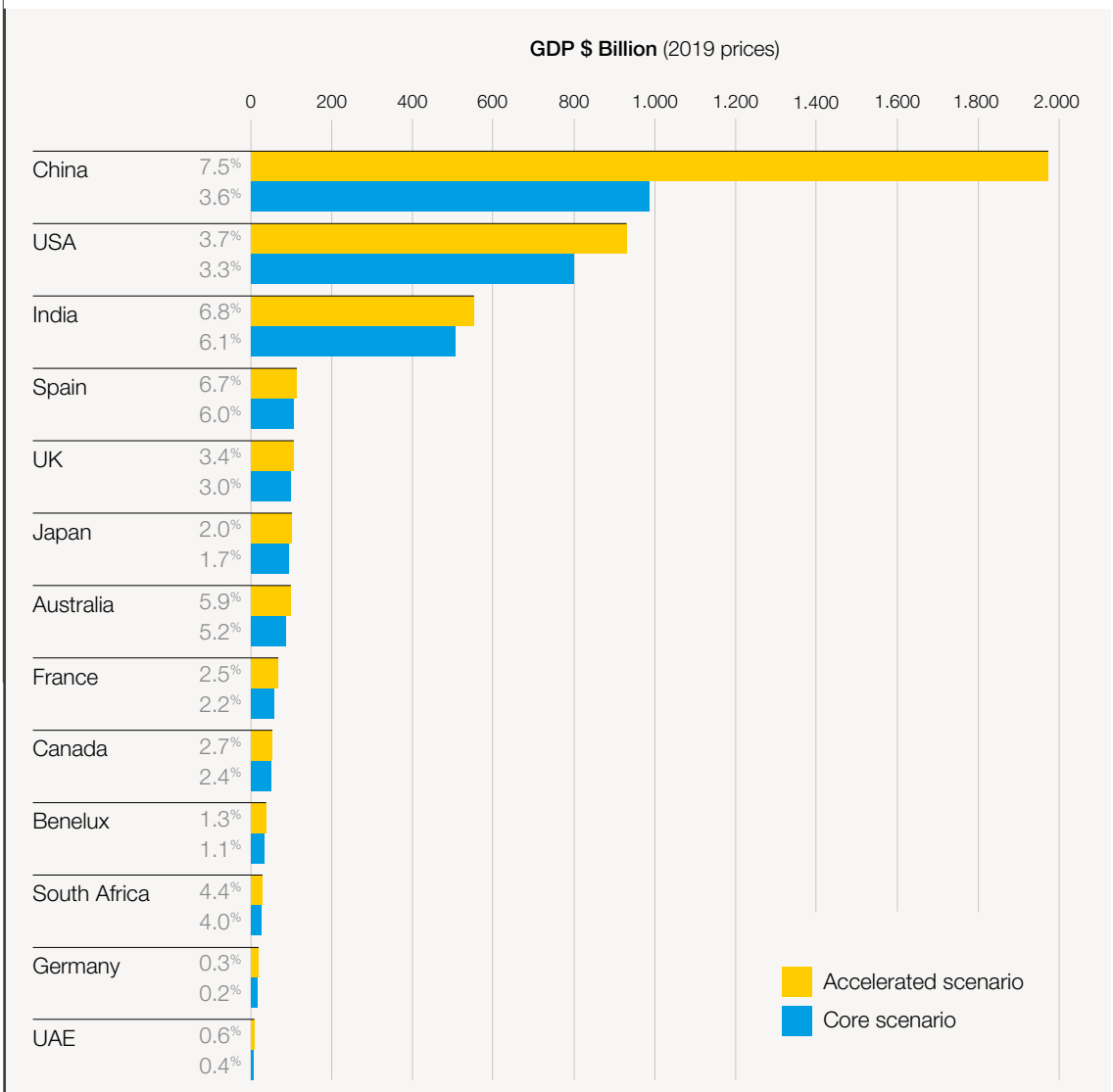
The results in this section show the country-specific boosts to GDP by 2030 from reducing skills gaps (Figure 6). The size of each bar in Figure 6 is closely aligned to GDP size for that economy. The world's biggest economies, the United States and China, have the most to gain economically in absolute terms.

Investments in training that match people's skills to existing and future jobs within economies are those that generate the largest benefits. Over-qualification for certain jobs – where jobs are not available when people qualify – will not result in big productivity gains.³² That explains the differences in the gains that different countries make. Countries with high existing levels of education and training, small workforces and/or more even demographics will realize smaller gains because their current skills gap is not large (e.g. Germany and Japan). Countries with skilled workforces but comparatively smaller jobs markets will also see fewer benefits (e.g. the

United Arab Emirates, where the private sector is underdeveloped). That is why it is important to develop transferable skills that allow for reskilling for sectors that are growing. The impact on mobility or skilled migrant workers because of COVID-19 will highlight this need.

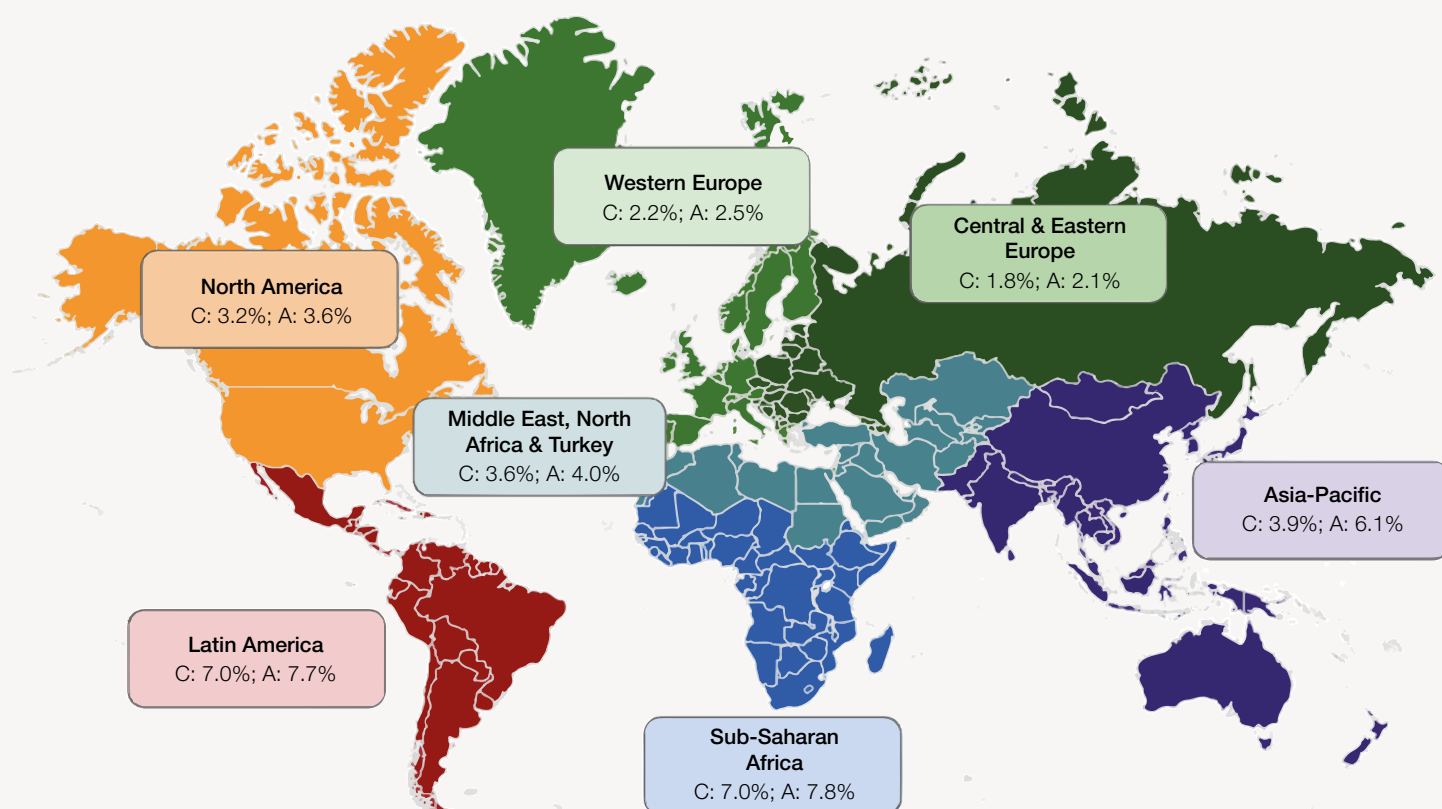
Other drivers exist as well. In countries where large portions of the workforce are low skilled or have large industry sectors that have untapped potential for digital transformation and automation, the gains could be larger if action is taken now to upskill workers for the Fourth Industrial Revolution. This begins to explain the relative percentage increase in additional GDP for each country, and is one of the main reasons why countries such as India and Spain can expect to see the largest percentage increases in GDP terms compared to countries such as Germany, where the skills gap today is narrower and workforce productivity is already comparatively high.

FIGURE 6 Additional GDP potential due to upskilling, by country, 2030 (2019 prices, billion \$, % relative boost to country GDP)



Source: PwC data analysis, December 2020

FIGURE 7 | Additional GDP potential due to upskilling, by global region, 2030 (% relative boost to global region GDP)



Note: C = Core scenario; A = Accelerated scenario.

Source: PwC analysis

Figure 7 displays the relative regional gains for GDP growth for both the core and accelerated scenarios. Developed economies in Europe, for example, will see lower gains in absolute numbers than Latin America and Africa, where workforce skills are currently lower and agriculture and/or natural resources continue to make up a significant portion of the economy. The return on investment of upskilling initiatives is likely to be larger in emerging markets because these economies are in the process of catching up. Although educational

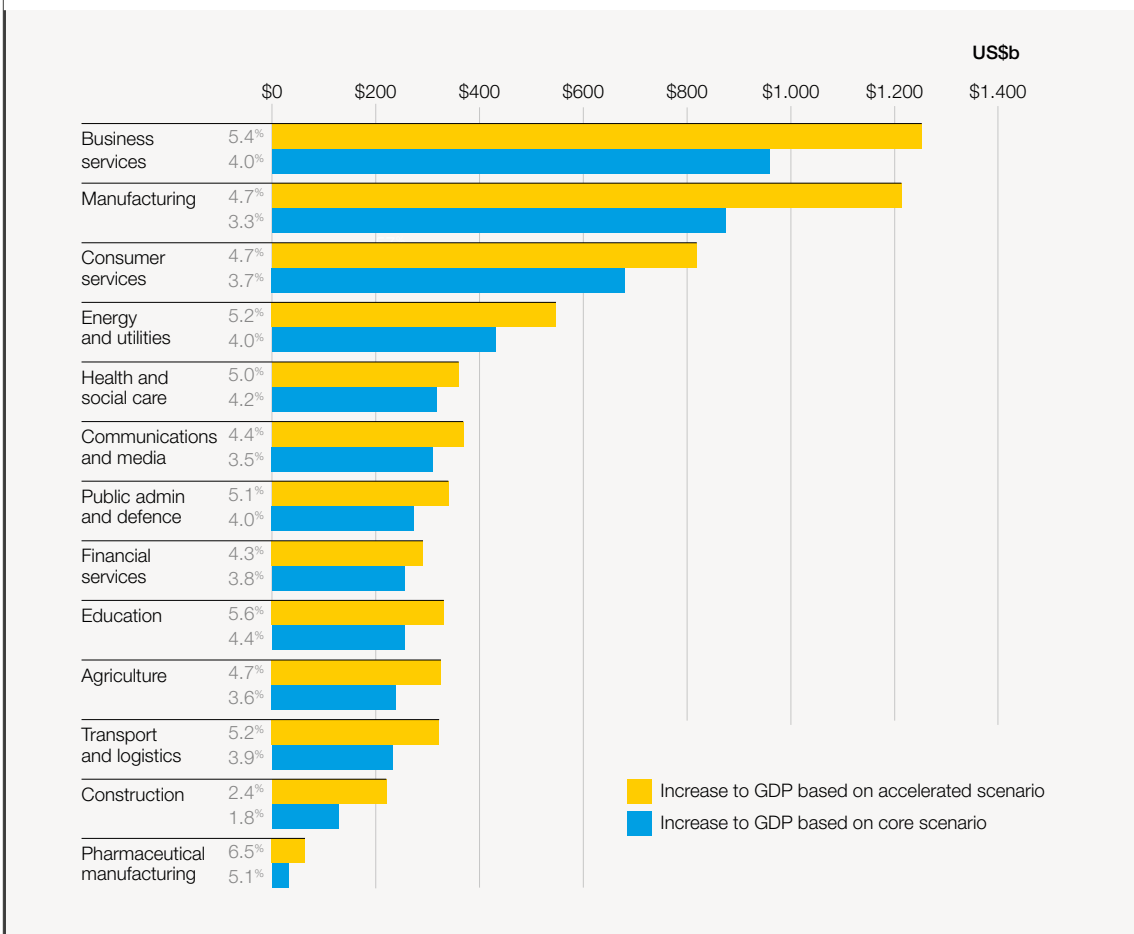
levels are increasing significantly in most emerging markets, the supply of skills does not always create its own demand.³³ Advanced economies, however, tend to principally face skills mismatches, thus the upskilling benefits may be less.³⁴ This is an untapped advantage: if there were mechanisms in place to upskill or reskill people so they can take available jobs. By contrast, many middle-income countries face significant shortages of higher-skilled workers to fill emerging occupations requiring advanced skills.

2.3 Sectoral view

Industries that are transforming because of technology will see boosts when the talent pool to fill these more highly skilled jobs becomes available. The sectors that will benefit the least from upskilling are the ones in which there are fewer jobs that require more skills, such as agriculture and construction (Figure 8). Sectoral trends

depend on many factors, including technology, international trade, global supply chains and industrial dynamics.³⁵ Further, how much of a boost upskilling gives to an overall economy – across sectors – will be determined by new technology adoption, the current level of skills gaps and how the demand for skills is expected to evolve.

FIGURE 8 Additional GDP potential due to upskilling, by global sector, 2030 (2019 prices, billion \$, % relative boost to sector GDP)



Source: PwC data analysis, December 2020

This analysis takes into account COVID-19 by using the expected recovery of GDP trajectory over a 10-year timeline and modelling growth above that expected base from 2019. However, the pandemic will have significant, lasting impacts. Some sectors, e.g. transport, may never fully recover even though the global economy is expected to recover its

growth trajectory, if not the speed of growth. The sections that follow present an overview of key sectors. Figures are based on the accelerated scenario unless otherwise stated. The biggest gains across sectors are seen in countries with the largest populations: China, India and the United States.

Business services

Business services is a broad industry encompassing a vast array of jobs – everything from professional services (lawyers, accountants, architects, etc.) to outsourced cleaners and security guards. The rapid uptake of new technologies is changing the nature of the work and the skills workers need.

China could experience as much as a \$438 billion rise in GDP contribution from upskilling. Significant gains are also expected in the United States, with a \$179 billion increase under the accelerated scenario, equating to 3.6% and 4.1% increases in GDP, respectively.

Manufacturing

Automation is likely to have a transformative effect on the manufacturing industry, with PwC research estimating that up to 45% of jobs could be automated by the end of the 2030s. This is widening skills gaps in developed nations, where the demand for workers with critical thinking and programming skills is replacing the need for low-skilled workers.³⁶

Countries where upskilling will add most to absolute GDP in manufacturing are China, the United States and India, while a few countries, like the UAE, will not see such large benefits.

Consumer services

While it is difficult to accurately forecast the level of job creation in a sector that is undergoing significant change due to technological advancements (e-commerce, robotized warehouses, etc.), there is little doubt that existing roles will require new skills.

The largest gains in GDP contributions under the core scenario are expected in the United States,

with a \$104 billion increase, followed by India with a \$98 billion increase. China's gain could be as much as \$83 billion under the core scenario, but this could double under the accelerated scenario. In 2019, China committed to spending \$14.8 billion to train 50 million people by 2022, and this investment will likely feed throughout the economy.

Communications and media

Currently, more than half of the businesses in this sector are facing a shortage of skills that would enable them to introduce new technologies, suggesting that without a concerted upskilling effort, skills gaps in this sector are set to widen.

In the United States, the core scenario could lead to a \$57 billion increase in GDP contribution to this sector, which is a 3.4% increase. However, under the accelerated scenario, the largest potential GDP contributions are expected in China, which could see gains of \$75 billion, an 8.1% rise.

Health and social care

The healthcare sector is one of the least susceptible to the increased adoption of automation, although the digital revolution is contributing positively to the sector, particularly with the rise in popularity of telehealth since the onset of the pandemic. Even before COVID-19, online appointments and the use of creative diagnostic tools had increased.

The United States is expected to experience the highest additional GDP contribution from this sector under both the core (\$89 billion) and accelerated (\$100 billion) scenarios.

Financial services

This broadly defined sector, including insurance providers and firms providing payment services and retirement plans, is primed for upskilling with an educated workforce with a desire to adapt. PwC's latest Global CEO Survey notes that instead of driving technology change in isolation and then defining the people skills needed to adapt to it, financial services firms should encourage their

people to become "infinite learners" so they can harness their ideas in order to innovate and help them realize their full potential.

The United States (\$85 billion), India (\$39 billion) and China (\$18 billion) will see the largest absolute gains from upskilling in this sector.

Transport and logistics

At present, 64.7% of businesses in this sector say a talent shortage is constraining their adoption of new technology. Behind mining, this sector reports that a lack of skills is the biggest barrier to boosting productivity through technology. The key issue currently is the shortage of qualified engineers, software developers and human problem-solvers

to create the environment in which autonomous transport is a reality.

China (\$109 billion), India (\$35 billion), the United States (\$26 billion) and Australia (\$6 billion) will see the largest boosts to these sectors in absolute terms.

2.4 Regional analysis

Globally, countries' development path will be shaped by technology, automation and the knowledge economy. Emerging and developing economies, however, have traditionally based their growth strategies on manufacturing and labour-intensive industries, which has consequently driven the demand for lower skills. This reliance on cheap labour has reduced the need to invest in automation for routine tasks. Although lower-income countries can still rely on large pools of cheap labour to sustain their economies (mainly in Africa), in emerging (middle-income) countries that have benefited from the outsourcing of routine tasks on the value chain (i.e. manufacturing), the impact of automation is expected to be high.³⁷

The message for emerging economies is that their cheap labour advantage must be converted into a skills advantage so people have a pathway to economic stability and better-valued jobs and their economies can compete globally with technology. COVID-19 is likely to lead to more on-shoring as developed countries strengthen their production capacity in certain sectors to ensure supply-chain resilience in future crises.

What follows is a summary of how upskilling will impact certain regions and the industries within them.

Western Europe

About 85% of all EU jobs today need at least a basic digital skills level. By 2025, about half of all job opportunities in Europe will need to be filled by individuals with tertiary-level qualifications. One European skills forecasting model projects basic manufacturing jobs will decline and high value-added service sector jobs will continue to grow – and 80% of new jobs will be high-skilled occupations.³⁸ This will require either massive replacement or upskilling of the existing workforce to achieve the 2.2-2.5% boost in GDP the model used in this report's analysis predicts.

Among the Western European countries included in the analysis, Spain has the potential to achieve the most economic gains, with a potential boost to GDP in absolute terms of \$132 billion, equivalent to 6.7% of GDP. This could also generate an additional 220,000 jobs, or 1.2% of total employment. The key drivers are expansions in manufacturing, and business and consumer services.

Central and Eastern Europe (CEE)

The potential uplift from large-scale upskilling in this region is one of the smallest globally, at less than 2.1% (1.8% under the core scenario), due in part to the structure of the economies and the level of education in these geographies. When free market economic practices replaced state-run planned economies, long-term unemployment and the widespread lack of participation in labour markets

became common phenomena.³⁹ These were largely driven by the lack of demand by an underdeveloped private sector. The challenge across the region will be to boost the productivity of the educated labour force and develop enabling conditions, such as labour regulations and more collaboration between businesses, government and labour stakeholders.⁴⁰

Middle East, North Africa and Turkey (MENAT)

The Middle-East, North Africa and Turkey (MENAT) region is the prime example of how investments in skills are not resulting in high economic and social returns, primarily because of a mismatch in jobs and an unbalanced economy made up of a dominant public sector and underdeveloped private sector. Youth unemployment stands at 30% throughout the region, twice the global average. This can distort incentives to acquire relevant skills: young workers with some formal education prefer well-paid public-sector jobs.⁴¹

Many oil-based economies, such as the Gulf Cooperation Council countries, face bigger challenges because capital and skilled nationals are heavily employed in sectors that are not the most innovative or subject to high long-term growth. For example, in the UAE the benefit from closing the skills gaps is a potential absolute gain of \$4.3 billion in GDP, which equates to just 0.6% of GDP; however, closing the skills gap could generate an additional 43,000 jobs by 2030.

Sub-Saharan Africa

With a GDP increase of 7.8%, Sub-Saharan Africa could enjoy one of the biggest boosts to GDP from the increase in productivity achieved through upskilling. The reasons lie in the make-up of the region's workforce and the scope for improvement. By 2035, Sub-Saharan Africa will be home to the world's largest labour force and, in 30 years, the region's youth are expected to represent one-third of the world's youth population. The ongoing challenges of employment and skills can turn the demographic dividend into a demographic liability unless it is accompanied by improvements

in both education and a restructuring of the jobs market. The rate of youth unemployment is two or three times as large as the rate for the rest of the workforce.

The potential \$24 billion gain in GDP from closing the skills gap by 2030 for South Africa is relatively small compared to other regions. However, this equates to a relative boost to GDP of 4.4% by 2030, which ranks as high in this study. Business services, manufacturing and the energy and utilities sectors stand to gain the most.

Asia-Pacific

The rapid economic growth over the last decades of many of Asia's economies has been, in part, propped up by a dynamic exports sector – supported, in the case of developing countries, by low-wage manufacturing jobs. The benefits of upskilling, which the analysis suggests could provide as much as a 6.1% boost to GDP by 2030, will be facilitated when emerging Asian economies move into higher, value-added sectors that require the most productive use of skills. The rise of automation has already been forcing many countries to rethink their developmental models, particularly those relying on routine work.

China will benefit the most, with a potential gain of nearly \$2 trillion by 2030, equivalent to 7.5% of

GDP under the accelerated scenario. India also has potential for substantial GDP gains – as much as \$570 billion additional GDP by 2030, which is equivalent to 6.8% of total GDP. India could also add more jobs than China, 2.3 million compared to 1.7 million.

The story is different in Japan. Closing the skills gap could add \$113 billion to its total GDP by 2030; however the gain in new jobs could be small. The economy is heavily geared towards the services sectors, with business services employing over 11% of the workforce. This suggests upskilling will involve transitioning already high-skilled workers as new types of jobs are created.

Latin America

The scope for increased growth through upskilling remains high across the region at 7.7% by 2030 under the accelerated scenario. Educational attainment has increased in recent years, and the economies continue shifting from agriculture to higher value-added industries and services, though this development is not uniform across the region. Labour polarization, however, is increasing. The

labour market has not been able to absorb the large wave of highly educated professionals, so knowledge occupations have experienced lower wage gains than certain manual occupations. In terms of upskilling, although education levels are improving, the scarcity of *relevant* human capital could prevent certain industries from advancing.

North America

Effective upskilling could broaden the talent pool and provide a corrective in the labour market for lower-skilled, undervalued positions by creating an environment that encourages people into sectors like health and social care, where upskilled jobs will be better paid. Business services remains the area where upskilling will produce the most gains, as it does across the world.

The United States' potential absolute gain to GDP is \$900 billion by 2030, equivalent to 3.7% of GDP. Closing the skills gap could generate an additional 2.7 million jobs by 2030, with business services and health and social care expected to gain significantly. Canada could boost GDP by \$56 billion, equivalent to 2.7% of total GDP, which is less than other countries primarily because the existing skills gap is less pronounced.

2.5 Adapting to short-term disruption: Upskilling for the COVID-19 recovery

The economic effects of COVID-19 will be severe and have serious implications for the global labour market. At the time of publication, more than 90% of the world's workers live in countries with some sort of workplace closure measures in place. Less developed regions are more likely to take longer to recover, given their fiscal support packages are smaller.⁴²

The analysis has revealed four key trends brought about by the pandemic that are affecting the labour market across those countries that are also the most relevant to the upskilling agenda. First, significant structural change is affecting such sectors as hospitality and travel. Second, a wave of job transitions or horizontal moves is likely, where laid-off workers try to find work in different sectors. For example, the number of jobseekers leaving occupation fields blank when searching for jobs has risen five percentage points to 28% since the onset of COVID-19, indicating that more people

are willing to consider any available work.⁴³ Third, remote working will increase, changing the nature and location of the global talent pool, primarily for knowledge workers. Fourth, the hit to young workers, the so-called "lost COVID generation", will mean businesses are less likely to hire in the face of uncertainty and recession, posing a greater threat to young jobseekers. It is here, however, where digital competencies could help.

As introduced earlier in this report, under the accelerated scenario, where governments fast-track investment in upskilling, an additional \$1.5 trillion in GDP can be gained, taking the global increase in GDP to \$6.5 trillion. The disruption in the workforce from COVID-19 presents an opportunity for governments to prioritize upskilling policies as a way to help people who have lost their jobs. The research in this report suggests the focus should thus be on long-term benefits to lay the foundation for a better future.

3 Upskilling for shared prosperity

The fact that so many people are unprepared for the Fourth Industrial Revolution and the resulting systemic change in the nature of work is proof that the world's economies are no longer delivering what their citizens need. Upskilling is part of the process of changing that story. It can help facilitate people's inclusion and participation in the economy and, with the right organizational and institutional enablers in place, will also lead to greater economic wealth in general.

To ensure that large-scale upskilling does not increase inequality, however, policies will need to be put in place to guarantee everyone has the opportunity to participate. There are risks that high-skilled workers may end up with better access to training, may be more motivated to undertake that training and may extract greater benefit from it due to their pre-existing higher-skill level.

This chapter looks at how to guard against poor planning by rethinking the way societies view economic growth and the development of good jobs: work that is rewarding and safe. It outlines how current economic models would need to be redirected to make them fit for purpose in a world of increasing inequalities and other threats. It explains how national skills strategies that are aligned with demand can create the "good" jobs that are so essential for prosperity goals.

The narrative also goes beyond economics by outlining how economic growth generated through upskilling is central to achieving societal improvements and "human development". As Megan Greene, Chief Economist at the Harvard Kennedy School of Government, has said: "You can't just simply retool people and let everyone loose, thinking inequality will be addressed. You also need to think about the environment which workers operate in. There is no economic law that says that inequality must necessarily increase with economic growth."⁴⁴

3.1 New economic directions

The disparity between the rich and poor has been growing for decades. Today, the world's richest 1% have more than twice as much wealth as 6.9 billion people. But in recent decades, wage growth – that is the median compensation growth across OECD countries – has become decoupled from productivity growth.⁴⁵ Too many people are getting left behind.

Though upskilling alone will certainly not solve all wealth and social inequalities, if upskilling initiatives become widespread and inclusive, more workers can raise their own productivity, leading to better job options, which in turn helps reduce wage inequalities, in particular those created by skill-biased technological change.^{46,47}

Research and discussions with a broad range of stakeholders, including academics, labour economists and union representatives, suggest that skills initiatives can become the basis of inclusive prosperity. For this to happen, skills initiatives and actions need to feed into a coherent, well-developed national development strategy that aligns supply and demand.

This will be helped if strong ecosystems are built that bring together all stakeholders working with governments – business, non-governmental organizations and educational institutions – to seek innovative ways to upskill at scale, help reduce the current skills gap and prepare people to take advantage of the new sectors in national and local economies that will evolve over time. "We are reaching a tipping point. Given the magnitude of the transformations we are experiencing, it's not going to be enough to leave it to the market to solve things. We need structural change in how we manage the economy, as we have focused too much on competition and flexibility but haven't necessarily encouraged companies to invest in their

workers," according to William Hynes, Head of the New Approaches to Economic Challenges, OECD.⁴⁸

Governments will need to be drivers of innovation in ways they have not been since the post-World War II era, when all sectors of society worked together to end the deprivations of wartime and take advantage of new technologies.⁴⁹ This implies a holistic assessment of the structure of the current and future job markets at the national and enterprise levels. For example, it means looking at the range of tasks lower-skilled workers can perform while also giving all workers access to upskilling opportunities. It is a recognition that there will be jobs tomorrow that do not exist today in areas like the green economy.

Government has a role to play in redirecting and influencing innovation in a more labour-friendly direction so that automation creates opportunities rather than destroying jobs. Many of the most consequential innovations of the post-war era – from early computers and antibiotics to sensors and the internet – were spearheaded by government demand and sustained by generous government support. These breakthroughs created new and productive opportunities for workers and fuelled the growth of good jobs in the economy.⁵⁰

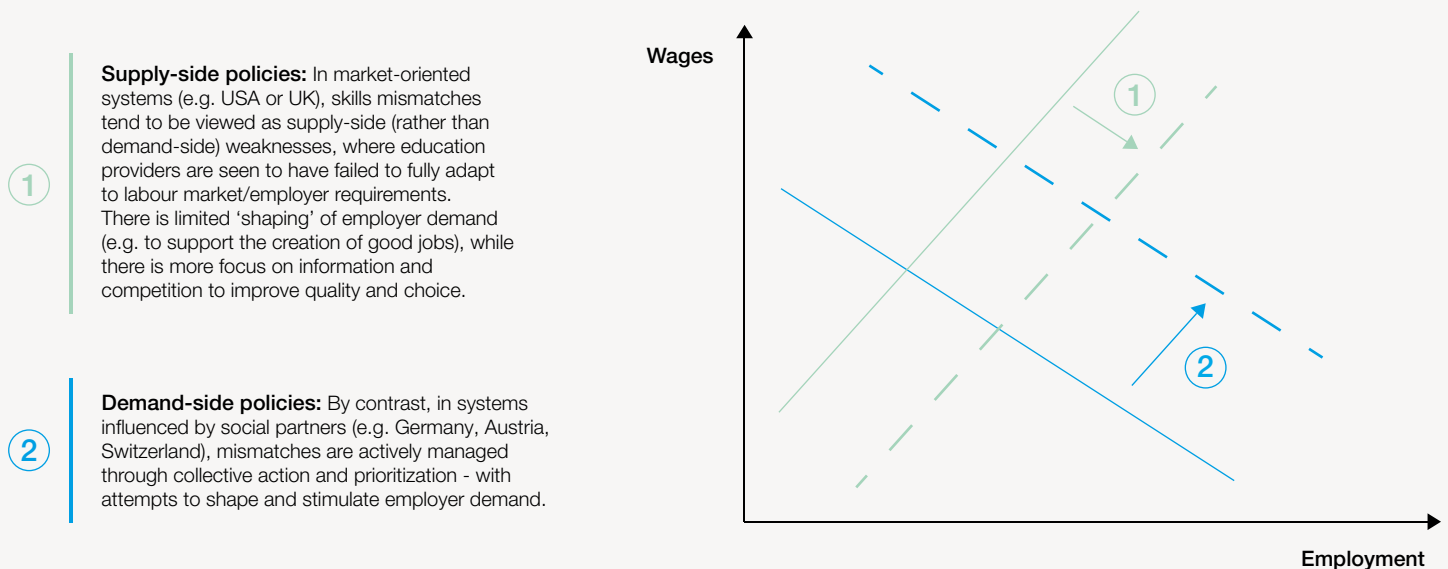
The cost of adjustment today will not be even across countries, communities, occupations or skill levels, and there are many different starting points. As shown in the regional and sectoral analysis sections of this report, some countries and industries will benefit more than others and will have bigger skills gaps to fill. As noted by Professor Carlota Perez, "We need to imagine the future in order to shape it, but it must be based on the technological and innovative potential at hand."⁵¹ For that, people need help to develop the skills they require for the future world of work.

3.2 Setting coherent skills strategies

Any skills initiative should feed into a coherent, well-developed national developmental strategy aligned with business. One important factor is that new sectors, such as the green economy, need a critical mass of skilled workers. Although it is possible to reskill certain workers for these new jobs, not everyone has the baseline skill set to upskill efficiently. Local economies can leverage local capabilities and opportunities, particularly in this new era of remote working.⁵²

Until recently, national skills strategies and interventions for boosting both the supply and demand of skills have tended to be pragmatic and piecemeal – a result of years of evolving cultural factors, policy history, reform and institutional change.⁵³ However, there are some similarities across countries.⁵⁴ In market-oriented systems (e.g. the United States or United Kingdom), the focus has been on supply rather than demand, and people bear more individual responsibility. Conversely, the social partner model puts more emphasis on collective action (Figure 9).

FIGURE 9 Countries' skills strategy orientations



Source: PwC synthesis using data/analysis from Campbell (2012)

The Scandinavian model, praised several times in discussions with different stakeholders for this report, combines some of the best educational systems with strong social protection. The Danish model, in particular, emphasizes flexicurity as a means to help people move to new, more productive jobs (Box 1).⁵⁵ The Scandinavian model also promotes policy changes that stimulate employer demand for better jobs that allow workers to move up the value chain. This joint supply-demand view to support new (good) jobs points to the increasing importance of stakeholder collaboration in ecosystems to pursue local and national goals. This is sure to be magnified after

COVID-19. Certain sectors are growing while others are shrinking, which makes rethinking national economic plans more urgent.

Such a paradigm demands more agility from both governments, businesses and people. For example, the World Economic Forum's Closing the Skill Gap Accelerator model provides a roadmap that governments can use to convene experts across countries and, at the national level, establish policies and practices that help identify needed skills and train people. The goal is to have 15 countries as part of a global platform by the end of 2021.⁵⁶

Denmark's flexicurity employment system, introduced 25 years ago, is based on enabling workforce adaptability via job mobility. In Denmark it is easy to hire and fire, but trade unions are also strong. People losing their job receive up to 90% of pay for a two-year period, subject to engaging in retraining or exploring entrepreneurial options or jobs in other cities. Few Danes lose their jobs

because they are fired. Most take the initiative to leave and retrain or reskill themselves – taking advantage of these active labour market policies. The proportion of job-hoppers to total employed is high (between 20% and 30% of those who are economically active),⁵⁷ primarily because people are looking for opportunities to cultivate new skills.

As Andrew Pakes from Prospect Trade Union commented, “Responses to the crisis are not only about skills; but also about sectoral and regional policy. We need a shared vision of what prosperity looks like, bringing social partners together ... COVID brought this back to fashion.”⁵⁸

An example of this is the concept of “Talent Competitiveness” that emerged from a collaboration between INSEAD and the Government of Singapore to gauge how well countries and cities are developing and supporting the skills they need. It is based on benchmarking the set of policies and practices, as well as the enabling context, that allow a country or a city to attract, develop and retain the human capital that contributes to its prosperity.⁵⁹ Talent competitiveness increases by strengthening human capital but also because of the environment

established to create new businesses and economic activities. This works in Singapore because of the make-up of its economy, the developed private sector and its education system. Other developed nations, particularly Switzerland and the Nordics, have consistently performed well in country comparisons of the Global Talent Competitiveness Index.

If the right enabling environment is not in place, the “return on investment” of education and upskilling investments will be lower. South Africa, for example, has spent close to 6% of GDP on education yearly, one of the highest percentages in the world, since the post-apartheid democratic transition in 1994.⁶⁰ Yet the country has not seen the envisaged economic returns. Unemployment is high and labour market participation low because of low private-sector demand.

3.3 Good jobs in the upskilling narrative

Many governments are now recognizing that achieving low levels of unemployment is not enough if the jobs are low-skilled, unrewarding and unstable. This does little to expand the economy or national competitiveness in an increasingly interconnected world. “Governments must find a balance between ‘expected’ curative solutions for unemployment, while providing visionary leadership for upskilling, that centres on that ephemeral ‘future job’. Current efforts that create concrete, effective skills strategies, executed correctly, will carry us towards meaningful and inspiring work for all,” according to Laurent Probst and Christian Scharff of PwC Luxembourg.⁶¹

A good job or “decent work”, as it is known in the international development community, encompasses a broad concept.⁶² Any definition presupposes a set of values about what matters – sustainability for some, productivity or security for others.⁶³ PwC defines “good jobs” as work that

is safe, paid fairly, reasonably secure, reasonably motivating, and leverages the human skills of the worker, thus delivering higher levels of productivity.⁶⁴ If policy-makers and organizations accept the narrative that upskilling leads to meaningful work – good jobs – upskilling has the potential to trigger a virtuous circle: increased levels of skills lead to better jobs, and better jobs foster the further development of skills (Figure 10).

Business has a significant role to play as workplace upskilling plays a crucial role in this narrative. Workers build skills based on their experiences of learning by doing.⁶⁵ It follows, then, that good jobs can create incentives for people to continue learning – thus further creating productivity (and better pay for workers) in an economy that is also growing as a result of the upskilling.⁶⁶ This requires recognizing the value of human skills in an automating world – and leaving robots to do what they do best.

FIGURE 10 | The virtuous work circle



COVID-19 presents a challenge because it is hard for individual organizations to prioritize creating well-paying jobs or providing the training to do them at scale in the middle of a global recession. That should be a government imperative as they control the policy levers that could make that happen (minimum

wage legislation, tax incentives, etc.). Poorly paid jobs are not better than no jobs and governments can address this through regulations. It is a choice. As argued earlier in this report, the creation of good jobs could become a catalyst for rebuilding a more resilient, inclusive and stable economy.

3.4 Beyond GDP: From shared prosperity to sustainable prosperity

“The advantage of economic growth is not that wealth increases but it increases the range of human choice – the case for economic growth is that it gives man greater control over his environment, and thereby increases his freedom – economic growth also gives us freedom to choose greater leisure.”⁶⁷ These are the words of economist Sir Arthur Lewis. The purpose of upskilling is to improve the well-being of people so they can reach their full potential and fully participate in the economy. Improving scores on measures like the Social Progress Index would be one way of measuring the impact of upskilling because it uses broad, non-economic indicators in its evaluations.⁶⁸ Education, for example, has a range of non-market benefits that extend beyond the classroom into personal life and the community.

As part of the qualitative research for this report, examples were identified of how this is beginning to impact national policies, providing a glimpse at what is possible to achieve. SkillsFuture Singapore made it clear that the return on investment of upskilling is driven not only by its benefits for productivity and

firm performance, but also by directly enhancing human development and how people enjoy work.⁶⁹ “This conversation should go beyond ‘skills’; it is about developing deeper attitudes and orientations. What we need is to re-fit people for a different world,” according to Paul Evans from INSEAD.⁷⁰ An upskilled workforce could also be better placed to exercise workers’ collective bargaining rights and improve labour relations. This in turn could lead to improvements in wages, with workers receiving a fairer share of the economic growth that comes as a result of their skills.

How to achieve the gains from upskilling suggested in this report, both in monetary and societal terms, requires new thinking, new priorities and new stakeholders working together in purpose-driven ecosystems. “Adaptive efficiency”, as coined by economist Douglass North, is what people are good at. People can acquire knowledge and learning to induce innovation, to undertake risk and creative activity of all sorts, as well as to resolve problems, imbalances and bottlenecks in society.

4 A call to action



To make large-scale upskilling across global economies and societies a reality, government, business, education, civil society and other leaders will need to work together in a more agile, resilient and inclusive manner. The call to action outlined in this section focuses on how to close the skills gap and prepare people for jobs now and in the future – starting primarily with secondary education. In many countries, this starts with access to basic health and nutrition, early education and connectivity, areas that the UN Sustainable Development Goals seek to address.

For the purposes of this report, closing the skills gap relies on a series of levers that are all underpinned by public-private cooperation: providing lifelong learning and upskilling, proactive

redeployment and re-employment, funding and the ability to anticipate what skills are needed in the job market. Actions should be focused on both the supply side – the upskilling of people – and the demand side – the jobs for those workers. The former requires a collaborative ecosystem across government, business and education. The demand side will require a new focus on the types of jobs that people do and the need to make these good jobs safe, fulfilling and inclusive.

Based on the analysis and extensive expert consultations,⁷¹ this report identifies four key areas that demand new approaches to upskilling and urgent action by governments, businesses and other stakeholders:

1

All stakeholders: Build a strong and interconnected ecosystem committed to a comprehensive upskilling agenda and give people the opportunity to participate

2

Government: Adopt an agile approach to driving national upskilling initiatives, working with business, non-profits and the education sector

3

Business: Anchor upskilling and workforce investment as a core business principle and make time-bound pledges to act

4

Education providers: Embrace the future of work as a source of reinvention to normalize lifelong learning for all

1

All stakeholders: Build a strong and interconnected ecosystem committed to a comprehensive upskilling agenda and give people the opportunity to participate

To be successful, ecosystems need to be based on the following key features: a common vision for people, clear roles and responsibilities, and the reinvention of industrial relations. Trade unions, employers and other stakeholders share common objectives and all stand to benefit from a common vision across governments, industries and the education sector to develop comprehensive national upskilling agendas.

COVID-19 has created a rare window of opportunity to rethink training and incentives on a national scale. Greater collaboration and coordination on upskilling are also urgently needed at an international level. In addition to intergovernmental processes such as the G-20, the World Economic Forum's Reskilling Revolution initiative aims to provide such a comprehensive global coordination platform, with the goal of providing at least 1 billion people with better education, skills and jobs by 2030.⁷²

Governments, businesses and educators need to work together and take the following key actions:

- Map the evolving job landscape and forecast future skills demand, providing global insights and facilitating national and sectoral analyses to stimulate evidence-based policy for governments and businesses
- Collectively determine a set of indicators that measure the quality of employment at the industry, national and subnational levels (including identifying the underlying drivers and trends in the provision of good jobs)
- Establish a common research framework to understand the dynamics and projections of labour markets and skills mismatches across all geographies, societal layers (including the community level) and industries, and continuously validate the long-term outlook
- Identify policy levers that succeed in guiding labour market transformation and the provision of good jobs, including minimum wage legislation, maximum working hours policies, and policy actions that discourage the creation of precarious work
- Promote a common set of key performance indicators for public and private upskilling initiatives, as included in the World Economic Forum's people stakeholder capitalism metric⁷³
- Define a toolbox enabling technical and financial assistance specifically for small and medium-sized enterprises to unlock private investments in skills.

2

Governments: Adopt an agile approach to driving national upskilling initiatives, working with business, non-profits and the education sector

To be effective in driving an ambitious national upskilling agenda, governments will need to become more agile to address the significant challenges created by changing demographics, new technologies and other global megatrends. Part of becoming agile is the digital transformation of governments, particularly in the use of labour market information systems that forecasts what skills will be in demand across geographies, industries and demographic groups.

Elements of such an approach in the recovery from COVID-19 might include appointing "jobs leaders/commissions" to convene and incentivize companies and local authorities to put in place schemes to help the young and the recently unemployed prepare for the future. It could also include the creation of national and international skills accreditations that can be won through online training mixed with practical apprenticeships. Public education should be connected to employment outcomes.

Governments should also focus on facilitating the rapid redeployment of workers displaced from the labour market, by investing in targeted reskilling initiatives, working with businesses, unions, industries and subnational and national government bodies. Luxembourg's Digital Skills Bridge provides one example of how stakeholders can align funding and outcomes successfully.

To "build back better" through industrial and educational strategy at the national and subnational levels, governments need to:

- Recognize the economic, skill-building and inclusion potential from government-sector employment and associated supply chains
- Support and provide incentives for green investments and technology innovation
- Nurture a pipeline of industrial investment projects via a "bottom-up" approach,

potentially implemented through interregional cooperation (these can be clusters of key businesses in a region)

- Encourage broad transparency of the types of skills and jobs that each economy (including subnational economies) is most likely to need in the medium and longer term
- Create partnerships among subnational/national/regional authorities, academia, business and civil society along the lines of the EU Smart Specialisation Strategy to develop platforms to provide advice to regional authorities and to facilitate mutual learning, data gathering, analysis and networking opportunities
- Provide tax breaks/loans for upskilling initiatives and apprenticeship programme subsidies

- Incentivize individual citizens to invest in their own skills and education, whether employed or unemployed, and incorporate some form of conditionality for investment in upskilling (earn-while-you-learn schemes)
- Incentivize businesses and the education sector (including vocational training) to align with high-growth skill needs.

Governments may also benefit from more systematic international exchange on policy experiments and innovations. For example, the Global Learning Network of the Closing the Skills Gap Country Accelerators, coordinated by the World Economic Forum, represents one such attempt to create an agile learning exchange between countries (Box 2).

BOX 2 Sample of countries implementing the Accelerators

INDIA

Launched in October 2018 with NSDC India, the Accelerator has developed work plans and established public-private partnership working groups to: (1) demonstrate leadership commitment on workforce reskilling and upskilling; (2) promote recognition of lifelong learning; (3) promote apprenticeships, skills bonds and learning accounts; and (4) create a dynamic national labour market information system.

OMAN

Launched in January 2019, the Accelerator is setting up three thematic public-private initiatives to improve alignment between skills and jobs, focusing specifically on: (1) soft skills among children and youth; (2) basic digital know-how among children and youth; and (3) relevant job-specific skills. The Supreme Council of Planning is coordinating the initiative. More information is available at <http://futureskills.om>.

PAKISTAN

Kicked off in July 2019 in collaboration with the Punjab Skills Development Fund, the Accelerator has engaged more than 40 of the largest employers in Pakistan. These companies are mapping sector-level emerging and declining roles and the skill set associated with them. They will then create and support sectoral, public-private incubators to create an adequate pipeline of talent for Pakistan's future of work. More information is available at <https://parwaaz.com>.

UNITED ARAB EMIRATES

Launched in November 2019 with the Ministry of Higher Education and Advanced Skills, the Accelerator brings together leading Emirati and international businesses. It is centred on two main pillars: (1) the creation of platforms to highlight skills gaps and formulate new business models and practical tools to address them; and (2) the set-up of multistakeholder coalitions in the UAE to establish a comprehensive vision to close the skills gap in the country.

Source: World Economic Forum, "Initiatives: Closing the Skills Gap – Country Accelerators", https://www.reskillingrevolution2030.org/reskillingrevolution/initiatives/forum-led/skills_accelerators/index.html (accessed 12 January 2021).

3

Business: Anchor upskilling and workforce investment as a core business principle and make time-bound pledges to act

While businesses cannot protect every job, they have a responsibility to help their people remain employable. Businesses need to articulate and communicate the business case for upskilling (win-win scenarios) and make upskilling part of their firm's purpose. PwC research shows that, by integrating upskilling, companies can realize an extra 10% to 15% of benefit to large-scale transformation initiatives, an up to 40% reduction in workloads on individual roles, and a more than 5% improvement in overall workforce retention. These benefits mean more output, more opportunities to reduce existing costs and higher customer satisfaction.⁷⁴

A way of making the “upskilling purpose” a new normal is the development of measurement systems where companies disclose upskilling performance along with profits, financial metrics and other corporate social responsibility (CSR) metrics.⁷⁵ These systems can also demonstrate the social impact of upskilling. The most pertinent type of upskilling will vary from business to business, but firms can adopt core upskilling principles and strategies.⁷⁶

Businesses large and small are called upon to commit to meaningful and sustained investment in upskilling. To facilitate this investment, create visibility and aggregate individual companies' efforts at a global level, the World Economic Forum's Reskilling Revolution platform contains a global Business Commitment Framework.

Specific actions can include:

- Develop a clear “people plan”, using a people-centric approach in which technology is aligned

to the needs of workers and society around initiatives that have vision, impact, scalability and inclusion⁷⁷

- Make long-term commitments to upskilling employees, promoting a new management culture of skills investments for higher productivity, employability and mobility
- Promote multidisciplinary collaboration (with diversity of perspectives) across internal and external stakeholders to co-create solutions for the responsible use of technology;⁷⁸ applying ethical principles to the transformation of jobs, where technology empowers rather than simply replaces human labour, can lead to upskilling being more effective in boosting productivity and innovation
- Promote policies that encourage greater participation by minorities in the workforce to promote upskilling; this could include banks developing special credit models backed by government
- Work with labour representatives to ensure good jobs and agree to workers' forums and common standards
- Conduct robust workforce planning to understand the impact of technology and automation on jobs and what this means for the skills needed in the future
- Operationalize redeployment and re-employment at scale with end-to-end methodologies and tools to support successful upskilling, leading to higher employability.

4

Education providers: Embrace the future of work as a source of reinvention to normalize lifelong learning for all

Education systems – in particular secondary and tertiary education – must play a central role in any comprehensive upskilling agenda. Educators and training providers have an opportunity to build on the fault lines of current systems exposed by COVID-19 as a moment of transformation for the sector. Even before the pandemic, the education and training sector was undergoing rapid transformation, with a wide range of online learning opportunities that also combined offline, face-to-face and experiential learning for a more human-centric learning experience.⁷⁹ Dual vocational training systems are particularly effective in emerging and developing countries – by combining theory and training embedded in a real-life work environment.

Despite these encouraging trends, the global education and training sector remains fragmented and would benefit significantly from the emergence of a more comprehensively interconnected ecosystem.

Several areas urgently need addressing:

- Curricula: Prioritize vocational and higher education curricula that are “just in time” rather than “just in case”, working with business
- Technology: Scale up the provision of self-directed learning and nano-degrees for lifelong learning; this can be delivered through massive

online open courses and other forms of online learning, in addition to the direct human-to-human connection of traditional learning

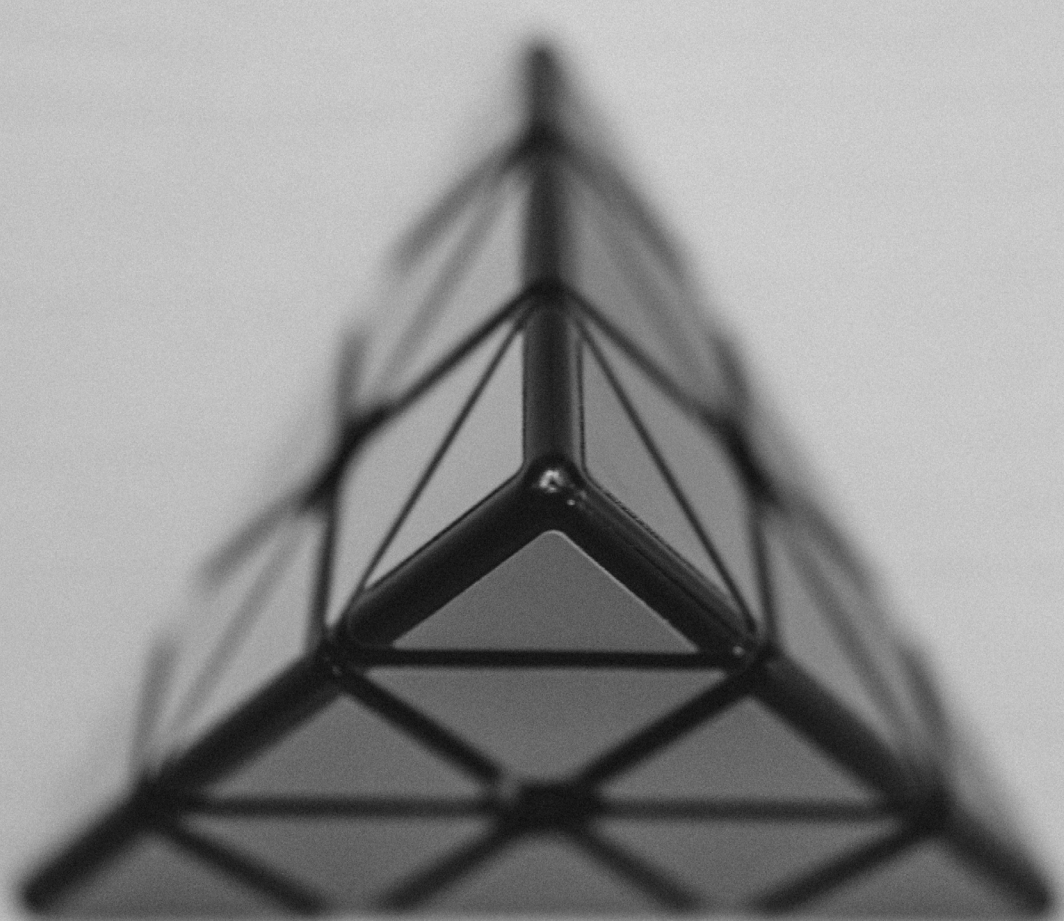
- Qualifications, experiences and recognition: Build bridges between national qualification systems and lifelong learning; in emerging countries, even experiences obtained in informal sectors are being framed for proper recognition, to improve the employment prospects of people in new jobs

- Connectivity: Link schools and places of learning with each other globally – currently, for example, UNICEF's Giga initiative aims to connect every school globally to the internet⁸⁰
- Credentialing: Develop and adopt at scale a much more joined-up taxonomy and recognition system for skills and credentials across countries, education systems and industries.⁸¹

Conclusion

Upskilling can help reduce inequalities because it can break the cycle that perpetuates low-paid work by preparing people to undertake good jobs. It can expand people's horizons over the course of their working lives, which are getting longer and longer. It can give people the tools they need to reach their potential. Further, when upskilling becomes widespread, it will be the way everyone looks to find their next role. In that way, upskilling may simply become how people prepare for fully taking part in society.

For this to become a reality requires collaboration and commitment, policy change and active business and governmental participation. At a time of great crises, the differences that impede solutions can be replaced by a new sense of purpose. This report is part of the broader effort of the World Economic Forum's Reskilling Revolution initiative and is intended to provide a strong call to action and collaboration for such change.



Appendix:

The Computable General Equilibrium (CGE) model

The model's approach

The research does not evaluate a specific policy or intervention as it relates to developing skills. Instead, the model assumes that upskilling interventions will reduce regional skills gaps in line with OECD industry best practices by 2030.⁸² This, in turn, will deliver higher labour productivity and an uplift in GDP across the global economy. This approach does not distinguish between the effectiveness of one country's upskilling initiatives versus another's. Some countries will be better equipped and more successful in tackling long-term skills challenges than others over the next 10 years based on a long list of factors, such as governance effectiveness, country demographics, appetite to invest in skills and so on. For the purposes of this exercise it is assumed every country makes the same progress.

By assuming a closing of the skills gap – defined as the gap between the availability of skilled workers and the jobs that need filling – as the main unit of analysis, the research overcomes the long-standing problem (especially in cross-country comparisons) of defining an appropriate proxy for skills. The most used measure of skills is educational attainment,

but more qualifications in a given country do not necessarily translate into more skills.

Although the OECD's survey of adult skills (Programme for the International Assessment of Adult Competencies - PIAAC) is an important step in directly measuring skills used at work, there is still no clear understanding of the specific benefits of different methods of upskilling, such as vocational training or workplace-based learning. In addition, the model does not look at how each country reaches the OECD best practice targets. Instead, the approach aims to highlight specifically the economic effect of reducing skills gaps, while acknowledging the distinctiveness of global economies.

The model used for this global study is a tailored Computable General Equilibrium (CGE) model. It assesses skills gaps in 12 countries and 8 regions.⁸³ In addition, the research models 13 industry sectors, covering different public and private economic activities.⁸⁴

The methodology for this analysis includes three stages:

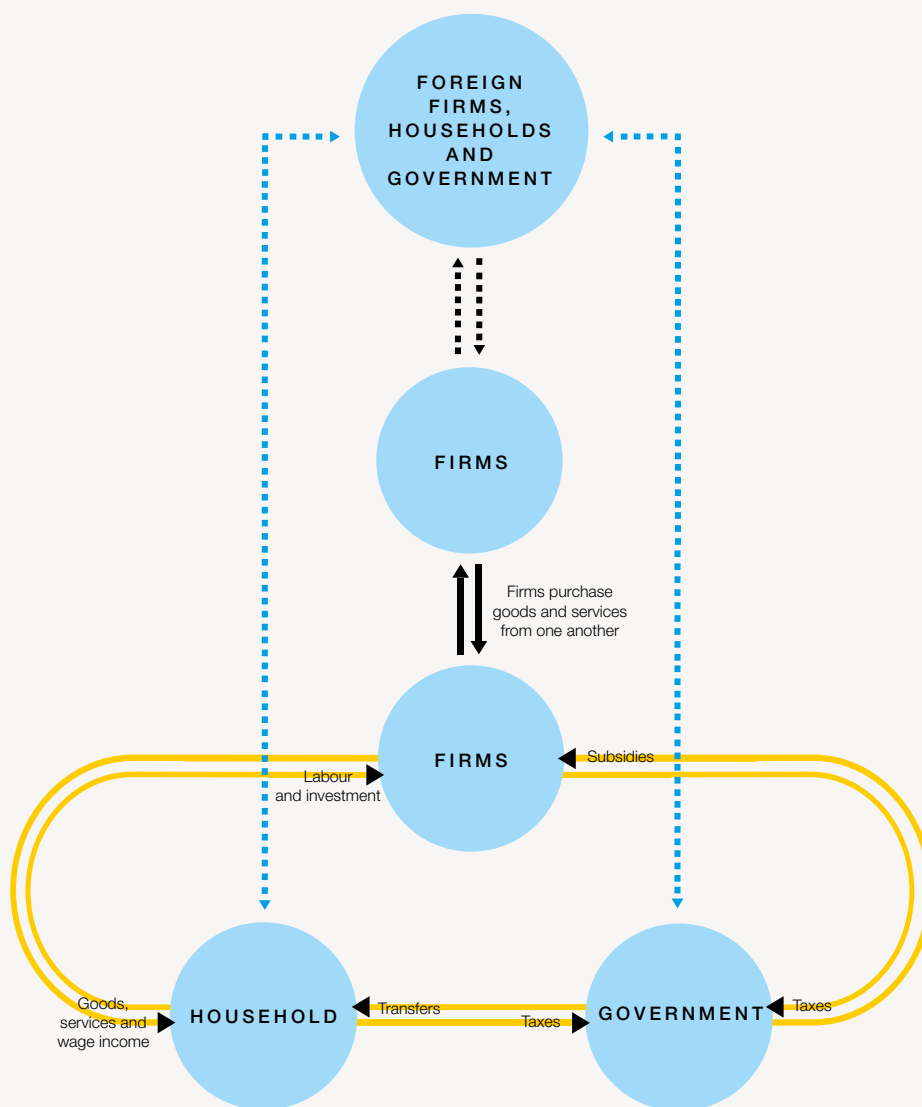
1	2	3
Literature review  on existing evidence on the relationship between skills development, closing the skills gap, productivity and economic development	Data research and analysis  on labour productivity uplifts associated with reducing skills gaps across various countries, to feed into the CGE modelling	CGE modelling  to assess the aggregate economic impact, by GDP and jobs, of these labour productivity uplifts across economies

The quantitative approach: The CGE model

The Computable General Equilibrium (CGE) model can be tailored to assess the economic impacts from different policy interventions and is used widely by international and national governments. It captures the interactions of various agents – private households, businesses, governments,

etc. – on all economic activity, including production, consumption, employment, taxes and trade, using a system of simultaneous equations. Figure A.1 provides an illustration of the core economic interactions between different agents.

FIGURE A.1 Economic interactions captured within a Computable General Equilibrium model



Source: PwC

CGE models help quantify the impact of policy interventions or shocks to an economy. These shocks alter the initial set of prices and capture how economic agents adjust to these price changes by reallocating consumption and production decisions until equilibrium in the economy is restored again. The CGE model used in the analysis for this report compares the differences between the

baseline and shock scenarios. The model is highly flexible, offering a single and robust integrated economic environment to assess net impacts on macroeconomic variables like GDP. CGE models have a high level of credibility with government officials and are used extensively by national governments to evaluate policy options.

Further assumptions

The analysis takes into account some of the displacement effects of labour moving across different sectors of the economy, i.e. economic activities that may become obsolete, and focuses on economic value added across value chains and throughout the economy. It focuses on the GDP impacts arising from labour productivity improvements when countries reach a baseline, defined by the OECD as when the skills people have match the demand for those skills in the job market. But this does not include other

wider benefits, such as capturing new business innovations occurring as a result of higher workforce knowledge and skills.

This analysis focuses on long-term structural skills gaps, while recognizing that COVID-19 could potentially accelerate the upskilling agenda and also affect different industries in different ways, resulting in faster progress and even larger economic benefits by the year 2030. This is captured using the accelerated scenario referenced earlier in the report.

Data sources

The Global Trade Analysis Project (GTAP) is the main data source; it is compiled and regularly updated by an international network of economists, and coordinated by the Center for Global Trade Analysis at Purdue University. The GTAP contains a reconciled set of intra-country and international

trade data from 140 regions and 57 sectors. For example, the analysis relies on GTAP data as trade and supply chain interactions between different industries, as well as consumption behaviour of households and governments.

Model parameters

The values of parameters in the international model are taken from the GTAP database. These parameters have been aggregated across the 8 regions and 13 sectors. To find the exact values of these parameters, “Behavioral Parameters” by Hertel and van der Mensbrugghe

is recommended.⁸⁵ Their chapter is a record of the base documentation in the GTAP 10 database and includes detailed annexes of the various parameters present in each country and sector. These values have been directly input into the international model of the analysis in this report.

FIGURE A.2

Key model features

Key model feature	Description
Firms	Captures 13 industries in each of the 12 countries
Household	Identifies one representative household in each of the 12 countries and Benelux
Long term	Considers projects lasting up to 30 years, i.e. to the year 2047
Recursive dynamics	Tracks the evolution of economic variables over time
Labour market	Allows labour market entry and exit, human capital accumulation and productivity reductions as workers move between sectors
Tax system	Stylizes taxes across regions into a select number of categories to facilitate consistency
Recursive dynamic	Assumes economic agents are rational and maximize their utility in each period; over time, they demonstrate adaptive expectations, i.e. they adjust their expectation of the future in line with past and current economic conditions
Imperfect competition	Allows Cournot ⁸⁶ (quantity) interactions in each industry to provide a better reflection of economic reality
Government closure rules	Assumes government addresses fiscal surplus/deficit at the end of each period; the international model closes government budgets following the Harberger rule, ⁸⁷ i.e. giving a lump sum transfer to households if there is a surplus, or a tax if there is a deficit

Source: PwC

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Endnotes

1. See SkillsFuture for more information: <https://www.skillsfuture.gov.sg> (accessed 12 January 2021).
2. PwC, 2020a.
3. ILO, 2018.
4. See SkillsFuture for more information: <https://www.skillsfuture.gov.sg>.
5. See the World Economic Forum website for more details on the Shaping the Future of the New Economy and Society platform, <https://www.weforum.org/platforms/shaping-the-future-of-the-new-economy-and-society> (accessed 12 January 2021).
6. Higher education has not always been driven by economic motives, but by religious and political community-building. See Schofer, et al., 2016.
7. Martin, 2018.
8. KelloggInsight, 2019.
9. Narratives about skills have changed the developmental trajectories of many countries in the past. As Laura Holden and Jeff Biddle have written, “Prior to 1958, ‘human capital’ was little more than a suggestive phrase in economics, and played no role in discussions of education policy”. By the early 1960s, economics departments developed theoretical and empirical human capital research programmes and opinion leaders and policy-makers started talking about public spending on education as an “investment with a demonstrably high rate of return [that had] the capacity to contribute to the achievement of important national goals”. This new idea started in the United States and spread rapidly around the world. See Holden and Biddle, 2016.
10. Holden and Biddle, 2016.
11. Coyle, 2020; Giuliano and Spilimbergo, 2009.
12. Schwab, 2020.
13. PwC UK, 2018.
14. World Economic Forum, 2020a.
15. PwC US, 2020.
16. The research suggests, however, that many organizations are creating a narrow view of upskilling by focusing simply on teaching people how to use new tech tools.
17. This matters for organizations in complex environments where the classic gains from specialization are eclipsed by the need to adapt flexibly to changing circumstances. See Bakhshi, et al., 2017.
18. Moritz, 2020.
19. Azhar and Droog, 2020.
20. Ted Talks, 2014.
21. Whether people need incremental or transformational new skills depends on how technology changes jobs: if automation just changes tasks that are required in a given job, then upskilling is enough; if complete jobs are destroyed, then complete reskilling for transitioning to new jobs is in order. But it is the learning mindset that will prepare populations for whatever the future brings.
22. Expert interview conducted for this report.
23. See, for instance, Dalton, et al., 2016, Chetty and Hendren, 2018, and Munshi, 2011.
24. Gartner, 2020.
25. Sethi, Brown and Jackson, 2019.
26. The focus countries are Australia, Canada, China, France, Germany, India, Japan, South Africa, Spain, the United Arab Emirates, the United Kingdom and the United States. The regions include Asia-Pacific, Benelux (including Belgium, Luxembourg and the Netherlands), Central & Eastern Europe, Latin America, Middle East, North Africa and Turkey, North America, Sub-Saharan Africa and Western Europe.
27. The activities are business services, public sector (including public administration, education and defence), manufacturing, consumer industries, health and social care, financial services, communications and media, energy and utilities, transport and logistics, as well as agriculture, mining and construction.
28. Accenture, 2018a.
29. For instance, Cedefop estimates that the existing skills of the EU’s workforce fall about one-fifth short of what is needed for workers to carry out their jobs at their highest productivity level. See Cedefop, 2018.
30. UKRI Economic and Social Research Council, 2018.
31. Quantifying these extra benefits requires making assumptions about how the demand for skills across sectors will evolve in the next 10 years, which is beyond the scope of this research.

32. Overqualified workers have been found to be more likely to be demotivated because their skills are underutilized (Hersch, 1991). Yet the costs (including opportunity costs) of education have already been incurred. A sizable share of the EU workforce, typically 4 in 10 employees, feels that their skills are underutilized – in many cases trapped in low-quality jobs or contingent work (see Cedefop, 2018).
33. World Economic Forum, 2020a.
34. Cedefop, 2018.
35. Nedelkoska and Quintini, 2018.
36. Deloitte, 2018.
37. Countries heavily invested in the low-cost manufacturing of textiles, cars and electronics could face the greatest risk. The International Labour Organization estimates that just over 137 million people – or some 56% of salaried workers in Cambodia, Indonesia, the Philippines, Thailand and Viet Nam – are at high risk of being replaced by machines. See Kinder, 2018.
38. Cedefop, 2016.
39. The similarities in how reforms were conducted include: (i) all the countries experienced drastic declines in output at the start of the transitions; (ii) there was a significant number of job leavers in comparison with job losers in the years of the steepest employment and decline of output; (iii) private employers recruited their workers mostly from the state enterprises rather than from the large unemployment pools; (iv) a significant number of workers left the labour force after the start of the transition and caused high inactivity rates; and (v) labour market reforms were not followed by reforms in the educational systems. See INSEAD and Adecco Group, 2020.
40. INSEAD and Adecco Group, 2020.
41. INSEAD, 2017.
42. ILO, 2020.
43. Adrijan and Kennedy, 2020.
44. Expert interview conducted for this report.
45. Schwellnus, et al., 2017.
46. Krusell, et al., 2000.
47. A debate continues on the extent to which skills shortages are behind increasing wage inequalities and unemployment in many developed countries – as opposed to general lack of demand for workers.
48. Expert interview conducted for this report.
49. Acemoglu, 2020.
50. Transformational change is difficult. The labour market is a social institution embedded in a dense web of rules, habits and conventions; the employment adjustment costs are substantial, even in the face of major changes, such as the arrival of new and disruptive technologies. Education is one of the slowest institutions to change in this society. The mismatch in clock speed between education and technology is something that will continue creating skills gaps. See Bakhshi, et al., 2017, and Acemoglu and Autor, 2012.
51. Expert interview conducted for this report.
52. One theme emerging from this research is how ‘local ecosystems’ can benefit from community wealth creation. Leveraging local strengths and resources can help create meaningful work. As explained by PwC’s Blair Sheppard, this involves partnerships with business service providers to increase skills use in the workplace, and technical support to industry associations to form partnerships with local training and government organizations to address local skill needs.
53. For instance, the ongoing debate regarding the merits and relative importance of vocational education versus generalist skills will be influenced by the economic structure and relevant industries of each country or region, although it also depends on culture and institutional traditions. For example, vocational education is not as well regarded by families in South Korea as it is in Switzerland.
54. There are other upskilling paradigms with more interventionist lines (e.g. programmes in some countries in East Asia), driving the skills system towards wider economic development goals of, for example, changes in economic structure and thus the shaping or stimulation of demand. See Campbell, 2012.
55. The research showed the increasing tendency to protect people rather than jobs as a way to increase flexibility for adaptation and investment in employability for the new jobs being created.
56. See World Economic Forum, “Closing the Skills Gap Accelerators” for more information on this initiative, <https://www.weforum.org/projects/closing-the-skills-gap-accelerators> (accessed 13 January 2021).
57. Madsen, 2006.
58. Expert interview conducted for this report.
59. The annual *Global Talent Competitiveness Index (GTCI)* report, available at <https://gtcistudy.com/#>, has been produced since 2013 and is a collaboration between INSEAD and the Adecco Group to benchmark and assess the performance of countries (and, recently, also cities). The idea of thinking of talent in terms of competitiveness is compatible with the philosophy of the World Economic Forum’s Global Competitiveness Index, where competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be reached by an economy. See the Global Competitiveness Index, http://www3.weforum.org/docs/GCR2014-15/GCR_Chapter1.1_2014-15.pdf (accessed 13 January 2021).

60. According to World Bank statistics and to “The World Bank in South Africa”, <https://www.worldbank.org/en/country/southafrica> (accessed 13 January 2021). See also World Bank, 2019.
61. Probst and Scharff, 2019.
62. Rodrik and Sabel, 2019.
63. Some issues will gain more prominence in future discussions about good jobs: (i) the role of workplace surveillance; (ii) increased dependency on digital tools and decreased human-to-human interaction; and (iii) the role of data management in maintaining good jobs and providing evidence to change the bad jobs managed by the algorithm phenomenon.
64. Sethi and Stubbings, 2019.
65. The well-known 70-20-10 rule states that 70% of learning is acquired from on-the-job experience, 20% from developmental relationships and only 10% from the classroom. This anecdotal rule might need to be revisited with all the work transformations being experienced due to COVID-19.
66. The benefits of the meaningful work virtuous circle can be far-reaching, going well beyond productivity and GDP: fulfilment through constant learning and better health via job satisfaction (see Faragher, et al., 2005). In general, more trustworthy relationships with business and government will lead to stronger social cohesion.
67. Lewis, 1955.
68. See Social Progress Imperative, “Learn About Us” for more information on the Social Progress Index, <https://www.socialprogress.org/about-us> (accessed 13 January 2021).
69. Access to good jobs by an upskilled population also brings wider social benefits, including better health outcomes and thus more well-being (see, for instance, Faragher, et al., 2005).
70. Expert interview conducted for this report.
71. The call to action outlined in this section is the outcome of dozens of interviews with practitioners and experts across industries, academics and heterodox thinkers, multilateral organization leaders and key policy-makers. It stems from an analysis of these experts’ thoughts on challenges, opportunities and ideas for new solutions to create meaningful work through upskilling.
72. See World Economic Forum, “Reskilling Revolution”, <https://www.reskillingrevolution2030.org> (accessed 13 January 2021).
73. World Economic Forum, 2020b.
74. PwC US, 2020.
75. There is certainly more appetite for CSR. In Switzerland, a vote is being held on holding businesses accountable for their entire value chain across the world to ensure minimum standards are met as they are in Switzerland. In France, efforts are being made to integrate the stakeholder approach into accounting standards.
76. Levesque, 2019.
77. A clear workforce strategy can help build organization-wide upskilling that addresses technical skills, digital ways of working, ethical implications and revised performance and compensation frameworks.
78. A joint approach with the participation of all relevant organizations’ stakeholders (empowered employees, citizens, civic organizations and advocacy groups) helps co-create solutions for the responsible use of technology.
79. World Economic Forum, 2020d.
80. See Giga, “Giga is a global initiative to connect every school to the Internet and every young person to information, opportunity and choice”, <https://gigaconnect.org> (accessed 13 January 2021).
81. See World Economic Forum, “The Skills Consortium”, <https://www.reskillingrevolution2030.org/reskillingrevolution/initiatives/forum-led/skills-consortium/index.html> (accessed 13 January 2021).
82. The OECD focus is on skills mismatch rather than qualifications mismatch to the extent that qualifications become less relevant for workplace performance over time than skills.
83. The focus countries are Australia, Canada, China, France, Germany, India, Japan, South Africa, Spain, the United Arab Emirates, the United Kingdom and the United States. The regions include Asia-Pacific, Benelux (including Belgium, Luxembourg and the Netherlands), Central & Eastern Europe, Latin America, Middle East, North Africa and Turkey, North America, Sub-Saharan Africa and Western Europe.
84. The activities are business services, public sector (including public administration, education and defence), manufacturing, consumer industries, health and social care, financial services, communications and media, energy and utilities, transport and logistics, as well as agriculture, mining and construction.
85. Hertel and van der Mensbrugghe, 2016.
86. Cournot competition is an economic model used to describe an industry structure in which companies compete on the amount of output they will produce, which they decide on independently of each other and at the same time.
87. Arnold Harberger’s research laid the groundwork for the later use of computable general equilibrium analyses of the impact of taxes on an entire economy.



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