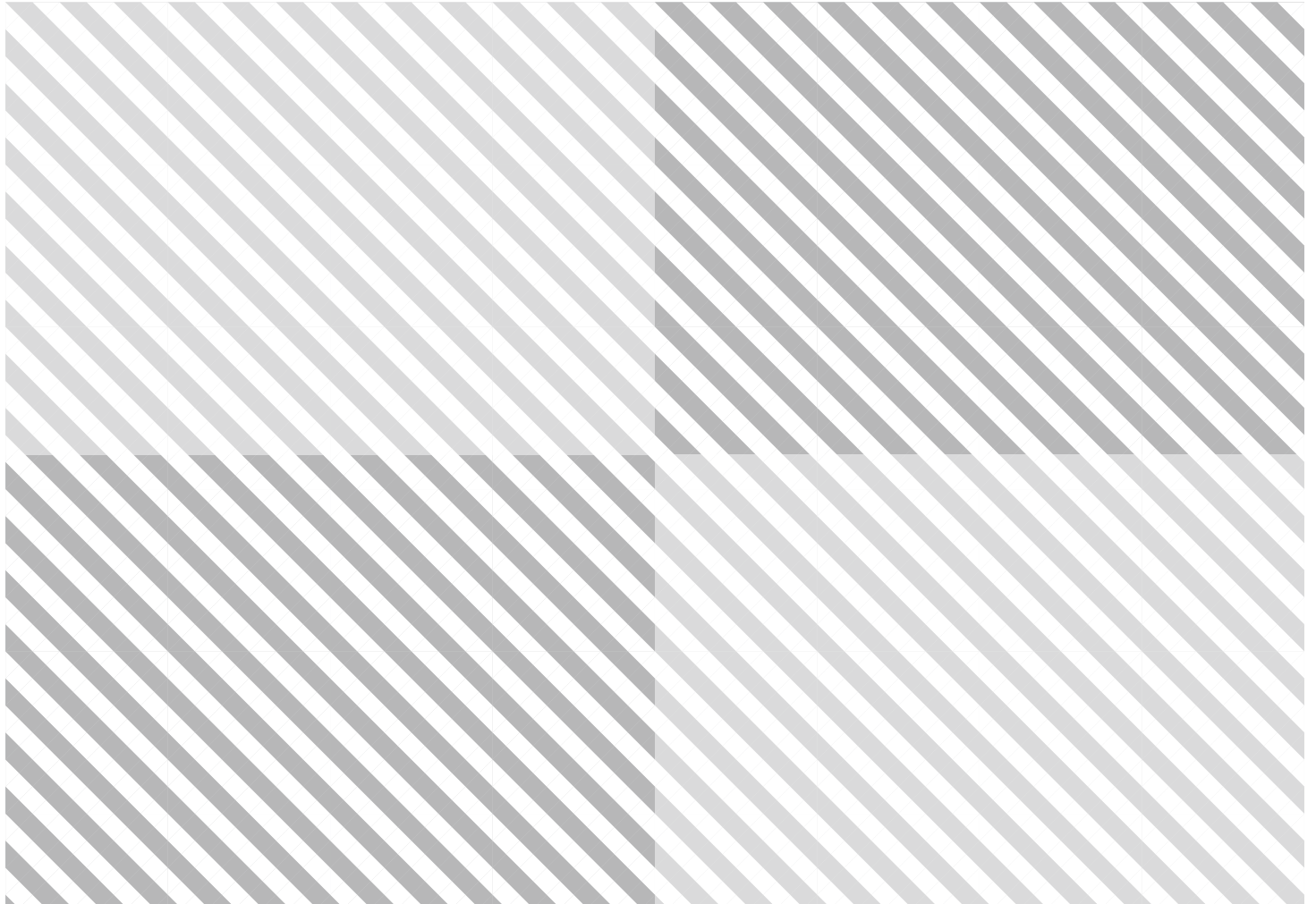


White Paper

Dialogue Series on New Economic and Social Frontiers Shaping the New Economy in the Fourth Industrial Revolution

Centre for the New Economy and Society

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This white paper is the outcome of a set of international, multistakeholder dialogues organized by the World Economic Forum's Centre for the New Economy and Society under the umbrella of the Dialogue Series on New Economic and Social Frontiers. The series engages the Centre's three Global Future Councils as well as representative business, government, civil society and academic constituents to identify the most urgent challenges at the intersection of technology, economics and society, and to explore a range of potential interventions to address them.

As a key output of the learning created, this white paper draws upon discussion contributions by leaders and experts who engaged in the Dialogue Series through a series of virtual calls and physical meetings between September and December 2018. It also includes the latest thinking from international organizations, academic researchers, think tanks, businesses and other stakeholders. It aims to develop consensus towards a common narrative on the new economic and social context and objectively identify emerging response options. The white paper is intended to be a resource for governments, business and other stakeholders interested in furthering economic and social progress in the Fourth Industrial Revolution.

For more information, or to get involved, please contact the World Economic Forum's Centre for the New Economy and Society at CNES_DialogueSeries@weforum.org.

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Introduction

As technological change creates new opportunities and challenges, there are emerging questions around the adequacy of our current economic policies and practices, the social contract between citizens, businesses and governments and the metrics used to assess and decipher socio-economic progress. In response to these questions, a range of options have been put forward by policymakers, academics and experts, as well as business leaders. In many cases, these options offer dramatically different routes to advancing human prosperity in the Fourth Industrial Revolution and evoke different ideologies, views and values about the appropriate path for social and economic progress. In other cases, they are not necessarily mutually exclusive; rather, they offer a range of possibilities to be customized to different circumstances.

The Dialogue Series on New Economic and Social Frontiers aims to support objective, transparent and widespread understanding of the key emerging new economy challenges and opportunities associated with the current context, and the range of response options that could enhance societal gains. The curated list of the range of options available for addressing each topic shared in this white paper, and developed in collaboration with leading experts from a range of sectors and disciplines, aims to offer an impartial basis for discussion among policy-makers, business leaders, civil society leaders and other decision-makers on how best to address new economic and social frontiers.

A Multiplicity of Narratives about the New Context

Long-term global trends on important dimensions of human well-being paint a hopeful picture: poverty rates are declining around the world,¹ incomes have grown for the majority of the global population,² and global public health has improved significantly in recent decades.³ Rapid technological advances have underpinned much of these global income and welfare gains, which are unprecedented in human history. Most recently, the scale of online markets has been a source of vast consumer benefits, arising from greater choice, speed, efficiency and lower costs.

At the same time, the technological developments currently unfolding pose a significant challenge in terms of the depth of economic and social transformation they will require for their benefits to be fully realized and equitably distributed.

Although many advanced economies have reaped enormous benefits from technological advances, they have also experienced a hollowing out of the middle class; growing market concentration within many sectors; a “great decoupling” between productivity growth and the evolution of wages; and concerns about algorithm bias solidifying patterns of exclusion. Largely because of increasing polarization and reduced social mobility, perceptions within these economies around the opportunities and risks are diverging. For some, the advent of the Fourth Industrial Revolution has untethered existing structures and reference points to such an extent that the prevailing sense has become one of uncertainty and insecurity rather than boundless opportunity. This has added fuel to populist movements thriving on promises of re-imposing old orders. Part of this insecurity comes from the very real experience of shifts in labour markets already underway; and it is compounded by growing uncertainty about what the future will look like, with the only area of consensus being that the biggest part of the transformation is still ahead of us.

Researchers are also still debating the reasons behind the long-term trend of declining productivity growth observed in the US and Europe and why the adoption of digital technologies is not yet showing up as a step change in growth. Beyond issues of mismeasurement of digital inputs and outputs, many suggest that only a small fraction of firms has so far leveraged digital technologies to fully transform their production processes at a systems level.⁴ Once again, this points to further expectations of disruption and transformation as the Fourth Industrial Revolution accelerates.

In many emerging markets, the promise of digital technologies to level the playing field by providing access to information, markets (working capital, logistics, marketing services), essential services (energy, financial) and formal employment is significant. Public discourse around emerging technologies in some of the large emerging markets such as India and Kenya is overwhelmingly positive. In China, technology enabled access to markets has helped millions of microentrepreneurs flourish, led to global value chain integration and contributed to large-scale reduction in poverty rates. However, in emerging markets too, a new middle class is starting to worry whether the same path to prosperity will be open to their children. As the concentration of wealth becomes more evident and as winner-take-all dynamics take hold across many economies, there is a perception that options for individuals to advance and choose their path to professional and personal fulfilment are

becoming fewer rather than more abundant. Additionally, the automation of tasks is calling into question the manufacturing-led development model that served as a growth engine for parts of East Asia over the last decades and was previously expected to serve as a template for other emerging areas. This now looks unlikely, and many developing economies will need to carve a new path to growth in a vastly different context.

The needs across different geographies vary considerably. Until the mid-21st century, annual growth rates of the working-age population are projected to exceed 2.7% in Sub-Saharan Africa. By contrast, the working-age populations of East Asia will shrink by 10–15% in China, the Republic of Korea, and Thailand over the same period. Policies in the former will therefore have to be especially responsive to the needs of the large youth cohorts entering the labour market. By contrast, in Europe and East Asia there will be demand for mechanisms to support the needs of an ageing population in a sustainable manner.⁵ In addition, whereas previous generations of social contract models were predominantly domestic affairs, the current context requires addressing these issues in a systemic way across the globalized system and its interactions. This is perhaps nowhere more directly apparent than in the question of the appropriate international architecture for the adequate taxation of globalized firms to mobilize the resources required to fund any one country's social contract expenditures.

An Emerging but Incomplete Evidence Base

Adding to the multiplicity of narratives is the lack of a common basis for objective analysis on the economic impact of digital technologies. Even as data has become ubiquitous, metrics that turn such data into useful, actionable insight are still limited. While there is a good understanding of the general mechanisms by which digital technologies are affecting economic outcomes such as output, employment, income inequality and market structures, the evidence for the magnitude of these effects is only beginning to emerge and mostly focused on high income contexts. Additionally, causal analyses remain rare. Some of the emerging evidence base is summarized below.

Fairly extensive evidence has been gathered for developments in high income labour markets (US and Europe), where fear of wage and job loss due to automation is weighing heavily on the public's mind. While there is no evidence of an overall decline in employment, studies point to a systematic loss of middle-skilled jobs and a decoupling of productivity from wages, with wages stagnating for low- and middle-skilled workers.⁶ Less evidence is available for the impact of platform work. For low income economies, the most important emerging labour market patterns concern the disappearance of routine jobs, pointing to the demise of the manufacturing-led development model.⁷ These developments may be compounded in the future if adoption of 3D printing leads to reshoring of an even larger proportion of previously offshored tasks. Despite the promise of digital leapfrogging, take-up of platform-enabled work is still modest.⁸

When analyzing the impact on product markets, two new strands of inquiry are emerging. One focuses on estimating consumer benefit from use of digital technologies, where

gains are inferred from time saved from technology use⁹ or derived from experiments which elicit consumers' willingness to pay for digital services.¹⁰ Another strand attempts to gauge potential consumer harm from changes in market structure. It examines indicators of market concentration such as profit margins, returns on capital and stock market valuations.¹¹ Research, however, currently still falls short on the consequences of such concentration on consumers and citizens. Evidence is largely anecdotal and involves either the study of specific companies or is centred around cases of major derailments. There are some early but incomplete efforts to take a broader perspective on both economic and social repercussions including on democratic processes and implications for labour conditions, but more rapid expansion of research is needed. Additionally, there is a need for more systematic evidence on distributional impacts arising from big data-driven decision-making in the allocation of goods and services, either positive or negative (for example in terms of access to insurance services or credit allocation).

Nascent research on the implications for capital markets has begun to look at the value of intangible assets at the core of the digital economy, including data, algorithms and specific types of human capital, but needs to be expanded further.¹²

In this environment of a limited evidence base, blind spots and speculation can often flourish. Both positive and negative narratives risk becoming overblown and ideological rather than objective factors can drive decision-making. However, irrespective of narrative and whether leaders and society's views fall within largely optimistic or pessimistic categories, when it comes to the relationship between technology, economy and society and our preparedness for addressing challenges and leveraging opportunities, there is wide-ranging consensus that how the future unfolds will be dependent on our actions today. While forecasts are not perfect, heightened awareness about the present moment of transformation offers a rare opportunity to shape the future rather than to course-correct reactively. The decisions we take today will determine the realities of the future and how quickly we act will also determine the range of options at our disposal. To develop political will and mobilize resources within this unique window at the advent of the Fourth Industrial Revolution, we need clarity around the areas of highest priority for action, the metrics that can best shed light on emerging economic and social frontiers, and the range of response options currently at our disposal.

Four Challenges for the New Economy and Society in 2019

Even though globalization and new technologies have delivered significant progress for the world economy, it is increasingly apparent that many people—especially in advanced economies—have predominantly benefitted from these trends in their role as consumers, not in their role as workers or citizens. Nor do headline figures tell an adequate story about dynamics beyond global averages. As the world seeks to come to terms with a rising tide of populism and nationalism, it can no longer be ignored that a widespread sense of economic insecurity lies at the heart of much of the current discontent. In the wake of the global financial crisis, voters in many high-income countries began to lose faith in

the state's ability to manage the disruption and dislocation caused by accelerating technological change and ever deeper globalization. At the same time, many people in low-income countries have yet to attain even basic standards of living, with many risking their lives in search of a more prosperous future.

A central focus of managing both globalization and the Fourth Industrial Revolution, in both advanced and emerging economies alike, should therefore be the elaboration of a new social contract. This is essential to restoring a sense of common purpose and economic security as well as sustaining political support for open economies and societies.¹³ Put another way, how can we leverage emerging technologies to advance economic prosperity and human flourishing while keeping in check the host of polarizing forces unleashed by the recent technological transformations?

The World Economic Forum's Dialogue Series on New Economic and Social Frontiers is designed to consider a range of priority action areas over the course of 2018–2019. In this first publication of the Dialogue Series, four topics of rising priority—and growing debate—were selected as forming a central tenet of the agenda for leaders seeking to shape new economic and social frontiers at the start of 2019:

1. Rethinking economic value in the Fourth Industrial Revolution: do we need to fundamentally rethink what constitutes economic value and what practical avenues exist for doing so?
2. Addressing market concentration in the Fourth Industrial Revolution: do we need to address the market concentration created by online platforms and how can concerns be balanced against benefits?
3. Enhancing job creation in the Fourth Industrial Revolution: do we need to consider proactive measures for job creation and what do they entail in today's economy?
4. Reimagining social protection in the Fourth Industrial Revolution: do we need to reimagine social safety nets and what range of options have been proposed?

Future iterations of the Dialogue Series, and subsequent publications, will address other issues of rising prominence and we welcome proposals for consideration.

A Multistakeholder and Multidisciplinary Approach

While it has become clear that neither knee-jerk reactions nor inaction are valid response options in the midst of the fundamental transformations underway, there is little agreement around the data, values and principles that should underpin responses. Therefore, vastly different ideologies and analyses form the basis of increasingly polarized debates, at times leading to paralysis instead of broad-based action.

For example, while there is largely consensus around the need to actively steer recent technological shifts towards positive, inclusive and equitable outcomes, there are divergent views about placing emphasis on increasing access to technology-enabled opportunity vs reigning in its negative side effects. Such debates also diverge on basic perceptions of whether markets can still be trusted as the engine of inclusive growth. Those

in favour point to the vast improvements in living conditions around the world. They recognize that markets have failed in important ways, most dramatically for low-skilled workers in advanced economies. However, they are confident that these failures can be fixed by governments in a targeted way.

Others argue that the system is broken in more fundamental ways. Mazzucato (2018a) points to the financialization of the economy since the mid-1990s, which is distorting incentives across the board and will be a roadblock to addressing technology-driven polarization via market solutions. As financialization has progressed, companies have lost the incentive to plough profits back into the real economy, leading in turn to huge shortfalls in investment. This trend has undermined the functioning of markets in fundamental ways, such that a piecemeal approach to fixing market failures will not be sufficient. In this view, governments will need to shift from merely reacting to symptoms of these failings to dynamically participating in the creation of new markets, encouraging risk-taking and experimentation, and helping to transform grand challenges into clear opportunities for innovation and investment.¹⁴ For example, shifting demographics and climate change are concrete problems that require investment across sectors and involvement of many actors.

In addition, policy-makers and business leaders face significant barriers to maintaining the analytic depth necessary to enact informed decisions for today's new economic and social agendas. The metrics in use today are increasingly irrelevant or partial, wedded to outdated models of economic and social systems, and lacking many of the features which could empower proactive governance of the new challenges on the economic and social agenda in the Fourth Industrial Revolution. In an increasingly digital world, new types of data, enhanced technologies and more sophisticated analytic methods are set to empower the creation of a range of powerful and meaningful metrics. Among the methods which are set to bringing fresh insight are data science, machine learning (ML) and probabilistic modelling and inference.

However, much new data is currently a by-product of digitalization, rather than purposefully created and further investment is needed to shape and develop new metrics. Barriers to greater analytic capacity include: fragmented initiatives, low visibility of innovative approaches and lack of focus on critical measurement challenges among private sector data-holding companies and organizations. A new metrics agenda is urgently needed, and it requires four discrete areas of focus: identifying relevant data; shaping data through models; the conversion of relevant data into insightful metrics and designing the use and adoption of new metrics. Such endeavours require an understanding of the tangible impact of new measures on social, political and economic institutions, as well as a focus on the design features that will enable such metrics to expand the realm of social justice, economic prosperity and fairness in the new economy and society.

The Dialogue Series aims to encompass a broad range of values, data, principles and ideologies and to build a set of diverse, multistakeholder and multidisciplinary approaches to fresh thinking about the new economy in the Fourth Industrial Revolution. To do so, it draws upon the views of preeminent thought leaders in the Global Future Council on the New

Economic Agenda, the Global Future Council on the New Social Contract, and the Global Future Council on New Metrics. Each of the three Councils provides a unique lens on the selected topics as well as a highly essential interdisciplinary approach to proposed solutions. In addition, topic-specific experts are invited to share views on selected areas, adding to the richness and wide spectrum of response options compiled.

Each of the next four sections is organized to provide a brief overview of the emerging challenges and opportunities around each area as well as the spectrum of response options generating traction in each area. Response options for each area are displayed without an order of preference, and while some are mutually exclusive, others may be considered in tandem.

As consensus emerges around a specific set of solutions or as there is further experimentation with a range of approaches, future work should aim to examine case studies globally to build a framework of core principles and a 'bank' of potential solutions to inform decision-making. We invite readers to share examples of response options for the featured challenges and proposals for future topics.

1. Rethinking Economic Value in the Fourth Industrial Revolution

Emerging Challenges and Opportunities

A substantial amount of work has been carried out in recent years on moving beyond GDP as the sole headline measure of economic value creation, in order to provide more nuance on economic activity, consumer welfare and distribution of gains. A prominent and comprehensive effort of rethinking the measurement of economic performance and social progress was carried out under the aegis of the Stiglitz-Sen-Fitoussi Commission.¹⁵ This investigation yielded a substantial set of recommendations on better capturing different dimensions of economic performance, subjective and objective well-being, distributional questions and sustainability.

Over the intermittent decade, as the digital economy has taken shape it has introduced several new dimensions of value creation that are not fully integrated into traditional concepts and metrics. There is also growing urgency to address some of the issues raised by the Commission. In particular, there are challenges on five fronts: the digital economy has given rise to new types of assets which are not well-understood; new types of economic activity; new sources of consumer welfare (and loss); concerns around how new gains are being distributed; and questions about who is truly creating value in the economy.

Emerging Responses

There is a growing debate on the range of options for rethinking market value in the Fourth Industrial Revolution. Several economists, policy-makers, business leaders and civil society have called for a critical re-appraisal of conceptualizing and measuring economic value and the actors that are recognized for contributing true long-term value to the economy. We summarize below a non-exhaustive range of response options and new ideas that are beginning to emerge around the areas of concern identified above. These range from arguments for reconsidering the creators of value to the need for new metrics and measurements.

1. Identify and account for a range of new intangible assets

Today's knowledge economy relies very heavily on intangible assets as inputs to value creation. Examples include "Google's search algorithms, software, and stores of data; Apple's design, brand, and supply chains; or Uber's networks of

drivers and users".¹⁶ These intangible assets are estimated to be worth billions of dollars.¹⁷ Intangibles like the sophistication of knowledge networks have been identified as one of the key determinants of product complexity, in turn associated with faster economic growth.¹⁸ While some of the more traditional types of intangibles (such as certain types of intellectual property) are included in national accounting, we are far from capturing the fast-growing asset base in new types of intangibles that are underpinning the digital economy.

In part this is because conceptual accounting boundaries have not yet been sufficiently and widely updated, including for traditionally cited intangibles such as human capital and unpaid care work. Additionally, it is because of measurement challenges, including for important new asset groups such as raw data and algorithms due to the absence of well-functioning markets for them and context dependence due to the desire of firms to set different prices depending on the counterpart in the transaction.

For example, the missing value of data assets is frequently mentioned as a large gap. The OECD (2013) identifies six potential avenues for obtaining a proxy of data value. One set is based on market valuations such as (i) market cap per data record (for companies which draw their entire value from their data holdings, such as social media platforms); (ii) market prices for data; (iii) cost of data breaches; (iv) data prices in illegal markets. Another set is based on individuals' valuations (i) through surveys and economic experiments; (ii) individual willingness to pay to protect data.¹⁹

While there is a growing literature in measuring investment levels in intangibles, studies attempting an ex post valuation of intangible asset holdings are rare. One often cited attempt is Elsten and Hill (2017) who infer the value of intangibles as the gap between companies' market valuation and the value of their tangible assets.

2. Adapt or complement GDP to account for digitally-derived value

When it comes to measuring value generated by the digital sector, relying on GDP alone may miss the mark for three main reasons. First, GDP includes mainly that part of national economic activity that is traded on a market and therefore has a market price, with some exceptions. The application of digital technologies is shifting some services into the market boundary (e.g. by creating a market for small tasks such as

rides and household tasks). However, an important part has also been shifted out of the boundary as technology has made certain tasks easy enough for consumers to complete themselves (e.g. booking flights and hotels, replacing the need for travel agents).²⁰ Note however, that this mainly changes our visibility on the composition of market-based economic activity rather than its level, as income saved by consumers on DIY digital production can be spent on other goods and services.

Second, free digital services are mostly not captured in GDP. A large range of digital services is provided free of charge, either meant to entice consumers to start using a platform and eventually move to adjacent paying services (freemium models) or because the company is set up to generate revenue through advertising (ad-based business models). Additionally, value from a growing volume of activity—including music streaming, email, search, social media, video content, wikis and open source software—is often not captured at all.

Third, national statistical offices face compilation challenges and countries have been slow to collect data on digital sector activity, e-commerce, free products and the sharing economy. Only a handful of countries have set up satellite accounts for certain elements of digital value creation in order to keep GDP comparable.²¹

While a measure as widely used as GDP is unlikely to be replaced in the near term,²² there are a growing number of digitally collected indicators available to complement it and to obtain more direct measures of aggregate and individual value and welfare within a more immediate time frame. Data collected online can provide higher frequency, greater granularity (geographical and individual), and greater reach (including into the informal economy). For example, mobile money data or online financial transactions can serve to give a more accurate picture of consumer spending, complementing data recorded both on the business side and income side.²³ Satellite data on light intensity can provide valuable alternative information on economic activity in areas where GDP statistics may be difficult to gather.²⁴

3. Adapt measures of consumer welfare, well-being and societal value

In addition to not capturing the market value of digital services that are provided free of charge, traditional approaches to assessing consumer welfare also need to be updated to capture new sources of consumer surplus. Estimates of value to consumers based on Massive Online Choice Experiments suggest that such benefits are potentially huge. Annual consumer surplus from search engines have been estimated at US\$14,760 on average; US\$6,139 from email; and US\$2,693 from digital maps per annum, for a sample of US consumers.²⁵ This adds up to an amount equivalent to approximately 30% of GDP. Other studies have estimated consumer gains from internet use, based on expenditure and time use data. One of the first studies taking this approach calculated consumer surplus to be around 2% of income at the time, equivalent to several thousand dollars per user.²⁶

Consumer welfare is traditionally expressed in the form of real GDP, i.e. GDP divided by a price index where the lower the price for a set of products, the higher the benefits a consumer derives from their consumption. The Billion Prices Project at

MIT²⁷ suggests that online prices are systematically lower than those in brick-and-mortar retail, implying higher consumer gains than what one would infer using official price indices. Secondly, where prices are not fully adjusted for quality improvements, consumer welfare is underestimated. For the case of many digital goods, quality has been improving rapidly and therefore prices going into the calculations of consumer welfare might be too high, yielding welfare estimates which are too low.²⁸

Beyond surplus from lower prices and higher quality, the non-economic effects on consumers and more broadly citizens must also be captured better. For example, social media and online communication has been associated with both social connectivity for those at risk of isolation and with negative effects on mental health and democratic processes. Emerging technologies may provide new opportunities for measures of well-being, reducing reliance on indirect measures of welfare through measures of economic activity.

4. Focus new metrics on distribution and disaggregated data

Recent technological advancements have unleashed strong polarizing forces on the economy. These include skill and wage polarization in labour markets and concentration of market power among very few players at the industry level. Algorithm-driven decision making is currently on course to exacerbating existing inequalities. Changing economic geography is widening the divide between urban and rural communities.²⁹ Emerging evidence points very strongly to a lock-in of privileged positions and reduced social mobility. Thus national averages carry increasingly less information for the economic opportunities of individuals or specific socio-economic groups. The statement of a disillusioned British citizen that “Brexit will hurt your GDP, not mine” is telling. Yet more disaggregated data is rarely considered.

New metrics and measurements will be important in surfacing previously neglected dimensions of economic impact such as distribution. Piketty et al (2018) go as far as calling for a formal institution of distributional national accounts.³⁰ In addition to new metrics around overall distributions, much more attention will need to be paid to using the power of new data sources to assess the well-being of different socio-economic groups. For example: mobile money usage data can provide real-time information about earnings by geography (AIDA), skills data from online talent platforms can identify major emerging skills gaps in populations (LinkedIn), and computer vision data based on photographs can be used to qualify the affluence, quality, density and liability of urban environments (Streetscape).

5. Rethink the fundamental definition of value

At a more fundamental level, going beyond the challenges and opportunities of capturing digital value, the theory of value underlying mainstream economic analysis has recently been put into question. As Mazzucato (2018a) argues, neo-classical theory of value creation is not able to reflect which actors are truly creating long-term value in today's economy. Instead, value is represented by market price and therefore only dependent on the choices and valuations of market participants. This definition may assign value to highly speculative financial products, while not giving sufficient

consideration to value created by government investment or household work, for example. This was not always the case, as economists like Adam Smith and David Ricardo drew a moral distinction between those who create, reshuffle or even destroy value and with a shift occurring over time to the neo-classical theory of value with its focus on market prices. While new relevant data will be important in providing a more accurate picture of economic activity and will be instrumental in driving long-term, inclusive economic value creation, in this proposed avenue of action these efforts should be complemented by a new narrative of economic value creation.

Proposals include highlighting the distinction between creation of value and rent-seeking, and rethinking markets as co-created by public and private sector actors. Public-private partnerships in this instance would need to be symbiotic, based on the concept of collective creation of value and a focus on maximizing stakeholder value beyond shareholder value.³¹ Additional proposals include empowering younger generations of consumers and investors to amplify their strong values through their consumption and investment decisions; empowering the right entrepreneurs through social impact investing; and transforming corporate governance.

2. Addressing Market Concentration in the Fourth Industrial Revolution

Emerging Challenges and Opportunities

Digital platforms are the source of a range of consumer benefits thanks to the introduction of new services, greater choice, higher matching speed and lower costs. Digital platforms facilitate entry of new businesses by giving access to marketing channels, credit, logistics and other basic services. And they can benefit workers and employers by enabling more efficient job matching as they increase the amount of information available on both sides of the market. Yet at the same time, scale and the resulting concentration of market power can offset some of these benefits, with potential repercussions on innovation, quality and distributional outcomes.

Network effects, which arise when the value of a good or service to consumers is higher the more consumers are in the market, are at the heart of the platform economy. For example, in the case of Uber, the larger the number of people looking for a ride, the higher the incentive for new drivers to join the market and the higher the likelihood that one of the drivers will be available for pick-up in a given location. While offline markets are also characterised by network effects, effects can become stronger online as the reach of the platform can be more extensive depending on the goods or services offered. The availability of personal data of users amplifies network effects over time by allowing companies to learn about and from consumers and adjust their products accordingly; the bigger the number of consumers, the greater the feedback, the better the products and therefore the better off consumers become. Through this constant learning from personal data, network effects become stronger over time and existing players become more locked in. Some prominent examples for these types of dynamic data effects are Google's search algorithm, which constantly improves its performance as more people use it, or navigation apps such as Waze, which becomes more accurate as more people submit their data on travel times. Another source of lock-in can be a reputation and social standing in the form of ratings or followership which was earned by interacting on a platform over time, for example the ratings earned by drivers on ride hailing services or the number of followers someone has accumulated on photo-sharing apps. The digital platforms that are characterized by these types of dynamics include production, intermediation and exchange platforms, across business-to-business, business-to-consumer and peer-to-peer transactions.³²

These effects are very powerful on digital platforms and contribute to growing market power for first-movers by making it more difficult for potential new entrants to compete. They are playing an important role in increases in measured market concentration across advanced economies which have recently been documented. The key indicators that have been considered in making this case are market shares, profits, return on capital and stock market valuations. According to the Economist (2018), concentrated US consumer goods industries (including platform-based services such as email, browsers, mobile networks, accommodation, and travel agents) have recorded combined profits of \$151billion, their median return on capital is at 29%, and they have outperformed the stock market by 484%. In addition, there have been \$44trillion worth of take-overs since 1998. Van Reenen (2018) studies patterns of sales concentration and aggregate mark-ups and suggests that they are consistent with an increasing number of industries having become "winner-take-most/all" due to forces unleashed by globalization and new technologies." Calligaris et al (2018) examine mark-ups across 26 economies between 2001-14 and show that mark-ups in digitally intensive sectors are both higher than less digitally intensive sectors and the differential between the two has grown significantly over time. While no causal evidence, these patterns are consistent with a story where the digital transformation is playing an important role in explaining increases in market concentration.

In the platform economy, while there are large gains for consumers at present in terms of price, speed and choice, and firms are currently still acting as if markets were contestable, there may be cause for concern in the long run if winner-take-all dynamics remain unchecked. Prices in the internet economy are lower on average than in the offline economy,³³ and some players in the most concentrated markets offer their products for free. Therefore, consumer welfare is not impacted according to traditional competition standards, which focus on price effects. However, as more detailed information about consumers' preferences becomes available to firms, it will become increasingly easy to price discriminate. This can work to the advantage of consumers where their preference for a given product is weak; it will work against them when they are in urgent need of something and may face personalized surge prices. Additionally, keeping competition robust is important for sustaining innovation and the quality of goods and services on offer. Low barriers to entry can help create opportunities for new entrepreneurs to realize their ideas, and in some cases, yield a double participation-dividend, as new

entrepreneurs may serve new markets which were previously underserved. Finally, there are additional concerns raised by the public and others that do not fall within the remit of traditional competition standards and differ depending on the platform in question, such as negative effects on platform workers' rights, undue political influence and behavioural manipulation.

Emerging Responses

There is a growing debate on the range of options for addressing the effects of concentration without destroying the benefits of scale. We summarize below a non-exhaustive range of response options and new ideas that are beginning to emerge around the areas of concern identified above. Opinions on appropriate action are divergent; they range from arguments that online platforms are essentially the same as any other market with no specific provisions or interventions needed, to calls for a complete overhaul of the regulatory system. Broadly, five approaches have been put forward that are not necessarily mutually exclusive.

1. Trust existing markets and regulations

Some participants in the discourse argue that online platforms and some of the associated network effects are in their essence no different from those associated with retail stores and other types of physical markets. Just as customers of retail stores benefit from the presence of other customers as greater numbers of consumers will give a retail chain more market power with suppliers and therefore lower prices, consumers of ride-hailing services benefit from having more consumers in the market since this triggers more supply and thus less wait times. Following this logic, no new approaches to dealing with market concentration are necessary in the platform economy and traditional competition standards suffice.

Other participants in the discussion point out that while online platforms are different from other types of markets, history has shown that incumbents will eventually be displaced. This includes cases such as Myspace and Yahoo, which were at some point very dominant in their respective markets but have since been overtaken by new entrants. The Economist (2018) further points out that Facebook nearly missed the mobile revolution and could well have been displaced by a new entrant. Following this logic, competition will continue to thrive and the market will continue to be disrupted by new entrants over time.

2. Develop new metrics to measure the impact of market concentration in the platform economy

In this view, we don't yet know enough about the platform economy, associated market concentration and its implications. This approach calls for more quantitative analysis for a fuller understanding of the market concentration in the platform economy and its positive and negative effects. While there have been some notable studies, including collaborations between specific platforms and academics as well as work by in-house economics teams at platform companies—studying, for example, the effects of ride-sharing³⁴—these are insufficient for a fuller view and more objective policymaking. Additionally, in this view there is an unmet need for more data sharing for public policy research purposes, leading to suboptimal research on the effects of the platform economy. Balancing

against privacy and competition concerns, this approach calls for more independent analysis and nuanced understanding of price, earnings and distribution of risks and rewards, in order to develop more objective paths to policy-making.

3. Use technology to reduce barriers to entry

Much of the power of personal data comes from the dynamics they introduce: reinforcing network effects over time. Since this data is private to a company, established players become more locked in over time, making market entry more difficult. A range of new initiatives have suggested new approaches to holding and accessing business-relevant data, premised on introducing greater accountability, transparency and ultimately more democratic opportunities to access current data assets.

These include Sir Tim Berners-Lee's initiative Solid, which aims to move control over personal data back to the individual. Citizens store their personal data in one place, a Solid POD, deciding on a case-by-case basis which app can access their data. In another initiative Ocean Protocol, a decentralized exchange allows data providers to trade their data with start-ups in the field of AI, potentially allowing new entrants to accumulate data holdings by acquisition rather than organic growth. Distributed ledger technology (DLT) more broadly could offer additional avenues for tackling the challenge of market power derived from accumulated data holdings. DLT could be used to make data pools shareable between several players, allowing entrants to pool resources and gain critical mass. Protocols used to access a pool of data against a contribution to the network allow smaller players to participate and catch up with established companies on data access. An open question is whether this is sufficient to compete with existing players and how such an approach might be scaled.

Data ownership and rights are under increasing public scrutiny as technologists, regulators, business leaders and citizens contest the topic from different angles. Increasingly a differentiation is made between holding and fully owning data, and there is a move towards greater transparency of how data is leveraged to create further value.

In many developed and emerging markets, in addition to data-related entry barriers discussed above, the success of new firms in the platform economy will also depend on reducing fundamental bottlenecks faced by potential entrants, including appropriate skills and access to credit and energy—in part delivered through technology (such as education platforms or DLT solutions such as credit and energy tokenisation and accounting).

4. Incentivize alternatives

The previous approach of using technology to reduce entry barriers addresses the issue of market concentration directly by creating opportunities for new entrants. However, wide-ranging application of this type of technology may not be feasible for the time being. An alternative approach would be to tackle the concentration indirectly by addressing its negative side effects in a more targeted way. For example, one effect of market concentration is that over time incentives to invest in and provide high quality services, including privacy and variety, decline. In the absence of other means to tackling

entry barriers for private competitors or specific forms of regulation, governments could incentivize competitive pressure for quality standards to be maintained or improved. Coyle (2018) proposes that one solution might be a government-owned digital service provider which sets minimum quality standards, drawing an analogy to the relationship between the BBC and private TV channels in the United Kingdom. Established players would then need to compete against this standard and such a service would be financed through user fees or publicly financed. Another example of creating alternatives is a recent collaboration between major Korean telecoms providers to set up One Store in the Republic of Korea to compete with Google and Apple's app stores.

5. Overhaul the regulatory framework

At the other end of the spectrum, it has been proposed that competition policy needs to be expanded to deal with issues arising from market concentration that is focused on the prices faced by consumers and instead take a broader approach to socio-economic impact. The current regulatory frameworks in the US and Europe, both of which focus on prices and short-term consumer benefits, are arguably not fit for dealing with the challenges of a transformed industrial landscape. Relevant laws are short and vague and date from 1890 (Sherman Act) and 1957 (Treaty of Rome) for the US and Europe, respectively. The Economist (November 2018) goes as far as arguing that competition authorities are not being sufficiently held accountable for ensuring a healthy level of competition, and simply claim that the level of competition is impossible to measure.

Specifically, Khan (2017) argues that "current doctrine underappreciates the risk of predatory pricing and how integration across distinct business lines may prove anticompetitive". In an economy where winner-take-all dynamics are becoming more dominant, the optimal strategy for businesses is to pursue rapid growth over profits, with predatory pricing as a conduit. Furthermore, companies have an incentive to integrate across business lines, putting them in a position where they control critical infrastructure and data flows.³⁵ Workers in parts of the platform economy may also face reduced choice over time. Other challenges are that "markets can exist even when no money changes hands; concentration can include intangible assets; dominant firms can kill competitors by buying them".³⁶ Current competition frameworks with their focus on price increases are not fit to surface these new challenges to competition and need to be adapted accordingly.

3. Enhancing Job Creation in the Fourth Industrial Revolution

Emerging Challenges and Opportunities

As technological advances rapidly shift the distribution of work tasks performed by humans and those performed by machines and algorithms, global labour markets are undergoing major transformations. If managed wisely, these transformations could lead to a new age of good work, good jobs and improved quality of life for all. If managed poorly, they pose the risk of greater inequality and broader polarization. There is some debate as to whether, in the long term, we may be heading towards a future in which more individuals derive their income and quality of life from sources other than employment. However, there is general consensus that for the short-to-mid-term horizon proactive choices must be made to determine how best to manage the disruptions to labour markets, managing both new opportunities and challenges.

In particular there is a focus on jobs that are being displaced already or are highly likely to be displaced in the near future as well wage stagnation. In many high-income countries, wage growth has slowed and job growth stalled, in particular for low and middle-income workers. Job losses have been concentrated mostly in the middle skill range: in the case of the US, routine jobs that were shed during the last three recessions were not replaced as output recovered.³⁷ With widely anticipated growth in the use of AI, more and more tasks are becoming possible to automate. Less educated workers in routine job roles are often struggling to re-join the work force and many are permanently excluded and no longer seeking work. Evidence for Germany, the UK, and the US suggests that real incomes of low-skilled workers have been falling. Brynjolfsson and McAfee (2015) point to a “great decoupling” between productivity and wages, which has affected all but the high end of the skills distribution.³⁸

Even for roles that are unlikely to be displaced, there is a growing skills gap. For example, some estimates suggest that on average 42% of the core skills within all jobs will be wholly new by 2022.³⁹ Not only does the skills gap sap innovation and growth, without a major effort towards reskilling and upskilling, the incentive to automate and displace workers may increase further.

While estimates differ, the outlook for net job creation is broadly positive, with most forecasts predicting that technology will create more roles than it will displace. For example, one set

of estimates indicates that in 20 key economies, between 2018 and 2022, 75 million jobs may be displaced by a shift in the division of labour between humans and machines, while 133 million new roles may emerge that are more adapted to the new division of labour between humans, machines and algorithms.⁴⁰ There are also positive jobs scenarios due to the need for more green products as well as demand from ageing populations in advanced economies and growing middle classes in emerging economies for new services. To meet the United Nations Sustainable Development Goals (SDGs) in education, health, gender equality and decent work, it is estimated that we will need total public and private expenditures on the provision of elderly and childcare services of US\$18.4 trillion. This corresponds to about 18.3% of total projected GDP of the 45 countries in 2030, and it is predicted that such investments would bring 475 million jobs by 2030.⁴¹ However, most positive predictions stipulate the need for proactive efforts to leverage these new opportunities and channel the “right” kind of job creation.

Additionally, many countries are experiencing structural shifts in their economies. For example, the contribution of services to GDP has now surpassed that of manufacturing in China, Indonesia, Malaysia, the Philippines, and Thailand.⁴² For emerging economies then, the arrival of the 4IR calls into question the use of export-based manufacturing as a path to prosperity. Increasing automation and innovation is also increasing reshoring of manufacturing back to advanced economies and shifts in global supply chains.⁴³ In this period of flux, economies can refocus their job creation efforts on these new opportunities through, for example, the promotion of technology enabled services, empowering the self-employed through greater access to digital tools, and support for small and midsize enterprises (SMEs) to engage in global value chains which can all support growth and new employment in this new context.

Finally, new work formats are posing additional challenges and opportunities. On the one hand, in developed and developing economies alike, online work platforms are improving ways for workers to connect more efficiently or for the first time with earning opportunities and offer additional benefits in the form of flexibility. On the other, such work often falls outside of traditional employer-employee arrangements, creating a different, often undefined, distribution of risks, rewards and responsibilities. An important question in current debates regarding job creation is whether new roles

are being created or if we are witnessing the increasing redistribution of existing jobs. Is the platform economy providing new job creation or substitution? The evidence to date suggests it is a mix of the two but currently only a small portion of jobs growth is comprised of newly created jobs.

Emerging Responses

While there is a wide-ranging debate on actions to manage job displacement in the 4IR, views around whether and how best to enhance job creation are more limited. We summarize below a non-exhaustive range of response options and new ideas that are beginning to emerge. Opinions on appropriate directions are divergent; they range from arguments for public-sector driven incentives for job creation to planning for a future without jobs as the main source of income. Broadly, five views have been put forward that are not necessarily mutually exclusive.

1. Incentivize job growth through a focus on priority sectors

Wholly new roles are emerging across all sectors, driven by demand for more skills to work with and build technology. The increased demand for improved education, training and retraining across entire populations is likely to create new work opportunities in education and training. Demographic shifts, such as the increasingly aging society in developed economies, will likely create heightened demand for care industry workers. An accelerated greening of the economy is also expected to create new opportunities in the agricultural sector, potentially breaking the traditional model of structural economic transformation from agricultural to industrial to service economy.⁴⁴ Broader action to limit global warming to 2 degrees Celsius is also predicted to create sufficient numbers of “green” jobs to more than offset losses elsewhere.⁴⁵

The public sector can play a role in incentivizing where, how and what jobs are created, focusing on sectors that are expected to grow as well as those that are vital for economies’ future vision and needs, mobilizing stakeholders across society and the economy to generate a collective sense of national mission in which everyone has a role to play. The role of the state in particular needn’t be focused on mitigating market failures but rather on using technological advances, domestic and outside investment and new ways of working to power new and sustainable job growth.⁴⁶

Targeted, sector-specific support can be focused on those industries forecast to grow, including in the more traditional industries of care, agriculture and education and in newer and emerging industries such as digitally enabled services and green technology. Denmark for example has successfully captured a large portion of the Chinese demand for green goods, services and know-how. Identifying common investment and growth goals can help economies build strategic funding strategies blending public and private funds. Tax incentives or credits can also help incentivize the private sector to carry out commercial activities which are job creating. Policy decisions can also ensure planned infrastructure and business investments—both foreign and local—generate local jobs. For example, London’s Crossrail project, funded through a mix of government, Mayor of London and London business funding and currently Europe’s largest infrastructure project, is designed

to generate jobs and skills across the country. Through its lifetime the project expects to support the equivalent of 55,000 full time jobs. To date, more than 1,000 apprenticeships have been created and over 5,000 previously unemployed people were employed through a partnership between Crossrail contractors and the public sector employment service, Jobcentre Plus. In an effort to ensure economic benefit is felt outside of the capital, 62% of business contracts generated through Crossrail have been awarded to businesses outside of London.⁴⁷ Through a proactive approach towards job creation, a geographic lens can also be applied to help stimulate stagnating local economies and aid social cohesion.⁴⁸

2. Improve education and skills as the path to maintaining and creating jobs

In this view, a focus on the supply side of skills is the most critical element for ensuring that the majority of today’s workers are able to transition within their role through upskilling or move to a new role through reskilling. By enhancing skills, ideas for future economic activity, future jobs and new paths to socio-economic mobility will continue to be generated in a dynamic way. Additionally, in this view a focus on broader education and training reform is essential for the creativity of the workforce of tomorrow and for leveraging the comparative advantage of human workers in the economy of the future.

According to some estimates, by 2022, no less than 54% of all employees will require significant re- and upskilling. Of these, about 35% are expected to require additional training of up to six months, 9% will require reskilling lasting six to 12 months, while 10% will require additional skills training of more than a year.⁴⁹ Some of the largest companies will have a clear business case in helping ensure workers are ready to capitalize on new job opportunities in the 4IR and secure their medium- to long-term growth by developing in-house lifelong learning systems, investing in human capital and collaborating with other stakeholders on workforce strategy. However, for smaller and medium-size companies, or for sectors under financial pressure, government incentives such as grants and direct training programmes or low-cost commercial solutions may be necessary to provide large-scale retraining. Furthermore, reclassifying worker training not as an expense—as such programs are typically categorized—but as an investment could help increase public commitments to support the programs. For example, highlighting the importance of lifelong learning, former Danish minister and EU Commissioner Poul Nielson has proposed that Nordic governments make adult education and further training mandatory for all employees in the Nordic Region and co-operate with labour-market partners to put training programmes into place.

The job roles that are set to experience increasing demand are those significantly based on and enhanced by the use of technology as well as those that leverage distinctively ‘human’ skills. With an education and skills-based approach as a central tenet of job creation, there is an opportunity for workers themselves need to be involved in the early stages of designing the future of work and engaging in the design and application of technology in the workplace so that transitions are complementary and organic where possible. The ‘Human-in-the-Loop’ (HITL) philosophy is an example of complementary artificial intelligence design

whereby humans are directly involved in training, tuning and testing data for a particular machine learning algorithm.

Policy-makers, regulators and educators can play a fundamental role in helping not only those who are displaced repurpose their skills or retrain to acquire new skills, but also invest heavily in the development of new agile learners in future workforces by tackling improvements to education and training systems. These efforts will be job creating in themselves, with additional roles developed within education and training systems and through greater entrepreneurship unleashed through giving people the skills to innovate.

3. Focus on the broader enabling ecosystem

In this view, direct government interventions toward job creation will create distortions and stifle innovation and instead government efforts should focus on the broader enabling ecosystem. In order to create the right environment for job creation, policy and behaviour shifts are needed across the public and private sectors. Many argue that by increasing aggregate demand domestic employment levels will rise. Therefore, ensuring that the financial rewards of technological change are distributed more evenly across an economy and society to help stimulate new job creation and growth is considered a crucial objective. Who 'owns' the technology reshaping our labour markets and how they manage this financial advantage are questions currently being asked by stakeholders. Suggested paths include encouraging companies to put a greater share of profits back into the community, into infrastructure and into job creation. There is potential for an enhanced role for states here to step in to help incentivise investment, looking in part to lessons from history regarding effective past industrial policy and updating this learning for the 4IR economy. Greater collaboration on investment between the public and private sectors could prove fruitful, with 'crowd-in rather than crowd-out' investments protecting state funds and unleashing further private sector spending.

One example of a collaborative investment strategy is Germany's Energiewende which covers several sectors and technologies in the economy and is focused on "missions" to fight climate change, phase-out nuclear power, improve energy security by substituting imported fossil fuel with renewable sources, and increase energy efficiency. Energiewende gives a shared direction to technical change and growth across sectors through targeted transformations in production, distribution and consumption.⁵⁰ Assessing the impact of Energiewende, research has found that in 2013 the German renewables industry accounted for around 371,400 jobs (gross) in energy production and supply, the manufacturing of hardware, publicly funded research and administration, and the service and maintenance of renewable energy facilities, up from 160,500 in 2004.⁵¹

Upgrading infrastructure can also help to ensure the opportunities inherent in the labour markets of the 4IR are distributed more equitably. A strong local digital policy can also be pivotal. Investment in internet access and digital infrastructure can help to create an environment conducive to innovation, upskilling and job creation. Patchy internet coverage, for example in developing economies, can hold

back entrepreneurs and those looking to engage in the digital economy. In this view, support for entrepreneurship and small and medium-sized businesses in the digital economy is also critical. For example, Alibaba's Taobao Villages have been at the forefront of the digital revolution shaping labour markets. For small business owners and entrepreneurs, the Taobao e-commerce site significantly reduces coordination costs, boosts efficiency and allows producers in towns and villages to participate in the national and even global economy, supporting an estimated 10 million jobs, or 1.3% of China's labour force. Most of the merchants are small, with an average of 2.5 employees. Four in 10 owners are female, and one-fifth were previously unemployed.⁵²

In a variation of this view, there is an expectation that the changes brought about by the 4IR are too fundamental for labour markets to continue in the ways of the past. Instead, governments should focus on managing the transition to a new economy through finding ways to broaden safety nets and alternative means of delivering income or services.

4. Ensure new jobs are quality jobs and find win-win approaches to new job formats

Strategies for job growth should not be singularly focused on the number of jobs created; the quality of work also needs to be prioritized. Developing a consensus across business, the public sector and workers regarding what constitutes quality work can help underpin economic and social stability. Policy-makers can contribute to ensuring quality work through better enforcement of existing labour laws and through the upgrading of employment guidelines and regulations. Companies can also introduce corporate policies that encourage the creation of fulfilling and dignified work.

Understanding, valuing and managing the new work opportunities presented by the platform economy is a key element of this pathway for job creation. Positive interventions from governments into this new world of digitally enabled work, in partnership with platform companies, could help ensure that local populations are equipped to access these jobs and that the work is good quality. In this view, flexibility and variety, highly valued by many workers in the platform economy will need to be balanced against ensuring adequate protections for workers and job creation efforts should aim to set new standards for a growing new format of jobs.

In many geographies online platforms could become a means for the formalization of work, particularly in low-income economies. Working in the informal sector is the norm in many emerging economies, with only 10-20% of the labour force estimated to be in formal employment. Platforms can therefore play a major role in standardising and professionalizing sectors where work is focused on the delivery of ad hoc services. The adoption of platform work also holds new opportunities for workers who find accessing the labour market difficult for reasons of poor local transport infrastructure, restricted economic opportunity, limited access to markets, care commitments, disability or physical or mental health issues. The chance to work flexibly, from home or a local shared workspace, reaching customers across borders, offers new opportunities to many. It has been suggested that the use of digital platforms may therefore result in relatively higher female employment

rates on platforms than in traditional industries or businesses: in the United States, for example, the proportion of female drivers is higher for Uber (14%) than for traditional taxis (8%).⁵³

5. Develop new metrics to understand the new labour market

Building a better understanding of the employment supply and demand across labour markets and industries could also support the enhanced targeting of investment and policy. Newly available, highly granular and timely data can provide new insights about areas of emerging job growth and provide insights into which type and size of companies are likely to be the job engines of the future, such as start-ups, SMEs and MNCs. Information on the geography of skills and jobs can also help solve matching and mobility challenges and support the execution of active labour market policies. New metrics and measurements will also be important in surfacing previously neglected dimensions of labour markets, developing a stronger understanding of new dynamics and bringing more precision into insight and action.

For example, studies have looked at the skills mix of workers and job roles (LinkedIn, Burning Glass Technologies, World Economic Forum⁵⁴, and others) to determine what might be effective transition paths for industry and the workforce. Developing insights such as these and thus building informed collaboration between the public sector and business to help facilitate transitions can contribute to the effective design of transition strategies. Additionally, 'job quality' faces conceptual difficulties and problems of assessment. New concepts and metrics must be developed to explore how job quality can best be measured.⁵⁵ Various frameworks have been developed over the last decade,⁵⁶ however building a broader consensus regarding their assessment and application could prove beneficial for workers and companies alike.

Common assessments of labour market performance do not provide information on the nature of jobs such as level of earnings, contract type, job security, and quality of the working environment. For example, some self-employed workers and those on temporary contracts report poorer working conditions, job quality and health, while workers in less-skilled occupations report significant differences in motivation, well-being, engagement and satisfaction with their working conditions.⁵⁷ New forms of data sources, such as from platform companies, bank account information, mobile usage and other sources offer the possibility of large-scale comparative studies shedding new light on specific groups within the labour market.

4. Reimagining Social Protection in the Fourth Industrial Revolution

Emerging Challenges and Opportunities

Technological transformations are continuing to reshape the nature of work, employment models, labour regulations and protections at a rapid pace. In developed economies these advances are challenging the efficacy of social insurance policies tied to formal work and stable employment contracts, as increasing numbers of people become displaced or experience insecure work, low pay and unequal access to good jobs. Workers' incomes also tend to be lower once they find new employment, especially when they are unable to find a new role in the same occupation as their pre-displacement job or in occupations using similar skills.⁵⁸ These changes to labour markets are in turn also reshaping societies, with the decline of the middle classes and broad-based prosperity a concerning global issue.

In developing economies, where work has mostly been diverse and informal, technological advances look set to continue that trend and offer additional flexible work opportunities. In these countries traditional social welfare systems underpinned by stable employment are scarce and around 80% of the labour force are not participating in traditional social insurance and related protections, leaving open the question what a future social protection model might look like in these economies.⁵⁹

There is broad consensus that action is needed to meet the needs of developed and developing economies looking to provide a supportive environment for workers while encouraging the dynamism of the new world of work. However, there is significant debate as to the level of depth and breadth of such support as well as the key stakeholders responsible for its delivery. For example, many unions are calling for measures to ensure a 'just transition' to a low-carbon, high-tech economy, involving guaranteed pensions for older workers, income support, redeployment support and continuous access to retraining and lifelong learning, while some academics and business leaders are proponents of the concept of a universal basic income.

While new technologies may offer a significant opportunity to build more flexible social protection systems, combining public and commercial approaches to financing, and providing agility in the face of an uncertain future, innovation in this sector has not yet delivered robust new models to emulate. Additionally, as more work transcends geographical

boundaries, collaboration between jurisdictions and the role of the private sector will also become increasingly pivotal to ensuring the welfare and opportunities afforded to workers. Finally, citizens, consumers, employees, the state and business need to reach a new settlement on rights, responsibilities and protections.⁶⁰ Actors will need to collaborate to ensure a fair distribution of risk between workers and unions, employers and other stakeholders benefiting from a worker's labour, and governments to allow for all stakeholders to thrive.

Emerging Responses

There is a growing debate on the range of options for redesigning social safety nets in the 4IR. Several economists, policy-makers, business leaders and civil society have called for a re-appraisal of the type of safety nets and social protection needed in the new economy and society. We summarize below a non-exhaustive range of response options and new ideas that are beginning to emerge around the areas of concern identified above. Opinions on appropriate directions are divergent; they range from arguments for considering universal basic income to the need for personalized, agile and customized safety nets. Broadly, six approaches have been put forward that are not necessarily mutually exclusive.

1. Enforce and improve existing methods

In this view, a range of existing employment laws and social protection methods and approaches should be better enforced and updated to adapt to key issues in the new economy, without necessarily requiring additional resources. For example, much of the activity conducted via online platforms, such as 'tasks', 'gigs' and 'rides', is work and can be brought within the scope of employment law in many geographies, with basic adaptation where necessary in order to protect both customers and workers and balance between the social responsibility and growth of platform companies.⁶¹

Social protection floors are a nationally defined set of basic social security guarantees seeking to realize universal rights to social security and an adequate standard of living. Floors are set in the form of health care for all residents; social protection for children; support for all people of working age in case of unemployment, maternity, disability; and work injury pensions for all older persons. Social protection floors are usually funded through a combination of contributory social insurance and tax-financed social assistance. India's Direct Benefit Transfer, an innovative use of digital technology

to provide direct subsidies to the bank accounts of the poorest, is a powerful example of what is possible today using technology as a tool for targeting and distributing support.

Flexicurity, a well-tested method, is designed to allow workers to change jobs and employers to alter workforces without affecting basic social protections. Levels of flexibility can be extended to ease workforce contractions and expansions; changing working hours; functional flexibility; and wage flexibility. The Danish model, which is the best-known example, consists of three parts: flexible hiring and firing policies (25% of Danes switch jobs each year); unemployment security (up to 90% for lowest paid workers in Denmark); and an active labour market policy, which includes investment in guidance and training for workers (1.5% of Denmark's GDP is spent on this). With some adaptations, this model has fared well in economies with high taxation and therefore public finance for social protection, supporting the dynamism needed in the 4IR. The long-standing case for a replication of this model has been made stronger.

Cross-sector collaboration is another tested method for establishing and managing social protection in the labour market, which may need wider adoption in the Fourth Industrial Revolution. Sweden leads the OECD in helping displaced workers find new jobs—over 85% of such workers find new jobs within a year. This is largely due to collaborative arrangements between employers and social partners, centred on job-security councils. The OECD has found these councils to be particularly effective because they intervene quickly after a redundancy, and because they have financial resources that public re-employment offices, which also exist in Sweden, do not have access to. They also support displaced workers to have frequent contact with counsellors, who offer practical and psychological assistance through what can be a difficult time for individuals. Job-security councils are available to workers who are members of a union, which is about 70% of the Swedish workforce. Through supporting workers to find new work following redundancies via job-security councils, companies are also able to reshape their workforce in collaboration with unions rather than in confrontation with them, facilitating a more dynamic economy in which individuals are supported.

Current models can also be enhanced through the integration of new knowledge. For example, behavioural economics could prove effective at 'nudging' change into effect, such as the recent UK measure requiring UK workers to opt out of autoenrolment into pension contributions. Additionally, safety nets can be better designed and delivered with the participation of citizens and users of services, rather than a top-down approach.⁶²

Finally, unions can help workers achieve higher earnings and better conditions and assist businesses in raising productivity. However, with the broader decline in union membership, in this view, there is a need for strengthening and reinvigorating them. In particular, their presence as equal stakeholders with business and government can support efforts for 'pre-distribution' rather than 're-distribution'. They also have the potential to play a major role in helping to design and administer new social safety nets. Suggestions for enhanced trade union roles include a trial of auto-enrolment into trade unions within the gig economy on the model of auto-enrolment into workplace pensions. New models of union organization are also emerging, often

deploying technology platforms to further their cause, such as the Independent Workers Union of Great Britain (IWGB) where a small team of staff use social media, citizen journalism, community action, and pro bono legal help to campaign on labour issues. Unions are also increasingly collaborating across geographical boundaries, such as the agreement between the Swedish trade union Unionen and the German union IG Metall to find tools for organizing the platform labour force.

2. Harness the potential of commercial solutions

Digital transformations offer huge potential to widen access to support in a changing labour market, including by providing governments opportunities to diverge from, or leapfrog over, traditional industrial-era social protection policies. In this view, however, more effective risk-sharing and benefits can be provided through a focus on opening up new market solutions. Lower barriers to entry, lower costs relative to 'bricks-and-mortar' infrastructure, and strong demand for social protection services all create new opportunities for commercial models to help deliver education, care, insurance and financial support to displaced, at-risk or low-income workers. Digital tools, for example, present opportunities for smarter social care systems and wider access to skills through educational technology solutions. In this view, efforts focused on curbing the growing prevalence of technological advances risk missing the window of opportunity to ensure they benefit the many, including by disrupting and commercializing social protection itself.

For example, financial technology solutions to the income volatility often experienced by gig workers are emerging. Trezeo, an online bank account, has been developed to help platform workers and the self-employed navigate unpredictable working patterns. Gig workers sign up for a £5 per week subscription fee and Trezeo tops up earnings during gaps between gigs, interest-free, to ensure a consistent salary. It works by leveraging open banking and machine learning to understand income patterns and financial behaviour, and model risk.⁶³

Another challenge often faced by platform workers is an atypical credit history, making securing loans, mortgages and credit difficult. Portify, a new UK application, partners with gig platforms and allows workers to connect their bank account and view their financial activity across all the platforms they work with. This data is then used to provide a credit score, help workers manage their finances and offer emergency credit to be spent at select stores on essential goods if their balance is running low. The durability and financing of such apps will need to be further explored to balance innovation with scale.

3. Focus on financing

In this view, any traditional or new form of safety nets requires first and foremost a broader base of public financing. Reflecting the growth and increasing dominance of new business models shaping the labour market, effective enforcement of existing regulations and new forms of collecting revenue to finance redesigned safety nets are needed. Modernised taxation regimes can provide solutions, alongside new proposals such as universal dividends financed through a levy on the sale of personal data.

A new digital services tax on sales (rather than just profits) generated in the UK is planned from April 2020 targeting “established tech giants”. The UK Treasury expects that digital services tax receipts will reach £400m in 2021–22. Many countries are now calling for regional and global agreements on digital tax issues, however. Both the 36-member OECD and the European Commission have been trying to reach a consensus on imposing a digital tax on social media platforms, internet marketplaces and search engines. Proposals include a ‘turnover tax’ and a more structural reform to modify the concept of permanent establishment in order that a company with significant digital presence, regardless of its physical location, would be deemed to have a “virtual permanent establishment” in that jurisdiction and would be liable to comply with its corporate tax regulations.⁶⁴ The International Trade Union Confederation has proposed introducing a ‘social licence to run’ for every business, entailing them to register and pay tax in each country of operation, to have an employment relationship with those they depend on for work and to contribute to social protection.

Other new agile forms of tax collection can help counter concerns regarding the tax receipts of online platforms while also protecting innovation and new tech entrants to markets. In Estonia, a collaboration between Uber and the tax authorities allows drivers to opt-in to a system where Uber sends drivers’ income data to the tax office, so it is automatically added to their tax return. Such an arrangement is possible in Estonia due to the government’s pre-existing tech infrastructure, with 95% of government services available online, including an e-service for the collection of taxes.⁶⁵

4. Develop portability and interoperability of social protection benefits

Given the undetermined nature of the future landscape of work, some level of agile governance will be key to ensure different safety nets click into place under varying scenarios. In this view, a key focus area for redesign is preparation for a growing workforce that is independent, whereas traditional social protection systems in advanced economies have tended to be connected to formal employment status. Reformed social protection systems and regulations will need to account for the rise of the self-employed, with gig economy workers often classified as independent contractors and at times unable to access traditional benefits.

Solutions currently being proposed include interventions on the portability of benefits, more effective enforcement of existing labour regulations and new rules on worker classifications. For example, platform companies could in the future contribute a proportion of their salary costs into a portable benefits fund that would provide contributions to health insurance, paid time off, and retirement. A portable benefits system could potentially be applied to all, without distinguishing between traditional, contractual or independent workers and new technology can be used to bundle payments into a shared benefits account. Alia, a new venture born out of the National Domestic Care Workers Alliance, provides domestic cleaners in the US with an online platform for portable benefits. Alia allows benefits to be accumulated on a pro-rata basis across multiple employers with clients able to contribute to single pot each time they hire

a worker, usually US\$5 per job. This benefit pot can then be drawn down to cover sick pay, life insurance and paid time off.

New infrastructure may also be required to coordinate and distribute benefits, using technology to streamline administration and access. New categorizations of workers can also be developed to ensure benefit entitlements to those engaging in gig work via online platforms – a new category of ‘dependent contractor’ has been proposed.

Finally, to accommodate for international labour market integration and online business models that transcend geographic boundaries, moving towards global interoperability between systems will be essential for effective delivery of benefits and protections. This will require enhanced collaboration between states on both publicly-provided and commercial solutions.

5. Identify new metrics for realizing the potential of precision safety nets

A growing number of data sources are now able to provide adequate information on the income vulnerability and the intermittency of work of specific socio-economic groups, with examples ranging from checking account information of platform workers in the developed world to mobile credit top-up information in developing economies. Similarly, there are new and growing sources of data on well-being, health, housing, care needs and other broader dimensions of social protection for specific groups within populations. Privacy, financing and implementation concerns notwithstanding, these new measures and metrics offer the possibility of customizing responses dynamically and offering the possibility of precision safety nets. More broadly, better metrics can support public and commercial responses to new avenues for large-scale social protection.

6. Prepare for universal or conditional basic income and services

The concept of universal basic income entails an unconditional cash transfer to each member of the local population. Proposals vary considerably in terms of benefit levels, financing mechanisms, and the benefits and services offered. Proponents argue that UBI could serve as an effective form of income distribution if wealth is concentrated by the process of further automation and that it can prove cheaper than providing in-kind transfers and conditional cash transfers, which both have significant administrative, implementation and logistics costs. Opponents argue that such a scheme would cost a significant portion of GDP (for example, if each American adult received a yearly stipend of \$10,000, the cost of the program would be almost three times the current level of welfare spending).

Basic income experiments are ongoing, with randomized controlled trials, in Finland, Scotland, and Ontario. Some pilots have demonstrated that some universal basic income proposals have positive social impacts while others result in a net welfare loss.⁶⁶ A series of completed programs and ongoing pilots suggests UBI improves basic living conditions, food sufficiency, nutrition, and education outcomes; decreases illness and debts; and improves economic outcomes including savings and entrepreneurship. Yet, it is not clear to what

extent long-run dependence on basic income support has negative psychological effects as the meaning individuals would otherwise derive from work is not compensated for.

Variations include conditional approaches such as income support that mandates or is reserved for specific socio-economic groups, as well as income support that is reserved for specific use, such as Singapore's SkillsFuture credit for all citizens above the age of 25. Finally, others contend that, in the case of increased revenues from AI, governments should aim to provide minimum basic services, such as food, shelter, healthcare and education, and develop social investment stipends to be deployed towards creating meaningful work such as care; volunteer jobs, such as environmental remediation, afterschool programs, or answering hotlines; and further education.⁶⁷

Notes

- 1 Our World in Data, 2018.
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- 6 Brynjolfsson and McAfee, 2015; Darvas and Wolff, 2016; Autor and Salomons, 2017.
- 7 World Bank, 2017.
- 8 Onkokame, et al, 2018
- 9 Goolsbee and Klenow, 2006
- 10 Brynjolfsson, Eggers and Gannamaneni, 2018.
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- 12 Oxford Internet Institute, 2016; Haskel and Westlake, 2018.
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- 14 Mazzucato, 2018b.
- 15 Stiglitz, Sen, Fitoussi, 2009; OECD, 2018.
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- 20 Bean, 2016; Coyle, 2016.
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- 22 See Coyle, 2016, on the political economy of internationally coordinating on a new aggregate metric.
- 23 E.g. Farrell, et al, 2017.
- 24 Henderson, et al, 2012.
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- 27 Cavallo and Rigobon, 2016.
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- 44 ILO, 2018b; Mazzucato, 2018a.
- 45 ILO, 2018b.
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