A Introduction

That the global economy has gone through a period both of enormous dynamism and of enormous disruption over the past quarter-century is hardly surprising – the two are inextricably linked. The world economy only grows when productivity rises; and productivity only rises when the world economy generates more and better output more efficiently. Current concerns about globalization in many countries are traceable at least in part to the economic adjustment challenge posed by a global economy becoming ever more productive. The *World Trade Report 2017* looks at two of the most powerful drivers of global economic advance today, technology and trade, and examines how they are affecting labour markets. It analyses how the challenges of adjusting to this new labour market are changing and how economies are adapting. In particular, it examines the similarities and differences in the way that technology, on the one hand, and trade, on the other, influence labour market outcomes.

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1. Economic progress involves economic change

If economic progress and economic disruption go hand-in-hand, then no period has involved more global progress – together with more global disruption – than the last quarter-century.

The world economy has doubled in size since 1990 – its biggest expansion in history, despite the post-2007 Great Recession. China, India and other emerging giants – representing one-third of humanity – are rapidly catching up with the developed world, even as the global economy as a whole continues to reinvent itself and race ahead. The development, welfare and living standards of billions of people around the world, including the poorest, are progressing at an unprecedented rate.

But this extraordinary period of growth and development has been accompanied by an equally extraordinary period of disruption, as new products, new industries, and whole new economies force others to adapt or decline; as the demand for more skilled, specialized or knowledge-intensive work grows across many countries and sectors, even as the demand for less skilled, more routine work shrinks; and as most of us advance in today's more productive, dynamic and diverse global economy, but some of us fall behind.

The same forces that are delivering economic progress – innovation, specialization, producing more and better with less – are necessarily also delivering economic change, turnover and dislocation. Joseph Schumpeter's creative destruction – the process through which a new economic structure replaces the old one – is unfolding on a global scale.

No two forces are driving this global economic transformation more than technology and trade. Indeed, because economic openness encourages innovation, and *vice versa*, the two are not just related but mutually reinforcing. New technologies – from containerization to fibre optics, to the Internet – are linking together and "hardwiring" today's globalized economy, in turn fuelling even more openness and integration. China could not have emerged as the new "workshop of the world" without its integration into global production networks; India would not be on track to becoming a global services hub without access to the World Wide Web.

At the same time, today's more interconnected global economy has accelerated the spread of technology, information and ideas, and has increased the incentives to innovate and create, helping to fuel further technological progress, especially in those parts of the developing world cut off from advanced technologies in the past. What emerging economies have gained most from their growing integration into the global economy is not merely more exports or more capital but more technology, and the opportunity to leverage it for rapid and sustained development.

Much, if not most, of this economic transformation reflects technological change, as digitization, automation, and other productivity-enhancing innovations allow industries to create more output with less labour, freeing up resources to be employed more productively elsewhere. The fact that the share of employment in manufacturing is now starting to fall across some developing countries – in the same way that it has already fallen in developed countries – indicates that the disappearance of factory jobs today, like the disappearance of agricultural jobs in the past, has more to do with automation and digitization than with offshoring and outsourcing (Banister and Cook, 2011). Indeed, manufacturing in developing countries is probably most vulnerable to technology-driven creative destruction because repetitive, low-skilled labour is the easiest to automate. For example, the Changying Precision Technology Company in China, a manufacturer of mobile phones, recently announced its first "unmanned factory", where 90 per cent of the workforce has been replaced with robots – and its productivity has since risen by 250 per cent (The Asian Age, 2017).

Nevertheless, growing trade integration reinforces, as well as reflects, these underlying technological changes by enabling a "global" division of labour and specialization that would have been unimaginable just a few decades ago. In the 1980s, Toyota produced cars that were "Made in Japan"; today it produces cars that are "Made in the World". The Japanese workforce that was once mainly employed on assembly lines is now increasingly engaged in running a highly integrated and technologically complex system of global production taking in everything from research, design and marketing to finance, logistics and information and communications technology (ICT) coordination. The rise of such global production networks – in effect "world factories" – is only possible because of the marriage of open trade and integrating technologies.

2. New chapter in an old story

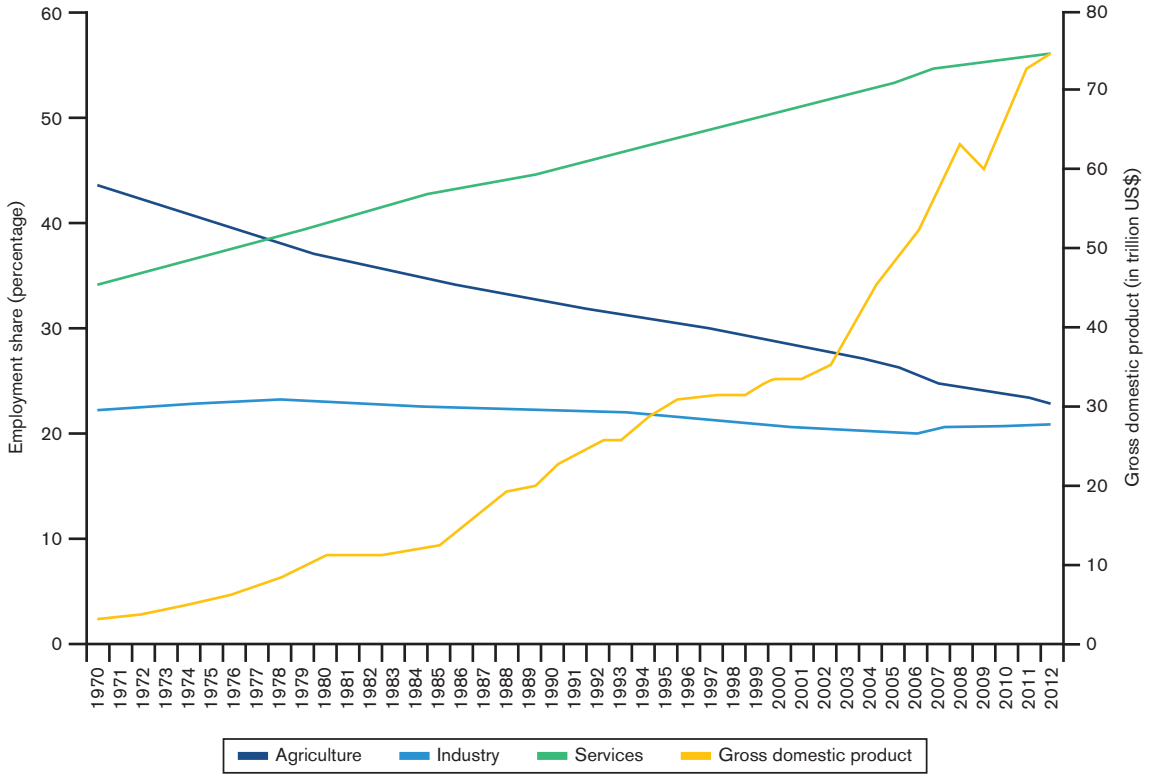
This process is not new, even if its scale and pace today are unprecedented. Since the Industrial Revolution began over 200 years ago, economic development has progressively widened, deepened,

and accelerated, thanks in no small part to the interplay of technological innovation and global integration. In the nineteenth century, new technologies – steamships, railways, the telegraph – allowed early industrializers in Europe and North America to race ahead of the rest of the world. In the twentieth century, newer technologies – automobiles, airplanes, telecommunications – enabled the next wave of industrializers – the Republic of Korea, Singapore, and other "Asian Tigers" – to catch up with the developed countries, even as they redoubled their *per capita* income lead on the less developed world. Now, even more advanced technologies – computers, smartphones, the internet – are fuelling the latest and biggest wave of economic catch-up, as dozens of developing countries achieve sustained annual growth rates of 8 per cent or more.

Even as developing economies continue advancing, advanced economies continue "developing", evolving from agricultural, to industrial, and now to services- and knowledge-based economies (see Figure A.1). In 1900, almost half of all workers in France were employed on farms; today, the figure is less than 3 per cent and, thanks to advances in agricultural productivity, consumers have more food and more choice than in the past. In 1970, over a quarter of American employees worked in the manufacturing industry; today, it employs less than 10 per cent, yet US manufacturing output has nearly tripled (Baily and Bosworth, 2014).

The biggest labour market shifts – and the most rapid productivity gains – are occurring in developing, not developed, economies. In less than two generations, more than 350 million Chinese workers have migrated from farms to factories and now increasingly to offices – a process that took a century or more in the West. As recently as the 1980s, China's economy was still overwhelmingly comprised of poor agrarian workers. Today, agriculture accounts for just 28 per cent of Chinese employment, while manufacturing accounts for 29 per cent and services – its fastest growing sector – account for 43 per cent.[1] Other developing countries are following the same trajectory: in Brazil, services now make up 67 per cent of GDP; in India, they make up 55 per cent.[2]

Figure A.1: Evolution of employment share by sector (1970 to 2012)



Source: Timmer, de Vries and de Vries (2015); World Development Indicators (July 2017).

Note: The five-year moving average of the employment share by sector in total employment covers 40 economies: 10 developed and 30 developing. The agriculture sector includes activities in agriculture, hunting, forestry and fishing. The industry sector includes mining and quarrying, manufacturing, construction and public utilities (electricity, gas and water). The services sector includes trade and transport services, business services, government services and personal services.

At each stage, continued economic advance has hinged on the ability of countries to adjust – to reconcile the tension between the opportunities presented by economic progress, on the one hand, and the challenge of helping people adapt to economic change and share in its benefits, on the other. While underlying technological and structural forces have been the main drivers of economic change, government institutions and policies have also played a central role, usually by facilitating or cushioning economic adjustment, but sometimes by impeding or resisting it.

The economic progress and globalization of the nineteenth century depended in part on nascent parallel social progress in the areas of labour laws, unemployment insurance, pensions and trade unions. In contrast, the economic reversals and de-globalization from 1914 to 1945 – marked by world war, trade protectionism, and economic depression – were at least partly traceable to the failure of countries, both individually and collectively, to adapt to a fast-changing economic landscape. It is no coincidence that the lesson drawn from the inter-war set-backs and crises by policymakers was that people support economic change only if they are sharing in its benefits.

Thus, the international economic system established after the Second World War was purposely designed around the interlinked objectives of open trade and integration, on the one hand, and full employment, social security, and mass public education, on the other – what John Ruggie has called "embedded liberalism" (Ruggie, 1982). Indeed, the evolution of the global economy over the past century, especially since 1945, has generally been accompanied not by a retreat of government but by its advance at the national and international level, providing the institutions, rules, regulations and social safety nets that are increasingly indispensable – along with less formal social and cultural institutions and networks – for the functioning of sophisticated and complex market economies.[3]

Now, as in the past, economic progress depends inescapably on adjusting to economic change. A key difference today is the pace, scale and scope of these changes. Labour market disruptions in many countries can now be perpetual and substantial, as employees are required to switch firms, localities and even careers with growing frequency. For example, every month an average of 1.7 million jobs disappear – and an equal number is created – in a US labour market of 160 million (Federal Reserve of St. Louis, 2015). In the late 1940s, 350,000 Americans worked as manual telephone operators in AT&T alone, while today, less than one-tenth of that number is employed across the entire telecommunications sector, despite the explosion of modern communications. Conversely, by 2012 almost half a million US jobs had been created to make mobile apps – none of those jobs existed five years before (Atkinson and Wu, 2017).

At the same time, the obstacles or labour mobility frictions experienced by workers who wish to move into rising sectors and out of declining ones can also be higher. Because of the increasingly global nature of labour markets, finding new work frequently means moving to different cities, regions, or even countries, which involves significant financial or political obstacles. And because economies today are increasingly knowledge-driven, being hired for a new job often depends on having ever higher and more specialized skills, which involves requalifying, retraining or even going back into education.

Workers with the skills, resources and flexibility to take advantage of new employment opportunities appear to be benefitting from these economic changes – career options are expanding, wages are rising, and living standards are increasing. More broadly, many have indirectly benefitted from economic progress because they spend less on food, clothing, and other necessities, thanks to productivity improvements in existing industries and lower-cost imports, and because they have access to smartphones, online movies, foreign vacations, and other luxuries that were once the preserve of the rich, thanks to technological advance and the formation of efficient global supply chains. The fact that billions in the developing world can now aspire to living standards that were once the preserve of a small minority in the developed world is the most notable benefit of economic progress.

Conversely, those who lack the skills, resources or flexibility to adjust to these new opportunities risk being adversely affected by economic change, experiencing shrinking career options and falling salaries in the face of automation, digitization and low-wage competition. The prolonged cyclical downturn and weak aggregate demand since the post-2007 financial crisis has exacerbated these challenges in many countries. For the first time since the Second World War, some groups in advanced countries face the prospect not just of progressing less rapidly than others, but of actually going backwards, often because they are no longer able to supply the new skills that advanced economies increasingly demand. For example, in 2016 roughly 5.9 million skilled US job vacancies went unfilled at the same time that millions of US workers saw their salaries stagnate or shrink – an illustration of the cost of skills mismatches in labour markets. By better matching jobs and skills, the allocation of labour across firms would likely improve (OECD, 2016b).

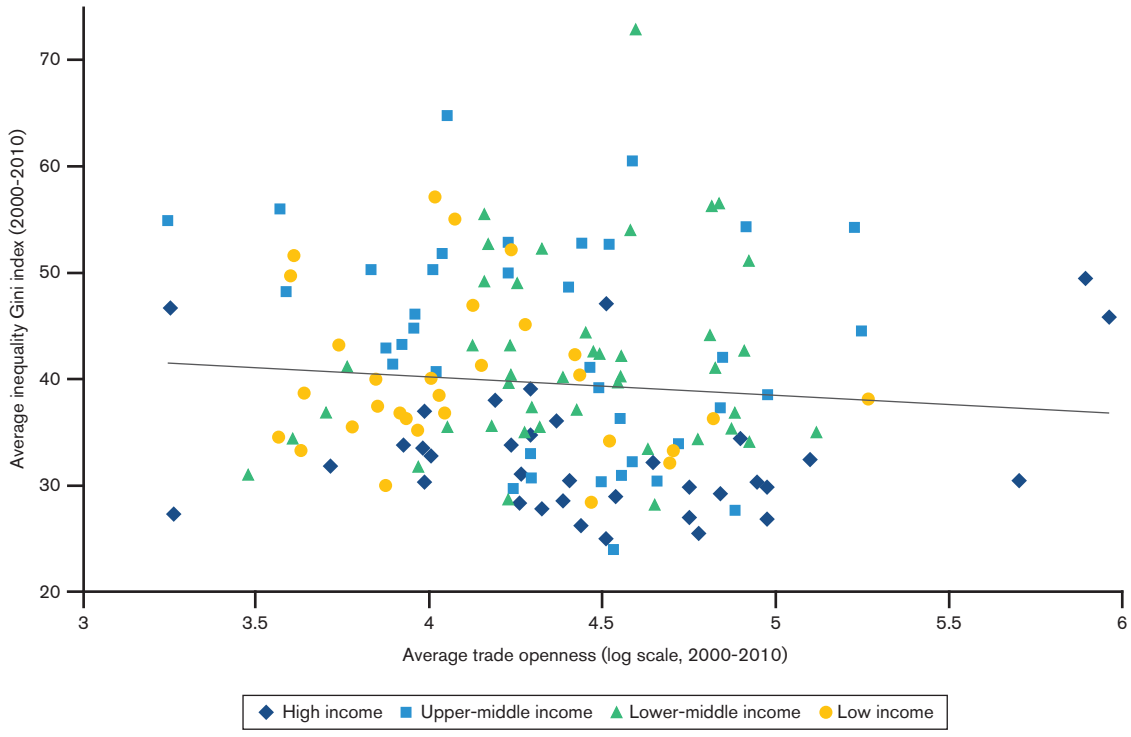
This gap between those who can successfully adapt to and benefit from economic change and those who cannot creates a risk of increasing inequality across classes, regions, genders and age groups. Some inequality is inevitable in economies – reflecting needed incentives to innovate or invest – but too much inequality can undermine economies by making it difficult for the poor or unemployed to receive the training or health care they need in order to contribute to economic growth, thereby adding to political resentments and tensions and potentially weakening popular support for continued economic progress.

The fact that certain economies seem to be adapting to today's global economy more successfully than others suggests that domestic policies and institutions play a key role in preparing societies for change, by facilitating adjustment and ensuring that the benefits – as well as the costs – of economic progress are widely shared. The evidence suggests that there is no correlation between openness to trade, on the one hand, and income inequality, on the other (see Figure A.2). Indeed, some of the most open and trade-dependent countries today, such as Germany, Latvia and the Netherlands, are also some of the most equal in terms of income levels, living standards, and wealth disparities, which suggests not only that economic openness can go hand in hand with economic inclusion, but that achieving the latter may be critically important to maintaining political support for the former.

Indeed, the pace and scope of global economic change today, as well as the evidence that popular support in some countries for the key drivers of this process is becoming eroded, have raised the policy bar, rendering the roles of governments and other institutions more, not less, important, and their policy successes (or mistakes) more, not less, consequential. They underline the importance of treating education, skills development and social safety nets as a work in progress, an exercise in continuously equipping people for a global economy that is itself continuously changing.

They also underscore the need for governments and other institutions to increase their efforts to pursue structural reform policies that further

Figure A.2: Trade openness versus inequality (2000 to 2010)



Source: World Development Indicators (consulted in July 2017).

Note: Trade openness corresponds to the ratio between the sum of exports and imports and gross domestic product (GDP). The Gini coefficient measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. The average trade openness and Gini coefficients are calculated for the period 2000 to 2010, or a shorter period, based on data availability. The linear trend is represented by the black line, which is statistically not different from zero.

promote technological innovation, trade openness, and business dynamism as essential steps towards reviving global economic growth and encouraging economies to be more responsive to emerging opportunities. There are worrying signs that the period of rapid global economic advance since the end of the Cold War began to slow even before the 2007/08 financial crisis, and that it decelerated precipitously after that, first in the developed world and now in a number of developing countries too (see OECD, 2016b). While current concerns about globalization seem to have contributed to the slowing pace of trade opening and structural change, the opposite may also be true – that the slowing pace of globalization has contributed to growing popular discontent, widening divisions, and growing geo-economic tensions. Rapidly expanding economies where living standards are rising tend to encourage optimistic "positive sum" attitudes – the belief that everybody is moving ahead together. But slow-growth economies can foment more pessimistic "zero-sum" attitudes – the belief that if one group or economy is progressing, it must be at the expense of some other group or economy. Slowing global growth since 2009 – itself partly a function of the slowing pace of global trade liberalization and other reforms – risks breeding the latter. Ironically, the backlash to technology- and trade-driven economic change in certain developed countries seems to be growing at a time when they are experiencing relatively less labour market churn (i.e. workers moving from job to job) than in the recent past – and certainly less than is currently unfolding in many fast-changing developing countries (Atkinson and Wu, 2017). Indeed, one answer to the current discontent with globalization may be – paradoxically – to redouble efforts to revive it.

3. Structure of this report

The *World Trade Report 2017* examines the similarities – but also the differences – in the way technology and trade are impacting labour markets today. Although technology and trade are related and affect labour markets through similar mechanisms, they also have distinct effects that warrant separate analysis. More broadly, the current debate about the impact of globalization, and whether it is technology or trade that is "responsible" for today's labour disruptions, raises important questions about how both are affecting the level and composition of employment. These questions deserve further examination if policymakers are to provide informed responses to the labour market challenges we face. Indeed, in light of the confluence and intertwining of these twin challenges, this report highlights the debate around the need for 21st-century adjustment policies, education systems and social support networks to match the 21st-century global economy that is emerging.

Section B places the discussion of the labour market effects of trade and technology in context. It presents a number of major trends in labour market outcomes and introduces basic insights from labour economics. Trends in real wages, unemployment and labour force participation do not show dramatic changes over the past two decades, other than those related to the post-2007 Great Recession. These broad trends, however, mask large differences across countries, including between economies in the same region or with a similar level of economic development. At a more disaggregated level, labour markets across many developed and developing countries have experienced profound changes over the past 25 years, with a sustained shift of employment from agriculture and manufacturing toward services. At the same time, the labour markets of many developed countries and several developing countries have become polarized due to the relative decline in the number of middle-skill/middle-paid jobs compared to the relative increase in the number of low-skill/low-pay and high-skill/high-pay jobs. Both phenomena may be relatively disruptive for workers, who face the risk of job losses and of having to switch jobs.

The diversity of outcomes across countries is in line with one of the main insights from labour economics introduced in Section B, which suggests that country-specific factors play an important role in explaining labour market outcomes. The section explains why the impact of technology and trade needs to be assessed in the context of the other major factors shaping supply and demand for labour and their influence on wages and employment, including macroeconomic conditions, labour market institutions and mobility obstacles. The 2007/08 financial crisis, for example, delivered a profound shock to labour markets across many countries, irrespective of longer-term technology or trade-driven change, from which many are still recovering. This section examines in particular how search and matching frictions (i.e. difficulties experienced by firms in searching for workers and matching them with jobs), mobility frictions (i.e. obstacles faced by workers in moving to regions or sectors where there are more job opportunities), or skills mismatches can prevent a smooth adjustment of the labour market, limiting the productivity gains from technology and trade, contributing to short-term unemployment, and widening the gap between the winners and losers of economic change.

Section C looks at how technological change impacts labour market outcomes. It explains that while

technology increases productivity by allowing firms to produce more output with less labour, it can have an ambiguous impact on labour market outcomes. Depending on whether cost savings associated with "labour-substituting" technology – such as automation – or with "labour-augmenting" technology – such as autopilot technology on planes – lead to increases in product demand, employment may rise or fall. This section discusses in particular the various effects of technological change on workers, depending on their skills and on the work tasks they perform. Current technological change tends to be both skill-biased – increasing the relative demand for skills – and routine-biased – decreasing demand for workers performing routine tasks. Therefore, relatively skilled workers performing non-routine tasks tend to benefit from technological change, while relatively unskilled workers employed in routine tasks tend to be vulnerable to job losses. This has important implications for skills development.

Section D examines how international trade influences labour market outcomes. It shows that the effect of trade on aggregate employment and real wages tends to be positive, but varies within economies and across regions and individuals because of different skills requirements and/or limited labour mobility. This section shows that, while trade benefits, such as lower consumer prices and greater variety, are often shared by many, the costs of adjustment, such as job losses, are typically borne by relatively few, though of course adjustments are very important at the individual level, as addressed in this report. Beyond the number of jobs, the section discusses how trade affects the composition of employment. It shows that trade often favours high-skilled workers more than others, and that trade plays a significant role in creating jobs for women in many countries.

Section E discusses how the costs of technological progress and trade can be reduced, how to better distribute the benefits from economic change and compensate those who are adversely affected, and how domestic policies and institutions fundamentally affect this distribution. This section suggests that globalization can be made more beneficial and inclusive for all, by making labour markets work more efficiently and by better compensating those adversely affected – either indirectly, in the form of retraining and education, or directly, in the form of income redistribution. Part of the problem is that many economies have attempted to correct twenty-first century labour market problems with twentieth-century education and social systems. However, the possibility of better designed policies and the spread of new technologies suggest that considerably more promising solutions are within reach.

Endnotes

1 World Bank national accounts data (July 2017), and OECD National Accounts data files (July 2017).

2 World Bank national accounts data (July 2017), and OECD National Accounts data files (July 2017).

3 According to estimates by the International Monetary Fund (IMF), the share of government spending in GDP has increased in most countries around the world since the 1950s, ranging from 25 per cent and 30 per cent in low- and middle-income countries to 43 per cent in high-income countries (IMF, 2014).