Shaping the Digital Transformation in Latin America

STRENGTHENING PRODUCTIVITY, IMPROVING LIVES



OECD

Shaping the Digital Transformation in Latin America

STRENGTHENING PRODUCTIVITY, IMPROVING LIVES



This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and any map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Please cite this publication as:
OECD (2019), *Shaping the Digital Transformation in Latin America: Strengthening Productivity, Improving Lives*, OECD Publishing, Paris, *https://doi.org/10.1787/8bb3c9f1-en*.

ISBN 978-92-64-76242-8 (pdf)

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Photo credits: Cover © design by Ana Lucía Soto

Corrigenda to OECD publications may be found on line at: *www.oecd.org/about/publishing/corrigenda.htm*.

© OECD 2019

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgement of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to *rights@oecd.org*. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at *info@copyright.com* or the Centre français d'exploitation du droit de copie (CFC) at *contact@cfcopies.com*.

Preface

The 21st century has witnessed a rapid increase in the uptake of digital technologies with a greater number of economies, societies and businesses across the globe going digital. The Latin America and Caribbean region (LAC) is no exception. The use of digital technologies in the region has grown rapidly and the diffusion of mobile broadband is enabling more and more people to connect to digital networks. By the end of 2017, 62% of the LAC population were online. However, the region is yet to reap the benefits of the digital transformation. Economic growth has been lower than expected, and labour productivity growth has declined.

As Latin America and the Caribbean moves towards higher levels of development, it faces new challenges related to low productivity, social vulnerability, institutional weaknesses and environmental impacts. Digital transformation can help address these challenges as it provides a wide array of opportunities to spur innovation, increase connectivity, foster skills, improve the delivery of public services and enhance citizens' well-being. However, Latin American policymakers need to be pro-active and act now – whilst ensuring coherent, co-ordinated and innovative policies – in order to shape a digital transformation that results in better lives for all citizens. Ensuring affordable access to digital technologies and enhancing their use across the economy and society are crucial in this endeavour.

The publication *Shaping Digital Transformation in Latin America and the Caribbean: Strengthening Productivity, Improving Lives* draws on the analysis undertaken in the context of the OECD's Going Digital project, including the report *Going Digital: Shaping Policies, Improving Lives* and the 2016 OECD-Inter-American Development Bank (IDB) report on *Broadband Policies for Latin America and the Caribbean*. It aims to inform LAC policymakers about policies and approaches that can help seize the benefits of the digital transformation. It also provides policy recommendations in seven specific areas where LAC countries should take action to make the digital transformation work for growth and well-being: 1) enhancing access to digital technologies; 2) strengthening their effective use; 3) enabling digital innovation; 4) ensuring quality jobs for all; 5) promoting an inclusive digital society; 6) strengthening trust; and,7) fostering market openness.

The report also provides key insights into the relationship between the digital transformation and productivity in Latin America – one of the region's most pressing challenges – and provides the basis for discussion for the ***Third Ministerial Summit on Productivity: Harnessing the Digital Transformation to Boost Productivity in Latin America and the Caribbean***. The report and the outcomes of the discussions of this Third Ministerial Summit on Productivity will support ongoing efforts in the region, such as the Digital Agenda for Latin America and the Caribbean (eLAC2020) underpinned by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC). The OECD Latin America and the Caribbean Regional Programme is proud to support these efforts in collaboration with other international organisations.



Ángel Gurría
OECD Secretary-General

Foreword

The report *Shaping Digital Transformation in Latin America: Strengthening Productivity, Improving Lives* is the fourth Key Issues Publication of the **OECD Latin America and the Caribbean (LAC) Regional Programme.** This programme was created in 2016 to support the region in advancing reforms to increase productivity, enhance social inclusion and strengthen institutions and governance. The report aims to inform LAC policy makers by providing a framework for understanding the implications of the digital transformation in different policy domains by building on the results of the OECD's cross-cutting **Going Digital project**. It was prepared to inform discussions at the OECD LAC Regional Programme's **Third Ministerial on Productivity: "Harnessing the Digital Transformation to** Boost **Productivity in Latin America and the Caribbean**", that is taking place in Bogota, Colombia on 25 October 2019. The discussions of this meeting, along with recent OECD analysis carried out at the national and regional level (including the 2016 OECD-IDB report *Broadband Policies for Latin America and the Caribbean*, recent OECD Reviews of Telecommunication Policies in Mexico and Colombia and an ongoing Review of Brazil, as well as ongoing Going Digital Reviews of Colombia and Brazil), will serve to produce an Action Plan with concrete recommendations for the region to fully reap the benefits of the digital transformation. All these projects aim to contribute to and strengthen ongoing processes in the LAC region, such as the 2020 Digital Agenda for Latin America and the Caribbean (eLAC2020) and the attainment of the Sustainable Development Goals.

The report emphasises key policy areas of attention that LAC countries should consider in order to create and maintain a healthy digital environment that promotes diversity and helps seize the benefits of the digital transformation, including productivity growth. These include: enhancing **access to broadband networks** to **reduce digital divides**, strengthening the **diffusion of digital technologies**, fostering **healthy business dynamism** and efficient resource reallocation to enable the **growth of digitally intensive firms and SMEs,** supporting the **development of skills** and finally, creating new **opportunities for trade**. Furthermore, across all of these policy areas, a **people-centred and inclusive approach** to policy making is required to ensure that the benefits of the digital transformation are shared by all.

The preparation of this report was led by Dirk Pilat, OECD Deputy Director for Science, Technology and Innovation. It includes contributions and inputs from several LAC countries, including Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Uruguay. Additionally, comments and inputs from colleagues within the OECD, notably José Antonio Ardavin, Frédéric Bourassa, Alexia Gonzalez Fanfalone, Angel Melguizo, René Orozco, Sebastian Nieto Parra, Lorrayne Porciuncula, Juan Vazquez Zamora and Verena Weber, are much appreciated. Stella Horsin and Angela Gosmann provided editorial support. Jorge Carbonell and Yomaira Lopez coordinated its finalisation and publishing. The OECD Mexico Centre for Latin America handled the translation to Spanish, carried out thanks to the Association of Internet Consumers and Users of Colombia (ACUI).

The elaboration of this report would have not been possible without the financial contribution of the Republic of South Korea.

Table of Contents

Preface **3**

Foreword **4**

Executive Summary and Key Policy Messages **7**

Enhancing access 9
Fostering use, innovation and productivity 10
Ensuring quality jobs for all 11
Promoting an inclusive digital society 11
Enhancing Trust 12
Fostering Market Openness 12
Towards inclusive, people-centred digital strategies 13

1. Introduction **14**

2. Setting the Scene **15**

Table 2.1. Snapshot of performance in science, reading and mathematics, 2015 16

3. Understanding the Digital Transformation **21**

3.1. The digital transformation 21
3.2. Digital divides 23
3.3. Data as a fundamental enabler 24
3.4. Key properties of the digital transformation 25

4. Digital transformation and productivity **27**

5. Policy Making in the Digital Age - Towards an Integrated Approach **32**

6. Key Areas for Policy Action in LAC countries **35**

6.1. Ensuring affordable access 35
6.2. Fostering use, innovation and productivity 41
6.3. Jobs and skills in the digital world 54
6.4. Digital transformation for a more inclusive society 64
6.5. Enhancing trust: security, privacy and consumer protection 67
6.6. Fostering trade and market openness in the digital economy 71
6.7. Strategies for digital transformation 79

7. Concluding remarks **83**

Annex I: OECD Policy Guidance on the Digital Economy **89**

Existing OECD Guidance on Access 89
Existing OECD Guidance on Innovation 90
Existing OECD Guidance on Society 90
Existing OECD Guidance on Trust 91
Existing OECD Guidance on Market Openness 93
Other OECD Guidance on Digital Transformation 94

Annex II: Measuring the Digital Transformation **95**

Methodologies and resources 95
Implementation challenges 95
Resources 96

Tables

Table 2.1. Snapshot of performance in science, reading and mathematics, 2015 16
Table 2.2. SDGs and ICTs..... 20

Figures

Figure 2.1. A look at the online and offline population in LAC, 2017 17
Figure 2.2. Fixed broadband penetration in LAC (2015 and 2017) 18
Figure 2.3. Mobile broadband and telephone penetration in LAC (2015 and 2017)..... 19
Figure 5.1. An integrated policy framework for making digital transformation work..... 33
Figure 6.1. Structure of the Broadband Policies for Latin America and the Caribbean Toolkit 36
Figure 6.2. Prices for fixed and mobile broadband access, 2017 37
Figure 6.3. LAC countries lag in connection speeds to internet infrastructure 39
Figure 6.4. Household use of Computers and the Internet at Home, 2017 (or latest available year).... 42
Figure 6.5. Enterprises with a website or home page, 2010 and 2017(1) 42
Figure 6.6. Productivity growth in key LAC economies, 1950-2017 44
Figure 6.7. Labour productivity levels in Latin America, OECD, China and Korea, 1950-2018..... 45
Figure 6.8. Relative internal productivity of MSMEs in Latin America and the European Union..... 46
Figure 6.9. Percent of firms identifying an inadequately educated workforce as a major constraint.... 48
Figure 6.10. Average Management Scores by Country..... 51
Figure 6.11. Expenditure on Research and Development, as a % of GDP, 2017*..... 52
Figure 6.12. A significant share of jobs could be affected by automation 56
Figure 6.13. Activities at high risk of automation (in %)..... 56
Figure 6.14. Education enrolment by levels of education and income quintiles in Latin America and the Caribbean..... 58
Figure 6.15. Public spending on training programmes, LAC..... 61
Figure 6.16. National online portals and digital recognition mechanisms 66
Figure 6.17. Export structure by technology level, world regions (1990-2016) 77
Figure 6.18. Intra and extra-regional participation in GVCs..... 78

Boxes

Box 1. Digital Transformation and Productivity: Recommendations for LAC countries..... 8
Box 2. Digital Agenda for Latin America and the Caribbean in 2020 (eLAC2020)..... 9
Box 6.1. Increasing access and fostering competition in the Mexican telecommunication sector..... 40
Box 6.2. Helping smaller firms improve their cyber security 49
Box 6.3. Enabling regulatory flexibility for new, digitally-enabled innovations..... 54
Box 6.4. The Portuguese National Initiative on Digital Competences 2030..... 60
Box 6.5. Digital security and resilience in essential sectors..... 67

Executive Summary and Key Policy Messages

1. Economies and societies across the globe are going digital. More than half of the world's population is now connected to the Internet, up from only 4% in 1995. In Latin America and the Caribbean (LAC) too, the uptake of digital technologies has grown rapidly and the rapid diffusion of mobile broadband, in particular, is enabling more and more people to connect to digital networks. At the end of 2017, 391 million out of 628 million people in the LAC region were online, or some 62% of the population, up from just over 50% at the end of 2014.

2. The digital transformation offers many opportunities for enhanced productivity and wellbeing. It can support a more inclusive and productive society and help improve governance arrangements; enhance access to key services such as health, education and banking; improve the quality and coverage of public services; expand the way individuals collaborate and create content; and enable people to benefit from access to global markets and greater diversity and choice in products, as well as lower prices. It is not for nothing that the United Nations Sustainable Development Goals (SDGs) pick out access to information and communication technology and universal and affordable access to the Internet as one of the key targets (9c) to transform our world. Moreover, the achievement of many other SDGs can benefit from the use of digital technologies.

3. At the same time, the digital transformation is not only an opportunity but also a challenge. It transforms our interactions with one another and with society more broadly, changes the nature and structure of organisations and markets, raises important issues around jobs and skills, privacy, security, tax and competition, and also on how to ensure that technological changes benefit all in society.

4. The digital transformation can play an important role to support the LAC region in overcoming its current development traps. Indeed, as LAC countries move towards higher levels of development they are facing new development challenges that are mainly related to low productivity, social vulnerability, institutional weaknesses and the environmental impacts of the current economic model.

5. To ensure that policies harness the benefits of digital transformation while mitigating the challenges, policy makers in the LAC region need to be pro-active and act now. Ensuring affordable access to digital technologies and enhancing their use across the economy and society are crucial to seize the benefits of digital transformation. Moreover, many policies in the LAC region, across all areas of government policy, remain ill suited to today's digital era and risk becoming obsolete – or barriers to change – as the transformation continues to advance.

6. Together, governments and stakeholders in the LAC region must shape a common digital future that makes the most of the opportunities that digital transformation holds to improve people's lives and boost economic growth for countries in the LAC region, while ensuring that nobody is left behind. Strengthening productivity is particularly important, and will require a concerted policy effort to benefit from the digital opportunities (Box 1).

7. While many important efforts are underway in the region, both in individual LAC countries and across the region seizing these opportunities will also require new policy approaches The regional digital agenda, approved in 2018, has begun major efforts in this

regard through a multi-sectoral dialogue and establishment of regional commitments in various aspects that are key to cross-border cooperation and the use of digital technologies (see Box 1.) In this sense, it is crucial to understand that digital transformation affects all aspects of the economy and society in complex and interrelated ways, challenging existing policies in many areas. As a result, silos of all types are disintegrating, and hard borders are becoming less relevant. This means that stronger co-operation and collaboration domestically and internationally are critical, as well as a re-think about how policy is developed and implemented.

Box 1. Digital Transformation and Productivity: Recommendations for LAC countries

After remarkable progress at the turn of the 21st century, productivity growth in the LAC region has weakened since 2011, holding back income and wage growth and slowing down reductions in income inequality. Digital transformation provides an opportunity to strengthen the productivity performance of LAC countries and overcome some of the development traps that are affecting the region. Policy makers in LAC countries need to take action to realise these opportunities, notably by:

- Enhancing **access to broadband networks** and **reduce the digital divides** that persist across and within LAC countries. This will spread the opportunities linked to the digital transformation and can help ensure an inclusive transformation.
- Strengthen the **diffusion of digital technologies** and related practices and business models across the economy, moving beyond large firms, start-ups and digitally-intensive sectors. This implies fostering investment in tangible (machinery and equipment) and in intangible capital, notably in complementary assets such as skills, organisational changes, process innovation, intellectual property, R&D, new systems and new business models.
- Fostering **healthy business dynamism** and efficient resource reallocation to enable the growth of digitally-intensive firms and facilitate the exit and transfer of resources from declining firms. This requires structural reforms in sectors that are being disrupted by digital transformation, policies to facilitate the entry, growth and exit of firms, healthy competition, as well as innovation-friendly regulation to enable the growth of new industries and business models.
- Helping **SMEs engage with digital transformation** by comprehensive national digital strategies that take into account SMEs, including policies that facilitate access to finance, knowledge networks and skills, and SME engagement with competency centres and/or technology extension services.
- Support the **development of skills** that people will need to succeed in the digital world of work, notably sound cognitive skills, ICT skills, complementary skills, specialist skills and the ability to cope with change and keep learning.
- **Seize the new opportunities for trade** linked to digital trade and e-commerce, by overcoming traditional trade barriers and adjusting trade policies to new challenges, e.g. related to data flows, e-payments and interoperability. Strengthening integration within the LAC region will be particularly important.

- Ensuring sufficient **competition in the digital economy** by providing competition authorities with rules and tools can address the new challenges posed by the digital economy, where these prove to be necessary, and by strengthening co-operation across national competition agencies to address competition issues that are increasingly transnational in scope or involve global firms.

8. The OECD's Going Digital project, which involves almost all of the policy communities at the OECD and multiple stakeholders, seeks to provide new evidence and insights for digital transformation policies, with the aim to help policymakers navigate the opportunities and challenges inherent in the ongoing digital transformation. This report draws on OECD work and identifies seven areas where LAC countries should take action to make the digital transformation work for growth and well-being, notably 1) enhancing access to digital technologies; 2) strengthening their effective use; 3) enabling digital innovation; 4) ensuring quality jobs for all; 5) promoting an inclusive digital society; 6) strengthening trust; and 7) fostering market openness. Moreover, addressing these issues in a flexible, coherent and forward-looking strategy that integrates these seven policy areas is essential to realise the full potential of digital transformation.

Box 2. Digital Agenda for Latin America and the Caribbean in 2020 (eLAC2020)

During the Sixth Ministerial Conference on the Latin American and Caribbean Information Society, held in Cartagena de Indias from 18 to 20 April 2018, the countries of the region agreed on a Digital Agenda for Latin America and the Caribbean in 2020 (eLAC2020). This commitment has the goal to be a catalyst for regional cooperation in the digital field and a tool to promote a political dialogue around the challenges and opportunities that the digital transformation presents for economy and society.

The Digital Agenda for Latin America and the Caribbean (eLAC2020), includes 7 areas of action and 30 goals. The topics addressed in the document include the promotion of digital infrastructure (broadband and high capacity networks), the use of digital technologies in businesses, with a special focus on MSMEs, the promotion of a regional digital market strategy to increase trade, establish and promote digital technologies and standards to ease government services and support multiaccess channels to citizens, strengthen advanced digital, technical and professional skills, promote the convergent use of different types of emerging technologies and strengthen regional cooperation as an essential mechanism for tapping the opportunities and tackling the challenges regard to digital technologies.

The following up mechanism of the eLAC2020 process covers three levels of coordination and cooperation: the ministerial conference, the presiding officers and the focal points. The mechanism also includes observers representing the civil society, international organizations, the private sector and the Internet technical community. ECLAC has the mandate for the technical secretariat of the process.

Enhancing access

9. People and firms can only benefit from the digital transformation if they have **access to key technologies**, including the Internet. While progress is being made, and some

countries such as Uruguay have now reached levels comparable to the OECD average, some 237 million people in the LAC region were not yet connected to the Internet at the end of 2017. Moreover, many firms, and SMEs in particular, have little or no access to digital technologies. To ensure an inclusive digital transformation, it is essential to enhance access and reduce digital divides, including by age, education, gender, income, and geography, that persist across and within LAC countries. Addressing these divides, e.g. by policies aimed at providing affordable broadband access to all, is crucial to ensuring an inclusive transformation. Recent reforms in the LAC region, such as Mexico's 2013 telecommunications reforms, demonstrate how progress can be made and highlight the importance of sound competition, strong regulatory frameworks including an independent regulator, and support for investment, in particular in remote and rural areas. The 2016 OECD-IDB Broadband Toolkit set out a comprehensive agenda for policies that can help broaden access to digital technologies in the LAC region.

Fostering use, innovation and productivity

10. Access is the basis upon which to build policies that can translate the digital transformation into greater **use and innovation**, and ultimately into growth, **productivity**, jobs and incomes. This is true for individuals, as noted above, and for firms. Digital technologies – and the related business models and organisational practices - aren't yet diffusing as well in LAC countries as they need to. While a growing number of firms - over 70% in LAC countries such as Argentina, Brazil, Chile and Peru - now have a website or home page, the use of more sophisticated, productivity-enhancing digital technologies is not yet as far advanced. And - as is also the case in OECD countries - large firms typically have much greater uptake of digital technologies than SMEs. This is despite the potential opportunities that the digital transformation offers to SMEs, e.g. in outsourcing business processes to the cloud, engaging in (global) e-commerce, attracting finance and talent, and in operating a business in a more flexible way and at lower cost.

11. Harnessing digital transformation for firms in the LAC region therefore requires policies that strengthen the diffusion of digital technologies and related practices and business models across the economy, as well as greater investment in tangible (machinery and equipment) and intangible capital. Investments in intangible capital are crucial as digital transformation requires not only investment in the technology and hardware, but also in complementary assets such as skills, organisational changes, process innovation, intellectual property, R&D, new systems and new business models. While investments in both tangible and intangible capital are crucial for the digital transformation, the LAC region still lags in these complementary investments in intangible capital, including R&D, where Brazil is the only country in the region that spends more than 1% of its GDP on R&D.

12. The impact of digital transformation on the economy also relies on healthy business dynamism and efficient resource reallocation, which should enable the growth of digitally-intensive firms and facilitate the eventual exit and transfer of resources from declining firms. The available evidence for some LAC economies, such as Mexico and Brazil, suggest that there is need to strengthen business dynamism. This requires attention to structural reforms in sectors that are being disrupted by digital transformation, policies to facilitate the entry, growth and exit of firms, healthy competition, as well as innovation-friendly regulation to enable the growth of new business models.

13. Helping SMEs engage with digital transformation is another key component of policies aimed at strengthening the use of digital technologies and enabling innovation and productivity growth. Comprehensive national digital strategies that take into account SMEs, policies that facilitate access to finance, knowledge networks and skills, and SME engagement with competency centres and/or technology extension services, can be helpful. National digital security strategies can also help address the needs of SMEs by providing them with practical guidance and incentives to adopting good practices. The growing attention to start-ups in many LAC countries is also important in helping more SMEs engage with the digital transformation.

Ensuring quality jobs for all

14. Digital transformation raises both opportunities and challenges for **jobs**, and it is key to an inclusive and people-centred approach. New OECD estimates suggest that on average 14% of jobs in OECD countries are at a high risk of automation in the next 15-20 years. Another 31% of jobs are at risk of significant change as a result of automation. While such OECD estimates are only available for Chile among the LAC countries, it is likely that more jobs may be at risk of automation in the LAC region, given the economic structure of LAC economies - with a greater prevalence of routine tasks - and the relatively low level of skills in much of the workforce. However, digital transformation should also contribute to new job creation, and there is no evidence that, to date, technological change has been associated with net job losses overall.

15. The new jobs that are being created will often require different skills than those that are being lost. High-skilled workers have thus far tended to benefit relatively more from technological change, while the share of employment in middle-skilled jobs has decreased in many countries. Going forward, low-skilled workers are most at risk of losing their jobs and being left behind, risking a polarisation in the labour market and possibly enhancing inequality, which is already high in the LAC region.

16. Ensuring a smooth and fair transition for all workers requires a comprehensive package of co-ordinated policies, including to facilitate worker redeployment, investing in education and skills, providing social protection and some form of employment protection to all forms of work, forward looking labour market regulation, fostering social dialogue, and prioritising resources that can support the transition process.

17. Tackling informality will also be important for LAC countries to make the digital transformation work for all, as there is a risk that digital technologies may enhance informality. While there is no “silver bullet" to combat informality, a package of policies promoting formalisation, including labour skills, encouraging investment in productive areas, enhancing the tax system and labour regulation, and deterring corruption, can make a difference. Digital tools, such as the use of electronic identities, may help to implement such policies.

Promoting an inclusive digital society

18. The implications of digital transformation on **society** in LAC countries must also be better understood and measured. Digital transformation may have both positive and negative effects, and there may be heterogeneous outcomes across different population groups, depending on age, gender or skill-set. Placing people at the core of the design and delivery of policies and services, enabling new mechanisms for engagement and

collaboration in policy making and service delivery, and making access and use of digital services more relevant and simple, is an imperative to fully seize the opportunities offered by digital transformation to improve people's well-being. In this context, it is promising to see the spread of digital government strategies in many LAC countries. In 2015, 73% of countries reported they had developed such a strategy, and some 60% of LAC countries had also established online portals for some government services.

19. The digital transformation may also help address inequalities and promote social inclusion, e.g. by creating better access to quality education, offer new opportunities for skills development, enhancing access to health care, or improving access to free and low-cost information, knowledge and data. Mobile Internet access in particular can be used to improve the welfare of lower-income and excluded groups in the LAC region, e.g. by enhancing access to financial services. More broadly, digital platforms allow consumers to find better prices for products (as well as identify better quality products). They also facilitate access to key goods and services, e.g. mobility and accommodation, sometimes avoiding consumers from making costly purchases. Realising these opportunities is not automatic, however, and will require further policy action.

Enhancing Trust

20. As the economy goes digital, it is critical to ensure **trust**; without it, individuals, firms and governments won't use digital technologies. It is essential to encourage good digital security risk management and foster trust with and among private actors to enable information sharing about threats, vulnerabilities and incidents. To do so, responsibilities for digital security must be shared among individuals, business and governments.

21. At the same time, privacy in an increasingly data-driven economy requires a multifaceted strategy, that needs to strike the right balance between the social and economic benefits of enhanced reuse and sharing of data and analytics, and individuals' and organisations' concerns about such openness, including the protection of privacy and intellectual property rights.

22. A third element of trust is consumer protection suited to the digital age. Digital consumers face challenges related to information disclosure, misleading and unfair commercial practices, confirmation and payment, fraud and identity theft, product safety, and dispute resolution and redress, including when using connected devices where offline and online experiences are blurring.

23. In all three areas, as discussed in the OECD-IDB Broadband Toolkit, much progress can still be made, with few LAC countries having national strategies in these areas.

Fostering Market Openness

24. **Market openness**, notably to trade and investment, is another essential component for a successful digital transformation, with new opportunities emerging through e-commerce and digital trade. Thus far, LAC countries have lagged compared with many others in seizing the benefits of trade with the share of LAC in world merchandise exports stagnating since 1970, and a loss of ground in high technology manufacturing and services since 2000. This is also related to the very low level of integration of the LAC region in global value chains (GVCs).

25. The digital transformation offers new opportunities for trade, including e-commerce and digital trade, and for the integration of LAC countries in GVCs. But digital trade can also change or amplify the importance of "old" issues. For instance, trade in low value goods ordered on-line is still subject to traditional physical connectivity constraints that remain a barrier in the LAC region.

26. Digital transformation also raises new issues such as those related to e-payments, or interoperability, but perhaps the most important, relates to cross-border data flows. Data underpin digital transformation and impact the trade environment: as an integral part of production, as an asset that can be traded, as a means to deliver services and co-ordinate global value chains, and as an enabler of trade facilitation. But the growing volume of data exchanged across borders has amplified concerns about digital security, the protection of privacy, and audit and regulatory reach. These issues will need to be addressed in the context of the LAC region, in particular if the region makes further progress on regional integration.

27. Ensuring sufficient competition in the digital economy is also a challenge. Global acquisitions of digital intensive firms grew by more than 40% over 2007-15, compared to 20% growth for acquisitions in less digital intensive sectors. Firms in the most digital intensive sectors enjoy a 43% higher mark-up than firms operating in less digital intensive sectors. Competition authorities should consider these and related trends when assessing dominance. Digital technologies and data can lead to greater competition in many markets, but can tilt others towards greater concentration, market power and dominance. Competition authorities must be prepared with flexible tools and co-operate across borders to address transnational competition issues.

Towards inclusive, people-centred digital strategies

28. Addressing these seven policy areas in a flexible, forward-looking and integrated strategy that cuts across policy silos is essential to fully realise the potential of digital transformation. But none of these policies can be successful on their own. Governments need a **comprehensive digital transformation strategy** and governance approach that supports effective co-ordination across policy areas and among all stakeholders. A strategic vision, clear priorities and objectives, measurable targets, sufficient budget, and thorough monitoring of progress and policy evaluation are essential elements of a successful digital transformation strategy.

29. Moreover, across all of these policy areas, a **people-centred and inclusive approach** to policy making is essential to ensure that the benefits of the digital transformation are shared by all. If policy makers and stakeholders lose sight of the individual and the need for all individuals to be engaged and benefit from digital transformation, the transformation cannot be positive and inclusive. Ensuring connectivity and affordable access for all, supporting jobs and strengthening skills, sound competition, as well as the protection of individual's privacy and consumer rights, are key elements of an inclusive and people-centred approach.

30. In developing its strategies, LAC countries should also look for opportunities to use digital tools in the process of policy making itself. This can help reshape existing policies, enable innovative policy design and rigorous impact evaluation, and can expand citizen engagement in local and national policy making.

1. Introduction

32. The world is in the midst of a digital transformation, with more than 50% of the world population now connected to digital networks, up from only 4% in 1995. In Latin America and the Caribbean (LAC) too, the uptake of digital technologies has grown rapidly and the rapid diffusion of mobile broadband, in particular, is enabling more and more people to connect to digital networks. At the end of 2017, 391 million out of 628 million people in the LAC region were online, or some 62% of the population.

33. All stakeholders – governments, business, civil society, trade unions and the technical and academic communities – need to work together to shape a future that realises the potential of digital transformation for all, as an essential driver of inclusive growth. The digital transformation will require the development of healthy digital ecosystems, and the sharing of responsibilities between people, business, trade unions, civil society, and governments.

34. A balanced policy approach that includes a combination of self-regulation, voluntary and market-driven standards and sharing of best practices, application of existing regulations, and updated, flexible policy and regulatory frameworks, needs to be considered. This requires overcoming organisational barriers to collaboration among government bodies, sharing and horizontal decision making, a stronger emphasis on anticipating potential changes and impacts, and greater use of data and digital technologies in policy making.

35. To support policy makers, the OECD is contributing to the international discussions on digital transformation through its cross-cutting Going Digital project (OECD 2019), through work for the G20 and the G7, and through work at the national and regional level, including the 2016 OECD-IDB Broadband Toolkit for Latin America and the Caribbean (OECD/IDB, 2016), recent reviews of telecommunication policies in Mexico and Colombia (and an ongoing review of Brazil), as well as ongoing Going Digital reviews of Colombia and Brazil. The OECD's work in sharing experiences and innovative practices can help strengthen the capacity of the institutions involved in policy making. Moreover, providing comparative data and indicators allows for a better understanding of the different policy issues affected by the digital transformation and can help point to national and international priorities for policy action.

36. This report draws on ongoing OECD work and uses available information for LAC countries. It is intended to inform policy makers in the LAC region about policies and approaches that may help seize the benefits of the digital transformation. It also aims to disseminate recent OECD work on digital transformation to the LAC region,[1] and provide input into policy discussions in the region that can help set the basis for future work, including possible national studies on the digital transformation, or on key policy areas, such as telecommunication infrastructures. It is intended to strenghten ongoing policy efforts in the LAC region, such as the 2018 Digital Agenda for Latin America and the Caribbean (eLAC2020).

[1] An overview of existing OECD guidance on the digital economy is contained in Annex 1 of the paper.

2. Setting the Scene

37. After the remarkable progress experienced at the turn of the 21st century, economic growth and socio-economic advancement in LAC has weakened since 2011 (OECD/CAF/ECLAC, 2019). Lower than expected potential GDP growth, at around 3% annually, reflects low labour productivity growth. Indeed, in recent decades, labour productivity has dropped to about 40% of the European Union rate. In turn, insufficient growth and productivity are holding back further reductions in income poverty and inequality.

38. Alongside these trends, the middle class has expanded to represent one-third of the population, but also the "vulnerable middle-class" (at risk of falling back into poverty) represents almost 40% of the population. The growing middle class has larger aspirations and demands for better quality public services and institutions; often unmet. For instance, the share of the population satisfied with the education system fell from 63% to 56% from 2006 to 2017, below the OECD levels of 65% (OECD/CAF/ECLAC, 2018; OECD/CAF/ECLAC, 2019).

39. Insufficient economic growth, high levels of inequality, lack of confidence in institutions, environmental risks are some of the symptoms that suggest that countries in Latin America and the Caribbean (LAC) are facing a number of "new" development traps that stand in the way of further inclusive and sustainable growth. In all, LAC faces four main development challenges or traps, as they act as self-reinforcing dynamics that limit further development, namely: the productivity, social vulnerability, institutional and environmental traps (OECD/CAF/ECLAC, 2019).

40. The LAC region has made notable progress in economic and social development over the past decades, enabling tens of millions of poorer households to join the global middle class. Nonetheless, the LAC region still lags behind in terms of standards of living, levels of income inequality and inequalities in opportunities, share of the informal economy, education, investment, government accountability and citizen trust, infrastructure, productivity, and connectivity. In order to better understand policy making for digital transformation in the LAC region, it is important to consider some of the structural challenges countries in the region face, as well as characteristics that may assist further development, and the role that digital transformation can play in that context (see OECD/IDB, 2016).

41. First, LAC is a **large and diverse geographical region**, encompassing 27 countries and with more than 600 million people, and covering close to 20 million square km of forests, mountain ranges, glaciers, deserts, islands and urban centres. The cost of connecting these populations, some of them in remote areas such as the Amazon forest, the Andes mountain range or small islands in the Caribbean, is far from negligible and must be taken into account when designing digital transformation policies that are inclusive and ambitious.

42. Second, the LAC region has some characteristics that are not shared by other regions of the world. Most of its countries are coastal (with the sole exceptions of Bolivia and Paraguay), potentially enabling easier access to trade, but also to submarine cables. The second is the widespread use of Spanish and Portuguese, which has advantages for communication, commerce and the development of content.

43. Between 2000 and 2014, average **GDP growth** in Latin America and the Caribbean was over 3% a year and extreme poverty fell from 29% to 16% in 2013 (OECD/IDB, 2016). Notwithstanding these developments, income inequality in the LAC region remains high not only when compared to high-income countries, but also when compared to East Asian and Sub-Saharan countries. In turn, since 2014 insufficient growth and productivity are holding back further reductions in income poverty and inequality (OECD/CAF/ECLAC, 2019).

44. The slowdown that began in 2011 led to a two-year recession in 2015 and 2016, from which the region is currently emerging. Activity expanded modestly in 2017, stalled in 2018 and is expected to slow down in 2019 before regaining some momentum in 2020, although growth performance is expected to be below the previous decade (OECD/CAF/ECLAC, 2019).

45. LAC countries continue to lag behind OECD countries in terms of **education outcomes**. Despite improvements, school enrolment of both secondary and tertiary education and average school performance of 15-year-olds in LAC countries remain well below OECD average (OECD/IDB, 2016; OECD, 2018b). Between 23 and 70% of 15-year-olds in LAC have not acquired the basic level competences to perform well in the labour market, and only between 0.1 and 3.6% of them are considered "top performers" in one of the three subjects tested (the average is over 15% in OECD) (Table 2.1). Students' outcomes are largely dependent on broader socio-economic backgrounds in LAC and this skills gap result in a fundamental constraint for business development, innovation and inclusive growth in the region (OECD/CAF/ECLAC, 2013).

46. The **skills gap** in the LAC region has profound implications for the labour market. Individuals with fewer skills are often confined to operate in low productivity and often informal jobs, with lower earnings, longer hours, higher insecurity, poorer working conditions and limited access to training. While the lack of jobs is not the most pressing issue in most LAC countries, the proportion of the informal labour market, along with low quality and productivity of jobs are major barriers for the development of the region. The existing skills gap and the high level of informality risk being accentuated even further in a context of rapid digital transformation.

Table 2.1. Snapshot of performance in science, reading and mathematics, 2015

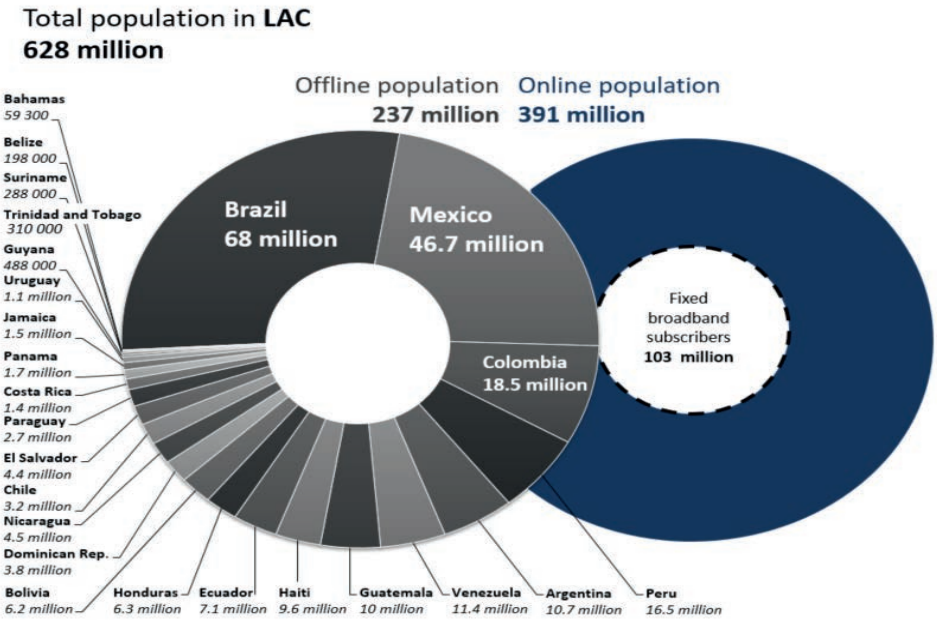
	Science		Reading		Mathematics		Science, reading & mathematics	
	Mean score in PISA 2015	Rank across all countries (between)	Mean score in PISA 2015	Rank across all countries (between)	Mean score in PISA 2015	Rank across all countries (between)	Share of top performers in at least one subject (in %)	Share of low achievers in all three subjects (in %)
OECD average	493		493		490		15.3	13.0
Portugal	501	18-25	498	6-27	492	21-31	15.6	10.7
Spain	493	25-31	496	19-28	486	29-34	10.9	10.3
Chile	447	44-45	459	41-43	423	47-51	3.3	23.3
Uruguay	435	46-49	437	46-49	418	49-55	3.6	30.8
Costa Rica	420	53-57	427	49-55	400	58-61	0.9	33.0
Colombia	416	55-60	425	50-55	390	60-63	1.2	38.2
Mexico	416	55-59	423	51-55	408	55-57	0.6	33.8
Brazil	401	62-64	407	57-61	377	64-65	2.2	44.1
Peru	397	63-64	398	61-64	387	61-64	0.6	46.7
Dominican Republic	332	70	358	65-67	328	70	0.1	70.7

Note: Countries and economies are ranked in descending order of the mean science score in PISA 2015.
Source: OECD, PISA 2015 Database.

47. The quantity and quality of **infrastructure** in LAC countries also remain an impediment for raising productivity and social inclusion levels in the region. Despite advances in the provision of basic access to services such as water supply and electricity, the quality of roads, ports, public urban transportation and communication infrastructures is still inadequate (OECD/CAF/ECLAC, 2015; OECD/IDB, 2016). The results of these structural challenges ultimately impact productivity, social inclusion and governance in the region. They also affect how the benefits of the digital economy can be spread across society.

48. In terms of **broadband access and use**, although relevant advances have been made, there is still a long way to go. As noted above, some 38% of the population of LAC was not yet connected to the Internet in 2017, implying that some 237 million people were considered to be "offline". Brazil, Mexico and Colombia, alone, for their size and populations, jointly still need to connect around 133 million people. In addition, that estimate does not yet qualify for the type or quality of Internet access. From the 391 million connected people in LAC, for example, only one-quarter of them, or 103 million, had a fixed broadband subscription at the end of 2017 (Figure 2.1). However, progress is being made rapidly, and more than 40 million more people were connected to a fixed network at the end of 2017 than in 2014 (OECD/IDB, 2016). Moreover, some 86 million additional people were online in 2017 compared to 2014.

Figure 2.1. A look at the online and offline population in LAC, 2017



Source: based on ITU data for individuals using the Internet (2018).

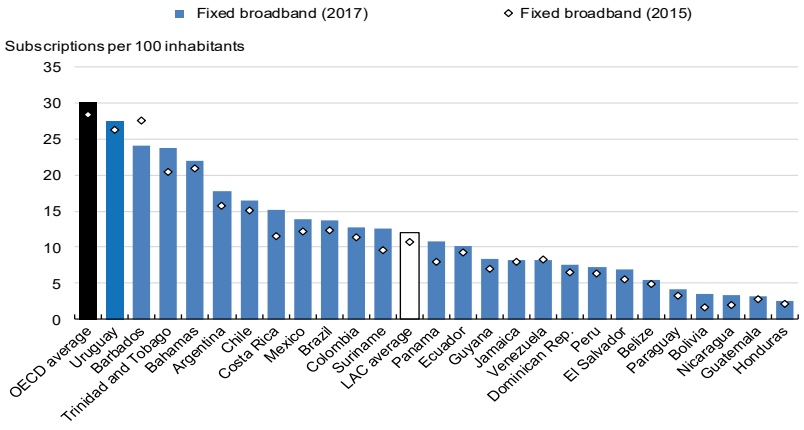
49. In terms of mobile and fixed broadband subscriptions, the numbers vary greatly among LAC countries. However, the LAC regional average remains much lower than in OECD countries. The LAC region has an average of 69.4% penetration for mobile broadband (i.e. over 69 SIM subscriptions per 100 inhabitants) and just over 12% for fixed

broadband in 2017, while OECD countries had over 102% and 30% in 2017, respectively (Figure 2.2 and 2.3).

50. Despite relatively low penetration of broadband services, the high number of mobile telephone subscriptions in the region suggests that there is much untapped potential at least for mobile broadband services. The average for mobile telephone subscriptions per 100 inhabitants in the region is 109%, not much below the OECD average of 122%. The data also suggest that for reasons such as unequal coverage of mobile operators in national territories or high termination rates, individuals may choose to subscribe to two or more mobile telephone services (Figure 2.3).

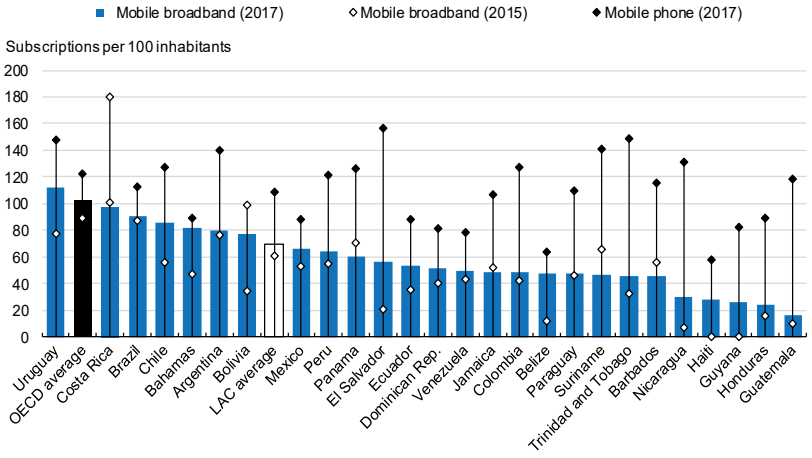
51. A considerable effort is therefore needed to connect more people in the LAC region. Likewise, the task to take not only Internet services, but quality broadband services that help businesses, individuals and governments to be more efficient and innovative, cannot be understated. Infrastructure needs to be deployed, sound, open and competitive markets fostered, and demand encouraged by policies that tackle affordability, entrepreneurship, skills and trust issues. The remainder of this report will tackle these, and other issues, in more detail.

Figure 2.2. Fixed broadband penetration in LAC (2015 and 2017)



Source: OECD for OECD countries and ITU World Telecommunication/ICT Indicators 2018 for other LAC countries.

Figure 2.3. Mobile broadband and telephone penetration in LAC (2015 and 2017)



Source: OECD for OECD countries and ITU World Telecommunication/ICT Indicators 2018 for other LAC countries.

52. Finally, the role of digital networks as an accelerator of development has been recognised globally, and due to its critical importance to the three pillars of development – economic development, social inclusion and environmental protection – the task of making the Internet universal and affordable was approved as a target (Target 9.c) of the **Sustainable Development Goals (SDGs)**, echoing the objective already elaborated by the United Nation's Broadband Commission for Sustainable Development. Table 2.2 summarises the ICT components already set as targets in the SDGs and includes other possible ICTs components that can contribute to the remaining goals.

Table 2.2. SDGs and ICTs

1 NO POVERTY	Target 1.4: *By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services […], appropriate **new technology** and financial services, including microfinance."*	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Target 9.c: *Significantly increase access to **information and communications technology** and strive to provide **universal and affordable access to the Internet** in the least developed countries by 2020.*
2 ZERO HUNGER	Target 2.a: Increase investment […] in rural infrastructure, agricultural research and extension services, ***technology development*** and plant and livestock gene banks […]." Target 2.c: Adopt measures to ensure the proper functioning of food commodity markets […] and facilitate timely ***access to market information***, including on food reserves, in order to help limit extreme food price volatility.	10 REDUCED INEQUALITIES	ICTs, especially through mobile-based services, can help reduce inequality by drastically **expanding access to information**, contributing to individual empowerment and social inclusion of individuals who used to fall outside the reach of traditional services. (*)
3 GOOD HEALTH AND WELL-BEING	The use of ICTs in the health sector can result in higher quality health care that is safer and more responsive to patients' needs. **E-health** can be particularly important in rural and remote areas, facilitating innovative models of care delivery, such as telemedicine and mobile health. (*)	11 SUSTAINABLE CITIES AND COMMUNITIES	ICTs can be leveraged to organise cities and communities more efficiently. **Smart cities** use ICTs and big data to improve public service delivery and to advance broad policy outcomes such as energy savings, safety, urban mobility and sustainable development. (*)
4 QUALITY EDUCATION	Target 4.b: *By 2020, substantially expand globally the number of scholarships available to developing countries […] for enrolment in higher education, including vocational training and **information and communications technology**, technical, engineering and scientific programmes, in developed countries and other developing countries.*	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	ICTs, and especially broadband, have directly connected consumers and producers and given rise to **"on demand" markets** of products that can be customised and localised, which can save time, reduce transport costs and contribute to more efficient and sustainable consumption. (*)
5 GENDER EQUALITY	Target 5.b: *Enhance the use of enabling technology, in particular **information and communications technology**, to promote the empowerment of women.*	13 CLIMATE ACTION	
14 LIFE BELOW WATER		15 LIFE ON LAND	Use of the **Internet of Things** can help make monitoring the environment cheaper, faster and more convenient. (*)
6 CLEAN WATER AND SANITATION		7 AFFORDABLE AND CLEAN ENERGY	ICTs can contribute to improving water and energy access by using **mobile solutions, smart grids and meters** to advance efficiency, manage demand and develop new ways to expand access. (*)
16 PEACE AND JUSTICE	The use of ICTs in the public sector can improve the range and uptake of **digital government** services; strengthen the performance of public institutions and enhance transparency and the participation of all citizens. (*)		
8 DECENT WORK AND ECONOMIC GROWTH	Target 8.2: *Achieve higher levels of economic productivity through diversification, **technological upgrading and innovation**.* Target 8.3: *Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, **creativity and innovation**, and encourage the formalisation and growth of micro-, small and medium-sized enterprises, including through access to financial services.*	17 PARTNERSHIPS FOR THE GOALS	Target 17.8: *Fully operationalise the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular **information and communications technology**.*

Note: Not all SDGs had an ICT component officially included in a corresponding target by the UN. In those cases, identified by (*), examples were identified by the OECD to depict how ICT could contribute to that particular goal.

Source: OECD (2016a), *Broadband Policies for Latin America and the Caribbean*, based on United Nations General Assembly (2015).

3. Understanding the Digital Transformation

3.1. The digital transformation

Throughout this report, *digital transformation refers to the economic and societal effects of digitisation and digitalisation. Digitisation is the conversion of analogue data and processes into a machine-readable format. Digitalisation is the use of digital technologies and data as well as their interconnection which results in new or changes to existing activities.*

53. As in other parts of the world, the LAC region is in transition towards a digital economy and society. In contrast to some of the popular rhetoric, this digital transformation is not new and has been underway for nearly half a century. The digital transformation has already contributed to significant structural changes across the global economy, e.g. in enabling the spread of global value chains and the outsourcing of business processes, and to productivity gains that many firms around the world have successfully reaped. The main difference with earlier eras of the digital transformation are three demarcations that have spread the impacts of the digital transformation across all economic sectors and aspects of society, propelling this issue to the top of the agenda in many international fora.

54. The first is the rapid expansion of connectivity to many firms and most large firms. In G7 countries, already 95% of firms have a high-speed connection to the Internet. While the levels of firm connectivity are still lower in the LAC region, several countries have now reached levels of firm connectivity of 70-80% (Figure 6.5, see section 6.2 for a more detailed discussion), implying that many firms in every sector in the economy are now potentially being affected by the digital transformation, expanding its scope and its potential benefits.

55. The second has been the advent of the "always connected" smart phone and with it the era of universal connectivity and ubiquitous computing. By June 2017, Japan led the OECD countries with 157 mobile broadband subscriptions per 100 inhabitants as the OECD average passed 100 subscriptions per 100 inhabitants. While the average for the LAC region on mobile broadband stood at 65.5 connections per 100 inhabitants, some LAC countries, like Costa Rica and Uruguay, have now passed the OECD average, with more than 100 mobile broadband connections per inhabitant (Figure 2.3). The growing connectivity due to smartphones has enabled many new digital platforms and the delivery of services through these platforms, including mobility and accommodation services.

56. Third, these devices and many of the services that operate on the open architecture of the Internet generate vast amounts of data. In the well-connected Nordic countries, for example, monthly data flows per mobile subscriber have grown by 60% between 2014 and 2016 in Sweden, 180% in Denmark and 185% in Finland where the average monthly usage is nearly 11 gigabytes (GB) (OECD, 2018c). These data flows are still much smaller in Latin America, but growing also there. They will grow further as connected devices become common.

57. Data combined with steady advances in the power of computing are leading to the emergence of data-driven innovation. Online activity and networked things generate "big data" which feed machine learning that enables artificial intelligence (AI), which in turn leads to advances in intelligent machines (robotics, automated vehicles) as well as new techniques in science, which can spur further innovation. The growth in volume, variety

and velocity of data and the ability to analyse and use it is a significant departure from the past and marks the emergence of a new factor of production.

58. Digital technologies have come a long way since the invention of the first computer during World War II and the emergence of the Internet in the 1990s. Some of the key technologies and applications that are driving the digital transformation today include (OECD, 2017a):

- **The Smartphone**: The popularisation of the smartphone since 2007, when the first iPhone was introduced, has transformed computing by enabling constant mobile connectivity and providing individuals with access to a wide range of new applications and services. It has also enabled the development of the "platform" economy.
- **The Internet of Things**: The Internet of Things (IoT) comprises devices and objects whose state can be altered via the Internet, with or without the active involvement of individuals (OECD, 2015a). It includes objects and sensors that gather data and exchange these with one another and with humans. The networked sensors in the IoT serve to monitor the health, location and activities of people and animals and the state of production processes and the natural environment, among other applications (OECD, 2015a). The number of connected devices in and around people's homes in OECD countries is expected to increase from 1 billion in 2016 to 14 billion by 2022 (OECD, 2015a).
- **Big data analytics**: Big data analytics is defined as a set of techniques and tools used to process and interpret large volumes of data that are generated by the increasing digitisation of content, the greater monitoring of human activities and the spread of the IoT (OECD, 2015a). It can be used to infer relationships, establish dependencies, and perform predictions of outcomes and behaviours. Firms, governments and individuals are increasingly able to access unprecedented volumes of data that help inform real-time decision-making by combining a wide range of information from different sources.
- **Artificial intelligence**: Artificial intelligence (AI) is defined as the ability of machines and systems to acquire and apply knowledge and to carry out intelligent behaviour. This means performing a broad variety of cognitive tasks, e.g. sensing, processing oral language, reasoning, learning, making decisions and demonstrating an ability to move and manipulate objects accordingly. Intelligent systems use a combination of big data analytics, cloud computing, machine-to-machine communication and the IoT to operate and learn (OECD, 2015a). AI is making devices and systems smart and empowering new kinds of software and robots that increasingly act as self-governing agents, operating much more independently from the decisions of their human creators and operators than machines have previously done.
- **Blockchain or distributed ledger technology (DLT)**: Whereas most software protocols support information exchange, blockchain or DLT enables protocols for value exchange, legal contracts and similar applications. It facilitates a shared understanding of value attached to specific data and thus allows transactions to be carried out. In itself, blockchain is a distributed database that acts as an open, shared and trusted public ledger that cannot be tampered with and that everyone can inspect. The combination of transparency of transactions, strict rules and constant oversight that can characterise a blockchain-based network provides the conditions

for its users to trust the transactions conducted on it, without the necessity of a central institution. The technology offers the potential for lower transaction costs by removing the necessity of trustworthy intermediaries to conduct sufficiently secure value, legal or other transfers. It could disrupt markets and public institutions whose business model rests on the provision of trustworthy transactions.

59. Many other technologies underpin the digital transformation that is currently underway, including open-source software like Hadoop, 5G, robotics, grid and neural computing, virtual reality, quantum computing, etc. Some of these have applications in almost all sectors of the economy and can be considered true "general-purpose" technologies. Others have more narrow applications in specific sectors.

60. This combination of ubiquitous digital devices, connectivity, software, data and the various digital technologies are empowering individuals and organisations to change behaviour, relationships, business models, and markets. Better understanding the ways in which digital transformation affects the economy and society is crucial to form a coherent response that is co-ordinated between tiers of government and across traditional policy domains.

3.2. Digital divides

61. Despite the rapid uptake of digital technologies, important digital divides remain, in particular at the global level with still only just over half of the world population connected to the Internet. However, compared to many other technologies in history, the Internet has diffused very rapidly across countries, with the development of the smartphone giving a large boost to access. In many countries, the uptake of digital technologies also still differs by age, education and income levels, although these gaps have been closing over time in OECD countries and have almost disappeared in some of them (OECD, 2017b). As noted above, in the LAC region, access to the Internet is growing rapidly, but almost 270 million people did not yet have access in 2016.

62. Other digital divides are also important in several countries, notably urban versus rural, high versus low income levels, as well as gender gaps (OECD, 2017b; 2017c). Gaps between cities and rural regions are important in many countries, in particular those with remote and difficult to reach regions, as is the case in several countries in Latin America. Policies aimed at fostering rural broadband networks are particularly important in this context. Large gender gaps also remain in some countries in the access and use of digital technologies, with women often under-represented in STEM fields. Addressing and closing these gaps is important to ensure an inclusive digital transformation.The experience of OECD countries suggests that such digital divides in access can be closed through sound competition and effective broadband policies aimed at ensuring that everyone has access to the Internet.

63. A more difficult digital divide for policy to tackle concerns how digital technologies are used, both by households and individuals, and by firms and organisations. In addition to access, other dimensions such as age, gender and education affect how the technology is used by individuals. For example, young people tend to dominate digital communication, content creation, social networking, online purchases, cloud computing, and software downloads, whereas older people are more frequent users of e-government and e-banking (OECD, 2017c). Higher education levels are associated with the uptake of more sophisticated activities such as online purchases, cloud computing and job search.

Strenthening effective use of digital technologies and addressing digital divides in their use therefore often requires complementary technologies, e.g. to improve digital skills.

64. Firms' access to digital technologies has also grown rapidly in the LAC region over the past decade, as discussed in more detail in Section 5.2. Across the LAC region, many firms now have access to broadband networks, although there are still large differences across countries. Evidence for OECD countries suggests that the uptake of digital technologies also still differs substantially across sectors, with the ICT sector typically among the more advanced adopters (Calvino et al., 2018).

65. Digital transformation is not only about the uptake of digital technologies, however. It is also about the transformation within society and within business that is needed to turn the new technology into economic and social opportunity. This requires investments that complement the technology itself, in skills, in organisational change, in new processes and business models, and also in the intellectual assets that help create value from the new technologies. Recent studies (e.g. Brynjolfsson, et al., 2017) suggest that this part of the transformation is more complex and costly than the diffusion of the technologies themselves, and moving more slowly, implying that the impacts of the new technologies are often slow to emerge. Moreover, there is a risk that only some organisations and firms may be able to develop the necessary capabilities, which could enhance the divide between those that can draw the benefits of digital transformation and those that can not. Section 5.2 of the paper will return to this issue.

3.3. Data as a fundamental enabler

66. A fundamental condition for digital innovation, including AI, big data analytics and distributed ledger technologies, is the effective use of data. Today, much data is generated online and collected by online platforms in digital markets or ecosystems, a trend that is certain to strengthen with the deployment of sensors and the networking of connected objects in the context of the Internet of Things (IoT). Maximising the social and economic value of data largely depends on ensuring access to data and global data flows (OECD, 2015a, 2017b).

67. Data play a fundamental role in digital transformation. The collection, flow, processing and manipulation of data, including across borders, drive digital transformation and create value synergistically. Data facilitate innovation and create value as a resource and asset in and of itself. As a result, data are considered a foundational driver of digital transformation as well as an enabler.

68. Data analytics, data-driven innovation, and other data-intensive activities, including machine learning and AI, benefit from open and interconnected information systems and networks that enable efficient, flexible and cheap data flows among potentially unlimited actors.

69. Data is constantly circulating across national borders; nevertheless, no widely applied typology of such data has been agreed so far, but it is clear that data are highly variegated and heterogeneous and as such different policies are needed for different types of data processing. International accords that cover cross-border data flows, such as the 1995 EU Data Protection Directive, the EU-US Safe Harbor Framework, and the EU-US Privacy Shield, are mostly concerned with data protection for privacy or with trade-related issues.

70. Enhancing access to data across nations, sectors, and organisations can maximise social and economic value of data by leveraging it as non-rivalrous, general-purpose productive capital. There are, however, legitimate reasons for keeping data "closed" including to protect confidential information (i.e. personal data and trade secrets).

71. Instead of using a binary definition of closed versus open data, degrees of openness can be identified on a continuum ranging from closed or limited access (only by a data controller) to open and public access to enable more differentiated approaches to data sharing and reuse. The optimal level of "openness" depends on the domain, security considerations and the legal and cultural environment in question. This calls for all relevant stakeholders to assess the possible trade-offs in data utilisation (how to reconcile risks and benefits), including across borders, when addressing the tension between risks and benefits of relative openness and "closedness".

3.4. Key properties of the digital transformation

72. In order to better understand the transformative effects that the use of digital technologies and data can have across the economy and society, the OECD has identified seven "vectors of digital transformation" that identify key properties of digital transformation (OECD, 2018a). These vectors provide a checklist to ensure that existing or new policies are well-suited to a digital economy and society. Rather than standing on their own, the vectors are interlinked and can have differential and reinforcing effects across policy domains. The seven vectors are:

- **Scale without mass**. The low marginal cost of many digital products allows firms to scale quickly and globally - more easily than with physical products - while making comparably less investment in tangible assets and amassing fewer employees. Some well-known Internet applications, such as WhatsApp, have almost global reach but a relatively small number of employees.
- **Panoramic scope**. The digitisation of functions can enable firms to gain a very wide scope through the ability to combine, process, and integrate digital resources within and across different products and at a global level. For example, e-commerce giants such as Amazon can offer a very wide product range, far beyond the ability of most traditional retailers.
- **Speed: Temporal and intertemporal dynamics**. The use of digital technologies accelerates interactions, generating economic and social opportunities but also disruptions, and also enhances the value of existing information, making it more easily accessible and reusable.
- **Intangible capital and new forms of value creation**. Data flows, algorithms and online platforms are being used to develop the service potential of capital goods, e.g. jet engines, tractors, computers, houses, or cars, and enable value creation that is increasingly decoupled from any specific location.
- **Transformation of space**. The possibility to move intangible digital value across the global Internet undermines conventional constraints of location, distance, and jurisdiction and changes the role that location used to play for production, trade and consumption.
- **Empowerment of the edges**. The Internet's architecture and digital technologies empower intelligence at the edge of networks, broadening markets and

communities and increasingly moving previously centralised responsibility, e.g. privacy and security, to decentralised users connected to those networks.

- **Platforms and ecosystems**. Digital intermediation, for example in e-commerce, social networks, content distribution, or search and storage, leads often to the centralisation of flows, access to -and control of data, which in turn can become a strategic asset and competitive advantage.

73. The vector analysis shows that many policy settings are likely to be affected by digital transformation as they were designed for a world of tangible products and assets, fixed geographic boundaries and locations, transaction costs that limited the scale and scope of interactions and offerings, and supply and demand conditions that reflected scarcity. In particular, the analysis reveals a growing need in many policy areas for:

- Reviewing policy frameworks that were conceived in an analogue era in light of digitally-induced behaviours and business models;
- Flexible policies and a broad, principle-based approach to regulation rather than overly specific regulation that may hamper dynamism;
- Policy co-ordination beyond traditional boundaries, including internationally, to foster interoperability, e.g. across IT systems and data formats, and based on open and voluntary standards;
- Support to those who benefit least from digital opportunities such as SMEs, the elderly, less educated, or those who are worse off than before in a digital world of work. In this context, there is also scope to better leverage digital technologies to bridge existing social and economic gaps and provide alternative solutions to historic structural problems, such as informality;
- Data-driven innovation, notably in the public sector, powered by the set of skills that workers need to succeed and innovate in a digital environment.

74. While nobody can predict the future, ongoing efforts to identify emerging changes and explore a range of future scenarios and their implications can help policymakers develop policies today that will be more agile and adaptive to changing conditions tomorrow.

4. Digital transformation and productivity

75. The ongoing digital transformation of the economy and society holds many promises for the LAC region to spur innovation, generate efficiencies, and improve services, and in doing so boost more inclusive and sustainable growth as well as enhance well-being. But these opportunities will not materialise automatically and often require policy action.

76. One example of such an opportunity concerns productivity growth. Digital transformation can improve productivity performance by enabling innovation and reducing the costs of a range of business processes (Goldfarb and Tucker, 2017). But despite rapid digital transformation, aggregate productivity growth in many countries and regions – including the LAC region – has slowed over the past decade or so, sparking a lively debate about the potential for digital technologies to boost productivity. Today, as in the 1980s, when Nobel-prize winner Robert Solow famously quipped: "we see computers everywhere but in the productivity statistics" there is again a paradox of rapid technological change and slow productivity growth.

77. Several possible factors may contribute to this new productivity paradox (including inadequate measurement, see e.g. Ahmad, et al., 2017). Together, these provide clues to possible avenues for policy action that could strengthen future productivity growth based on digital transformation.

Laggards firms and stalling diffusion

78. A first factor relates to the important differences in digital transformation across industries that affect the overall state of digital transformation, and thus its impacts on productivity. Recent OECD analysis shows that sectors are not equally advanced in terms of the pace of digital transformation (Calvino et al., 2018; OECD, 2017c). For example, even if new technologies are being integrated here too, agriculture, mining and real estate typically still rank in the bottom part of the distribution on digital intensity across all available indicators. Conversely, telecom and IT services rank consistently at the top of the distribution. Other sectors display a large heterogeneity in the adoption of different digital technologies, suggesting that they are only engaged in some aspects of digital transformation.

79. Looking behind the aggregate and sectoral statistics, cross-country analysis of micro-level data reveals that the aggregate productivity slowdown masks a widening performance gap between more productive and less productive firms, especially in ICT services sectors (Andrews, Criscuolo and Gal, 2016; Figure 4.1). Throughout the economy, this divergence is not just driven by frontier firms pushing the productivity frontier out, but also by the stagnating productivity of laggard firms related to the limited capabilities of, or lack of incentives for, such firms to adopt best practices. Together, these signs illustrate that the main source of the productivity slowdown is not so much a slowing of innovation by the most globally advanced firms, but the uneven uptake and diffusion of these innovations throughout the economy (OECD, 2015b; Andrews, et. al., 2016).

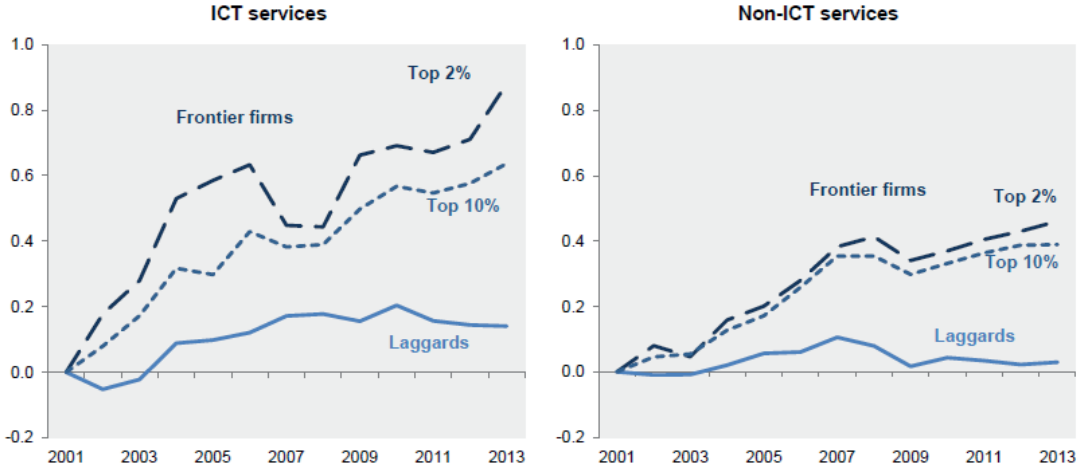
80. The available data also show that the diffusion of digital technologies across countries is far from complete. While most firms – also in some LAC countries – now have access to high-speed broadband networks, more advanced, productivity-enhancing digital

tools and applications, such as enterprise resource planning systems or big data analytics, have diffused to far fewer firms. The available evidence suggests that this is also the case for LAC countries (see section 6.2). Moreover, significant cross-country differences emerge – even amongst the most advanced economies – raising important questions about why some countries are more successful at adopting digital technologies than others.

81. The diffusion of so-called "general-purpose technologies" (GPT) like digital technologies, typically follows an S-shaped curve where technologies are initially only adopted by some leading firms and later diffuse to all firms, as they become more established, prices fall and demand grows. Moreover, technology development and adoption depend on a host of economic, legal, ethical and social factors, as well as on the availability of the requisite skills and organisational changes. Consequently, there is a significant gap between what can be implemented from a technical point of view (and what may already be implemented by frontier firms) and what is being implemented by most firms.

Figure 4.1: The divergence in multi-factor productivity growth

ICT vs. non-ICT services sector



Source: Andrews, D. C. Criscuolo and P. Gal (2016), "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy", OECD Productivity Working Papers, No. 5

82. The history of technological change also demonstrates that the successful implementation of new technologies involves much trial and error, or experimentation, and that it takes time to reorganise production processes, introduce new business models, and provide workers and management with new skills. Digital transformation is not just about the diffusion of technology, but increasingly about the complementary investments that firms need to make into skills, organisational changes, process innovation, new systems and new business models (Haskel and Westlake, 2017). Some recent research suggests that the scale and complexity of these complementary investments is growing, which may make digital transformation particularly difficult for non-frontier firms, such as traditional SMEs (Brynjolfsson, et al., 2017). During this process of adjustment and experimentation, productivity growth may be low and can even turn negative (Brynjolfsson et al, 2017).

83. On a positive note, the slow diffusion of digital technologies and the related processes across firms and industries suggests that its impacts on productivity are likely to

emerge in the years to come, as digital intensity in firms and sectors increases further and the economy adjusts (Van Ark, et al., 2016).

84. Unleashing the potential of ICTs and digital tools for firms to increase productivity therefore requires successful diffusion. Recognising limitations of a linear technology diffusion model of the past for a dynamic and networked digital environment, approaches to boost diffusion should take into account not only the individual firm, but also networks of suppliers, users, and customers. Key actors and institutions for technology diffusion include, for example, government technology transfer offices, universities, other non-governmental stakeholders, and test beds which can help to de-risk prospective investments. Examples of diffusion mechanisms used in different countries include industrial extension programmes, technology transfer, technology-oriented business services, applied technology centres, R&D centres, knowledge exchange and demand-based instruments. In addition, networks, partnerships, and open-source collaborations are increasingly important in orchestrating diffusion (OECD, 2017[64]).

SMEs and productivity

85. Policies to promote ICT investment and the diffusion of digital tools should pay particular attention to the challenges faced by SMEs to adopt and benefit from ICTs. Digital transformation facilitates the emergence of "born global" small firms, and SMEs' access to customers in local and international markets, with Internet platforms increasing the supply of products and services and allowing trades that otherwise would not happen. Big Data and data analytics enable SMEs to better understand the processes within the firm, the needs of their clients and partners, and the overall business environment. The use of digital technologies can also ease SMEs' access to skills and talent, such as through better job recruitment sites, and the outsourcing of key business functions, all of which can help improve performance. It can also facilitate access to a range of financing instruments and the development of innovative solutions to address information asymmetries and collateral shortages.

86. However, today, important differences exist for all digital tools among firm sizes; for example, in OECD countries, big data analysis is performed by 28% of large firms, but only by 16% of medium sized and by 9% of small sized firms. This underuse is evidence of important barriers to adoption, which can include a lack of collateral to take risk and to access finance to invest in technology and complementary assets, or a lack of key capabilities, e.g. human resources and management expertise. For instance, lack of investment in in-house innovation and organisational capabilities limits the capacity of SMEs to take full advantage of data analytics, of engaging in e-commerce, and of participating in knowledge networks. Furthermore, SMEs face specific challenges in managing digital security and privacy risks, mainly due to lack of awareness, resources and expertise to assess and manage risk effectively. Finally, the slow adoption of digital technology might also be a reflection of the lower incentives for some SMEs who might not be able to reap the same pay-off from the digitalisation of their production processes as larger businesses.

87. To help SMEs overcome barriers to effective use of advanced digital tools, governments need to enhance support and better target policies to SMEs. To help SMEs overcome barriers to the use of advanced digital tools, governments can create favourable conditions for ICT adoption, such as policies that foster ICT investment, skills development and business dynamism, and address specific challenges faced by SMEs through more targeted policies. Examples of policy approaches include:

- Support schemes to facilitate the adoption of tools that are particularly beneficial and may be new to SMEs, such as cloud computing, which requires limited up-front investment when being paid as a service, and offers flexible up- or down-scaling of activities.
- Measures to help SMEs overcome obstacles to better exploit and protect intellectual property and leverage other intangibles. This may include, for example, targeted skills development or measures to overcome hurdles to accessing IP, such as administrative burdens and complex and costly litigation and enforcement mechanisms.
- Policies targeting firms by size should avoid creating disincentives for SMEs to scale up. For instance, in the case of regulatory simplification for SMEs, efficient firms may choose to remain small to avoid the additional regulatory burden that may come with a certain size threshold.
- Exemptions of certain rules for SMEs to facilitate regulatory compliance. For example, the EU General Data Protection Regulation includes a derogation for organisations with fewer than 250 employees with regards to data record-keeping.
- Programmes that raise awareness of and create opportunities for linkages and partnerships between SMEs and larger firms, domestically and internationally, can help SMEs to exploit their potential in producing intermediate goods and digital services.

88. These and other policy measures to support SMEs may be taken into account in the context of a national digital strategy in order to ensure coherence and co-ordination across different SME related measures implemented across different policy areas.

Structural factors for digital adoption

89. Another important factor limiting the impacts of digital technologies on productivity is the pace of structural change and resource re-allocation. Digital transformation of firms involves a process of search and experimentation with new technologies and business models, where some firms succeed and grow and others fail and exit (OECD, 2004). Countries with a business environment that enables this process may be better able to seize the benefits from digital transformation than countries where such changes are more difficult and slow.

90. New OECD research shows that the diffusion of selected digital technologies is typically more advanced in sectors where firm turnover (i.e. entry and exit) is higher (Calvino and Criscuolo, 2018). This is consistent with the idea that new entrants: *i*) possess a comparative advantage in commercializing new technologies (Henderson, 1993); *ii*) place indirect pressure on incumbent firms to adopt new technologies; and *iii*) can more fully reach their potential when they have sufficient space to grow, which is accommodated by the exit of inefficient firms.

91. Moreover, digital adoption will be facilitated by efficient resource allocation, since a firm's incentives to experiment with uncertain/risky digital technologies will be shaped by its perceived ability to rapidly scale-up operations in event of success, and rapidly scale-down operations and potentially exit the market at low cost in the event of failure (Andrews and Criscuolo, 2013). From this perspective, harnessing digital transformation for firms places an added premium on policies that foster business dynamism and efficient resource reallocation. This is a challenge in many countries against the backdrop of declining business

dynamism (Criscuolo, Gal and Menon, 2014) and rising resource misallocation (Adalet McGowan et al., 2017a; Berlingieri, Blanchenay and Criscuolo, 2017) in many countries over the past decade.

92. A range of policies can incentivize greater digital adoption through experimentation either by increasing competitive pressures or by lowering the costs of reallocation. This includes insolvency regimes that do not inhibit corporate restructuring and do not excessively punish entrepreneurial failure. At the same time, access by entrepreneurs to appropriate forms of finance, such as venture capital financing, together with corporate tax regimes that do not excessively favour debt over equity financing, are also associated with higher digital adoption rates.

93. Importantly, the transition of an economy based on tangibles to one based on intangibles (or ideas) can only succeed if firms have access to the right set of *capabilities*. For example, qualified firm management that takes the decisions to invest and guides the adoption process has been identified as a key capability (see Bloom et al., 2012; Pellegrino and Zingales, 2014). Firm-level practices related to workers, including their participation in training, or their flexibility in working hours, are also important in this context.

94. Second, worker's skills matter, including providing them with the opportunity to continuously develop their skills in order to keep pace with the fast changing technological landscape; and ensuring people's skills are allocated to their most productive uses. In addition, evidence gathered within the Going Digital project shows that workers' wages, that can be used as a proxy for their productivity, are positively correlated not only with workers' advanced numeracy skills but also with their management and communication capabilities.

95. A third, and closely related factor, concerns the link between digital transformation and business dynamism. Recent OECD work has pointed to a slowdown in business dynamism in many economies, which has slowed down the necessary reallocation of resources across the economy. For example, the share of non-viable old firms has been increasing in many countries, particularly since the financial crisis, while the productivity of the latter group of firms has been falling rapidly relative to "viable" old firms, as well as younger firms in general (Adalet McGowan, et al, 2017a). The growing amount of resources trapped in unproductive "zombie" firms and the slowdown in reform efforts to tackle regulations that impede product market competition (Adalet McGowan et al., 2017b) have also contributed to the slowdown in structural change.

96. Section 6.2 of this paper will further explore the productivity dimension of digital transformation, with a specific focus on the LAC region.

5. Policy Making in the Digital Age - Towards an Integrated Approach

97. Digital transformation is challenging almost every aspect of the economy and society, which implies that a wide range of policy areas need to be considered. It also implies that all actors (individuals, firms, governments, trade unions, civil society and other stakeholders) need to be involved in the policy making process. At the same time, governments need to reach across traditional policy silos and across different levels of government to develop a whole-of-government approach to policy making using the multi-stakeholder model that has underpinned the development of the Internet.

98. One aim of the OECD's Going Digital integrated policy framework is to help change the way policy makers think about digital transformation and in doing so change the way policies are made in the digital age (Figure 5.1). Rather than considering narrow policy silos, the OECD's framework aims to support an integrated approach because policy changes in one domain may have implications in another domain. It is essential to be aware of interconnections and relationships across policy domains and to develop digital policy making with them in mind. The framework considers seven policy domains, notably: a) access; b) use; c) innovation; d) jobs; e) society; f) trust; and g) market openness. Moreover, it encourages the development of an integrated strategy for digital transformation that combines all these elements in a coherent and comprehensive manner.

99. The first integrated building block concerns **access** to digital infrastructure and key complementary enablers (e.g. fibre optic back-haul, spectrum and increasing uptake of IPv6 Internet addresses), devices and services at competitive prices, including efficient, reliable and widely accessible broadband communication networks and services, data, software, and hardware. These act as the technical foundations upon which digital transformation is based. Multiple policy domains need to be considered to ensure access including: communications infrastructure and services, competition, finance, investment, as well as regional development.

100. Access to digital networks provides the technical foundation for the digital transformation of economies and societies, but does not necessarily ensure effective **use** by itself. Widespread diffusion and effective use of digital technologies empowers individuals, firms and governments to reap the benefits of digital transformation for innovation, productivity growth, and well-being. Diffusion and effective use crucially depends on skills, but also on investments in intangible capital, including software, data, process innovation, skills and organisational change. Multiple policy domains need to be considered to ensure effective use including: education and skills, privacy, digital security, business dynamism and SMEs, and digital government.

101. Another integrated building block involves **innovation** and its effects in specific sectors. Digital technologies can help foster economic growth, including through positive spillover effects within and across sectors. Smart applications (including data analytics) and other innovations can improve the delivery of public services and make public administrations more efficient, as well as spur innovations in a wide range of areas including education, health, finance, insurance, transportation, energy, agriculture, and fisheries, as well as the ICT sector itself, among many others. Multiple policy domains need to be considered to foster innovation including: science and technology (including investment in research and development), digital government, entrepreneurship and SMEs, competition

and sectoral policies such as energy, finance, education, transport, health and education, among others.

Figure 5.1. An integrated policy framework for making digital transformation work



Source: OECD.

102. Digital transformation has already begun to change the nature and structure of organisations and markets, raising important questions about which **jobs** might disappear and where new ones will come from, what they will they look like and which skills will be required, who might be most affected, and what can be done to foster new job creation and to align skills development with the changing skills requirement of jobs. Making sure that digital transformation leads to more and better jobs will depend on the kind of policies that accompany it, including in the areas of: labour markets, education and skills, and social protection; since the impacts may be concentrated in some industries and regions, sectoral and regional policies will be important, too.

103. Digital transformation affects **society** in complex and interrelated ways as digital technologies change the ways in which individuals, firms and governments interact among and with one another. For digital transformation to work for growth and well-being, it is essential that public policies support a positive and inclusive digital society. To do so, multiple policy domains need to be considered: social policies, (e.g. housing and welfare), education and skills, tax and benefit policies, health, environment, and digital government.

104. As all sectors of the economy go digital, it is critical to ensure **trust**; without it, individuals, firms and governments will not use digital technologies, and an important source of potential growth and social progress will be left unexploited. Large-scale data breaches have become common, causing organisations financial and reputational damage, while leaving individuals vulnerable to personal data and identity theft. Comprehensive data collection creates a sense that the private space is shrinking. A complex legal environment creates consumer uncertainty about the protections available and reliability of information provided. Trust is a multi-faceted concept that involves several policy domains: Digital security, privacy, consumer protection, critical infrastructures and essential services, insurance and SMEs.

105. **Market openness** policies related to trade, investment, competition and financial markets play an important role in ensuring that favourable conditions exist for the digital transformation to flourish. Digital transformation also affects market openness policy domains, raising opportunities and posing challenges. Governments could benefit from periodically reviewing market openness policies and, where appropriate, update them to ensure that they are well-suited to an increasingly digitalised world.

106. The next chapter discusses several key elements of these policy areas for the LAC region, and also briefly explores how LAC governments can integrate policies in these areas to develop a comprehensive strategy for digital transformation.

6. Key Areas for Policy Action in LAC countries

107. This section considers some of the key areas where policy action will be needed to make digital transformation in the LAC region work for growth and well-being. This includes ensuring affordable access; fostering use to strengthen innovation and productivity; supporting jobs and skills; enhancing well-being; strengthening trust; and fostering trade and market openness. It is also essential that policies in these areas are brought together in a comprehensive strategy for the digital age to ensure policy coherence and overcome policy silos, which is briefly discussed in the last section of the chapter.

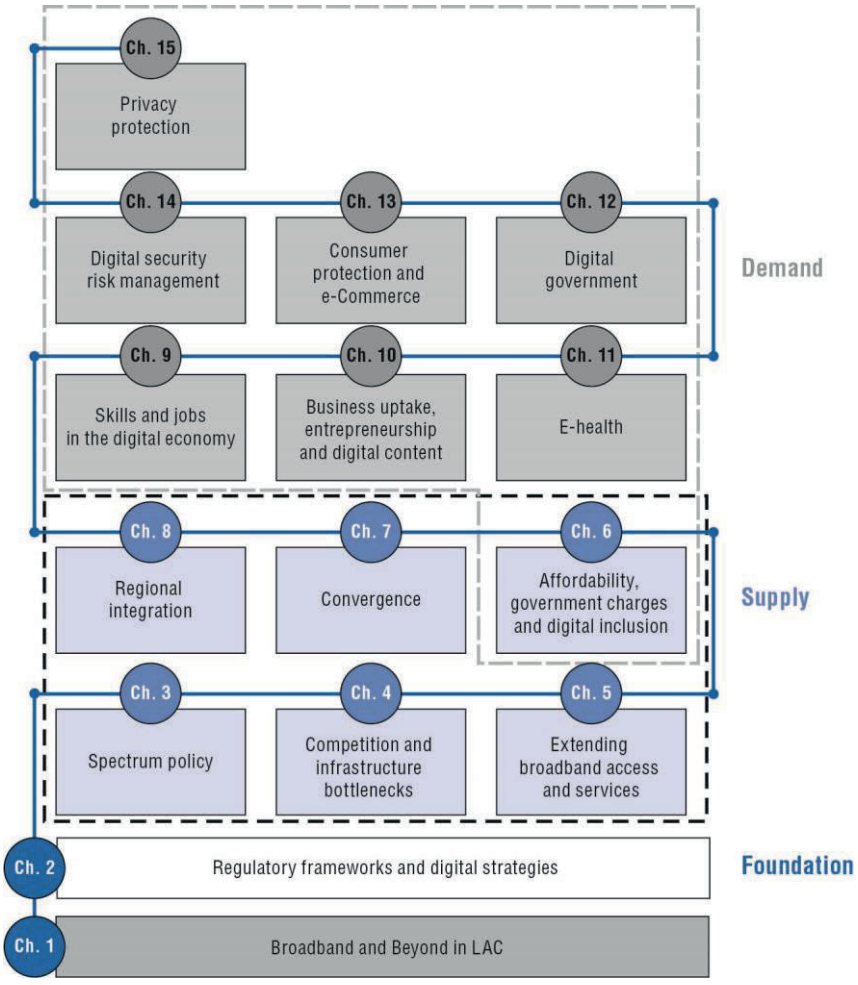
6.1. Ensuring affordable access

108. Digital infrastructures, including efficient, reliable and widely accessible broadband communication networks and services, data, software, and hardware, are the foundations on which digital transformation is based. The 2016 Cancun Declaration, that was signed by several LAC countries, notably Argentina, Chile, Colombia, Costa Rica, Ecuador and Mexico, includes a statement to "*Increase broadband connectivity and harness the potential of interconnected and converged infrastructures and digital services to bridge digital divides and foster innovation by adopting technologically neutral frameworks that foster investment in broadband networks, protect consumers, promote competition and enable opportunities for all.*" (OECD, 2016a)

109. Broadband networks are the foundation of digital economies. Increased availability and effective use of the services enabled by broadband can advance social inclusion, productivity and good governance. A range of challenges has to be overcome, however, in providing readily accessible, universal and locally relevant broadband-based services in many parts of the world. In the Latin American and Caribbean (LAC) region, almost 270 million people had no access to the Internet by the end of 2016. While new generations of broadband networks are rapidly emerging, much remains to be done to expand the necessary infrastructure and to encourage individuals, business and governments to make the most of what broadband has to offer.

110. Increasing connectivity and the use of digital services in the LAC region will require policies and practices that address major supply and demand issues in a holistic and coherent manner. The OECD-IDB *Broadband Policies for Latin America and the Caribbean: A Digital Economy Toolkit* (OECD/IDB, 2016a) sheds light on good practices and case studies, based on a whole-of-government approach. Its aim is to offer public authorities an overview of the policies, regulatory practices and options that can maximise the potential of broadband as a driver of economic and social development. The 15 chapters of this Toolkit cover a broad array of topics on broadband policy making, from digital strategies, regulatory frameworks and spectrum management, to competition, access, affordability and taxation, including education, skills and business uptake, as well digital security and privacy (Figure 6.1).

Figure 6.1. Structure of the Broadband Policies for Latin America and the Caribbean Toolkit



Source: OECD/IDB (2016a).

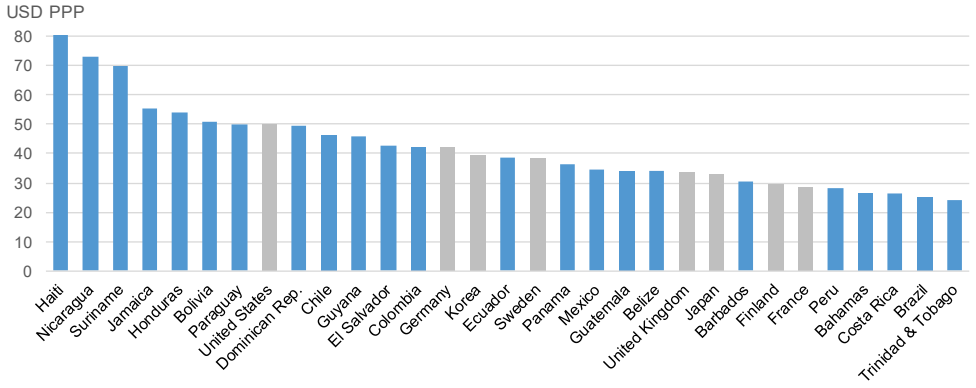
111. The Toolkit found that the chief challenges for increasing broadband access and use in the LAC region relate either to supply-side issues, such as infrastructure deployment and provision of broadband services, or to demand-side issues, such as skills, entrepreneurship, local content and consumer protection. In these respects:

- Competition in communication markets in the LAC region tends to be weaker than in OECD countries, and pro-competitive regulation could be strengthened to actively encourage its development as a tool to meet policy goals.
- In some areas in the LAC region, insufficient incentives for infrastructure deployment are offered at the regional, national, and international level, which limits domestic and international traffic and leaves demand for broadband services unsatisfied.
- Affordability has been one factor holding back growth in broadband services in the LAC region, but the spread of mobile services suggests that this issue is far from insurmountable. Figure 6.2 shows prices for fixed and mobile broadband access in

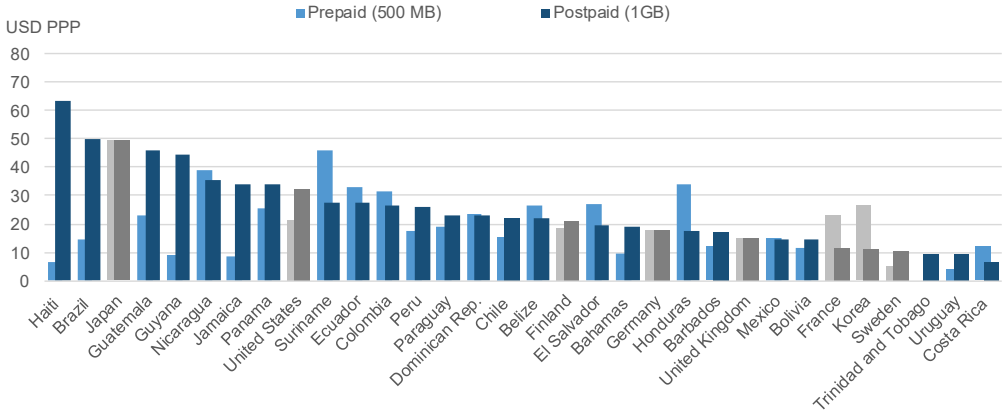
the region, showing that they remain high in many LAC countries, in particularly relative to income levels in the region.

Figure 6.2. Prices for fixed and mobile broadband access, 2017

Fixed broadband monthly subscription prices, 2017, USD PPP



Mobile broadband, postpaid & prepaid handset-based monthly subscription prices, 2017, USD PPP (*)



Note: (*) Prepaid baskets include a minimum of 500 MB of monthly data allowance, postpaid baskets include a minimum of 1 GB of monthly data allowance.
Source: ITU World Telecommunication / ICT Indicators database

- As technologies and services converge, in many instances regulatory frameworks in the LAC region continue to operate in separate silos.
- With some exceptions, such as Uruguay, many countries in the LAC region have not yet made the progress that they could in introducing broadband to local institutions such as schools, promoting ICT and broadband adoption in business, and encouraging governments to become more transparent, effective and responsive by using the services that broadband makes possible.
- Countries in the LAC region need to address an increasing range of issues related to trust as their digital economies develop, for example in the areas of consumer protection, privacy protection and digital security risk management.

112. The Toolkit also noted that the task of increasing broadband access and usage is complex, involving major supply and demand-side issues. Extending broadband use cannot be addressed by policy makers and regulators alone. Broader structural issues must be addressed, with the help of all relevant stakeholders. Good practices in this respect include the following:

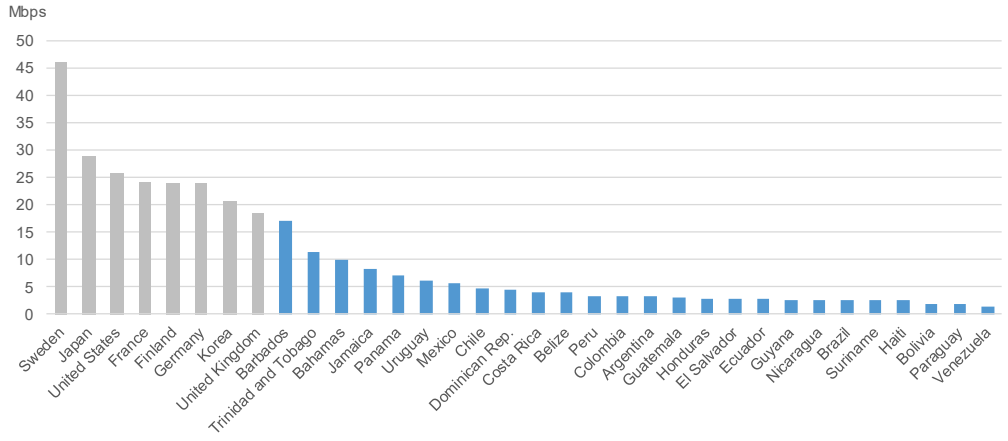
- Digital strategies and national broadband plans should seek to increase broadband access and usage by using a whole-of-government and multi-stakeholder approach.
- A stable and predictable regulatory framework is necessary to cultivate long-term investment in broadband infrastructure. Sound regulations can help expand infrastructure expansion by lowering the costs of deployment.
- Increased competition is a key element for disciplining prices, promoting innovation and improving responsiveness to demand. Independent agencies are needed to address dominance issues or impose wholesale regulation when necessary to lower the barriers to new entrants.
- Broadband should be made increasingly accessible and affordable to disadvantaged groups and people living in rural and remote areas. Sectoral over-taxation that deters broadband expansion and use should be avoided. Public authorities can also establish incentives and finance networks when markets alone are unable to meet the demand.
- Regulatory frameworks should make sure that authorities are in a favourable position to address competition and investment issues arising from the increasing convergence of networks and services.
- Regional co-operation arrangements, sharing of regulatory experiences, deployment of regional connectivity infrastructures, cross-border data flows and lowering the prices of international connectivity and roaming should be encouraged.
- Broadband services should be made available in schools, health care centres and other places of public access, along with the promotion of a skills system geared to the digital economy. Facilitating ICT adoption by businesses, creating digital content accessible to local populations, and the promotion of digital entrepreneurship can all increase demand and improve services.
- Digital governments should be actively promoted in the LAC region to allow for smarter organisation of cities and to help governments become more efficient, effective, open, transparent and accountable.
- Enhancing trust in digital services is critical to encourage the uptake of broadband. Consumer protection, digital security risk management and privacy protection should be ensured.
- Implementing systematic measurement frameworks to monitor the growth of broadband and digital services is critical for informing policy and regulatory decisions.

113. Many regions and localities in LAC and OECD countries alike remain badly connected to modern high-speed broadband networks, resulting in large inter-regional gaps. For example, indicators on the percentage of households with a broadband internet connection show gaps of up to 48 percentage points between the most and the least connected

regions in the OECD (OECD/IDB, 2016a). In addition, even though Internet access has increased in Latin America over the past decades, major gaps persist with advanced economies in terms of the quality and speed of Internet connections. In Latin America, for example, the average broadband connection speed is around 5 megabytes per second (Mb/s), more than five times slower than in Korea (Figure 6.3). In addition in the region, only 2% of broadband connections operate faster than 15 Mb/s, while in Sweden, Norway and Korea this share is above 35% (OECD, 2018c).

Figure 6.3. LAC countries lag in connection speeds to internet infrastructure

Average download fixed broadband speed, 2018



Note: Mbps: megabytes per second
Source: Akamai (2017).

114. Fully benefiting from the opportunities linked to digital transformation will require that all individuals, businesses and governments have reliable and affordable access to digital networks and services. In some more remote or less-densely populated regions this might require proactive approaches by the government, often in the context of national broadband strategies, and co-investment when commercial players assess there is insufficient demand for them to invest (OECD, 2017e). In LAC countries also, countries are experimenting with new approaches to enhance access, such as Mexico's *Red Compartida* wholesale network, that was an important component of recent reforms in the telecommunication sector (Box 6.1).[2]

[2] The OECD is currently undertaking Going Digital national reviews for Colombia and Brazil, that will look at the full range of policies considered in the Going Digital Framework presented in Chapter 5.

Box 6.1. Increasing access and fostering competition in the Mexican telecommunication sector

Increasing access to telecommunication services for consumers is the first foundational step for enabling economies and societies to benefit from digital transformation. Nearly 60% of the global population is still offline and unable to fully participate in the digital economy. Increasing access, including for the least fortunate, often calls for an increase in competition among infrastructure and service providers to improve the quality of service of communication services and to bring prices down for consumers.

In 2012, the Mexican telecommunications sector was characterised by a high degree of concentration and high average prices for telecommunication services. A single company controlled 80% of the landline phone market in Mexico and 70% of the wireless market, while over three quarters of households lacked access to the Internet. A review of the sector carried out by the OECD recommended 31 actions to improve competition in the telecommunication market, ensure the consistent and transparent application of telecommunication regulation, improve the legal and regulatory framework and stimulate competition more broadly throughout the economy.

The recommendations were implemented in a wide-ranging reform of the legal and regulatory framework in 2013, fully covering 29 of the 31 listed with partial implementation for just three recommendations. Five years later, the OECD was invited to review the implementation of the recommendations and the effects of the reform of the Mexican telecommunication sector and to put forward a set of further recommendations to maintain the momentum.

A subsequent OECD Telecommunication and Broadcasting Review in 2017 found that increased competition as a result of the reform helped to drive down prices for telecommunication services in Mexico. The OECD high-usage basket, for example, had the sharpest drop in prices, from 101 USD PPP to 24.93 USD PPP, representing a decline of over three quarters of the original price. Almost 50 million mobile broadband subscriptions had been added since the reform, most of them with higher quality offerings than before. This decline in prices and increase in the quality of telecommunication services especially benefitted lower income households and disenfranchised communities and individuals throughout Mexico. Foreign entry into the marketplace has spurred investment in infrastructure and the *Red Compartida* – a shared wholesale wireless network – will likely further this trend.

However, additional efforts will be needed to further increase fixed and mobile access to the Internet, an essential precondition for engaging with the digital economy. At the same time, the country should undertake further efforts in the broadcasting sector, a sector where concentration increased and prices have risen 5% over the past few years.

The OECD Telecommunication and Broadcasting Review of Mexico 2017 encourages Mexico to go even further, given an expected further increase of convergence of broadcasting and telecommunication services. Specific recommendations relate to competition, market conditions and national policies, all underpinned by the necessity to strengthen current legal and institutional frameworks. The OECD believes that the adoption of these recommendations would further expand access to telecommunication and broadcasting services for Mexicans, including for those in communities with lower levels and quality of Internet access.

Source: OECD 2017d.

6.2. Fostering use, innovation and productivity

115. Access to digital networks provides the technical foundation for the digital transformation of economies and societies, but does not necessarily ensure effective **use** by itself. Widespread diffusion and effective use of digital technologies empowers individuals, firms and governments to reap the benefits of digital transformation for innovation, productivity growth, and well-being.

116. As regards the use of digital technologies by households and individuals, as already briefly discussed in Chapter 3, the available data point to large variation across LAC countries (Figure 6.4). In some, like Argentina, Brazil, Chile, Costa Rica and Uruguay, more than 60% of households had Internet access at home in 2017, allowing people to benefit from the information and services it provides, and developing some of the skills needed to use the technology, both at home and in the workplace. In other LAC countries, less than 50% of households have Internet access at home, and in some, like El Salvador and Bolivia, less than 20% of households had access in 2017.

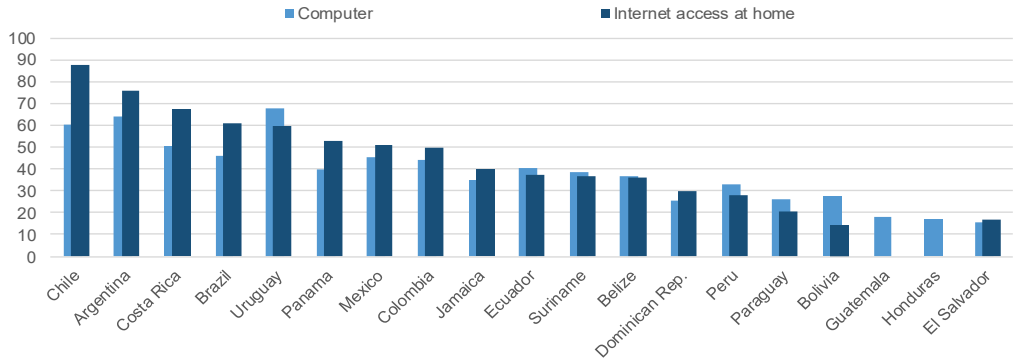
117. The available data for LAC countries does not provide much detail on the use of digital technologies by households and individuals. Private sources suggest that Internet users in Latin America spend more of their online time with social media than their counterparts anywhere else in the world, according to research from 2015 (ComScore, 2016). In Brazil specifically, users spent an average of 8.8 hours on social networking sites in June.[3]

118. At the firm level, the available data at the international level for LAC countries is somewhat dated and incomplete, but points to considerable differences across the LAC region. In 2010, Chile, Brazil and Argentina were among the leaders in the region in terms of firm-level use of digital technologies, as measured by firms having a website or home page, with some 70-80% of firms having a website or home page (Figure 6.5). In some other LAC countries, only some 30% of firms had a website at this stage. More recent data are only available from World Bank surveys for thirteen LAC countries, and point to strong progress in the uptake of such technologies in several countries, e.g. Ecuador, Peru, Paraguay, Suriname and Uruguay, resulting in these countries also reaching an average uptake of basic digital technologies of 70% or more of firms.

119. While more detailed data is not available for many LAC countries, the experience for OECD countries suggests that many firms still engage only in rather basic digital technologies, such as establishing a broadband connection, using e-mail, or establishing a website or home page. Far fewer firms tend to engage in more advanced digital technologies and practices, such as buying and selling online, using digital technologies to outsource business processes to the cloud (cloud computing), or using digital technologies for customer relationship management or enterprise resource planning. And even fewer engage in the most advanced technologies, such as the use of big data or artificial intelligence. While similar evidence is not available for LAC countries, the available data suggest that the more advanced use of digital technologies in the LAC region is still at an early stage. Moreover, the experience in OECD countries suggests that SMEs tend to lag large firms in the uptake of advanced technologies. Further and better evidence on the diffusion of specific technologies in the LAC region would be helpful to support policy development in this area.

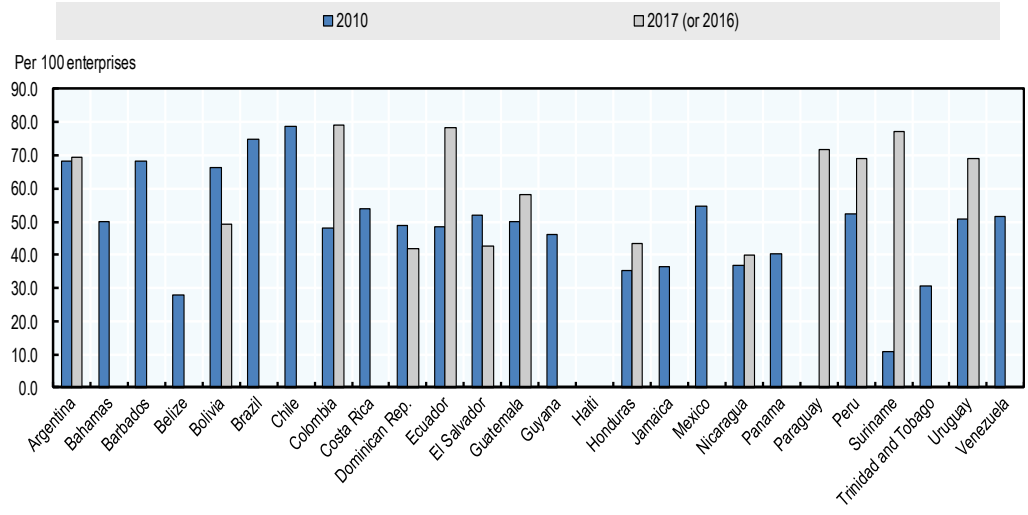
[3] https://www.emarketer.com/Article/Latin-Americans-Most-Avid-Social-Media-Users/1013517

Figure 6.4. Household use of Computers and the Internet at Home, 2017 (or latest available year)



Source: OECD calculations based on ITU World Telecommunication/ICT Indicators 2018.

Figure 6.5. Enterprises with a website or home page, 2010 and 2017(1)



Note: (1) Or latest year available.
Source: OECD, based on World Bank, Enterprise Surveys.

The use of digital technologies and productivity growth

120. As noted already in Chapter 4, the use of advanced digital technologies could help improve productivity performance by enabling innovation and reducing the costs of a range of business processes (Goldfarb and Tucker, 2017). Evidence on productivity impacts from new production technologies comes mainly from firm and technology-specific studies (OECD, 2017f). A sample of these studies is reported below. These studies suggest sizeable potential productivity impacts. However, by way of caveat, such studies follow a variety of methodological approaches, and often report results from just a few, early adopting technology users:

- In the United States, output and productivity in firms that adopt data-driven decision making are 5% to 6% higher than expected given those firms' other

investments in information and communication technology (ICT) (Brynjolfsson, Hitt and Kim, 2011).

- Improving data quality and access by 10% – presenting data more concisely and consistently across platforms and allowing them to be more easily manipulated – is associated with a 14% increase in labour productivity on average, but with significant cross-industry variations (Barua, Mani and Mukherjee, 2013).
- The Internet of Things reduces costs among industrial adopters by 18% on average (Vodafone, 2015). Autonomous mine haulage trucks could in some cases increase output by 15-20%, lower fuel consumption by 10% to 15% and reduce maintenance costs by 8% (Citigroup-Oxford Martin School, 2015).
- Autonomous drill rigs can increase productivity by 30% to 60% (Citigroup-Oxford Martin School, 2015).
- Warehouses equipped with robots made by Kiva Systems can handle four times as many orders as un-automated warehouses (Rotman, 2013).
- Google data centres use approximately 0.01% of the world's electricity (Koomey, 2011). In July 2016 it was reported that DeepMind – a leader in AI – used AI to optimise cooling of data centres, cutting energy consumption by up to 40% and significantly reducing costs.
- A 1% increase in maintenance efficiency in the aviation industry, brought about by the industrial Internet, could save commercial airlines globally around USD 2 billion per year (Evans and Anninziata, 2012).

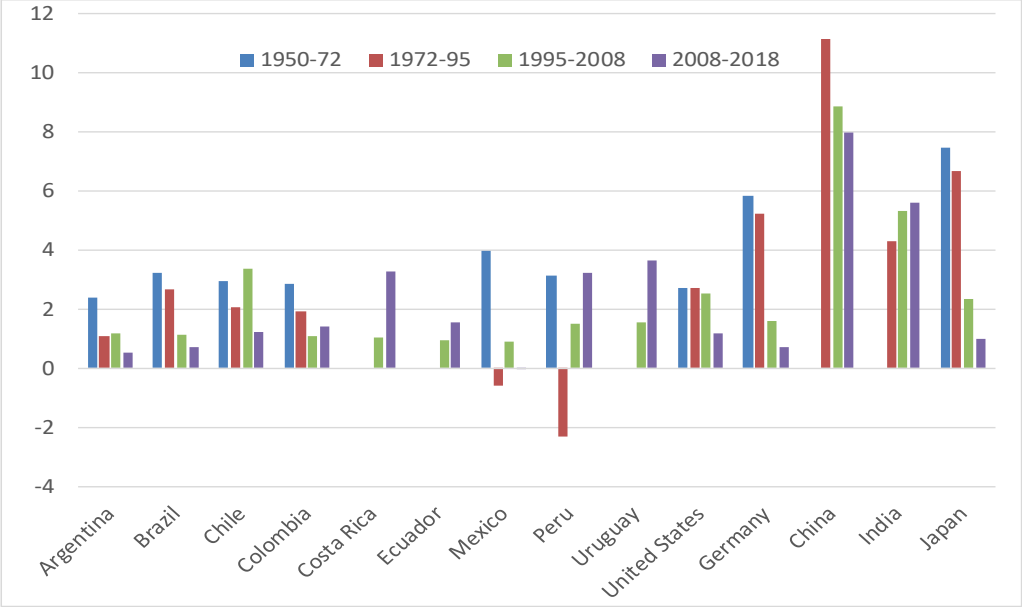
121. These potential impacts of digital technologies are important in the context of the global slowdown in aggregate productivity growth over the past decade or so, with many countries, including some in the LAC region, looking for new avenues to boost productivity. Today, as in the 1980s, when Nobel-prize winner Robert Solow famously quipped: "we see computers everywhere but in the productivity statistics" there is again a paradox of rapid technological change and stagnating productivity growth.

122. The situation for key LAC countries, including the Pacific Alliance countries, is mixed as regards their productivity performance (Figure 6.6). Argentina, Brazil and Mexico have all experienced relatively weak productivity growth over the period from 2004 to 2017. Chile and Colombia have had somewhat stronger growth, whereas Costa Rica, Peru and Uruguay have been characterised by a strong rebound in productivity over the most recent period. Over the longer term, many LAC economies have lost ground with average productivity levels in the LAC region falling from 1980 onwards, at a time when key Asian economies such as China and Korea continued to catch up with the United States (Figure 6.7).

123. These trends and fluctuations in productivity growth are determined by many factors, including cyclical factors, macroeconomic conditions and a range of structural policies. It goes beyond the scope of this paper to discuss all of these in detail. Rather, this section discusses what countries in the LAC region might be able to do to strengthen the use of digital technologies and enable stronger future productivity growth based on digital transformation.

Figure 6.6. Productivity growth in key LAC economies, 1950-2017

Annual average growth in GDP per hour worked, in percent



Source: The Conference Board (2019), Total Economy Database, April 2019.

124. First, productivity growth due to digital transformation depends on the state of the diffusion of digital technologies and related business models. As noted above, the diffusion of digital technologies across LAC countries is far from complete. While many firms now have access to the Internet and have a website, more advanced, productivity-enhancing digital tools and applications, such as big data, cloud computing or e-commerce, have only diffused to a limited number of firms.

125. There are also still important differences in digital transformation across industries that affect the overall state of digital transformation, and thus its impacts on productivity (see also McKinsey Global Institute, 2018). Recent OECD analysis shows that some sectors are less advanced than others in terms of the pace of digital transformation (Calvino et al., 2018; OECD, 2017c). For example, even if new technologies are being integrated, agriculture, mining and real estate still rank in the bottom part of the distribution on digital intensity across all available indicators for OECD countries. Conversely, telecom and IT services rank consistently at the top of the distribution. Other sectors display a large heterogeneity, suggesting that they are only engaged in some aspects of digital transformation.

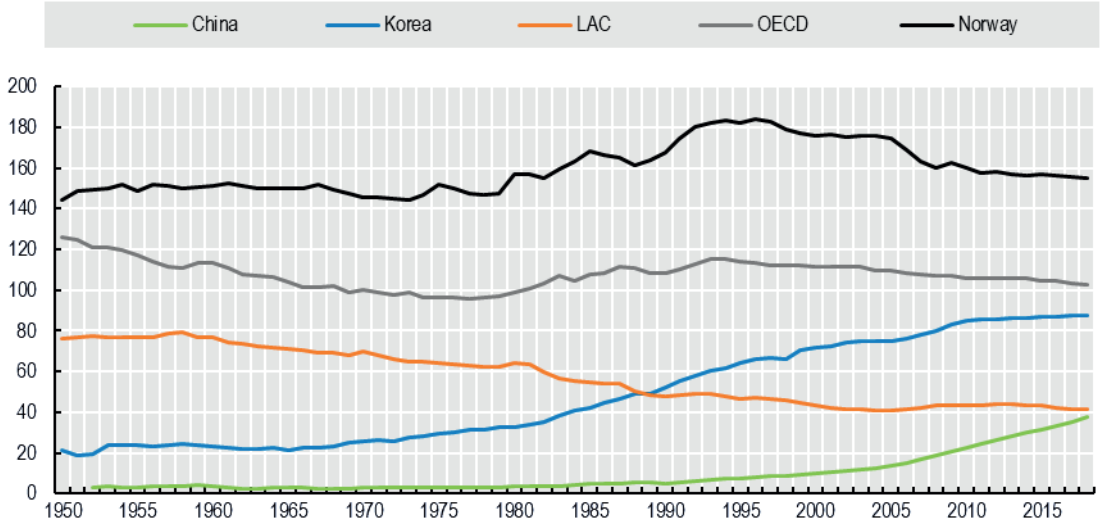
126. Moreover, some of the most digitally advanced sectors in the economy - such as telecom and IT services - have a relatively small weight in the economy, limiting their impact on aggregate productivity growth. Conversely, some sectors that are on average less advanced in the digital transformation, such as health services, education, construction and real estate, have a relatively large weight in the economy.

127. Looking behind the aggregate and sectoral statistics, micro-level studies for OECD countries reveal that the aggregate productivity slowdown masks large gaps between more productive and less productive firms, especially in ICT-intensive sectors (Andrews, Criscuolo and Gal, 2016). This divergence is not just driven by frontier firms

pushing the productivity frontier out, but also by the stagnating productivity of laggard firms related to the limited capabilities of, or lack of incentives for, such firms to adopt best practices.

Figure 6.7. Labour productivity levels in Latin America, OECD, China and Korea, 1950-2018

As a % of US productivity



Source: OECD/CAF/ECLAC (2019) based on Conference Board (2018), The Conference Board Total Economy Database.

128. While evidence on this productivity divergence is not yet available for a wide range of LAC countries, some indicators and analysis suggest that similar factors may be at work also in LAC countries. For example, in Mexico, there has been a sharp divergence in productivity growth between frontier industries and lagging industries since 2003 (OECD, 2017g). Moreover, Mexico is characterised by a very high dispersion of productivity levels across Mexican states. In Brazil, the evidence points to a "missing middle" in the firm distribution, with relatively few firms in the middle of the firm size distribution, suggesting it is difficult for small start-up firms to reach a sufficient scale (OECD, 2017h).

129. In both the OECD and LAC context, it is therefore important to look at the uptake and diffusion of innovations related to the digital transformation throughout the economy (OECD, 2015b). The history of technological change suggests it is normal for frontier firms, certain sectors and some regions to get ahead of others. However, to ensure the success of digital transformation and its widespread impacts across the economy, it is important to ensure that advanced technologies and practices that are being developed and absorbed by leading firms, sector and regions are spread more widely across the economy.

130. The diffusion of so-called "general-purpose technologies" like digital technologies typically follows an S-shaped curve where technologies are initially only adopted by some leading firms and later diffuse to all firms, as they become more established, prices fall and markets grow. Consequently, there is a significant gap between what can

currently be implemented from a technical point of view (and what may be implemented by frontier firms) and what is currently being implemented by an average firm.

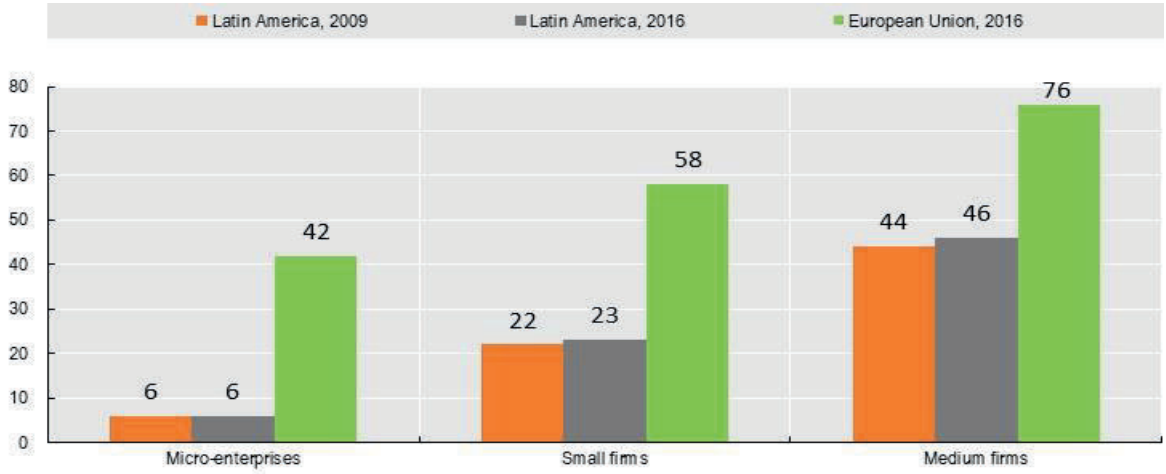
131. The history of technological change also demonstrates that the successful implementation of new technologies involves much trial and error, and that it takes time to reorganise production processes, introduce new business models, and provide workers and management with new skills. Digital transformation is not just about the diffusion of technology, but increasingly about the complementary investments that firms need to make into skills, organisational changes, process innovation, new systems and new business models (Haskel and Westlake, 2017). Some recent research suggests that the scale and complexity of these complementary investments is growing, which may make digital transformation particularly difficult for non-frontier firms, such as traditional SMEs (Brynjolfsson, et al., 2017). During this process of adjustment and experimentation, productivity growth may be low and can even turn negative (Brynjolfsson et al, 2017).

Opportunities for SMEs and start-ups

132. As discussed in the latest Latin American Economic Outlook, micro, small and medium-sized enterprises (MSMEs) dominate the business sector in LAC countries, accounting for 99.5% of all firms, and 61% of formal employment, though only 25% of total production (OECD/CAF/ECLAC, 2019). The low contribution of MSMEs to total production shows they have low levels of productivity and tend to be concentrated in low-productive sectors. Relative internal productivity measures show that, in 2016, the labour productivity of a medium-sized company in LAC was, on average, less than half that of big companies. Small and micro enterprises were exhibiting an even poorer performance, reaching only 23% and 6% of big companies' productivity, respectively. Conversely, in the European Union, MSMEs reach 42%, 58% and 76% of big companies' productivity, respectively (Figure 6.8).

Figure 6.8. Relative internal productivity of MSMEs in Latin America and the European Union

(100 = average productivity of a large firm in the same economy)



Note: Relative internal productivity refers to the productivity of MSMEs relative to the productivity of large firms.
Source: OECD/CAF/ECLAC (2019) based on Dini and Stumpo (2018)

133. The productivity gap between MSMEs in LAC is also higher than in the European Union. In fact, the productivity of a medium-sized enterprise is less than twice that of a micro establishment in the European Union. In LAC, this gap is larger than seven times. Low productivity levels across MSMEs in LAC translate into a scarce contribution to total exports. While MSMEs in the European Union generate more than half of total exports, large companies in LAC account for more than 80% of regional exports (Dini and Stumpo, 2018).

134. The concentration of LAC's exports on primary sectors further limits the capacity of MSMEs to improve their productivity. At the same time, the predominance of lowproductive MSMEs represents a barrier towards achieving an upgraded export structure. In this sense, LAC's export profile is both cause and consequence of an economic structure where low-productive MSMEs are predominant.

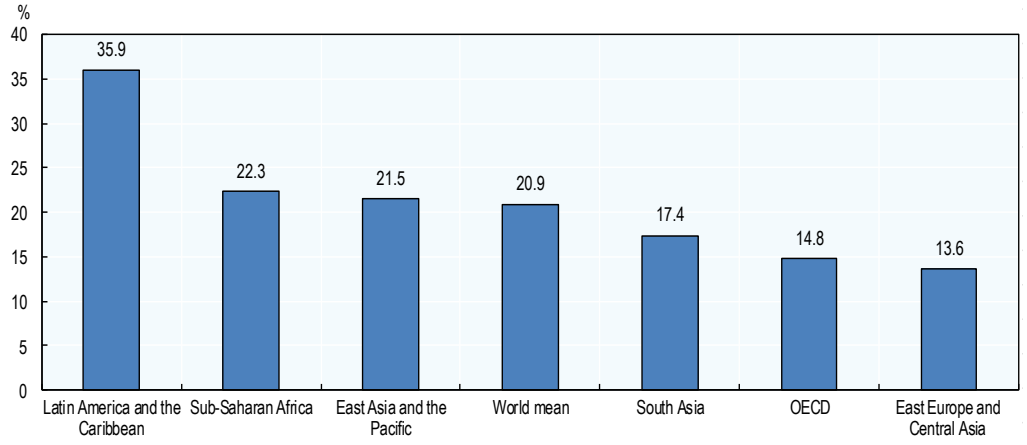
135. Two self-reinforcing effects are at play. First, the export profile of LAC makes it more difficult for MSMEs to connect to GVCs, adopt technology and compete in international markets, leaving them unproductive. This export profile is characterised by few large companies specialised in natural resource-intensive sectors and some high-intensity capital services. In this context, MSMEs face barriers and disincentives to participate in activities with higher value-added. This occurs both because these activities demand high capital investments and because they do not create backward linkages that help them in accessing international markets. In this situation, the role of MSMEs is limited to providing employment with low levels of quality, stability and wages. They remain in low-productive sectors where they do not face barriers to entry. They serve local markets, and have few incentives to connect with firms in other stages of a productive chain. The productive structure thus significantly conditions the modalities of insertion of MSMEs into the regional economy, their potential contributions and ultimately the global level of productivity that can be achieved.

136. Second, many MSMEs remain small and unproductive. They have no incentives to invest in productive capacities or to incorporate technology, and face no international competition. As a result, their productivity stagnates. They remain concentrated in lowproductive sectors, which eventually favours an export structure focused in sectors of low sophistication. This is aligned with the self-selection hypothesis of the new "new trade theory", which predicts that more productive firms self-select into export markets, and hence that less-productive firms remain serving local markets (Melitz, 2003). In all, the concentration in these sectors leads to low levels of productivity, which make it difficult to upgrade the productive structure.

137. Digital transformation may help change this dynamics, as digital technologies offer new opportunities for SMEs to participate in the global economy, innovate, scale-up and enhance productivity. Digital transformation facilitates the emergence of "born global" small firms, and SMEs' access to customers in local and international markets, with Internet platforms increasing the supply of products and services and allowing trades that otherwise would not happen. Big data and data analytics can enable SMEs to better understand the processes within the firm, the needs of their clients and partners, and the overall business environment. The use of digital technologies can also ease SMEs' access to skills and talent, such as through better job recruitment sites, and the outsourcing of key business functions, e.g. through cloud computing, all of which can help improve performance. It can also facilitate access to a range of financing instruments and the development of innovative solutions to address information asymmetries and collateral shortages.

138. However, SMEs face particular challenges in the adoption and effective use of ICT, particularly in the case of productivity-enhancing applications. The adoption lag of SMEs is mainly due to a lack of key capabilities, e.g. human resources and management expertise, and a lack of investment in complementary assets. Previous OECD work has already pointed to the important skills gap that many firms in Latin America face (OECD/CAF/ECLAC, 2015; Figure 6.9). Moreover, lack of investment in in-house innovation and organisational capabilities may limit the capacity of SMEs to take full advantage of new technologies to enhance data analytics, engage in e-commerce, or increase participation in knowledge networks. SMEs also face specific challenges in managing digital security and privacy risks, mainly due to lack of awareness, resources and expertise to assess and manage risk effectively.

Figure 6.9. Percent of firms identifying an inadequately educated workforce as a major constraint



Source: OECD, based on World Bank, Enterprise Surveys.

139. A sound environment for entrepreneurship and start-ups can contribute to realising the benefits from digital transformation. Start-ups are often the first to develop and commercialise new technologies and business models, and their growth can have a large impact on other firms and disrupt existing business models and approaches. The environment for start-ups in the LAC region therefore plays an important role for digital transformation.

140. Previous OECD work showed that Latin American countries are strengthening their pro-start-up policies (OECD, 2016b). Many LAC countries are creating new institutions and support instruments and are reforming existing programmes to make them more effective. Further efforts to strengthen the environment for innovative and digital start-ups will be important to help realise the benefits from digital transformation and diffuse these across economy and society.

141. Enabling SMEs and entrepreneurs to fully harness digital transformation can help ensure growth is inclusive, as well as boost productivity and competitiveness, as these firms find new niches in global value chains. Comprehensive national digital strategies that take into account SMEs, policies that facilitate access to finance, knowledge networks and skills, including the development of management skills for the digital

economy, and SME engagement with competency centres and/or technology extension services, can be helpful for SMEs. National digital security strategies can also help address the specific needs of SMEs by providing them with practical guidance and the appropriate incentives to adopting good practices (Box 6.2).

Box 6.2. Helping smaller firms improve their cyber security

To fully realise the benefits of digital transformation, it is essential that actors and organisations consider the risks to their security and privacy. It is therefore increasingly important for organisations to consider their digital security and actively review their preparedness for potential digital threats.

However, SMEs often lack the capacity, resources or skills required to properly maintain their digital security. For example, SMEs may lack the specialised skills required to update legacy security systems, or to remember to patch vulnerabilities in software when identified by the software developer. This is particularly significant due to the distributed and interconnected nature of the digital economy, which creates opportunities for smaller firms to trade in international markets, participate in GVCs or contract with other larger enterprises. SMEs can therefore become the weakest link in interdependent networks, thereby compromising the cybersecurity of other actors in the system. For example, in 2015, the personal information of 70 million customers of the American multinational retail firm Target was compromised after criminals gained access to the firm's information system by penetrating a small heating and air conditioning contractor that was working with Target.

Increasing SMEs awareness of digital risk and elevating their capacity to manage it is critical to building trust. Given that SMEs may lack expertise and face resource constraints, larger organisations, industry associations, the technical community and governments can play an important role in this area and share their knowledge, skills and expertise about best practices in managing digital risk. Useful approaches could include the development of SME-specific risk management guidance tools and incentives.

Public policy can play an important role in improving the conditions for SMEs to adopt digital security and privacy risk management frameworks. In particular, as SMEs face specific challenges related to expertise and resource constraints, SME-specific risk management guidance tools and incentives may be the most effective approach. For example, the German initiative 'IT Security in Industry' (IT Sicherheit in der Wirtschaft) has been developed by the German Federal Ministry for Economic Affairs and Energy, with the aim of improving the security of SMEs. It includes a free digital security check that considers the implications of new directives like the EU General Data Protection Regulation. The programme also offers malware and virus checks and disseminates information about ICT security, data protection and ongoing privacy and risk management.

Source: http://www.it-sicherheit-in-der-wirtschaft.de

The role of structural factors for digital adoption

142. Another important factor affecting the potential impacts of digital technologies on productivity is the pace of structural change and resource re-allocation in LAC economies. Digital transformation of firms involves a process of search and experimentation with new technologies and business models, where some firms succeed and grow and others fail and exit (OECD, 2004). Countries with a business environment that enables this process may be better able to seize the benefits from digital transformation than countries where such changes are more difficult and slow to occur.

143. New OECD research shows that the diffusion of selected digital technologies is typically more advanced in sectors where firm turnover (i.e. entry and exit) is higher (Calvino and Criscuolo, 2018). This is consistent with the idea that new entrants: *i*) possess a comparative advantage in commercializing new technologies (Henderson, 1993); *ii*) place indirect pressure on incumbent firms to adopt new technologies; and *iii*) can more fully reach their potential when they have sufficient space to grow, which is accommodated by the exit of inefficient firms.

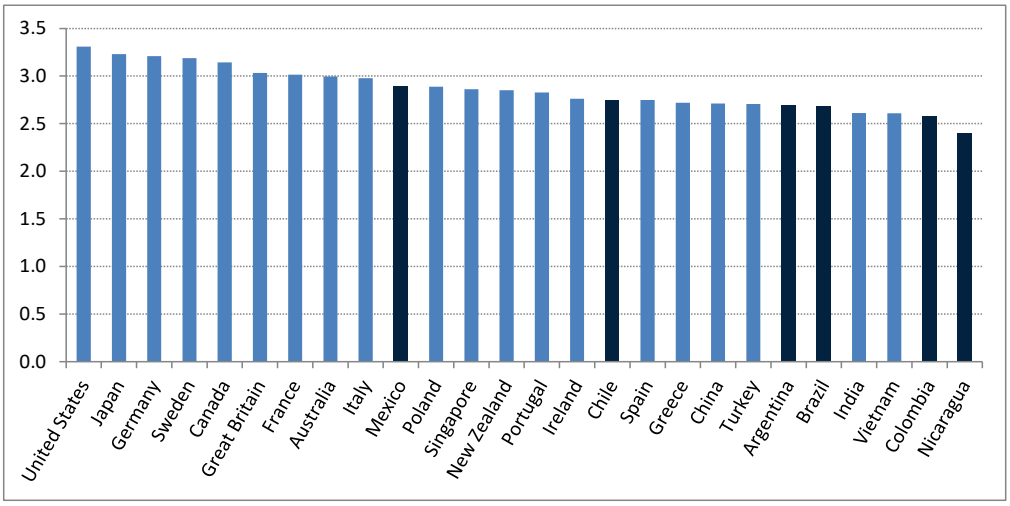
144. Moreover, digital adoption will be facilitated by efficient resource allocation, since a firm's incentives to experiment with uncertain/risky digital technologies will be shaped by its perceived ability to rapidly scale-up operations in event of success, and rapidly scale-down operations and potentially exit the market at low cost in the event of failure (Andrews and Criscuolo, 2013). From this perspective, harnessing digital transformation for firms places an added premium on policies that foster business dynamism and efficient resource reallocation. This is a challenge in many countries against the backdrop of declining business dynamism (Criscuolo, Gal and Menon, 2014) and rising resource misallocation (Adalet McGowan et al., 2017a; Berlingieri, Blanchenay and Criscuolo, 2017) that has been observed over the past decade. These issues also play a role in LAC countries, e.g. as suggested by the very low level of allocative efficiency observed in Brazil's manufacturing sector (OECD, 2015c).

145. A range of policies can incentivize greater digital adoption through experimentation either by increasing competitive pressures or by lowering the costs of reallocation. This includes insolvency regimes that do not inhibit corporate restructuring and do not excessively punish entrepreneurial failure. For example, OECD analysis suggests that reforming insolvency regimes to the least stringent levels in the OECD is associated with a 3-10% increase in the share of firms adopting cloud computing in industries highly dependent on external finance relative to those less dependent on such finance (Andrews, et al., 2018). At the same time, this analysis also shows that access by entrepreneurs to appropriate forms of finance, such as venture capital financing, together with corporate tax regimes that do not excessively favour debt over equity financing, are also associated with higher digital adoption rates.

146. Importantly, the transition of an economy based on tangibles to one based on intangibles (or ideas) can only succeed if firms have access to the right set of *capabilities.* For example, qualified firm management that takes the decisions to invest and guides the adoption process has been identified as a key capability (see Bloom et al., 2012; Pellegrino and Zingales, 2014). The available data show that several LAC countries lag considerably behind relative to best practice on management, which is considered an important factor for productivity (Figure 6.10). Moreover, the dispersion in management is high in some LAC countries, like Brazil (Bloom, et al., 2017).

147. Firm-level practices related to workers, including their participation in training, or their flexibility in working hours, are also important. Moreover, as discussed later in this section, worker's skills matter, including providing them with the opportunity to continuously develop their skills in order to keep pace with the fast changing technological landscape; and ensuring people's skills are allocated to their most productive uses. In addition, the ability to manage digital security and privacy risks, also contributes to a more effective use of digital technologies (see Box 6.2).

Figure 6.10. Average Management Scores by Country



Source: Bloom, Sadun and Van Reenen (2017).

Policies to strengthen digital adoption and productivity growth

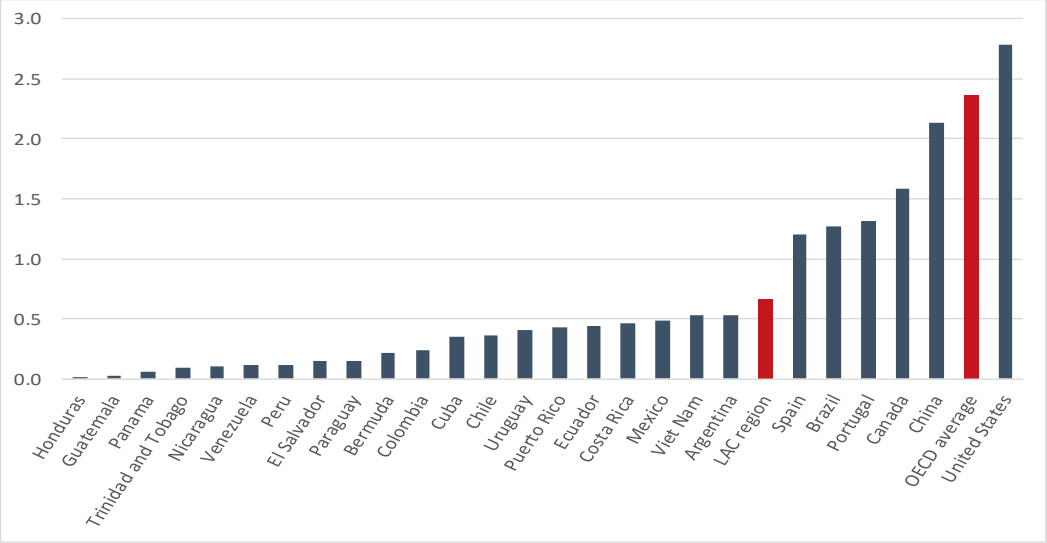
148. For policy makers in the LAC region, a number of points emerge from the discussion above. First, digital transformation is probably already having impacts on productivity in individual firms in the LAC region - and also in specific industries, although these impacts are not necessarily very visible yet. Second, further and more visible impacts should emerge as digital transformation evolves and new technologies, business models and practices diffuse across the LAC region to more firms and industries. Third, ensuring that the largest possible impacts emerge can benefit from pro-active policy action, all of which should also support productivity growth more generally. Key actions include:

- *Strengthening national and international technology and knowledge diffusion*. As discussed in detail in OECD (2015b), advanced technology and knowledge often comes from abroad, as it is developed in scientific institutions and global frontier firms. Openness to foreign technology and knowledge is therefore essential to benefit from digital transformation, and requires openness to trade, investment, and international mobility of the highly skilled. This dimension is further discussed in section 6.6 of this chapter. Moreover, strengthening knowledge diffusion within the economy is important and can benefit from further policy action, e.g. as regards the wider use of technology extension services, improvements in science-industry linkages and stronger mobility of human resources within the economy. Adequate protection of intellectual property rights is also important in this context.

- *Fostering investment in tangible and intangible capital, notably skills*. With investment levels in intangible assets such as R&D, intellectual property and skills remaining low across most LAC countries, policies that can strengthen investment in tangible and intangible capital are crucial to increase the adoption of digital technologies, strengthen the necessary complementary knowledge and enhance the absorptive capabilities of firms, managers and workers. Investment in skills (firm-specific and otherwise) of both workers and managers is particularly important in this context. Expenditure on R&D is also very low in most countries in the region, Brazil

being the only country that spends more than 1% of GDP on R&D (Figure 6.11). OECD Reviews of Innovation Policy for several countries in the LAC region, including Chile (2007), Colombia (2014), Costa Rica (2017), Mexico (2009 and 2013) and Peru (2011) show that much more can be done in the region to strengthen innovation performance.[4]

Figure 6.11. Expenditure on Research and Development, as a % of GDP, 2017*



Note: (*) Or latest available year.
Source: OECD, Main Science and Technology Indicators, and UNESCO Institute of Statistics.

- *Enabling SMEs to harness digital transformation*. SMEs' adoption of digital technologies and uptake of productivity-enhancing practices is particularly important to ensuring that productivity growth is inclusive and that emerging entrepreneurial opportunities are seized. Comprehensive national digital strategies that take into account SMEs, policies that facilitate access to finance, knowledge network and skills, including management skills, and SME engagement with competency centres and/or technology extension services can be particularly helpful for SMEs. The increasing focus in the LAC region on a sound environment for start-ups is also important for enabling SMEs to benefit from the digital transformation.
- *Facilitating the necessary structural change in the economy*. Policies that facilitate structural change through the entry, growth and exit of firms are important to support the introduction of new, digital-intensive business models, and replace old and obsolete business models. Policies in many countries often implicitly or explicitly favour incumbents, and do not always enable the experimentation with new ideas, technologies and business models that underpins the success of innovative firms, be they large or small. Policies which (sometimes unwittingly) constrain the entry and growth of start-up firms can also slow down structural

[4] See http://www.oecd.org/innovation/inno/oecd-reviews-of-innovation-policy.htm for more details on these reviews and the recommendations they provided for LAC countries.

change. Moreover, policy should also avoid trapping resources in inefficient firms, e.g. through bankruptcy laws that do not excessively penalise failure.

- *Strengthening structural reform to support digital transformation*. In many sectors of the economy in LAC countries, successful digital transformation will require changes to existing institutions, regulations and markets, as new technologies enable the emergence of new business models and innovative firms, as well as new ways of delivering public and private services. To unlock the potential of digital transformation, further structural reforms will eventually be required in many sectors, as well as in the public sector itself.

- *Regulatory reform adapted to the digital era*. Regulatory changes may also be necessary to ensure appropriate protection of consumers in online transactions, in particular when these involve the disclosure of personal data. Consumers' take-up of new and innovative products, as well as e-commerce transactions, may be slowed down by a lack of adequate protection. Similarly regulation of data ownership and data portability will have to be such as to ensure that the accumulation of data from incumbents does not create barriers to entry for new-comers, thus slowing down innovation and reducing competition. Regulation may also require new approaches and more experimentation, e.g. the use of regulatory sandboxes (Box 6.3).

- *Ensuring effective competition*. Policy makers will also need to ensure that market competition is effective by providing competition authorities with rules and tools can address the new challenges posed by the digital economy, where these prove to be necessary, and that co-operation across national competition agencies is enhanced to address competition issues that are increasingly transnational in scope or involve global firms.

- *Investing in innovation to drive the productivity frontier*: Finally, firms and governments in LAC countries will also need to continue investing in innovation to further develop digital and other technologies that can move the global productivity frontier. This includes ensuring sufficient investment in basic research that is key to developing the seeds for future innovation and that has underpinned most of the technologies that drive the current digital transformation (OECD, 2015b; 2015d). Ensuring the impacts of such investment will also require efforts to foster diffusion across the economy, including by strengthening the exchange of knowledge between science and business.

Box 6.3. Enabling regulatory flexibility for new, digitally-enabled innovations

Digital transformation has unlocked new sources of potential and disrupted whole industries through the innovative use of data and technology. New business models, processes or methods can increase competition, unlock new potential or previously unexploited markets and provide new services, accessibility and convenience to consumers.

However, innovations that take advantage of digital technologies often challenge legacy regulatory frameworks, particularly in previously-public industries like financial services, transport, energy or health. Regulation in these industries is often significant to ensure basic minimum standards and ensure the ongoing provision of critical infrastructures or services.

Digital innovations frequently take place outside of existing frameworks, particularly where those regulations are technologically prescriptive or rest upon legacy demarcations in sectors or the roles of actors. Incumbent firms in disrupted industries also contend that new digital competitors benefit unfairly from the unequal enforcement or application of regulation.

New digital business models and products are often completely new-to-market, and could therefore pose unforeseen risks for consumers and the economy as a whole. However, there is a need to mediate the tension between accomplishing the legitimate goals of regulation without disincentivising innovation, and potentially missing out on the benefits of the digital transformation.

One policy response to this challenge is the emergence of 'regulatory sandboxes'. Regulatory sandboxes provide a limited regulatory waiver or flexibility, usually explicitly to facilitate experimentation and testing. The limits are usually in terms of geographic space, duration or sector, and are negotiated or enabled by regulatory authorities to facilitate market-testing, experimentation and innovation.

For example, in 2014 the British Financial Conduct Authority launched a programme called Project Innovate, which enabled innovative, digitally enabled financial start-ups to test innovative products and business models in the real market, with real consumers. It offers tools such as restricted authorisation, individual guidance, waivers and no enforcement action letters to selected financial start-ups, and enables pilot trials with safeguards for financial consumers. Cohorts of start-ups were accepted on application, upon demonstration of objective, benefits to consumers and the relevant limits to testing (for example, with respect to scale or time).

Participants of Project Innovate have reported benefits in terms of reduced time-to-market, potentially at lower cost. The increased regulatory certainty for innovative new business models also may increase their attractiveness to investors, while also removing some of the disadvantages and uncertainties associated with being a 'first-mover'.

Source: https://www.fca.org.uk/firms/regulatory-sandbox

6.3. Jobs and skills in the digital world

Digital transformation both creates and eliminates jobs

149. Advances in AI, ICTs and robotics have the potential to profoundly change the world of work. Many people now regularly use digital tools like touchscreens, computers or smartphones at work and many see their jobs change as a growing share of the tasks they undertake can be automated and production processes get redesigned and embedded in ICT infrastructures. Digital technologies have also facilitated the rise of the "platform economy", in which workers perform "gigs" (i.e. short-term engagements), either in the

real world (such as delivering food or providing rides) or entirely online (such as photo tagging, transcription, product categorisation, etc. – also sometimes referred to as "crowd work").

150. On the whole, it is difficult to predict how digital transformation will affect the total number of jobs in LAC countries: while some jobs might disappear as a result of automation, new ones will be created, too. What is clear is that the risks of automation are not distributed equally among workers (Nedelkoska and Quintini, 2018). Automation is found to mainly affect jobs in the manufacturing industry and agriculture, although a number of service sectors, such as postal and courier services, land transport and food services are also found to be highly automatable. The occupations with the highest estimated automatability typically only require basic to low level of education. At the other end of the spectrum, the least automatable occupations almost all require professional training and/or tertiary education.

151. More challenging that the possible job losses is that digital transformation will lead to a restructuring of the labour market and changing skills needs which, if not well-managed, could result in growing skills mismatch, structural unemployment and rising inequalities. As the kinds of jobs that are emerging are not necessarily the same as the ones that are disappearing, some groups of workers can be left behind. Moreover, although digital technologies will help automate some strenuous work, improve work safety and free workers to engage in more interesting and creative work, it may deteriorate the quality of other jobs in some cases – e.g. through a rise in digitally-enabled precarious work.

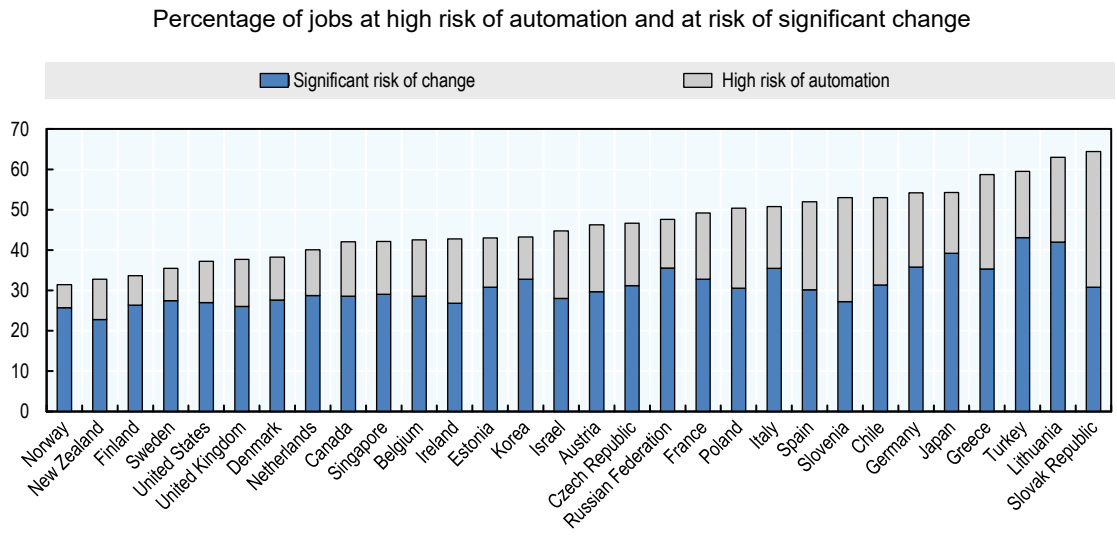
152. Making sure that digital transformation leads to more and better jobs will depend on the kind of policies that accompany it, including in the areas of labour markets, social protection, and education and skills. As the impacts may be concentrated in some industries and regions, sectoral and regional policies will be important too.

153. Available estimates of the number of jobs potentially at risk of automation vary considerably. While bounded by uncertainty, the latest OECD estimates place the percentage of jobs at a high risk of automation in the next 15-20 years at 14%, on average in those countries that participated in the Survey of Adult Skills (Figure 6.12; Nedelkoska and Quintini, 2018). Another 31% of jobs are estimated to be at risk of significant change as a result of automation, implying that half of all jobs will experience significant change. In Chile, the only LAC country to be covered by the OECD estimates, about 30% of jobs are considered at risk of significant change, and some 20% of jobs are estimated to be at a high risk of automation. In general, it is likely that more jobs may be at risk in the LAC region than in the OECD, given the economic structure of LAC economies, with more routine tasks, and the relatively low levels of skills. Available estimates (Figure 6.13) put LAC countries in the middle when considering the activities that are at high risk of automation.

154. However, there are several reasons why the risk of automation may not necessarily translate into net job losses overall. These include the fact that technology development and adoption depend on a host of economic, legal, ethical and social factors, as well as on the availability of the requisite skills and organisational changes. Consequently, there is a large gap between what can be automated from a technical point of view, and what is currently being automated by firms (see also section 6.2 above). In addition, while destroying some jobs or changing the task content of others, technological change also creates new jobs. It does so both directly, through the emergence of entirely new occupations, and indirectly, as a result of rising productivity and prosperity. While the

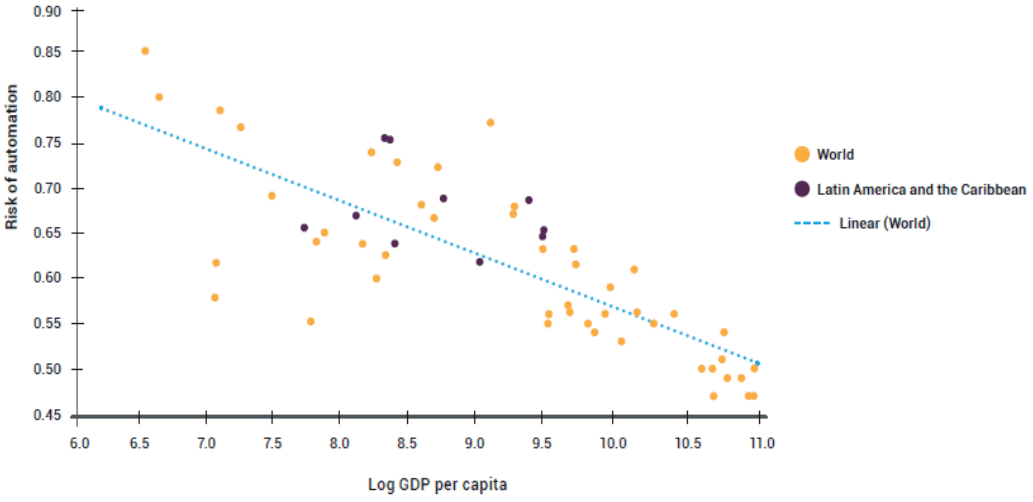
future is uncertain, there is no evidence that, to date, technological change has been associated with net job losses overall (OECD, 2017i).

Figure 6.12. A significant share of jobs could be affected by automation



Source: Nedelkoska and Quintini, 2018.

Figure 6.13. Activities at high risk of automation (in %)



Source: AfDB/ADB/EBRD/IDB (2018), The future of work. Regional perspectives.

155. While it remains difficult to assess the impact of digital transformation on overall employment levels, there is mounting evidence that it results in considerable restructuring of the labour market, thereby affecting the distribution of jobs, wages and income. High-skilled workers have tended to benefit relatively more from technological change as they have skills that complement technology in undertaking non-routine tasks, such as problem-solving, or creative and complex communications activities. Over the past two decades, many countries have therefore experienced a process of labour market polarisation

whereby the share of employment in high-skilled (and to some extent in low-skilled jobs) has increased, while the share of employment in middle-skilled jobs has decreased.

156. Looking forward, however, low-skilled workers are most likely to bear the costs of digital transformation. They look most likely to lose their jobs, face increased competition for jobs from middle-skilled workers, are least likely to be able to adapt to new technologies and working practices, and are also least likely to benefit from the new opportunities that arise as a result of digital transformation. This is already putting downward pressure on their wages (Acemoglu and Restrepo, 2017; Dauth et al., 2017; Graetz and Michaels, 2017).

157. Digital transformation may also exacerbate inequalities between regions, as new jobs appear in places other than where they have been lost. Evidence from the United States shows that new industries have mainly appeared in urban locations that have a large share of high-skilled workers (Berger and Frey, 2015). Similarly, regions vary in their exposure to digital transformation and those most exposed to the adoption of robots have seen negative effects on employment and wages (Acemoglu and Restrepo, 2017).

Supporting skills development[5]

158. For jobs and skills in Latin America, the digital transformation raises the importance of skills development even further (OECD/CAF/ECLAC, 2016). Skills levels are poor in the region, due to the low quality of primary and secondary education and structural barriers. Young Latin Americans perform poorly in reading, mathematics and science compared to their counterparts in OECD countries. Between 23 and 70% of young Latin Americans enrolled in school do not acquire basic-level proficiency in reading, mathematics and science, according to PISA results (OECD, 2018b).

159. As noted in Chapter 2, less than 3.6% of LAC students perform among the highest levels of proficiency in either mathematics, reading or science. In contrast, 15% of students in OECD countries perform in the top in at least one of these subjects (OECD, 2018b). This constitutes an obstacle to further develop more specific skills and may hamper innovation. While the latest PISA results show a moderate improvement over time in students' learning outcomes (Figure 6.14), results remain poor compared to many other regions in the world.

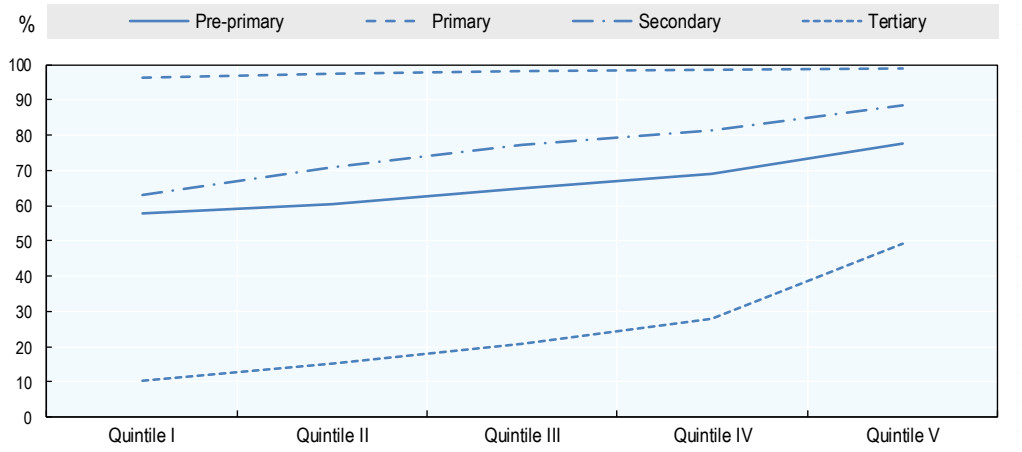
160. More than two-thirds of LAC youth are low-skilled without college, university or high level technical school education, representing a challenge for structural transformation of LAC countries that are transitioning into knowledge-based economies where citizens need to innovate, adapt and leverage advanced human capital. Many young Latin Americans leave school too early, as shown by the region's high drop-out and low completion rates for school. As a result, 43 million young Latin Americans aged 15 to 29, or 31% of the youth population, have not completed secondary education and are not enrolled in school. Even those who graduate suffer from poor quality education and transition into adult life with skills far down the ranks in comparative international evaluations such as PISA (OECD, 2015e; OECD/CAF/ECLAC, 2014).

161. Quality higher education provides young individuals with tools to better integrate into the productive, political and social life of their countries. A more skilled workforce is crucial for LAC countries to enjoy strong and sustainable economic growth and social

5 This section draws extensively on OECD/IDB (2016b) and OECD/CAF/ECLAC (2016).

development. In the context of digital transformation, this will require equipping people, especially youth, with the right mix of skills to successfully navigate through ever-changing, technology-rich work environments. This mix includes general cognitive skills, complementarity skills such as problem solving, creative thinking, communication collaboration, emotional intelligence, ICT and generic skills and technical skills, and a strong ability to continue learning.

Figure 6.14. Education enrolment by levels of education and income quintiles in Latin America and the Caribbean



Note: LAC average includes Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru and Uruguay .
Source: OECD calculations based on CEDLAS and the World Bank (2016).

162. Educational attainment often determines labour market participation, employment, job quality prospects and earnings. As in OECD countries, education increases the chances of being employed in Latin American countries. Moreover, more highly educated youth are more likely to be employed formally, and education plays a much larger role in determining earnings in LAC countries than in OECD countries. Differences in earning are both a reflection of and a source of high unequal distribution of income in LAC countries. However, they are also a consequence of a low supply of highly educated workers, particularly with tertiary education, and demonstrate that broader investment in education is highly desirable.

163. Access to higher education has expanded in LAC during the last decade, but remains below OECD levels. Between 2004 and 2014, enrolment in higher education increased from 29% to 44% of the population aged 15 to 64. However, completion of tertiary education still remains a major problem in LAC, and the potential for higher education remains unrealised. While 41% of the population aged 15-64 began tertiary education, on average, only 14% completed this cycle across LAC countries. This percentage is particularly low compared to OECD countries, where 39% of young people graduate from higher education.

164. The quality of education and training systems (starting from early childhood education) needs to improve by taking a holistic approach to skills. Relevant bodies need to adapt the catalogue of recognised occupations requiring formal training and need to adapt the curricula thereof. Policies also need to enhance equity in educational opportunities for inequality to be reduced.

165. Technical and vocational education (TVET) in LAC rarely train youth in mid- and high-level trade, technical, professional and management skills. Because of the low relevance of TVET in educating the general population in LAC countries, youth could benefit from its expansion. In OECD countries, 26% of the population in secondary education are enrolled in TVET programmes, over 10 percentage points higher than the LAC average. National vocational training institutes have expanded and developed better connections with private sector needs. They play an important role in providing basic technical skills to high school drop-outs and disadvantaged youth, but, with a few exceptions, programmes are limited in size.

166. Skills-enhancing programmes for youth that combine classroom teaching, workplace learning and job search services help young Latin Americans transition to employment. Training interventions for youth in the region, such as *Jóvenes con más y mejor trabajo* in Argentina, *ProJovem* in Brazil, *Plan Nacional de Lenguas* Digitales in Chile, *Jóvenes en Acción* in Colombia, *Puntos México Conectado* in Mexico and *ProJoven* in Peru, prove that comprehensive interventions have positive results on youth employability, earnings and especially job quality (ILO, 2016a). Public spending in training programmes in LAC ranges from 0.02% of GDP in Peru to more than 0.30% in Colombia and Costa Rica, compared to an OECD average of 0.14%. At secondary and tertiary levels, Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico and Peru are making significant advances in coverage, quality and adequacy of the programmes to meet the needs of the private sector.

167. Training programmes that respond to the needs of the marketplace, thanks to private sector participation in their design and implementation, facilitate youth's transition into quality jobs and better earnings. Impact evaluations of the early experiences of these programmes in LAC show that coordinating course content with the private sector as well as providing participants with a stipend, are central for programmes to work well. Although foundational skills are important, individuals should be trained to participate in knowledge-based and skills-based economies. General education and TVET should expand their links with the region's productive sector to underpin on-the-job-training systems, which should be a cornerstone of education and training across the life cycle. Upgrading human capital by boosting formal education, training programmes and "learning-by-doing" is paramount, and needs to be paired with organisational and productive structures changes to maximise the benefits of technology for productivity.

168. Improving Latin American youth's skills involves strengthening the coverage and quality of the education system and promoting lifelong comprehensive skills-enhancing policies. Broader reforms of the education system are expected to increase access to, and quality and pertinence of, primary, secondary and tertiary education. As they do, alternative human capital policies such as the existing training and productive inclusion programmes should support the current generation of low-skilled youth and provide all future adults with training options.

169. Enforcement of clear quality standards for education, investment and better training for teachers, and improvement of mechanisms to identify students who are low performers and those who are struggling academically, economically and socially would help close learning gaps and avoid early exit. Moreover, countries need to expand access to high-quality education and also improve coherence and links between secondary and tertiary education to facilitate the transition from school to higher education.

170. Quality vocational and technical education is crucial to develop a highly skilled labour force. Academic education curricula and skills-enhancing programmes should combine classroom teaching with practical training for productive inclusion and foundational skills. Vocational and technical education should be strengthened by investing in better and more modern infrastructure, teacher training and mechanisms to identify labour market needs. Both traditional and TVET education should be more responsive to the needs of the marketplace and provide channels for the business sector to participate in the curriculum content. An example of such a policy is Portugal's National Initiative on Digital Competencies (Box 6.4).

171. LAC countries also need more efficient ways to collect information on the skills individuals have and those skills businesses need to design national skills-enhancing strategies. This information helps countries identify skills shortages and gaps but also to plan for future skills needs to become more productive and competitive. It is essential to encourage public-private work that allows identifying future areas of knowledge and skills that will be needed in the long term, to be promoted today.

Box 6.4. The Portuguese National Initiative on Digital Competences 2030

Improving the general level of ICT-specific and complimentary skills is necessary to improve the effective use of digital technologies, increase productivity and competitiveness and thereby maximise the benefits of digital transformation across OECD economies.

One approach to this policy challenge is the Portuguese National Initiative on Digital Competences 2030 (INCoDe.2030). This programme aims to broaden digital literacy, promote employability and professional training in digital technologies and to raise the national participation in the R&D international network, namely in the production of knowledge in all the areas associated with digital transformation.

INCoDe.2030 aims to make use of the existing Portuguese training infrastructure to improve the overall level of competence for ICT, particularly in terms of human capital and Internet usage level. However, the programme takes a broad view of competences, including not only digital literacy but also information processing, communication and digital content production skills. Similarly, improving competences for the digital age encompasses the use of digital technologies and the ability to handle and manipulate data. Increasing the understanding of advanced communication networks and mobile systems, network hardware and software and cyber-physical systems like robotics are also considered.

INCoDe.2030 includes a range of interventions alongside the promotion of digital competences. It enables citizens to benchmark their level of digital skill on a dynamic framework based on the European initiative DigComp2.0, which can then be used to identify knowledge gaps. Specific programmes have also been targeted towards disenfranchised groups, who are able to use a freely accessible online training platform. Further elements of the programme include lifelong learning and active labour market programmes for disenfranchised workers to help workers adapt to a dynamic labour market.

Source: OECD 2018a.

172. After initial education, all workers need to be given opportunities and incentives to maintain their skills, upskill and/or reskill throughout their working lives – whether through formal or informal learning. Many of them will need to be given specific guidance how to realise life-long learning. Large numbers of workers lack the basic skills required to thrive in or simply cope with technologically-rich work environments and low-skilled workers are less likely to participate in training than high-skilled ones.

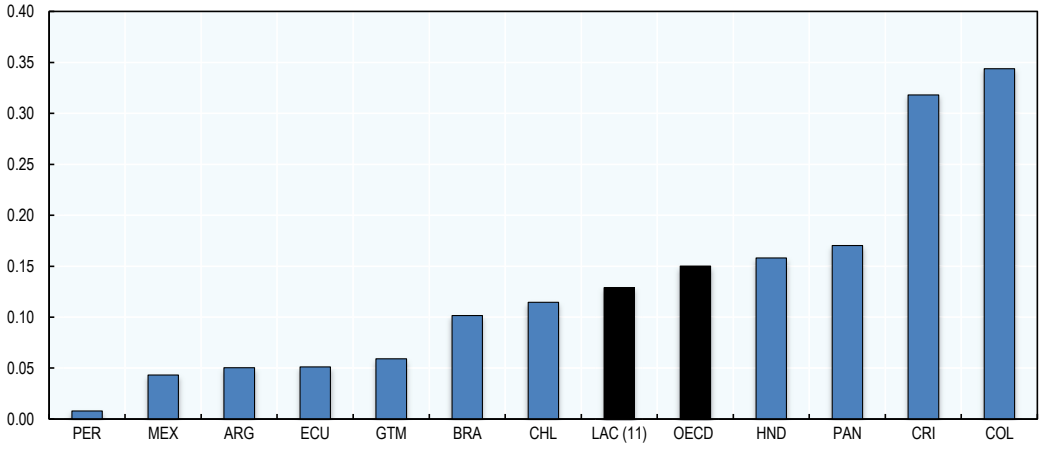
173. Addressing the barriers to adult learning, especially for low-skilled individuals, requires working on various fronts such as increasing incentives for investments in training (e.g. personal training accounts, or lifelong training rights), developing mechanisms to allow the portability of training rights between employers so built up rights are not lost when workers change jobs, fostering motivation and removing time and other constraints.

174. Training programmes are the most used active labour market policy (ALMP) in LAC and youth employment intervention worldwide (Betcherman et al., 2007). In the early 2000s, LAC countries, except for Colombia, spent less than 0.1% of gross domestic product (GDP) on all training programmes (Cerutti et al., 2014). In the 2010s, spending in Brazil, Chile, Costa Rica, Honduras and Panama surpassed that mark. Moreover, four LAC countries currently spend a larger share of their GDP on training programmes than the average of OECD countries (Figure 6.15).

175. Almost all LAC countries offer training and first employment programmes for youth. Traditionally, training programmes in LAC offered either classroom preparation or on-the-job placement, similar to OECD countries. However, in past decades, to address the growing problem of youth's lack of skills and unemployment, especially among the poor and vulnerable, LAC combined classroom training with practical experience in the formal labour market and other interventions to boost employability and access to quality jobs (Fares and Puerto, 2009).

Figure 6.15. Public spending on training programmes, LAC

As a percentage of GDP



Note: Year 2014 for Argentina, Brazil, OECD and Panama, 2013 for Costa Rica, Guatemala, Nicaragua and Peru, 2012 for Dominican Rep, Honduras and Mexico, 2011 for Chile
Source: World Bank (2015), LAC Social Protection (database); OECD.Stat (2015), http://stats.oecd.org.

176. Policies to encourage employers to invest in training are also required, as the scale of the challenge goes beyond the capabilities of government alone. To facilitate this, governments can provide incentives for the private sector to invest in the development of transferable skills, build work-based learning into educational programmes, and create an environment where people have greater discretion over learning activities.

Non-standard work and informality

177. Technological advances and the introduction of new business models are also leading to the emergence of new forms of work such as "crowd work", "gig work", and other forms of on-demand labour which, despite currently representing only a small share of employment, appear to be growing fast. Non-standard forms of work which already represent one-third of jobs, coupled with the new business models enabled by digital transformation, can offer an important source of income and flexibility for workers, including on working time, while at the same time contributing to enhanced innovation and productivity. They may also facilitate the labour market integration of under-represented groups (and therefore promote inclusiveness) by e.g. helping individuals overcome barriers to participation.

178. However, labour market outcomes vary greatly across non-standard workers, in particular in terms of pay, job security and social protection. In addition, workers may not be covered by collective bargaining arrangements and/or some labour regulations, and may receive less training and suffer more job strain. Given that certain population groups are over-represented in non-standard forms of work (typically women, youth, the least-skilled, workers with disabilities, and workers in small firms as well as migrants), on-demand labour risks being a source of inequality in access to good jobs (with some groups confined to less attractive types of work), thus resulting in increased labour market segmentation.

179. In the LAC region, the growth of the gig economy occurs in a context of very high levels of informality, i.e. income and employment outside the scope of tax and labour regulations. Informality is associated with lower levels of skills, productivity and income and on average, 55% of the workers in Latin America were informal, measured as contributing to social insurance (OECD/CIAT/IDB (2016). Despite the gains in formality in the past decade, the bulk of employment in Latin America remains informal. Informality rates also vary significantly across countries, by income and by occupational activity within countries, affecting the poor and low-middle income workers the most. On average, 85% of the population in the lowest earning quintile are informal. With respect to occupational category, the largest proportion of informality is among self-employed (88.3%) who represent 27.9% of the workforce. Informality is also important amid employed wage-earners (60.8 % of the labour force),accounting for 46.5 % of this group.

180. Adequate social protection is crucial to help workers transit smoothly between jobs, especially when they have been displaced. In a context where many countries already struggle to provide adequate social protection for workers on non-standard work contracts (e.g. temporary contracts, self-employed, on-call labour), the advent of the platform economy adds to these difficulties. An increasing number of people only work occasionally and/or have multiple jobs and income sources, with frequent transitions between dependent employment, self-employment and work-free periods. Many people do not even have all of the formal permits allowing them to formally work as and such be protected under existing rules. All this is adding to the challenges faced by existing social security systems, which are still largely predicated on the assumption of a full-time, regular, open-ended contract with a single employer. As a result of these challenges, more workers risk falling through the cracks – although the scale of the problem that lies ahead is difficult to predict at this stage.

181. Moving forward, formal and quality job creation should be at the centre of the agenda for inclusive growth. To this end, governments should improve the quality of the public services they deliver. Improving opportunities of formal employment so that

workers and companies can fully enjoy not only the benefits of social insurance, but also the capacity for personal growth and added value that comes from formal economies is critical in LAC. Evidence in countries such as Mexico and Peru suggest that there is no "silver bullet" to combat informality, yet a package of policies promoting formalisation, including labour skills, encouraging investment in productive areas, enhancing the tax system and the labour regulation, and deterring corruption can help (Dougherty and Escobar, 2016; OECD/IDB, 2016b). Digital tools may contribute to this agenda, e.g. in helping reduce tax evasion, addressing corruption, improving social policies, or reducing bureaucracy and red tape (see also Section 6.7).

182. Focusing on taxation and social insurance, an appraisal on lower thresholds of social security programmes, progressive social security cuts, and matching contributions pension schemes that increase the returns from becoming formal are good avenues to achieve this end (Bosch et al., 2013). Promoting productive job stability to lay the foundation for longer lasting and productive employment relationships is key to ensure growth in long-term and to consolidate a stronger and more vibrant middle class.

183. Technological progress will also have an impact on the organisation of work and the nature of working arrangements in the LAC region, so *labour institutions and regulations* should also evolve (ILO, 2016b). Labour market institutions should be designed so that they encourage employers to seize the opportunities offered by technological change and to prevent a disproportionate impact on workers of low pay or precarious conditions. This includes rethinking social security systems, strengthening activation frameworks, and promoting new forms of social dialogue (OECD, 2017j; OECD, 2017k). Non-standard employment includes temporary and part-time work, multi-party employment relationships, disguised employment relationships and dependent self-employment. This diversification challenges the concept of "decent work", given that many labour laws and social security policies depend largely on standard employment relationships.

184. Labour market institutions also need to adapt, including measures to address employment misclassification, ensure equal treatment for workers and implement minimum hours and other safeguards. Institutions must also be able to assign obligations and liabilities in multi-party arrangements, restrict the use of non-standard employment, and promote collective responses and agreements. Women's labour market integration can improve with the proliferation of non-standard employment, as this seems to facilitate a balance between work and family tasks (OECD/CAF/ECLAC, 2016). However, particular attention must be paid to avoid the perpetuation of vulnerable working conditions. Social protection systems should be strengthened, ensuring non-discrimination and equal treatment among different contractual arrangements. Such systems should also adapt schemes to extend coverage to previously excluded categories of workers and complement social insurance with non-contributory mechanisms to provide a social protection floor.

185. Finally, the implementation of a people-centred "adaptation agenda" that relies heavily on skills development, life-long learning and social protection will require resources in an era when public budgets are under tremendous pressure. Governments will need to realign spending to support these new initiatives and improve the efficiency of government services and the effectiveness of the initiatives put in place. The adoption of new digital tools could help improve public sector efficiency and help deliver better services. New forms of public-private partnerships can also help to deliver the adaptation agenda for the digital age.

6.4. Digital transformation for a more inclusive society

186. Like any technology that has been developed in history, digital transformation presents opportunities and challenges, benefits and risks. But the high speed of change due to digital transformation, and its scale and scope imply that virtually every aspect of people's lives is being affected by digital transformation. While the technology by itself can be neutral, what affects the outcome is how it is used, which is what policy can affect. Policy needs to help shape the transformation to ensure that the benefits and opportunities emerge and are accessed equally, in support of inclusive growth.

187. Certain benefits of the digital revolution are accruing to those towards the bottom of the income distribution and excluded or marginalised. For example, digital tools have made possible services like mobile payments that allow disadvantaged populations to be banked and gain access to government services, reducing disparities. And the Internet can be a powerful democratising device, making an essentially limitless amount of information available to virtually everyone, wherever they are.

188. At the same time, however, the digital revolution can be the source of new divides or exacerbate existing ones. Notably, as the connectivity gap diminishes across the globe, new gaps are emerging based on the ability of businesses and individuals to actively exploit the new functionalities of digital tools.

189. One area where the digital transformation can support inclusive growth is in empowering women in developing countries, that is if the digital gender divide can be narrowed. For women, digital technologies could make a significant contribution to engagement in the formal labour market and seizing the full benefits of their efforts. In a study by the Groupe Speciale Mobile Association (GSMA), for instance 64% of working women across 11 low- and middle-income countries said that they have (or would have) greater access to business and employment opportunities because of mobile phone technologies. A survey of Kenyan women found that almost all had a M-pesa mobile banking account[6] and over three-quarters of them transacted at least twice a week, with 95% saying they sent money to their relatives and (for the 37% owning a business) 96% saying M-pesa helped them scale their venture. At a more basic level, the "Better than Cash Alliance" initiative to spur digital payments is helping to boost transparency, security and financial inclusion for women. A case study of Bangladesh's garment production sector (whose worker population is 80% female) found that digital payments reduced the risk of loss or theft of wages for workers, and enhanced the ability to save.

190. A recent OECD study for Argentina's G20 presidency emphasised the importance of policies to bridge the digital gender divide. It found that while many economies have put in place a number of important actions aimed at narrowing the gender gap, more needs to be done in light of the many worrying signs of a widening digital gender divide at the global level and the compounded effect that its different components may have in the future. Hurdles to access, affordability, lack of education as well as inherent biases and socio-cultural norms curtail women and girls' ability to benefit from the opportunities offered by the digital transformation. In addition, girls' relatively lower educational enrolment in those disciplines that would allow them to perform well in a digital world (e.g. science, technology, engineering and mathematics [STEM] and information and

[6] **M-Pesa** (M for mobile, pesa is Swahili for money) is a mobile phone-based money transfer, financing and microfinancing service, launched in 2007 by Vodafone for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania.

communication technologies [ICTs]), coupled with women's and girls' limited use of digital tools and relatively scarcer presence or activity on platforms – e.g. for business purposes – suggest a potential scenario of widening gaps and greater inequality, especially in disadvantaged areas. If one adds to this the fact that women receive comparatively less financing for their innovative endeavours and are often confronted with "glass ceilings" curbing their professional ambitions (especially so in tech industries), the picture that emerges is far from positive and points to a vicious circle that could lead to a widening of digital gender divides.

191. Policy, especially in the form of co-ordinated and complementary actions, may reverse these trends and trigger a more inclusive path, based on narrowing digital and gender gaps. Addressing the digital gender divide requires raising awareness and tackling gender stereotypes, while at the same time enabling enhanced, safer and more affordable access to digital tools and fostering strong co-operation across stakeholders to remove barriers to girls and women's full participation in the digital world. Digital technologies may provide new opportunities for making progress, underscoring the importance of broadening access. But "tech fixes" can do little to address the underlying structural problems driving the digital gender divide and gender biases. While the report discussed some of the ways in which women can be empowered, gaps narrowed and hurdles leapfrogged, narrowing the (digital) gender divide is not about "fixing women", or perpetuating existing roles with the aid of technology. Rather, the focus needs to be on putting in place concrete policy actions fostering women's and girls' full participation and inclusion in the digital economy, while at the same time addressing ingrained stereotypes and social norms that lead to discrimination and even violence against women.

192. More generally, there is some urgency to ensure that an inclusive foundation for the digital era is set as the world embarks on another stage of transformation that involves the deployment of interconnected things and people with networked devices generating constant and ever-growing flows of data. Such big data can be analysed using powerful new tools, which in turn can feed machine learning and enable further progress in artificial intelligence. This innovation will redefine competitiveness across a wide cross-section of industries and businesses, and it is incumbent upon policy to use this shift to reduce differences and address long standing policy challenges, rather than to accentuate existing gaps and problems.

193. In general, policy should therefore aim at reducing risks while enhancing opportunities. However, designing appropriate policies becomes increasingly complicated as the digital transformation of economies and societies involves a radical change in how people live, work and interact. Growing pressures to compete with machines in the workplace; the use of algorithms and digital platforms enabling patient-managed healthcare and more efficient service delivery, but also related ethical risks and privacy concerns; the impacts of automation on adolescents' development and human relations, are just some examples of how the new digital context affects the drivers of individuals' well-being.

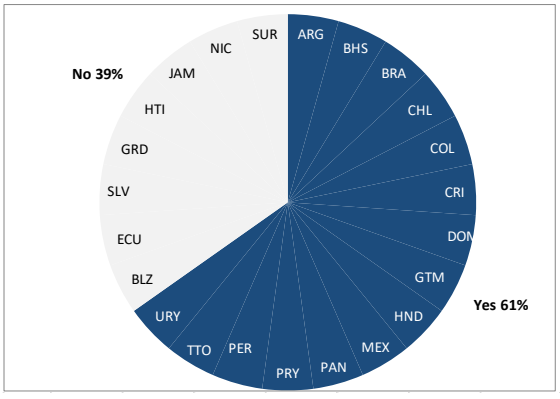
194. These issues are in many cases still uncharted territory for policy-makers. Better mapping and understanding these changes in society will be important to develop appropriate policy responses. Moreover, digital transformation itself opens the ground for new ways of conducting and designing policies through more user-driven approaches as discussed below.

195. Given the horizontal nature of public sector digital transformation, efforts to move towards digital government affect all aspects of service delivery and policy making, and as a result have direct implications for inclusive growth. Digital government strategies are powerful tools to secure a coherent evolution towards a use of technology across the whole public sector that fosters a citizen-driven approach. Placing people at the core of the design and delivery of policies and services, enabling new mechanisms for engagement and collaboration in policy making and service delivery, and making access and use of digital services more relevant and simple, is an imperative for the public sectors to fully seize the opportunities offered by digital transformation to impact people's well-being and support inclusive growth.

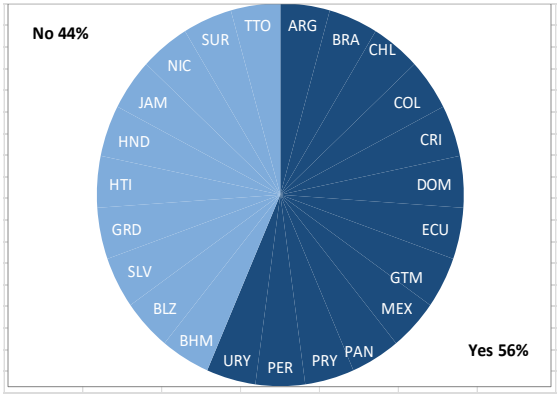
196. In the LAC region, 73% of countries, including Brazil, Mexico, Argentina and Colombia, had developed a digital strategy by 2015 (OECD, 2017l). For those countries that reported not having a strategy in place, many have advanced preliminary steps in establishing it. A smaller share of LAC countries, reaching 60%, reported using performance indicators to monitor progress in e-government. At the same time, 61% of LAC countries had established online portals by 2015 (Figure 6.16) that allow for a single point of access to government services, thereby facilitating the interaction of citizens with the public sector and the provision of a unified image of the public sector to the society. Slightly more than half of LAC countries already had legally recognised digital identification mechanisms in 2015 (Figure 6.16).

Figure 6.16. National online portals and digital recognition mechanisms

Existence of a main national citizens portal for government services (2015)



Existence of a legally recognised digital identification (e.g. digital signature) mechanism (2015)



Source: OECD 2015 survey on digital government performance.

197. Digital technologies can also contribute to increased engagement in societal and political communities and foster open government and transparency which can increase accountability and public sector integrity. However, accountability may also reduce trust as collateral damage in the short term. New technologies also have an impact on issues such as political campaigning, hate speech and fake news, which potentially affect social cohesion and trust.

198. Governments can address these issues through Digital Government strategies that can sustain more open and collaborative approaches, able to foster the positive effects of

digital transformation (Ubaldi, 2013). This may also help address some potential negative implications for governments, e.g. the risk of further marginalisation due to more entrenched political views, or the increased opportunities to circumvent policies and regulations in a platform-based economy, possibly affecting public safety and the provision of equal opportunities.

6.5. Enhancing trust: security, privacy and consumer protection

199. Trust in the digital environment can be undermined in many ways, including through identity theft and personal identification in electronic transactions. Once lost, trust can be hard to regain. As a result, trust is fundamental to digital transformation; without it, individuals, firms and governments won't fully use digital technologies, and an important source of potential growth and social progress will be left unexploited.

200. Comprehensive and coherent national strategies for digital security and privacy, developed in consultation with all relevant stakeholders, can help address issues such as protection of personal data, protection of trade secrets, resilience of essential services (e.g. water, energy, finance, public health and safety, see Box 5.5), the creation of incentives (e.g. cyber insurance, public procurement), support to SMEs, and related skills development. At the same time, it is important to continue promoting effective protection to consumers engaged in e-commerce and other online activities, and to foster the use of electronic identity, authentication and e-signatures, to promote trust.

Box 6.5. Digital security and resilience in essential sectors

One important issue inherent to digital transformation is the need for resilience and better security to mitigate possible disruption of economic and social activities by digital security incidents. Traditionally understood as breaches of availability, integrity and confidentiality of ICTs and data, digital security incidents are increasingly frequent and sophisticated. They can take advantage of the global nature of the Internet to rapidly propagate across jurisdictional, organisational and sectoral boundaries, as demonstrated by the recent Wannacry, NotPetya, and Dyn attacks.

Digital security incidents can disrupt the activities of all businesses, both SMEs and larger firms, governments and individuals and generate financial and reputational harm. For example, NotPetya caused a temporary production shutdown at several global companies such as Merck which had to borrow doses of its vaccines from the US Center for Disease Control and Prevention stockpile to fulfil customer orders, reducing the company's third-quarter sales by USD 240 million. Incidents can also cause physical damage, as demonstrated by electricity service outages in Ukraine affecting approximatively 225 000 customers in 2015. Such incidents could evolve into large-scale crises affecting infrastructures critical to the functioning of the economy and society such as finance, energy, transport and essential government services. In addition to such catastrophic scenarios, digital security incidents can also have subtle but long-term negative effects by undermining trust in the digital environment, limiting innovation, slowing down the adoption of new technologies, as well as hampering digital transformation and its related benefits.

Most critical infrastructures and essential sectors have been relying on digital technologies for many years and therefore their operators have some experience in

managing digital security risk. However, the breadth of the changes brought by digital transformation raise new challenges for policy makers approaching these issues from a whole-of-government perspective and for regulators and policy makers in each sector as some operators increasingly engage into new areas for them such as data-driven innovation and the Internet of Things.

There are many differences across critical infrastructure and essential services with respect to digital security. The financial sector, for example, has been a major target of cybercrimes and has been working to address digital security risks for many years. This highly digital-dependent sector is internationalised with significant cross-border infrastructure to manage cross-border payment, inter-bank transfer and foreign exchange settlement systems. As a result, financial regulators have placed increasing attention on digital security risks at the institutions they oversee, and implemented a number of international co-ordination initiatives to share experience and ensure the integrity of the common systems on which they depend. At the same time, policymakers and regulators have an interest in ensuring an efficient and innovative financial system that meets the needs of its users. A key challenge is therefore to balance the need for high security standards to maintain the integrity of the financial systems while ensuring sufficient openness to new innovation. An interesting area is the payment capture and settlement systems where significant innovation driven by digital technologies – including blockchain – is taking place, making digital security a priority issue. Additionally, several innovations have arisen to make digital transactions more secure and to ensure trust in the online environment.

The energy sector – perhaps less digitally dependent as it manages primarily a physical resource – has been an early adopter of digital technologies, with power utilities using ICTs to facilitate grid management and operation already in the 1970s. But the growth of the IoT combined with the diversification and decentralisation of energy technologies will link millions of new small-scale “prosumers” and billions of potentially vulnerable devices into the electricity system (IEA, 2017). Digital technologies used in centralised energy systems are also changing, with a move from proprietary or vendor-specific solutions to newer, open-protocol industry standards, more automation and a shift to cloud computing. These newer systems might have a higher general level of security, but lose the protection provided by secrecy of proprietary product design ("security through obscurity") and by the need for potential attackers to acquire highly specialised energy system knowledge. The attack surface is thus changing and vastly expanding.
In the transport sector, which is an essential enabler for public services, freight transport and logistics, many experts are predicting a revolution in terms of how mobility is provided, resulting in particular from the emergence of ride-sharing platforms and vehicle automation, both enabled by big data analytics and progress in data science. Vehicle automation, particularly when combined with e-hailing and possibly also with urban freight delivery, is likely to be among the first use cases to be implemented (ITF, 2017). Digital security will be an important aspect of car-to-car/-infrastructure communication, including strong data security safeguards to prevent digital security attacks on critical transport infrastructure and to ensure acceptable resilience levels in response to incidents.

Many Governments' facilities and agencies are also a critical infrastructure and providers of essential services. In recent years, governments have faced a growing deluge of increasingly sophisticated and stealthy digital threats. They include attacks by cybercriminals who hold government data for ransom, by State-sponsored actors aiming

to steal State secrets and the personal information of civil servants, and by some political activists who protest by disrupting and defacing government websites. For governments, digital risk goes beyond digital security attacks. Public trust in governments per se is vulnerable to "hybrid" threats such as the use of online channels to spread disinformation campaigns that aim to influence political processes or erode social cohesion. Many governments are still not able to mitigate advanced digital security attacks or agile enough to develop timely counter narratives to hybrid threats.

One important challenge of digital transformation across the finance, energy, and transportation sectors is the increasing role taken by smaller actors such as SMEs which extends digital security risk to critical infrastructure and essential services beyond the realm of large central players such as banks or electricity companies. These include for example start-ups offering innovative payment systems, blockchain-based energy trading technologies, or mobility services in the area of transport. Besides start-ups, digital security risk management by well-established SMEs in essential services' value chains is also increasingly important to avoid that these companies become the weak point of larger firms in their value chain.

In a context of generalised digital transformation, governments are struggling to create the conditions for a higher level of digital security in all essential services and critical infrastructures. While many digital security risk and risk management practices are similar across sectors, some aspects are sector-specific, for example to take into account sophisticated technical equipment, particular market characteristics (e.g. value chain structure) and regulatory requirements (e.g. minimum service requirements), etc. However, a number of policy challenges cut across all sectors, including how to encourage good digital security risk management practices by all organisations including SMEs, how to take into account cross-border and cross-sector interdependencies, how to embed security in the design of IoT devices, and how to foster trust with and among private operators to enable information sharing on threats, vulnerabilities and incidents.

Source: OECD 2018a.

201. Public-private dialogue and co-operation will be important to enhance trust in the digital economy. Engaging governments, citizens and other key stakeholders in the digital security debate will be key to support confidence in the adoption of digital technologies. It is essential to foster cross-sector synergies and bring together government and business leaders to join forces in addressing digital security challenges.

202. The OECD-IDB Broadband toolkit (OECD, 2016a) noted that many LAC countries have developed policies that address some aspects of **digital security**. However, they often – with some exceptions - do not yet address this issue from a strategic perspective. Most importantly, they often do not approach digital security policy as a means of increasing economic and social prosperity, focusing instead on the technical and criminal aspects of the issue, or on national security. The policies in place often lack the appropriate level of co-ordination between the governmental and stakeholders. This undermines public policy efforts to encourage the use of ICTs, as a result of a limited understanding of the economic and social dimensions of cyber security.

203. In 2015, only six countries (Colombia, Mexico, Panama, Paraguay, Trinidad and Tobago and Uruguay) had a national digital security strategy. Unfortunately, the great majority of national digital strategies already adopted thus far lack a clear, overarching

long-term vision in relation to digital security risk and face a number of challenges, such as the creation and improvement of legal frameworks on digital security, the creation of operational security risk management capabilities, the clear distribution of responsibilities among government institutions; and international and multi-stakeholder co-operation. All indications are that the majority of LAC countries are not yet approaching digital security risk from the economic and social perspective as called for by the OECD.

204. The Broadband Toolkit also introduced a number of good practices to encourage digital security risk management policies and strategies, based on the 2015 OECD *Recommendation on Digital Security Risk Management for Economic and Social Prosperity* and its companion document (OECD, 2015f). In particular, policy makers should recognise that digital security risk is an economic and social issue rather than solely a technical challenge. They should also note that it is impossible to create a fully safe and secure digital environment where risk is entirely avoided. As a consequence, they should encourage an approach where leaders and decision makers take responsibility to manage the risk. That means to reduce it to an acceptable level, depending on the context and the economic and social objectives and benefits at stake. All measures in national cybersecurity strategies should reflect this approach, whether they relate to critical information infrastructure, international co-operation or CSIRTs.

205. The increased collection and processing of personal data for economic and social activities that rely on the digital environment raises a number of **privacy** challenges. These must be addressed both to protect fundamental values and individual liberties, and to ensure a digital environment that inspires confidence and in which individuals can fully participate. Privacy protection frameworks, also known as "data protection" frameworks, aim to create the conditions for public and private organisations to process personal data to pursue economic and social objectives while protecting privacy. In general, they set the requirements that organisations must respect when they collect, process and share personal data, as well as the rights granted to individuals. Although privacy protection frameworks are generally developed at the national level, flows of personal data often cross borders, raising the issue of the interoperability of these frameworks. In addressing this, policy makers face a double challenge: i) developing a framework that protects privacy while promoting economic development; and ii) ensuring a sufficient level of international interoperability to prevent the privacy protection framework from hindering blocking or inhibiting international trade.

206. The *OECD Guidelines Governing the Protection of Privacy and Transborder Flows of Personal Data* (hereinafter OECD Privacy Guidelines) aim to assist policy makers in the development of privacy frameworks (OECD, 2013). They were initially adopted in 1980 and revised in 2013. They define key concepts used in this area ("personal data", "data controller" and so on) and include principles that can be used as a basis for privacy protection frameworks worldwide. The OECD Privacy Guidelines are high-level policy recommendations that can be used as a basis to develop a privacy protection framework with the flexibility to accommodate regional and local variations. Meanwhile, they should facilitate international interoperability for transborder flows of personal data.

207. As noted in the *Broadband Toolkit*, none of the countries in the LAC region had a comprehensive national privacy strategy or programme at the time of its writing, although some, such as Uruguay, have implemented such a strategy since. This is not surprising considering that the concept of national privacy strategy is relatively new. However, the proportion of LAC countries with privacy and data protection legal frameworks in place is relatively high (around 40%), and the number is growing. Nine countries (Colombia, Costa

Rica, Chile, the Dominican Republic, Ecuador, Mexico, Nicaragua, Peru and Uruguay) already had privacy and data protection laws, including supervisory or regulatory authorities. Brazil, Chile, Jamaica and Paraguay were in the process of consultation and drafting new laws in this area (with Brazil passing a new data protection law recently). The great majority of countries in the LAC region, for example Brazil, Panama and El Salvador, have sectoral laws with scattered provisions on privacy and data protection, but no independent laws and regulations so far on data protection and national data protection authorities.

208. A third area that is important to ensure trust in the use of digital technologies concerns **consumer protection**. In recent years, there has been growing recognition that informed and empowered consumers can, through demand-side choices, stimulate firms to innovate, improve quality and compete in pricing. By making well-informed choices between suppliers, consumers not only benefit from competition, but drive and sustain it. As the use of communication services has increased and converged, more emphasis is being placed on reviewing the policies governing communications services' relations with consumers. New measures have been devised to provide better protection, more flexibility in the market for consumers, and better access to information. In this context, OECD countries developed a set of policy principles to ensure that consumer interests in communication services are adequately protected (OECD, 2008).

209. The introduction of e-commerce responds to a structural change in how commercial transactions take place over broadband networks, bringing them online and making them more efficient. Businesses benefit by enlarging the scope of the market and lowering operating barriers and costs. Consumers also benefit from information on goods and services, being able to locate sellers more easily, price comparisons, convenient delivery, and ease of purchase via a computer or mobile device. The key policy objectives for e-commerce can be grouped into three main areas: creating a framework for electronic settlements, identifying the barriers for e-commerce (growth of businesses engaging in e-commerce or barriers preventing users from adopting it) and developing initiatives promoting the adoption of e-commerce among business and users.

210. The *OECD Recommendation on Consumer Protection in E-Commerce* (OECD, 2016c) covers business-to-consumer e-commerce and addresses issues arising from the relationship between consumers and the online platforms that enable peer-to-peer transactions. The guidelines underscore that people buying online are entitled to the same level of protection as with conventional transactions. They call on governments to work with business and consumer groups to determine legal changes that could improve consumer trust in e-commerce. In particular, they suggest that consumer protection laws should cover online apps and services offered for free in exchange for gaining access to the user's personal data. They also indicate that businesses should take special care in marketing targeted at children or other vulnerable consumers. Provisions should also be made to ensure consumers understand the terms and conditions relating to the acquisition and use of digital content, and that consumers should also have access to easy-to-use mechanisms to resolve domestic and cross-border e-commerce disputes.

6.6. Fostering trade and market openness in the digital economy

211. Digital transformation does not occur in isolation; it is shaped by (and helps shape) the broader economy and society as a whole. Framework policies play an important role in ensuring that the right conditions exist for digital transformation to flourish. In

particular, openness to trade and investment can create new avenues for rapidly upgrading technologies and skills, and increasing specialisation.

212. Digital transformation has significantly reduced the cost of engaging in international trade; facilitated the co-ordination of global value chains; helped diffuse ideas and technologies across borders; and connected greater numbers of businesses and consumers globally, pushing out the digital trade frontier. A growing number of enterprises, across both manufacturing and services sectors, are engaging in cross-border electronic sales. But there are differences across countries, which underscores the importance of unlocking the potential of e-commerce - and digital trade more generally - in a range of countries.

213. Digital transformation has allowed trade to take place through digital means entirely (e.g. digitally delivered cloud-computing services), and enabled more traditional trade (e.g. goods and services trade via on-line platforms). But while it has never been easier to engage in trade, digital trade has also amplified the importance of some trade measures (e.g. trade facilitation for cross-border online purchases) and given rise to new issues with trade impacts (e.g. cross-border flows of data) (OECD, 2017m).

214. As digital transformation progresses, governments are facing new regulatory challenges, not just in managing issues arising from digital transformation, but also in ensuring that the opportunities and benefits from digital trade can be realised and shared inclusively. One particular question around which there has been a great deal of discussion is whether current trade rules adequately address new developments arising from trade in the digital age. Indeed, existing multilateral trade rules were negotiated when digital trade was in its infancy and, even if conceived to be technologically neutral, questions arise over whether they might require clarifications to reflect new forms of, and issues raised by, digital trade.

215. Trade rules are traditionally predicated on identifying whether products are goods or services and the borders they cross, but new business models and the global nature of the Internet blur these distinctions. Firms can flexibly service markets from different locations. Moreover, the products they now sell bundle goods with services (as is the case of a smart home speaker connected to a voice-controlled intelligent personal assistant). This makes it increasingly difficult to identify the particular trade rules that apply to specific transactions.

216. A better understanding of the factors that shape market access and openness in the digital era is needed. First, by looking at openness to trade in goods, services and digital connectivity in a more holistic way. Second, by identifying how different types of measures, whether new or old, raise new issues for digital trade.

Moving towards a more holistic approach to market openness

217. Market openness creates a business-friendly environment that allows "foreign suppliers to compete in national markets without encountering discriminatory, excessively burdensome or restrictive conditions" (OECD, 2010). It helps firms, domestic and foreign, reap the benefits of trade and contributes to economic growth (Romalis, 2007). However, the rise of new business models, while enabling greater trade, also makes ensuring market openness more complex.

218. Indeed, innovative business models – like matching services, logistical support and secure payment systems – are providing solutions that enable firms to sell their products

online, reducing some of the complexity of trade in the digital era. Others make local or offline activities part of their business model in order to profitably sell new types of products. Moreover, firms increasingly rely on digital technologies not just in the production stages and the delivery of goods and services, but also as a means of connecting different, and geographically dispersed, actors. Digital transformation allows firms to draw on data from users to better respond to consumer preferences, better target services and connect and customise production processes globally.

219. Yet these changes, coupled with the greater bundling of goods and services enabled by digital transformation, challenge traditional market openness distinctions between goods and services. Not only do these now have to be considered jointly, but a greater focus on openness to information transfers and digital connectivity is also needed.

220. Market openness in the 21st century therefore needs to be approached more holistically. For example, Internet access may be a necessary but it is not a sufficient condition for digitally enabled trade in goods to flourish. If logistics services in the receiving (or delivering) country are costly due to service trade restrictions increasing prices, or if goods are held up at the border by cumbersome procedures, then the benefits of digital transformation may not materialise. Platform-enabled trade transactions might be curtailed or might not take place at all.

221. Open trade and investment regimes can create new avenues to rapidly upgrade technologies and skills, and increase specialisation. Market openness is a critical framework condition to enable the digital transformation to flourish. The bundling of goods and services and the rise of new technology-driven products and markets raises issues related to the classification of new types of products and services, and highlights the need to ensure market access for both the good and the bundled or embedded service. Growing interconnectedness and a greater demand for just-in-time delivery also means that trade needs to be faster and more reliable more than ever, underscoring the need for more efficient trade facilitation. At the same time, data form an integral part of international production processes. Data are an asset that can be traded, a means to deliver services and co-ordinate global value chains and an enabler of trade facilitation.

222. In this interconnected world, the benefits of digital transformation for trade are contingent on a combination of factors. Within the firm, investment in information and communication technologies (ICT) such as big data is associated with higher productivity, but only for firms that adopt new organisational processes or have access to workers with adequate skills. Reaping these benefits also requires market openness. New technologies are often made available through international trade, and access to international markets for both inputs and outputs is necessary for scaling production and increasing competitiveness. Indeed, successful 'born global' firms combine both adoption of new technologies and access to global markets.

223. At the same time, a better understanding and mapping of how traditional issues in market openness, such as trade facilitation, may have new consequences in the context of digitally enabled trade; or how market openness in the digital era might be conditioned by new issues, such as having internationally interoperable e-payment systems, can give policy-makers a better overview of the factors that help countries maximise the benefits from digital trade.

Measures affecting digital trade

224. The nature of the measures that affect how modern firms engage in digital trade is varied, some relate to accessing and using digital networks or supporting digital services; others are old trade issues with new consequences; and some are new measures which raise new issues.

225. A cross-cutting issue affecting any firm seeking to engage in digital trade relates to access and the use of digital networks. Issues range from the quality of physical infrastructure to regulatory matters. While some issues are not the direct purview of trade policy, they affect the ability of firms to engage in digital trade. The physical infrastructure or the cables and wires that underpin the transfer of information between countries underpin digital connectivity. Access to this infrastructure, through market openness ensuring competitive telecommunications markets, conditions the cost of participation in digital trade. In this respect, restrictions on the cross border supply of telecommunication services is a trade-related horizontal measure affecting the ability of firms to engage in digital trade, irrespective of whether a firm is producing a good or a service.

226. Digital trade can also change or amplify the importance of "old" issues. For instance, trade in low value goods ordered on-line is still subject to traditional physical connectivity constraints. However, since trade costs can represent a sizeable share of the value of small consignments, how fast and at what cost a physical good can clear a border is especially important for this type of trade. At the same time, growing trade in digitally ordered parcels poses new challenges for customs authorities and other border agencies. These relate to growing workloads and the need to adapt clearance processes and risk management. These may, in turn, affect at-the-border costs, including for larger shipments. They may also relate to revenue issues related tariffs or collection of VAT.

227. Digital transformation also raises new issues such as those related to e-payments, or interoperability, but perhaps the most important, and controversial, relates to cross-border data flows. Data underpin digital transformation and impact the trade environment: as an integral part of production, an asset that can themselves be traded, a means to deliver services and co-ordinate global value chains, and an enabler of trade facilitation. But the growing volume of data exchanged across borders has amplified concerns about digital security, the protection of privacy, and audit and regulatory reach. As a result, governments are increasingly seeking to regulate the cross-border transfers of data, or requiring that data be stored locally.

228. The implications of these measures are not well understood and have led to a polarised debate. On the one hand, there are concerns about the impact that the emerging measures may have on business activity and on the ability to benefit from digital trade; on the other hand, there are concerns about ensuring legitimate public policy objectives, such as the protection of privacy. The challenge is to find the balance that enables these key objectives to be met while preserving the significant economic and trade benefits flowing from data-enabled trade. To support this dialogue it will be important to better understand the nature and composition of data flows that are highly heterogeneous, ranging from data associated with engineering to logistics to more sensitive financial and customer data. Each may require a different approach and policy framework.

Competition in the digital economy

229. Strengthening competition, including by opening access to markets, benefits consumers through lower prices and a greater variety of goods and services, and supports

trade and investment. Competitive markets also underpin digital transformation by spurring innovation, new business models, business dynamism and productivity, driving structural change across the economy. Digital transformation promotes greater competition in a large variety of product and service markets, both domestically and internationally. In the digital age, geographic market boundaries matter less because the Internet has facilitated the entry and growth of digitally based suppliers and retailers (e.g. Amazon, Rakuten, Alibaba) that do not need to have a physical presence in all markets in which they sell, which has helped increase competition and expand GVCs. In turn, digitally enabled business models have increased competitive pressure on offline incumbents.

230. Digital technologies enable new types of products and services to compete with existing ones (e.g. services that stream television content over the Internet versus cable and satellite TV providers, onlineonly publications versus traditional print media, etc). In some cases, these new products and services have greatly reduced prices (e.g. financial and brokerage services) and improved services (e.g. movie rentals). Occasionally, digital technologies and data have helped to make possible new products and services that disrupt well-established markets (e.g. film cameras replaced by digital cameras, digital cameras supplanted by smartphones, compact discs superseded by digital downloads and streaming).

231. But even as digital technologies and data lead to greater competition in many markets, they have also demonstrated a potential to tilt others towards greater concentration, market power and even dominance. For instance, in online platform markets, network effects and the possibility to achieve "scale without mass" can drive winner-take-all or winner-take-most outcomes. While network effects – the phenomenon that some products, such as the telephone, become more useful as the number of users increases – are widely understood, scale without mass refers to a feature of many digital markets that allows companies to add new users at virtually no cost (see section 3.4).

232. Mark-ups – the wedge between the price a firm charges for its output on the market and the cost the firm incurs to produce one extra unit of output – are one indication of the level of competition in a particular market. Mark-ups have been increasing on average across firms and countries, especially for firms at the top of the mark-up distribution and those in digital-intensive sectors. On average, firms in the most digital-intensive sectors enjoy a 55% higher mark-up than firms operating in less digitalintensive sectors all else equal (elaboration based on Calligaris, Criscuolo and Marcolin, 2018). This gap is persistent, even after controlling for productivity and firm patent stock.

233. Industry concentration – while imperfect – can serve as a proxy to help understand the degree of competition in a given sector or market, as well as changes in the structure of industries. Mergers and acquisitions are associated with increases in industry concentration. Over 2003-15, the number of global mergers and acquisitions doubled, with a strong increase in cross-border mergers and acquisitions of firms in digital-intensive sectors (Bajgar et al., forthcoming[22]). The number of cross-border acquisitions of digital-intensive firms grew by more than 40% over 2007-15, compared to 20% growth of acquisitions of less digital-intensive firms (Bajgar et al., forthcoming[22]). These developments may not necessarily be a source of concern, as they may be inherent to the nature of digital transformation, but they should be further examined and considered by policy makers.

234. As digital transformation continues to affect competition, it may lead to some new challenges for competition policy frameworks that were designed with traditional products

in mind. One such challenge is that digitalisation may introduce new dimensions of competition in markets, as well as new ways to achieve anticompetitive outcomes, such as the use of algorithms to collude. In addition, a range of issues will require competition authorities to enhance their advocacy efforts and deepen their co-operation with consumer protection, data protection and other regulators. These include the use of consumer data under the relevant data protection safeguards as a competitive asset when providing products at no cost, or when developing personalised prices.

235. Co-operation may be needed across borders to ensure that common standards are applied and that information is available to regulators. Bilateral and regional enforcement may also be useful, for example joint decision making between jurisdictions, although it is important that clear rules exist to indicate how enforcement actions are to be addressed if there are bodies with overlapping responsibilities.

Implications for LAC countries[7]

236. Trade is critical to boost inclusive growth and can play a powerful role in contributing to accessing technology, rising incomes and creating jobs. As discussed above, digital transformation offers new opportunities for trade. However, LAC has thus far been unable to reap all the gains trade can bring. The share of LAC in world merchandise exports has stagnated since 1970, averaging 5.2% since that year with minimal variations. Such stagnation contrasts with the performance of developing Asia, whose share of world merchandise exports was similar to LAC levels in 1970 but has grown steadily to 31% in 2015.

237. This is also because LAC's export structure is biased towards primary sectors with low levels of sophistication (such as agriculture, fisheries or mining) (OECD/CAF/ECLAC, 2019; Figure 6.17). This has created an export structure that presents barriers to entry and does not generate backward linkages in the economy. This, in turn, makes it difficult for micro, small and medium-sized enterprises (MSMEs), which are abundant in LAC, to connect to international markets. Hence, the region has poor insertion into GVCs (Figure 5.18). Poor participation of LAC in GVCs is associated with low levels of technology adoption and few incentives to invest in productive capacities. In all, competitiveness remains low, making it difficult to move towards a more sophisticated export structure and higher added-value segments of GVCs.

238. Since the beginning of the century, exports in the region have further concentrated on primary goods and on the basic manufacturing of natural resources. In 2016, on average for LAC (excluding Mexico), 50% of exports were commodities (up from 42% in 2000). Another 23% were natural-resource based manufactures, with less than 5% being manufactures with high technology and only around 15% manufactures with medium technology (Figure 6.17).

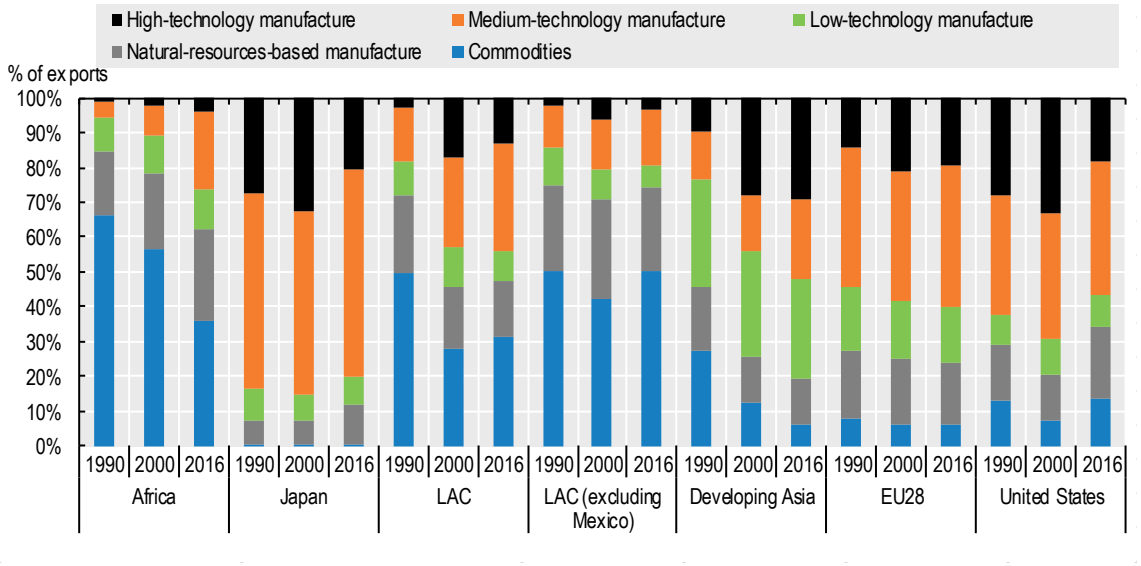
239. Latin America's integration into GVCs has also been weak (OECD/CAF/ECLAC, 2018). The regional dimension of value chain activity is apparent when examining backward and forward GVC participation by origin and destination of traded value added (Figure 6.18). In Latin America, only 11% of foreign value added used for exports on average was sourced from within the region in 2015 (Figure 6.18, Panel A) and only 6% was exported as intermediates for further processing in the region (Figure 6.18, Panel B).

[7] OECD/IDB (2016b) and OECD/CAF/ECLAC (2018) discuss trade in the LAC region in greater detail.

In the European Union and South East Asia – the two regions with some of the highest overall GVC participation rates globally – regional links were much stronger. For example, in the European Union on average 51% of foreign value added used for exports came from other EU countries and in South East Asia this ratio was 44% in 2015.

240. The region's share is higher in NAFTA's exports (10% in 2014, compared to around 6% in 1995). This is largely explained by Mexico's forward linkages with its North American partners (particularly the US). Globally, Brazil is the region's main contributor of foreign value added into world exports (one-third of the region's total in 2014), followed by Mexico (with nearly 30%). This level of concentration is similar to that of gross exports, which shows Brazil and Mexico as the region's largest exporters (OECD/CAF/ECLAC, 2018).

Figure 6.17. Export structure by technology level, world regions (1990-2016)

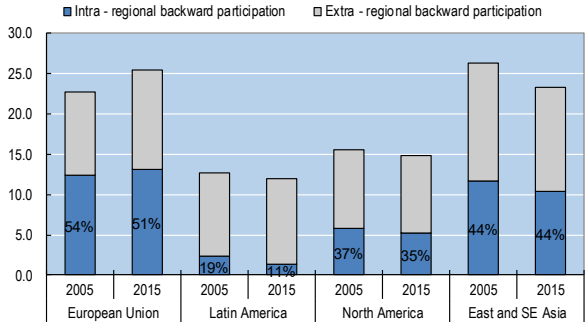


Source: OECD/CAF/ECLAC (2019), calculations based on CEPALSTAT database.

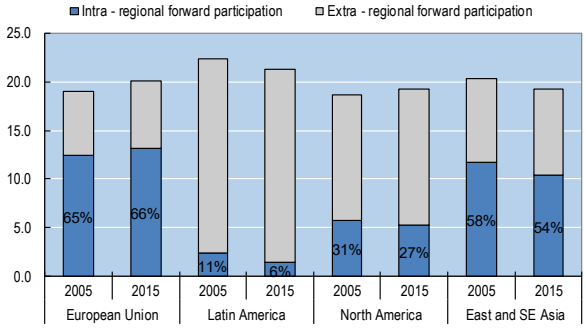
241. For decades, LAC has experienced too few changes in the structure of trade, while regional economic integration remains far from its potential. In the last 15 years, more than 70% of total exports and imports have been concentrated in five economies: Argentina, Brazil, Chile, Mexico and Venezuela. The region continues to trade with the same partners, but new relationships are emerging and trade patterns differ across the region. Over the same period, the United States has remained the region's top trade partner for both exports and imports. Recently, the People's Republic of China has emerged as a key partner (OECD/CAF/ECLAC, 2015).

Figure 6.18. Intra and extra-regional participation in GVCs

Panel A. Backward GVC participation



Panel B. Forward GVC participation



Note: Shading identifies the share of linkage which is from the region.
Source: Updated from Cadestin, et al. (2016) based on OECD Trade in Value Added Database, July 2019.

242. Regional integration also remains low, with just 16% of total LAC exports destined for the regional market. This is well below the intra-regional trade of the world's three major trading blocs in 2015: European Union (63.2%), the North American Free Trade Agreement (50.4%) and the Association of Southeast Asian Nations (46.5%) (UN Comtrade, 2017). Imports are equally important as they can favour the acquisition of key inputs and technology, and boost firms' productivity, export competitiveness and growth. This has become even more apparent with the emergence of global value chains (GVC) and "the intertwining of trade in intermediates, the movement of capital and ideas, and demand for services to coordinate the dispersed production and distribution of goods and services" (OECD/WBG/WTO, 2014).

243. In the face of a challenging global trading environment, one effective policy response for LAC countries is *regional integration*. With the advantages offered by geographical proximity, language and cultural affinities, the region is a natural space for LAC countries to enter GVCs. Also, despite representing just 16% of the region's total exports, LAC accounts for much larger shares of manufacturing exports than most countries. Regional markets are also a path towards export diversification. And a more integrated regional market would enhance LAC's position in trade negotiations with other partners.

244. The convergence between the region's two largest integration agreements, the Pacific Alliance and Mercosur, offers a promising path. Combined, these two integration agreements account for more than 80% of the region's population and over 90% or more of its GDP, trade and foreign direct investment flows. This means that any agreements between them could act as a powerful catalyst of region-wide integration. Convergence is still at an early stage and not expected to lead to any formal trade negotiations in the short term. Still, it will proceed incrementally, starting with work on customs co-operation, trade facilitation for goods and services, rules of origin and digital certification of origin.

245. While the region has progressed in removing tariffs to intra-regional trade, it now faces the challenge of removing *non-tariff (regulatory) barriers*. These include inconsistent technical, sanitary and phytosanitary standards; discrimination against regional suppliers in government procurement; and cumbersome customs procedures. These obstacles may be greater to the formation of regional value chains than tariffs (Cadestin, Gourdon and Kowalski, 2016; Bown, Lederman and Robertson, 2017).

Similarly, the region needs to further harmonise rules of origin and regulatory frameworks for the exchange of goods, services and endowments for production (e.g. electricity) (Powell, 2017). It also requires adoption of international standards and export certifications, particularly in agro-food. High-trade costs remain a challenge for regional integration. Thus improvements in infrastructure, logistics and customs procedures are critical as well (OECD/CAF/ECLAC, 2013).

246. As regards digital trade, the new issues mentioned above will also need to be addressed in the context of the LAC region, in particular if the region would be making further progress on regional integration. In addition to issues such as trade facilitation, new issues such as those related to e-payments, interoperability, and cross-border data flows will also need to be considered further in the context of LAC countries.

247. Ensuring sound competition in the digital economy is another issue that will need to be considered by policy makers in the LAC region. Fostering market openness and dynamism in the digital business environment will require tackling changing competition dynamics, including issues related to increasing concentration. This may also require more effective international co-operation, e.g. between competition authorities in the region.

6.7. Strategies for digital transformation

National Digital Strategies

248. As shown throughout this chapter, the digital transformation affects all corners of the economy, society, and government activities. To realise its full benefits, governments in the LAC region need to reach across traditional policy silos and across different levels of government and develop a whole-of-government approach to policy making. This means more co-ordination when making decisions and implementing policy measures across ministries and levels of government as well as more active involvement of all key stakeholders, including the business community, trade unions, civil society and the technical community, in the policy making process as well as implementation and monitoring. By identifying the inter-dependencies among policy areas affected by digital transformation, it will be easier to link up the relevant ministries and government bodies that need to be co-ordinated to ensure that policies are mutually reinforcing.

249. National digital strategies (NDS) are a key component of ensuring a whole-of-government approach. Current approaches to governing NDS vary across countries. Information from 35 OECD countries provides an overview of the responsibilities allocated for the development, co-ordination, implementation, and monitoring of NDS (OECD, 2017b). The lead on strategy development is often taken by a ministry or body that is not dedicated to digital affairs, while only a minority of countries so far is charging a ministry or body that is dedicated to digital affairs. Almost all countries engage multiple private stakeholders and public bodies to contribute input to developing their NDS.

250. Only few countries (e.g. Chile and Mexico in the LAC region) have a single high-level government official, e.g. in the Prime Minister's Office, Presidency or Chancellery that leads the development of or co-ordinates the NDS. Effective co-ordination is essential for developing and implementing a whole-of-government approach with an NDS. In the majority of OECD countries, the implementation of the NDS is the responsibility of several ministries, bodies or institutions, and in some, multiple stakeholders are also involved in implementing it. Bodies responsible for monitoring the implementation of the NDS tend to be the same as those who lead the development and the co-ordination of the NDS.

251. Developing an integrated strategy for digital transformation will also benefit from stronger institutions (OECD/CAF/ECLAC, 2018). As discussed in the 2018 Latin America Outlook, institutions in the LAC region need to be rethought to build states that deliver and respond to citizens' demands. They need to be more reliable, building a culture of integrity and transparency that leads to regaining citizens' trust; they need to be more efficient and effective, to improve the delivery of services to citizens and make better use of existing resources; and they need to be more forward-looking, to anticipate change, adapt to emerging challenges and demands, and find innovative responses to them.

Using digital technologies to improve policy making

252. In considering its strategies for digital transformation, governments also need to consider how they can use digital tools to improve policy making. The combined adoption of new digital technologies, increased reliance upon new data sources, and use of advanced analytic methods hold significant potential to improve the effectiveness and enforcement of existing policies, enable innovative policy design and impact evaluation, and expand citizen and stakeholder engagement in policy making (OECD, 2018d).

253. From the first pioneering experiences of policy applications, it is possible to identify three areas in which digital transformation promises to improve policy making. The first area is the improved efficiency and targeting of existing policies. The increased possibility to monitor outcomes directly, for example thanks to sensor technologies, and the availability of data that were previously imperfectly observable, or only observable at significant administrative cost, enables more effective enforcement of existing rules and lowers the cost of policy targeting.

254. In the area of finance, financial flows can now be tracked at a level of granularity and periodicity that was not previously possible and allow for the better enforcement of existing financial market regulations and improved public finance management. In agriculture, remote sensing and digital land parcel identification systems allow countries to grant direct subsidies to farmers and to enforce other regulatory measures related to the sustainability of agriculture. Yet the increased complexity of policy coupled with privacy concerns remain significant barriers to more widespread use of policy targeting and differentiation, for example in social and education policy.

255. The second area in which digital transformation holds the potential to improve public policy is in improving policy design and evaluation. Digital technologies broaden the suite of policy instruments available to governments and can lower the cost of policy experimentation and evaluation. In cities, digital cameras that automatically register the license plate of vehicles entering a congestion zone have made it more feasible to design, implement and enforce congestion pricing schemes. Merging congestion data with public transport use data from smart cards can be used to evaluate the effect of urban policies on travel behaviour. In education, being able to track all students over their study path has allowed some countries to uncover study patterns in some institutions that were at odds with study design and led to the experimentation of new study paths. Governments have also started using online laboratory experiments as low cost approaches to test the impact of alternative labelling schemes, enabling more effective policy outcomes upon roll-out.

256. The third area of promise is the potential of digital transformation to reshape government-citizen interaction and expand stakeholder engagement. Many OECD countries are making more data freely available to enhance accountability in the public sector and allow for evaluating the effects of current policies. Making pollutant release and

transfer registers publicly available online can facilitate civil society oversight on regulated entities, making compliance efforts more transparent and breaches more open to public scrutiny. As an example of improved engagement of regulators with the private sector, the creation of regulatory sandboxes in Fintech has allowed companies to test the introduction of new technologies in a controlled and monitored environment and facilitate regulator-firm engagement.

257. More specifically, digital technologies can be useful to develop more effective National Development Plans in LAC. These technologies are a powerful tool to improve citizens' participation and empowerment in the design phase of planning strategies. They also facilitate the impact evaluation of government programmes and projects in connection to the SDGs. Moreover, digital technologies can enhance state capabilities to develop more accurate and rigorous long-term macroeconomic scenarios that are essential in setting up consistent and sustainable development strategies.

258. However, digital transformation poses a number of challenges: the increased granularity of data and increased data-sharing between government agencies and across public-private partnerships can generate digital security vulnerabilities and concerns over individual privacy. While these apply to both government and private sector applications of digital technology, these concerns are arguably more acute in the public sector as it may own more private or accurate data about individuals. Further, the insufficient public infrastructure to link disparate source of data is a key bottleneck. This raises the question of interoperability of data systems within and across different areas. Finally, while the availability of more data usually helps to improve policies, it is not a panacea and comes with risks that will need to be tackled over the next decade: in some instances, less data is better than more. This has meant that public sector adoption rates remains low relative to the private sector, with the majority of policy examples identified only implemented at the local level or representing pilot projects. Mainstreaming digital best practices across national institutions might be the largest challenge to be tackled.

259. These applications also hold promise for Latin American countries, and some examples are emerging in LAC countries, e.g. in Peru and Uruguay, and in other emerging countries. For example, the Indian government operates the world's largest biometric ID system, Aadhaar, which digitises the transfer of benefits and schemes to residents and aims to cover 1.3 billion people. Given the scale of the program, cost-savings are difficult to quantify but substantial benefits are expected from fraud reduction, reduced leakage and efficiency gains (World Bank, 2016). Deploying digital technologies has also eased the detection of illegal waste dumping in Lima, where in a particularly striking example involving a joint project between the Peruvian environment ministry and USAID 10 vultures were kitted with GoPro video cameras and GPS trackers.[8] While this enables vultures to identify illegal waste dumps and provides GPS coordinates to environmental authorities, it ultimately is the municipalities' responsibilities to tackle dumping and fly-tipping.

260. Such applications – and many others – can potentially be used in many areas, e.g. to help reduce informality, address corruption, improve efficiency, etc. The extent to which this potential is realised will depend on whether governments prove willing to adopt and able to scale the use of such technologies, obtain reliable access to relevant data which is

[8] http://www.minam.gob.pe/notas-de-prensa/gallinazo-avisa-una-iniciativa-que-rastrea-zonas-contaminadas-de-lima-junto-a-las-aves-mas-emblematicas-de-la-capital/

often in the hands of private actors, and how successfully concerns such as privacy and cybersecurity are addressed.

7. Concluding remarks

261. The ongoing digital transformation affects all aspects of economies and societies in complex and interrelated ways, challenging existing policies in LAC countries in many areas. As a result, silos of all types are disintegrating, and hard borders will become less relevant. This means that stronger co-operation and collaboration within and across LAC countries is critical, as well as a re-think about how policies are developed and administered. In particular, a flexible, forward-looking and integrated policy framework that cuts across policy silos is essential to ensuring a coherent and cohesive whole-of-government approach to fully realise the potential of digital transformation for productivity and wellbeing, and address its challenges.

262. LAC governments – at the local, regional and national levels – have an opportunity to be remade by digital transformation as they use digital technologies to improve efficiency and targeting, enable innovative policy design and rigorous evaluation of outcomes, and expand citizen and stakeholder engagement.

263. International and multi-stakeholder co-operation within - and beyond - the LAC region are essential to ensure that digital transformation is positive and supports inclusive growth. The Internet crosses national borders and changes conventional notions of location, distance, and jurisdiction, requiring stronger international and multi-stakeholder co-operation.

264. A people-centred and inclusive approach to policy making in the digital age is essential. If policy makers lose sight of the individual and the need for all individuals to be engaged and benefit from digital transformation, the transformation cannot be positive and inclusive. Ensuring connectivity and affordable access for all in the LAC region, investment in education and skills, sound competition, as well as the protection of individual's privacy and consumer rights, are key elements of an inclusive and people-centred approach.

265. To support policy making in the digital age, better measurement of digital transformation in the LAC region and its implications is critical, including in areas such as national accounts, business and household use of digital technologies, data and data flows, citizen trust, and digital trade. Existing approaches to measuring the digital economy can be implemented by statistical offices in the region (see Annex II for available OECD guidance on the measurement of the digital transformation). At the same time, data need not necessarily come from traditional statistical sources and can also draw on the growing volume of data available on the Internet (e.g. on prices).

266. Looking ahead, it is clear that governments will need to overcome existing policy silos and reach across them to better understand how digital transformation is reshaping lives, how best to exploit it, and how to help those in danger of being left behind. Using the multi-stakeholder model that has served many countries so well, it is important to be creative and bold in making digital transformation work for all people and for the economy.

267. Together, governments and stakeholders in LAC countries can and must shape a common digital future that makes the most of the immense opportunities that digital transformation holds to improve people's lives and boost productivity and economic growth, while ensuring that nobody is left behind.

REFERENCES

Acemoglu, D. and P. Restrepo (2017), "Robots and Jobs: Evidence from US Labor Markets", NBER Working Paper, No. 23285, National Bureau of Economic Research, Cambridge, MA, https://www.nber.org/papers/w23285.

Adalet McGowan, M., D. Andrews and V. Millot (2017a), "The Walking Dead? Zombie Firms and Productivity Performance in OECD countries", *OECD Economics Department Working Paper* No 1372.

Adalet McGowan, M., D. Andrews and V. Millot (2017b), "Insolvency regimes, zombie firms and capital reallocation", *OECD Economics Department Working Papers*, No. 1399, OECD Publishing, Paris. http://dx.doi.org/10.1787/5a16beda-en

Ahmad, N., J. Ribarsky and M. Reinsdorf (2017), "Can Potential Mismeasurement of the Digital Economy Explain the Post-crisis Slowdown in GDP and Productivity Growth?", OECD Statistics Working Papers, 2017/09, OECD Publishing, Paris. http://dx.doi.org/10.1787/a8e751b7-en.

Andrews, D. C. Criscuolo and P. Gal (2016), "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy", *OECD Productivity Working Papers*, No. 5.

Andrews, D. and C. Criscuolo (2013), "Knowledge-Based Capital, Innovation and Resource Allocation", OECD Economics Department Working Papers , No. 1046, OECD Publishing, Paris.

Andrews, D., G. Nicoletti and C. Timiolitis (2018), "Going Digital - What Determines Technology Adoption Among Firms", OECD Economics Department Working Papers , OECD Publishing, Paris.

Berger, T. and C.B. Frey (2015), "Industrial Renewal in the 21st Century: Evidence from US Cities", Regional Studies, http://dx.doi.org/10.1080/00343404.2015.1100288.

Berlingieri, G., P. Blanchenay and C. Criscuolo (2017), "The great divergence(s)", *OECD Science, Technology and Industry Policy Papers*, No. 39, OECD Publishing, Paris, http://dx.doi.org/10.1787/953f3853-en

Betcherman, G. et al. (2007), "A review of interventions to support young workers: Findings of the Youth Employment Inventory", *Social Protection Discussion Paper*, No. 0715, World Bank Group, Washington, DC.

Bloom, N., R. Sadun and J. Van Reenen (2012), "Americans Do IT Better: US Multinationals and the Productivity Miracle", *American Economic Review* 102(1): 167–201

Bosch, M., A. Melguizo and C. Pagés (2013), *Better Pensions, Better Jobs: Towards Universal Coverage in Latin America and the Caribbean*, Inter-American Development Bank, Washington, DC, https://publications.iadb.org/handle/11319/462?locale-attribute=en.

Bown, C., D. Lederman, S. Pienknagura and R. Robertson (2017), *Better Neighbors : Toward a Renewal of Economic Integration in Latin America*, Latin America and Caribbean Studies, Washington, DC, World Bank, https://openknowledge.worldbank.org/handle/10986/25736 License: CC BY 3.0 IGO.".

Brynjolfsson, E., D. Rock and C. Syverson (2017), "Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics", *NBER Working Papers 24001*, National Bureau of Economic Research, Cambridge.

Cadestin, C., J. Gourdon and P. Kowalski (2016), "Participation in global value chains in Latin America: Implications for trade and trade-related policy", *OECD Trade Policy Papers*, No. 192, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlpq80ts8f2-en

Calvino, F. and C. Criscuolo (2018), "Business Dynamics and Digitalisation: A Progress Report". DSTI/CIIE(2017)17

Calvino, F., C. Criscuolo, L. Marcolin, and M. Squicciarini (forthcoming), "A Taxonomy of Digital Sectors", *STI Working Paper*, OECD Publishing, Paris.

Cerutti, P. et al. (2014), "Social assistance and labour market programmes in Latin America: Methodology and key findings from the social protection database", *Social Protection and Labour Discussion Paper*, No. 1401, World Bank Group, Washington, DC.

COMSCORE (2016), "Latin Americans Are the Most Avid Social Media Users", https://www.emarketer.com/Article/Latin-Americans-Most-Avid-Social-Media-Users/1013517

Criscuolo, C, P. Gal, C. Menon (2014), "The Dynamics of Employment Growth: New Evidence from 17 Countries", *OECD STI Policy Papers*, No. 14.

Dauth, W., S. Findeisen, J. Suedekum and N. Woessner (2017), "German robots – The impact of industrial robots on workers", CEPR Discussion Papers, No. 12306.

Dini, M. and G. Stumpo (co-ords.) (2018), "Mipymes en America Latina: un fragil desempeno y nuevos desafios para las politicas de fomento", *Documentos de Proyectos* (LC/TS.2018/75), Economic Commission for Latin America and the Caribbean, Santiago.

Dougherty S. and O. Escobar (2016), "What Policies to Combat Labour Informality? Evidence from Mexico", OECD Economics Department, May. Revised version of Working Paper No. 1043, http://dx.doi.org/10.1787/5k483jrvnjq2-en

Fares, J. and O.S. Puerto (2009), "Towards comprehensive training", *Social Protection Discussion Paper*, No. 0924, World Bank Group, Washington, DC.

Goldfarb, A. and C. Tucker (2017), Digital Economics, NBER Working Paper, No. w23684. National Bureau of Economic Research.

Graetz, G. and G. Michaels (2017), "Robots at work". http://personal.lse.ac.uk/michaels/Graetz_Michaels_Robots.pdf

Haskel, J. and S. Westlake (2017), *Capitalism without Capital: the Rise of the Intangible Economy*, Princeton University Press.

Henderson, R. (1993), "Underinvestment and Incompetence as Responses to Radical Innovation: Evidence from the Photolithographic Alignment Equipment Industry", *RAND Journal of Economics*. 24(2), pp. 248–270.

International Energy Agency (IEA) (2017), *Digitalization and Energy*, OECD/IEA Publishing, Paris, http://www.iea.org/publications/freepublications/publication/DigitalizationandEnergy3.pdf.

ILO (2016a), Soluciones eficaces: Políticas activas del mercado de trabajo en América Latina y el Caribe [Efficient Solutions: Active Labour Market Policies in Latin America and the Caribbean], International Labour Organization, Geneva.

ILO (2016b), *Non-standard Employment around the World: Understanding Challenges, Shaping Prospects,* International Labour Organization, Geneva.

International Transport Forum (ITF) (2017), "Managing the Transition to Driverless Road Freight Transport", https://www.itf-oecd.org/sites/default/files/docs/managing-transition-driverless-road-freight-transport.pdf.

Nedelkoska, L. and G. Quintini (2018), "Automation, skills use and training," OECD Social, Employment and Migration Working Papers 202, OECD Publishing.

McKinsey Global Institute (2018), *Solving the Productivity Puzzle: The Role of Demand and the Promise of Digitization*, McKinsey & Company.

Melitz M.J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica*, Volume 71, Issue 6, pp. 1695-1725, November 2003.

OECD (2019a), *Going Digital: Shaping Policies, Improving Lives*, OECD Publishing, Paris.

OECD (2019b), *Measuring the Digital Transformation – A Roadmap for the Future*, OECD Publishing, Paris.

OECD (2019c), *How's Life in the Digital Age*, OECD Publishing, Paris.

OECD (2018a), "Going Digital in a Multilateral World: An Interim Report to Ministers", report presented to the OECD Meeting of the Council at Ministerial Level 30-31 May 2018, C/MIN(2018)6.

OECD (2018b), *Skills in Ibero-America: Insights from PISA 2015*, OECD Publishing, Paris.

OECD (2018c), OECD Broadband Portal, http://www.oecd.org/sti/broadband/broadband-statistics

OECD (2018d), "Using digital technologies to improve the design and enforcement of public policies", *OECD Digital Economy Papers*, OECD Publishing, Paris.

OECD (2017a), *Going Digital: Making the Transformation Work for Growth and Well-Being*, Meeting of the OECD Council at Ministerial Level, Paris, http://www.oecd.org/mcm/documents/C-MIN-2018-6-EN.pdf

OECD (2017b), *Digital Economy Outlook 2017*, OECD Publishing, Paris.

OECD (2017c), *OECD Science, Technology and Industry Scoreboard 2017*, OECD Publishing, Paris.

OECD (2017d), *OECD Telecommunication and Broadcasting Review of Mexico 2017*, OECD Publishing, Paris.

OECD (2017e), *OECD Territorial Reviews: Northern Sparsely Populated Areas*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264268234-en.

OECD (2017f), *The Next Production Revolution – Implications for Governments and Businesses*, OECd Publishing, Paris.

OECD (2017g), *OECD Economic Surveys - Mexico*, OECD Publishing, Paris.

OECD (2017h), *Business Dynamics and Productivity*, OECD Publishing, Paris.

OECD (2017i), *OECD Employment Outlook 2017*, OECD Publishing, Paris. http://dx.doi.org/10.1787/empl_outlook-2017-en.

OECD (2017j), "Future of work and skills", Paper presented at the 2nd meeting of the G20 Employment Group, February 2017, Paris.

OECD (2017k), "Enhancing Social Inclusion in Latin America, Key Issues and the Role of Social Protection Systems", OECD Latin America and the Caribbean Regional Programme, OECD, Paris.

OECD (2017l), *Government at a Glance - Latin America*, OECD Publishing, Paris.

OECD (2017m) "Digital trade: developing a framework for analysis", OECD Trade Policy Papers, No. 205, OECD Publishing, Paris. http://dx.doi.org/10.1787/524c8c83-en

OECD (2016a), *Ministerial Declaration on the Digital Economy (Cancún Declaration)*, Cancun, https://www.oecd.org/internet/Digital-Economy-Ministerial-Declaration-2016.pdf

OECD (2016b), *Start-up Latin America 2016 - Building an Innovative Future*, Development Centre Studies, OECD Publishing, Paris.

OECD (2016c), *OECD Recommendation – Consumer Protection in E-Commerce*, Digital Economy Papers, OECD Publishing, Paris.

OECD (2015a), *Data-Driven Innovation: Big Data for Growth and Well-Being*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264229358-en

OECD (2015b), *The Future of Productivity*, OECD Publishing, Paris.

OECD (2015c), *OECD Economic Surveys - Brazil*, OECD Publishing, Paris.

OECD (2015d), *The Innovation Imperative – Contributing to Productivity, Growth and Well-Being*, OECD Publishing, Paris.

OECD (2015e), Education at a Glance 2015: OECD Indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2015-en

OECD (2015f), *Digital Security Risk Management for Economic and Social Prosperity*, OECD Recommendation and Companion Document, OECD Publishing, Paris.

OECD (2013), *The OECD Privacy Framework*, OECD Publishing, Paris.

OECD (2010) "OECD market openness principles", OECD innovation Policy Platform, accessed May 2017: http://www.oecd.org/innovation/policyplatform/48137680.pdf

OECD (2008), *OECD Policy Guidance for Protecting and Empowering Consumers in Communication1 Services*, OECD Publishing, Paris.

OECD (2004), *The Economic Impacts of ICT - Measurement, Evidence and Implications*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264026780-en.

OECD/CAF/ECLAC (2013), *Latin American Economic Outlook 2014: Logistics and Competitiveness for Development,* OECD Publishing, Paris, http://dx.doi.org/10.1787/leo-2014-en.

OECD/CAF/ECLAC (2014), *Latin American Economic Outlook 2015: Education, Skills and Innovation for Development*, OECD Publishing, Paris, http://dx.doi.org/10.1787/leo-2015-en

OECD/CAF/ECLAC (2015), *Latin American Economic Outlook 2016: Towards a New Partnership with China*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264246218-en.

OECD/CAF/ECLAC (2016), *Latin American Economic Outlook 2017: Youth, Skills and Entrepreneurship*, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/leo-2017-en

OECD/CAF/ECLAC (2018), *Latin American Economic Outlook 2018 - Rethinking Institutions for Development*, OECD Publishing, Paris.

OECD/CAF/ECLAC (2019), *Latin American Economic Outlook 2019 – Development in Transition*, OECD Publishing, Paris.

OECD/CIAT/IDB (2016), Taxing Wages in Latin America and the Caribbean, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264262607-en

OECD/IDB (2016a), *Broadband Policies for Latin America and the Caribbean*, Paris, OECD Publishing.

OECD/IDB (2016b), *Boosting Productivity and Inclusive Growth in Latin America*, OECD Publishing, Paris.

OECD/WBG/WTO (2014), "Global Value Chains: challenges, opportunities, and implications for policy", OECD, World Bank Group and World Trade Organization Report prepared for submission to the G20 Trade Ministers Meeting, Sydney, Australia, 19 July 2014.

Pellegrino, B. and L. Zingales (2014), "Diagnosing the Italian Disease", *NBER Working Paper*, No. 23964, National Bureau of Economic Research.

Ubaldi, B. (2013), "Open Government Data: Towards Empirical Analysis of Open Government Data Initiatives", OECD Working Papers on Public Governance, No. 22, OECD Publishing. http://dx.doi.org/10.1787/5k46bj4f03s7-en.

Van Ark, B., et al, (2016), "Navigating the New Digital Economy: Driving Digital Growth and Productivity from Installation to Deployment", Conference Board, New York.

World Bank (2016), *LAC Equity Lab, Tabulations of SEDLAC* (CEDLAS and the World Bank) and *World Development Indicators (*database), www.worldbank.org/ en/topic/poverty/lac-equity-lab1/overview

Annex I: OECD Policy Guidance on the Digital Economy

Since the creation of the OECD in 1961, around 450 substantive legal instruments have been developed within its framework. These include OECD Acts (i.e. the Decisions and Recommendations adopted by the OECD Council in accordance with the OECD Convention) and other legal instruments developed within the OECD framework (e.g. Declarations, international agreements). All substantive OECD legal instruments, whether in force or abrogated, are listed in the online Compendium of OECD Legal Instruments.

Most of the legal instruments relevant to the digital economy are in the form of Recommendations. These are OECD legal instruments which are not legally binding but practice accords them great moral force as representing the political will of Adherents. There is an expectation that Adherents will do their utmost to fully implement a Recommendation. Thus, Members which do not intend to do so usually abstain when a Recommendation is adopted, although this is not required in legal terms. Some other legal instruments related to the digital economy are in the form of Declarations. These are OECD legal instruments which are prepared within the Organisation, generally within a subsidiary body. They usually set general principles or long-term goals, have a solemn character and are usually adopted at Ministerial meetings of the Council or of committees of the Organisation.

In the main policy areas included in the OECD's Integrated Policy Framework, a number of OECD Council Recommendations are relevant, as listed below. LAC countries have adhered to several of these. For example, Argentina, Chile, Colombia, Costa Rica, Ecuador and Mexico have adhered to the Declaration on the Digital Economy: Innovation, Growth and Social Prosperity (Cancún Declaration), which was adopted on 23 June 2016 on the occasion of the Ministerial Meeting of the Committee on Digital Economy Policy held in Cancún, Mexico. Several LAC countries, including Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico and Peru have adhered to the OECD Recommendation on Artificial Intelligence that was agreed to at the OECD Ministerial Council meeting of 22-23 May 2019.

The full list of adherences of LAC countries to OECD Recommendations is available on the OECD Internet, at: https://legalinstruments.oecd.org/en/adherences A number of the recommendations listed below are currently being reviewed by the responsible OECD Committees and may be revised.

Existing OECD Guidance on Access

OECD Recommendation on International Roaming (2012)

The OECD Recommendation on International Roaming presents a set of measures that aim to ensure effective competition, consumer awareness and protection, and a fair price level in international roaming markets (OECD, 2012). These policy principles were put forth in response to high wholesale charges for international roaming, which in turn had resulted in high retail charges. Since the Recommendation, significant progress has been made in reducing international mobile roaming prices through either regulation or increased competition (OECD, 2016).

OECD Recommendation on Broadband Development (2004)

The OECD Recommendation on Broadband Development outlines a set of policy principles to expand broadband markets, promote efficient and innovative supply arrangements and encourage the effective use of broadband services. It recognises the role of the private sector in facilitating the expansion of communication infrastructure and development. Importantly, the Recommendation underscores technological neutrality among new technologies, underscoring the need for interoperability, innovation and choice in facilitating access in the digital age.

Existing OECD Guidance on Innovation

G20/OECD High-level Principles on SME Financing (2015)

The G20/OECD High-level Principles on SME Financing include eleven principles: (1) the identification of SME financing needs and gaps and improvement of the evidence base, (2) the strengthening of SME access to traditional bank financing, (3) the enabling of SMEs to access diverse non-traditional bank financing instruments and channels, (4) the promotion of financial inclusion for SMEs and ease access to formal financial services, including for informal firms, (5) the design regulation that supports a range of financing instruments for SMEs, while ensuring financial stability and investor protection, (6) the improvement of transparency in SME finance markets, (7) the enhancement of SME financial skills and strategic vision, (8) the adoption of principles of risk sharing for publicly supported SME finance instruments, (9) the encouragement of timely payments in commercial transactions and public procurement, (10) the design of public programmes for SME finance which ensure additionality, cost effectiveness and user-friendliness, and (11) the monitoring and evaluation of public programmes to enhance SME finance. The principles aim to support the efforts of G20 and OECD members and other interested economies in enhancing access to a diverse range of financing instruments by SMEs, including micro-enterprises, and entrepreneurs. The principles are voluntary and non-binding, and build on existing international financial principles and guidelines.

OECD Recommendation on Access to Research Data (2006)

These guidelines are based on commonly agreed principles and are intended to facilitate cost-effective access to digital research data from public funding. They are intended to assist all actors involved when trying to improve the international sharing of, and access to, research data. The guidelines are meant to apply to research data that are gathered using public funds for the purposes of producing publicly accessible knowledge.

Existing OECD Guidance on Society

OECD Recommendation on Health Data Governance (2017)

The OECD Recommendation on Health Data Governance (OECD, 2017) lays out the framework conditions to encourage greater availability and processing of health data within countries and across borders for health-related public policy objectives, while ensuring that risks to privacy and security are minimised and appropriately managed. The Recommendation is based on 12 high-level principles, ranging from engagement and participation of a wide range of stakeholders, to effective consent and choice mechanisms to the collection and use of personal health data, to monitoring and evaluation mechanisms. These principles set the conditions to encourage greater cross-country comparison and

harmonisation of data governance frameworks so that more countries are able to use health data for research, statistics and healthcare quality improvement.

OECD Recommendation on Digital Government Strategies (2014)

The OECD Recommendation on Digital Government Strategies lays out a framework for the use of digital technologies and data by governments that increase the inclusiveness, openness and transparency of government processes and operations. The Recommendation outlines in particular a set of policy principles that focus on the need to take steps to address existing digital divides and avoid creating new ones, to encourage the engagement and participation of public, private and civil society stakeholders in policy making and public service design and delivery, and to open up open government data.

OECD Recommendation on the Protection of Children Online (2012)

The OECD Recommendation on the Protection of Children Online (OECD, 2012) outlines a series of policy principles for making policies for the protection of children online, in recognition of the unique risks associated with increasingly varied use of the Internet by minors. The Recommendation focuses on the challenges faced by governments for policy making in this area with respect to managing policy complexity, adopting an evidence-based policymaking approach, and fostering international co-operation to improve the efficiency of national policy frameworks. It notes that all policies made to make the Internet safer for minors should aim to remain flexible, proportional and focus on empowering children and parents to evaluate risks.

OECD Recommendation on Information and Communication Technologies and the Environment (2010)

The Recommendation of the Council on Information and Communication Technologies (ICTs) and the Environment (OECD, 2010) recommends that, in establishing or reviewing their policies for communication technologies and the environment, Members take due account of and implement the principles that enhance the contribution of digital technologies (referred to as ICTs in the Recommendation) to improving environmental performance, addressing climate change, e.g. through increasing energy efficiency and managing scarce resources, and tackling other environmental challenges such as the protection of biodiversity. Such contributions can come from direct effects, such as lower energy consumption, indirect effects through the use of digital technologies across sectors, as well as from underpinning systemic behavioural change that contribute to better environmental performance.

Existing OECD Guidance on Trust

The OECD has developed guidance for managing digital risks and enabling trust which is not legally binding but puts peer-pressure on countries to take action.

OECD Principles on Artificial Intelligence (2019)

The OECD Principles on Artificial Intelligence promote artificial intelligence (AI) that is innovative and trustworthy and that respects human rights and democratic values. They are the first such principles signed up to by governments. They set standards for AI that are practical and flexible enough to stand the test of time in a rapidly evolving field. They complement existing OECD standards in areas such as privacy, digital security risk management and responsible business conduct. The Recommendation identifies five

complementary values-based principles for the responsible stewardship of trustworthy AI: a) AI should benefit people and the planet by driving inclusive growth, sustainable development and well-being; b) AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and they should include appropriate safeguards – for example, enabling human intervention where necessary – to ensure a fair and just society; c) There should be transparency and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them; d) AI systems must function in a robust, secure and safe way throughout their life cycles and potential risks should be continually assessed and managed; e) Organisations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the above principles. Consistent with these value-based principles, the OECD also provides five additional recommendations to governments as regards their national policies and the need for international collaboration.

The OECD E-Commerce Guidelines (2016)

The OECD E-Commerce Guidelines cover business-to-consumer e-commerce and address issues arising from the relationship between consumers and the online platforms that enable peer-to-peer transactions. The guidelines underscore that people buying online are entitled to the same level of protection as with conventional transactions. They call on governments to work with business and consumer groups to determine legal changes that could improve consumer trust in e-commerce. In particular, they suggest that consumer protection laws should cover online apps and services offered for free in exchange for gaining access to the user's personal data. They also indicate that businesses should take special care in marketing targeted at children or other vulnerable consumers. Provisions should also be made to ensure consumers understand the terms and conditions relating to the acquisition and use of digital content, and that consumers should also have access to easy-to-use mechanisms to resolve domestic and cross-border e-commerce disputes.

The OECD Security Guidelines (2015)

The OECD Security Guidelines were revised in 2015. They provide guidance for all stakeholders on the economic and social dimensions of digital security risk. In an economic context in which the digital environment has become essential to growth, well-being and inclusiveness, digital security risk should be considered with respect to the broader economic and social perspective. The revised security guidelines introduce the notion that digital security risk should be treated like an economic rather than a technical issue, and should be part of an organisation's overall risk management and decision-making. The Security Guidelines also underscore that all stakeholders have a responsibility for understanding and managing digital security.

The OECD Privacy Guidelines (2013)

In 2013 the OECD revised its Privacy Guidelines – the first internationally agreed upon set of privacy principles. At the core of the Privacy Guidelines is a set of eight principles to be applied to both the public and private sectors: (1) the collection limitation principle, (2) the data quality principle, (3) the purpose specification principle, (4) the use limitation principle, (5) the security safeguards principle, (6) the openness principle, (7) the individual participation principle, and (8) the accountability principle. Two themes run through the Privacy Guidelines: a focus on the practical implementation of privacy protection through an approach grounded in risk management, and the need to address the global dimension of privacy through improved interoperability.

Existing OECD Guidance on Market Openness

OECD Market Openness Principles

Market openness is characterised by a regulatory environment where foreign suppliers of goods and services have the ability to "compete in a national market without encountering discriminatory, excessively burdensome or restrictive conditions". This entails not just the elimination of barriers to trade and investment but also the adoption of appropriate international approaches to trade-policy making. The OECD has developed six market openness principles: (1) transparency, (2) non-discrimination, (3) avoidance of trade-restrictive, (4) harmonisation of international measures, (5) mutual recognition, and (6) competition. These principles can help in better understanding what measures might be relevant for openness in digital trade, and how these measures could lead to more favourable regulatory environments for digital trade.

The OECD Competition Assessment Toolkit

The OECD's Competition Assessment Toolkit, consisting of three parts, was revised and extended in 2015. Revisions included Volume 1 and Volume 2. Volume 1 sets down the toolkit principles, and provides a Competition Checklist and examples of government processes. Volume 2 presents detailed technical guidance on key issues when performing a competition assessment. Volume 3 was issued to provide an operational manual and a step-by-step process for performing competition assessment. The Toolkit helps governments to eliminate barriers to competition by providing a method for identifying unnecessary restraints on market activities and developing alternative, less restrictive measures. The Toolkit can be used in three main ways: 1) In the development and review of policies (e.g. the competition authority evaluating competitive impacts of regulations or ministries developing laws), 2) In an overall evaluation of existing laws and regulation, and 3), In the evaluation of draft new laws and regulations (for example, through regulatory impact assessment programs).

OECD Guidelines for Multinational Enterprises

The OECD Guidelines for Multinational Enterprises (MNEs) have been a leading tool to promote responsible business conduct since 1976. A the core of the Guidelines are a set of 15 recommendations addressed by governments to multinational enterprises operating in or from adhering countries and provide voluntary principles and standards for responsible business conduct in areas such as employment and industrial relations, human rights, environment, information disclosure, combating bribery, consumer interests, science and technology, competition, and taxation. The Guidelines aim to ensure that the operations of enterprises are in harmony with government policies, to strengthen mutual confidence between enterprises and societies, and help improve the foreign investment climate and sustainable development by multinational enterprises. Adhering governments are required to set up a National Contact Point (NCP) whose main role is to further the effectiveness of the Guidelines by undertaking promotional activities, handling enquiries, and contributing to the resolution of issues that may arise from the alleged non-observance of the guidelines in specific instances.

OECD Code of Liberalisation of Capital Movements

The Code provides a framework for countries to progressively remove unnecessary barriers to the movement of capital, while proving flexibility for countries at different levels of development and in times of economic distress and financial disturbance. It is binding for

all 35 OECD countries. Since 2012, the Code is also open to non-OECD countries. The Code is based on a range of premises, including (1) an open multilateral regime for international capital flows, (2) the entitlement of an adhering country to benefit from the liberalisation of other adhering countries regardless of its own degree of openness, and (3) the reintroduction of capital flow restrictions that can be justified in specific circumstances. In 2016, the OECD Code of Liberalisation of Capital Movements was reviewed by adhering countries.

Other OECD Guidance on Digital Transformation

Cancun Declaration (2016)

Daejeon Declaration (2015)

Internet Policy Making Principles (2011)

More detail on the various OECD Recommendations is available on the OECD Internet, at: http://www.oecd.org/sti/recommendationsandpolicyguidances.htm

Annex II: Measuring the Digital Transformation

The OECD has worked on measurement of the digital economy since the late 1990s. This involves methodological and measurement work, but also includes experimentation with new metrics. The work also seeks to identify data and measurement gaps that can be explored in the future. The data is used extensively in OECD policy reports, and is also summarised in specialised measurement publications, the latest of which was released in March 2019 – *Measuring the Digital Transformation – A Roadmap for the Future*. The work is also used to support work in other forums, as exemplified in the *G20 Measurement Toolkit* prepared with several other international organisations in 2018 for Argentina's G20 Presidency, which was made available in the G20 Repository of Digital Policies: https://g20digitalrepo.org/.

Methodologies and resources

Between 1998 and 2003 the OECD developed guidelines on the measurement of the information society (definitions of ICT and content sectors, products and technologies, ICT use in business and in households/by individuals). The guidelines are periodically reviewed and revised and have been adopted by the European Union and the UN Statistical Commission. In 2014 the OECD produced Measuring the Digital Economy: A New Perspective where countries were benchmarked along several dimensions, gaps were identified and a measurement agenda was developed. Today, the OECD is working on measurement in a number of areas, including Artificial Intelligence, the Internet of Things, broadband metrics, digital security and privacy, consumers' trust in online environments, skills in the digital era, governments' digital services, digital transformations of government operations and their use of data, digitisation of science, "digital" trade, barriers to trade in digital services, digital economy in GDP and digitalisation and the future of work. Much of the measurement work is undertaken in close consultation with the OECD's policy committees, to ensure that the work is policy relevant and responds to key priorities.

In January 2017, the OECD launched an organisation-wide project *Going Digital: Making the Transformation Work for Growth and Well-being* (Going Digital project). The project has developed an integrated policy framework to help policy makers better understand the transformation that is taking place and implement policies that foster a positive and inclusive digital economy and society. Each of the main policy dimensions of the Going Digital integrated policy framework – access, use, innovation, jobs, society, trust and market openness – was mapped to key benchmark indicators and relevant policy levers, to help give analysts and policymakers deeper insight in the digital transformation and its impacts on growth and wellbeing. At the same time, existing metrics were reviewed and measurement gaps identified. The report *Measuring the Digital Transformation – A Roadmap for the Future*, released in March 2019, is intended to lay the foundation for future measurement initiatives by establishing a medium to long-term measurement roadmap for the digital transformation. Data building on this report are available in the OECD's on-line *Going Digital Toolkit*: www.oecd.org/going-digital-toolkit

Implementation challenges

Not all OECD countries implement the existing OECD methodological guidance on the digital economy in full, reflecting *inter alia* national priorities and existing measurement

tools. Moreover, the implementation of existing guidance can be affected by the resources available, i.e. in implementing specialised surveys of household or business use, or in improving the measurement of price indices of ICT goods and services, or being able to experiment with new measurement tools in hard to measure areas. New sources and methodological approaches, often building on digital tools, may facilitate implementation or open new ways of measuring, e.g. by drawing directly on data from the Internet.

Measuring the Digital Transformation and the Going Digital policy framework



Resources

OECD methodological work and data on the digital economy is provided in different formats, including reports and online resources. Key resources and reports include:

- *Going Digital Toolkit*: www.oecd.org/going-digital-toolkit
- *Measuring the Digital Transformation – A Roadmap for the Future (2019):* http://www.oecd.org/publications/measuring-the-digital-transformation-9789264311992-en.htm
- *Science, Technology and Industry Scoreboard 2017 – The Digital Transformation*: http://www.oecd.org/sti/scoreboard.htm
- *Measuring the Digital Economy – A New Perspective* (2014): http://www.oecd.org/sti/measuring-the-digital-economy-9789264221796-en.htm
- *OECD Model Survey on ICT Access and Usage by Households and Individuals* (2014), http://www.oecd.org/sti/ieconomy/ICT-Model-Survey-Access-Usage-Households-Individuals.pdf
- *OECD Model Survey on ICT Usage by Businesses* (2014), http://www.oecd.org/sti/ieconomy/ICT-Model-Survey-Usage-Businesses.pdf
- *OECD Guide to Measuring the Information Society* (2011): http://www.oecd.org/sti/sci-tech/oecdguidetomeasuringtheinformationsociety2011.htm
- "Can potential mismeasurement of the digital economy explain the post-crisis slowdown in GDP and productivity growth?", *Statistics Working Papers,* https://doi.org/10.1787/a8e751b7-en

- *Digitalisation and the Future of Work*: http://www.oecd.org/employment/future-of-work/
- *OECD Broadband Portal*: http://www.oecd.org/sti/broadband/broadband-statistics/
- *Other data on information and communications technologies* (including from household and business surveys of ICT access and use): http://dotstat.oecd.org/?lang=en
- *OECD Going Digital Project*: http://www.oecd.org/going-digital/

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Union takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

Shaping the Digital Transformation in Latin America

STRENGTHENING PRODUCTIVITY, IMPROVING LIVES

This report discusses policies and approaches to spur sustainable and inclusive digital transformation in the LAC region across seven action areas: enhancing access to digital technologies; strengthening their effective use; enabling digital innovation; ensuring quality jobs for all; promoting an inclusive digital society; strengthening trust; and fostering market openness. The report also aims to contribute to the preparation of an action plan that will support the region's efforts to reap the benefits of the digital transformation.

This publication was prepared to support the discussions of the OECD Latin America and the Caribbean Regional Programme's Third Ministerial Summit on Productivity "Harnessing the Digital Transformation to Boost Productivity in in Latin America and the Caribbean". It draws on OECD work on carried out in the context of the Going Digital project, as well as a range of work specific to the LAC region, such as the OECD-IDB report Broadband Policies for Latin America and the Caribbean, the OECD Reviews of Telecommunication Policies in Mexico and Colombia, and the OECD Going Digital Reviews of Colombia and Brazil.

This publication is a contribution to the OECD Going Digital project which aims to provide policymakers with the tools they need to help their economies and societies prosper in an increasingly digital and data-driven world.

For more information, visit ***www.oecd.org/going-digital***

#GoingDigital

Consult this publication on line at ***https://doi.org/10.1787/8bb3c9f1-en***.

This work is published on the OECD iLibrary, which gathers all OECD books, periodicals and statistical databases.
Visit ***www.oecd-ilibrary.org*** for more information.

ISBN 978-92-64-76242-8

OECD publishing
www.oecd.org/publishing