The future of work in Latin America and the Caribbean

A great opportunity for the region ?

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1 | Introduction

Will our jobs disappear with the arrival of robots? What should young people study today to be successful in the labor market of tomorrow? How will this technological transformation change how we work? Will it help to tackle the serious issue of informality or on the contrary, will it make it worse? As the importance of the fourth industrial revolution grows, the debate regarding what the labor market will be like in a few years has intensified, and uncertainty is increasing. Through the publication of our series *The Future of Work in Latin America and the Caribbean*, we aim to provide new data that enables reflection on how the region may take advantage of the opportunities and minimize the risks posed by the Fourth Industrial Revolution.

As indicated in this first issue, the future of work will be marked by **two major trends**: the technological tsunami and population aging, as although the myth exists that Latin America and the Caribbean is a young region, the reality is that its population is aging more rapidly than that of the rest of the world. Both trends are of a positive nature (they provide us the opportunity to live longer, abandon more repetitive work, and increase our quality of life) and present a **great opportunity** for the region. However, we must take action to take advantage of this opportunity.

The challenges are numerous. Although technological advances now spread more rapidly than in the past, they reach Latin America and the Caribbean more slowly, as the region is subject to barriers that hinder the absorption of these innovations. On the other hand, the Fourth Industrial Revolution has the potential to destroy employment in some industries and occupations, as well as to increase inequality. Additionally, technology is creating new types of employment relationships that may lead to the precarization of labor. Together with population aging, these types of employment, made possible by the success of the gig economy, pose a risk to the welfare state as we know it.

In any case, **the future of work is not a predefined scenario, but an ongoing reality**. The nature of the future labor market in our region will depend on how we act on all levels, including states, companies and employees. As such, in this initial note, we present the actions or strategies that may be activated to address this as yet uncertain scenario.

The future of work in Latin America and the Caribbean will be marked by two major trends: the technological tsunami and population aging. The nature of the future labor market will depend on how workers, companies, and states act today

2 | Why this?

The future of work has formidable **economic, social, and political repercussions** on a global level and, in particular, for Latin American and Caribbean countries, where it will be an issue of particular significance, given that the region finds itself in a key moment. The decisions made today may change the fate of countries, their workers, and the productive sector as a whole.

Two trends will leave their mark on the future labor market in Latin America and the Caribbean: rapid technological change and population aging. From an economic perspective, both trends may generate changes in economic growth and productivity, increase or reduce inequality, and affect employment and income levels. From a social point of view, they will alter how companies, individuals, and the state interact. In the political sphere, they will require a rethinking of education, vocational training, and the configuration of the welfare state itself, demanding from countries an efficient response to common challenges.

Although work may not be a pleasant activity (it requires us to leave our families and moments of leisure to perform an activity that implies physical or mental effort to obtain an income), it is an essential part of our lives. In fact, almost half of the income in Latin American and Caribbean countries originates from work, and the vast majority of people depend on their work activity to subsist financially. **Furthermore, work goes beyond income: it is a source of integration in society**. As such, our occupation constitutes an important part of our individual identity.

The labor market also constitutes the foundation of a social contract, under which many states have attempted to redistribute income or have organized social security systems to protect against loss of income in cases of old age, illness, or unemployment. Therefore, any change in the labor market may fundamentally alter the organization of society and have a defining impact on our wellbeing.

Any change in the labor market may fundamentally alter the organization of society and have a decisive impact on our wellbeing

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VIDEOS

LATINA AMERICA AND THE CARIBBEAN IN THE FACE OF THE FOURTH INDUSTRIAL REVOLUTION
IS THE FIRST TIME THAT TECHNOLOGY HAS TRANSFORMED THE LABOR MARKET?
POPULATION AGING AND THE FUTURE OF WORK
WHAT WILL HAPPEN TO CONSTRUCTION WORKERS IN THE MACHINE AGE?

AUDIOS

AUTOMATION AND ITS IMPACT ON WORK: WHAT SHOULD WE HIGHLIGHT?
Mafe Polini, Senior Associate of the IDB's Communications Division, interviews **Matías Busso**, Lead Specialist at the IDB's Research Department.

WILL THERE BE MORE INEQUALITY IN THE FUTURE OF WORK?
Laura Ripani, Principal Specialist at the Labor Markets Division, speaks with **Julián Messina,** Lead Specialist at the IDB's Research Department.

HOW WILL THE FUTURE OF WORK LOOK FOR WOMEN?
Anamaría Núñez, Senior Associate of the IDB's Communications Division, interviews **Monserrat Bustelo,** Senior Specialist at the IDB's Gender and Diversity Division. The analysis includes the opinion of **Paul Oyer,** Professor of Economics and Senior Member of the Stanford Institute for Economic Policy Research.

THE GIG ECONOMY AND WORKER PROTECTION
Mariano Bosch, Principal Specialist at the IDB's Labor Markets Division, reflects on the implications of the gig economy's successful incursion for social security in Latin America and the Caribbean. The analysis is complemented by the thoughts of Ivo Correa (Uber) and **Albert Cañigueral** (Ouishare).

3 | What's up?

In the **debate on the future of work**, it is difficult to distinguish real transformations from marginal changes or mere peculiarities. In this first note, we want to facilitate this analysis, which at times can be complex, by describing the main trends and their potential impacts on the labor markets of Latin America and the Caribbean.

The major trends: technology and demographics

Two major underlying trends will affect the future of work globally and in Latin America and the Caribbean: technological changes and population aging. Both trends are in addition to the effects of the globalization of goods and services as well as the potential effects of climate change on the labor market, which are as yet undetermined.

Technology and demographics are two radically different trends. The first receives widespread media coverage, and although it is happening now, its effects are still highly uncertain. Often, technological advances may bring a certain degree of astonishment and optimism regarding human capacity to progress, although they may also be seen as a threat to humanity itself. On the other hand, population aging occurs gradually, although, as indicated below, it is currently progressing more rapidly than normal. Stealthy and inevitable, demographic evolution is transforming the social and economic fabric of countries in the region, even though it does not appear in the news. In that sense, both trends share a common feature: they will cause profound changes in how we work and how societies are organized.

Technology as a disruptive agent

Technological changes have been constant throughout human history. So, **why is so much emphasis given to discussing the future of work now?** What is so different about the current technological revolution compared to those that occurred at the end of the 19th century and start of the 20th century? How does artificial intelligence *blockchain*, 3D printing, the Internet of Things, or robotics compare with the emergence of electricity, sewage, or antibiotics?

Some prestigious economists, such as Robert Gordon[1], believe that the current technological changes are not capable of equaling the impacts (in terms of economic growth and individual well-being) of past inventions. Previous inventions such as the elevator, the washing machine, the refrigerator, heating and air conditioning equipment, motorized vehicles, and water distribution through pipes transformed people's lives and boosted economic growth. In fact, the technologies of the fourth industrial revolution have still not shown the desired (or expected) impacts in terms of greater productivity.

On the other extreme, experts (such as Erik Brynjolfsson[2]) warn that technological changes will have major impacts, although they emphasize that technology alone is not sufficient. This perspective states that the way companies work must be redesigned to obtain all of the benefits that may be derived from new technologies, which must not be seen as a threat but rather as an ally.

The past has shown us that technological changes strongly impact the labor market. If we were writing this in the middle of the 19th century (with a pen and ink), it would be difficult to predict that little more than a century later, more than 90% of agricultural jobs in the United States will have disappeared. In the middle of the 20th century (this time with a typewriter), we would also probably not have believed that in just three decades, between 1950 and 1980, more than half of the jobs in a sector such as manufacturing will have disappeared.

What differentiates the fourth industrial revolution from previous revolutions is the speed of the changes. Those who predict radical alterations in the labor market[3] argue that we live in exponential times, in which everything seems to change more rapidly. For example, the power of microchips doubles every two years. Only two decades have been required from the sale of the first smartphone for more than half of the global population to own one. And social networks such as Facebook and Twitter have needed even less time—just ten years—to make us shift from an interconnected world to an interdependent world.

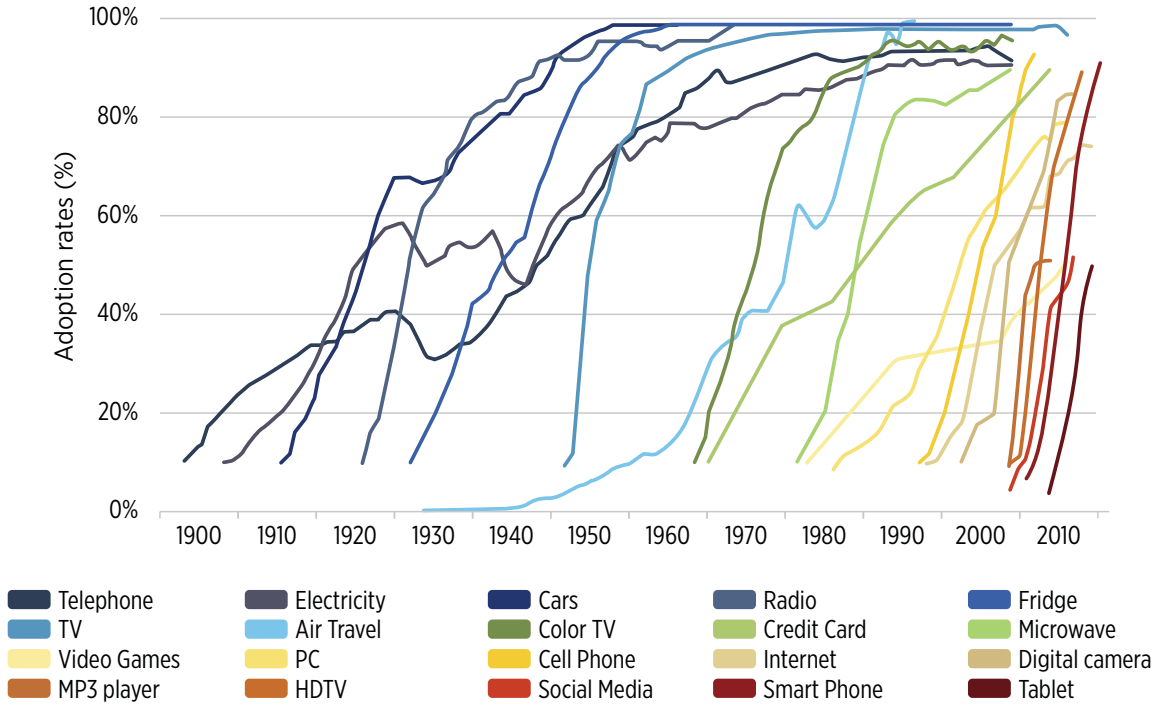
As our capacity to adapt is limited, **these accelerated technological changes may present a problem.** It takes us years to develop new skills and undertake new tasks (sometimes, it is even impossible) and, at the same time, governments move even slower when it comes to exploiting new technologies. This is a relevant consideration, given that evidence shows that the adoption of new technologies is accelerating. This is what we may call a true **technological tsunami**. In the past, adoption may have taken one or several generations, but today it occurs in just a few years.

Accelerated technological changes may represent a problem, as our capacity to adapt is limited

Some major barriers make it difficult for Latin America and the Caribbean to absorb this technological tsunami rapidly. This is because, compared to developed countries, the region does not have the necessary capacities, skills, and infrastructure to fully accommodate this technological revolution. First, the level of preparation among the region's workforce is an obstacle for the adoption of new technologies. However, it is not the only constraint: the lower cost of labor makes incorporating technological innovations less attractive for companies. Additionally, the fact that the majority of companies in the region are SMEs further restricts innovation. For example, according to the Work Skills Survey in Peru[4] (to be published shortly), only 27% of companies have incorporated new technologies, and that percentage falls to just 7% if advanced network services are not considered.

Governments in Latin America and the Caribbean also face limitations, in terms of both financing and technical capacities, in designing and implementing the necessary digital transformations. All of the above is in addition to a clear infrastructure deficit: broadband access, for example, is lower in the region than in developed countries[5].

GRAPH 1. TECHNOLOGY ADOPTION IN THE UNITED STATES SINCE THE 20TH CENTURY



Source: Asymco (2013).

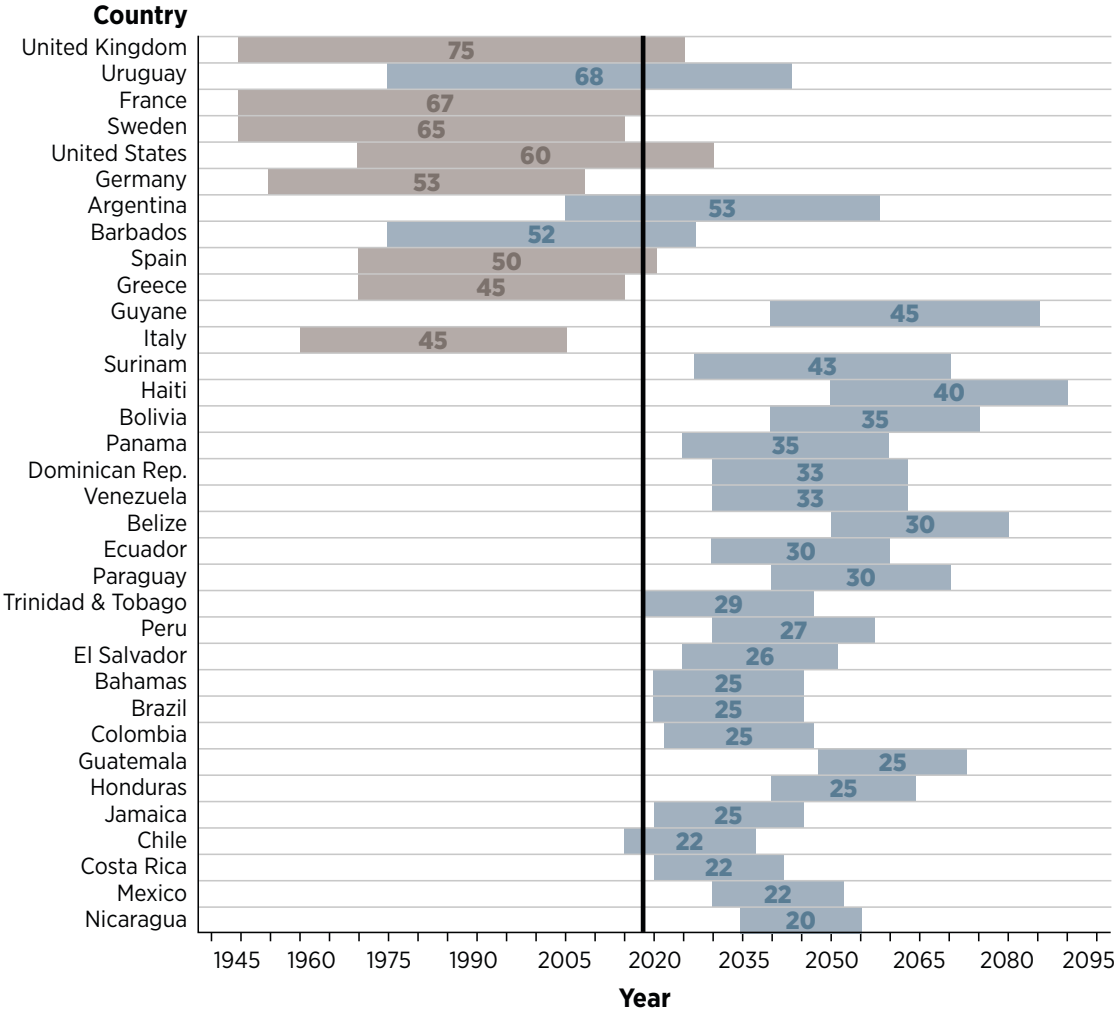
Demographics, slowly but surely

Without making a fuss or attracting headlines, the world is aging, and this is occurring more rapidly in Latin America and the Caribbean than in other regions. Although population aging appears to be gradual, in reality, it is occurring at great speed in demographic terms.

If anything has grown exponentially in recent decades, it has been the population. A demographic explosion took place for the majority of the 19th and 20th centuries, due in large part to medical and healthcare advances in cities. This population increase has been a source of growth, providing economies in the region with a greater percentage of working-age people compared to dependents (children and senior citizens). This low dependency rate (few dependents for each person of working age) is today at its lowest point in the last 100 years. This is what is known as the end of the demographic dividend, and it follows that, starting from now, the region will age very rapidly. Doubling the percentage of senior citizens (from 10% to 20%) took between 50 to 75 years in European countries. In some Latin American and Caribbean countries, this same increase in the percentage of senior citizens will occur in a much shorter period, such as in Nicaragua (20 years) and Mexico (22 years).

Not only will the region see an increase in the number of senior citizens but the percentage of people who reach the "fourth age" will also increase. As the number of senior citizens increases more people will live beyond the third age and will

GRAPH 2. NUMBER OF YEARS REQUIRED FOR PEOPLE OVER 65 YEARS OLD TO INCREASE FROM COMPRISING 10% TO 20% OF THE TOTAL POPULATION

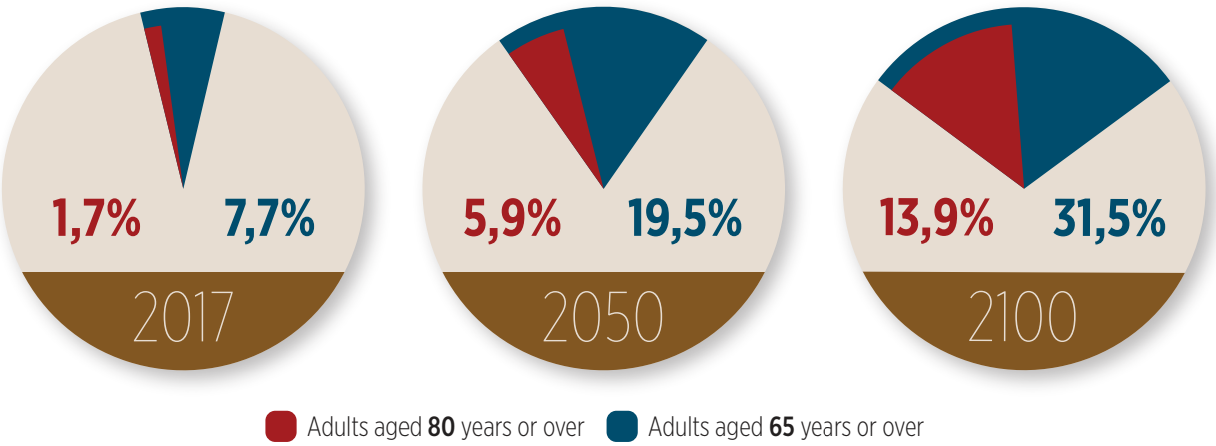


Source: Prepared by the authors with data from the United Nations Population Division (2017).

require additional care. In parallel, the reduction of birth rates will notably reduce family sizes (which traditionally represented a safety net for the well-being of individuals, especially for senior citizens). Faced with this scenario, people will likely have to prolong their active lives and work for more years. This, in turn, implies that labor markets—which today are hostile to workers over 50 years of age—must adapt to provide employment opportunities to this population segment.

The challenge is enormous because Latin American and Caribbean countries are not prepared for aging. Current social security systems are far from fulfilling the duties entrusted to them: their coverage is very limited, pensions are often insufficient, and in the majority of cases, their financial and social sustainability is far from guaranteed. All of these challenges will be difficult to resolve if the high levels of informality that characterize labor markets in the region are not reduced[6].

GRAPH 3. **PERCENTAGE OF SENIOR CITIZENS IN LATIN AMERICA**



Source: Prepared by the authors with data from the United Nations Population Division (2017).

Impacts on the future of work

The fourth industrial revolution is an opportunity that the region cannot afford to let pass. The extent to which this becomes a reality will depend, in part, on how transformational new technologies are and the pace at which governments, companies, and workers can adopt and absorb them. The major promise of all these advances is that they will increase economies' productivity and therefore improve citizens' lives. This will be possible as long as actions are taken to adopt the most promising technologies and that investments are made in people to accompany these changes.

To start understanding the direct effects that these innovations will have on the labor market, it is important to remember that they are not all equal. Some technologies show immediate effects, while others have potential or long-term effects. In practical terms, we can distinguish between technologies that enable tasks carried out by humans to be automated (which we refer to as **automation technologies**) and those that increase the capacity to connect supply with demand (which we refer to as **intermediation technologies**).

The group of automation technologies includes the sometimes-feared robots, information and communication technologies (ICTs), and more recently, artificial intelligence. On the other hand, the group of intermediation technologies includes shared transport platforms (such as Uber and Cabify), digital work platforms (Upwork and Workana), and property rental platforms (Airbnb and Turo). Others, such as 3D printing, *blockchain*, the Internet of Things, and biotechnological innovations may also have the potential to revolutionize many aspects of our lives. However, although we must not lose sight of them, their effects on the labor market are, for now, less direct.

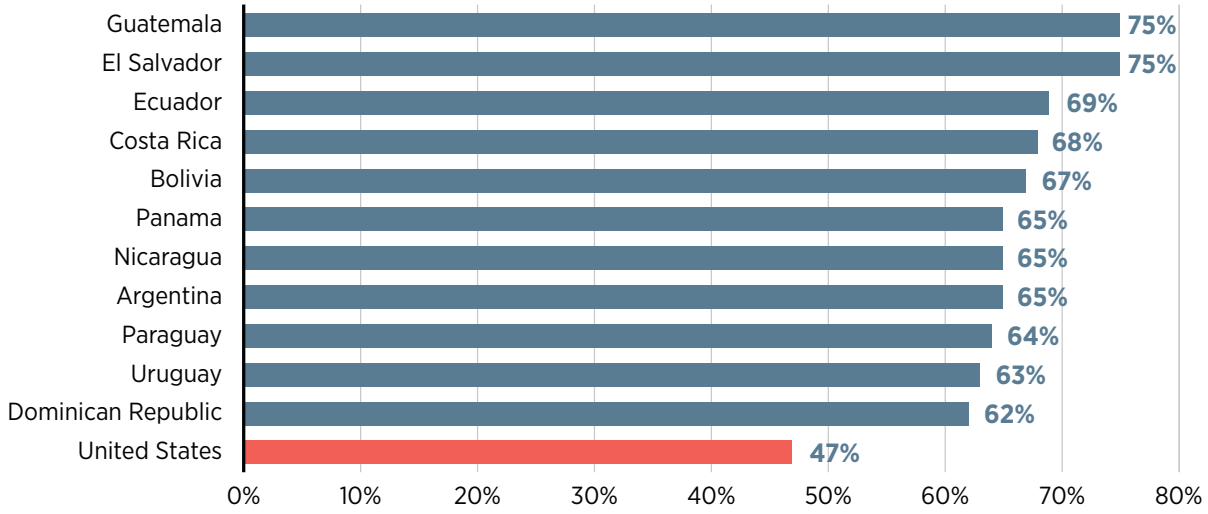
Will automation destroy our jobs?

There is an extensive debate on the effects of automation on the labor market. The mass media and a significant number of studies constantly emphasize the potentially destructive effects of automation technology. This debate intensified in 2013, when research claimed that 47% of jobs in the United States were at risk of being automated over the next 10 or 20 years[7]. Several additional studies using the same methodology offered chilling figures for other countries—more than 50% of jobs globally could be replaced by machines[8]. In the region, for example, between 62% of jobs in the Dominican Republic (the country with the lowest level of impact) and 75% in Guatemala (the country with the highest level of impact) could disappear as a result of automation.

However, it is highly likely that these studies have overestimated the negative impacts of automation on employment in the coming years. One thing is the potential for automation from a technological perspective, and another very different issue is whether, from a financial viewpoint, it really makes sense for businesspeople in Latin America and the Caribbean to replace humans with robots to perform specific tasks. Given that the cost of hiring an employee in many countries within our region is low, purchasing robots to replace workers may not be cost-effective, as indicated in the infovideo in the previous section.

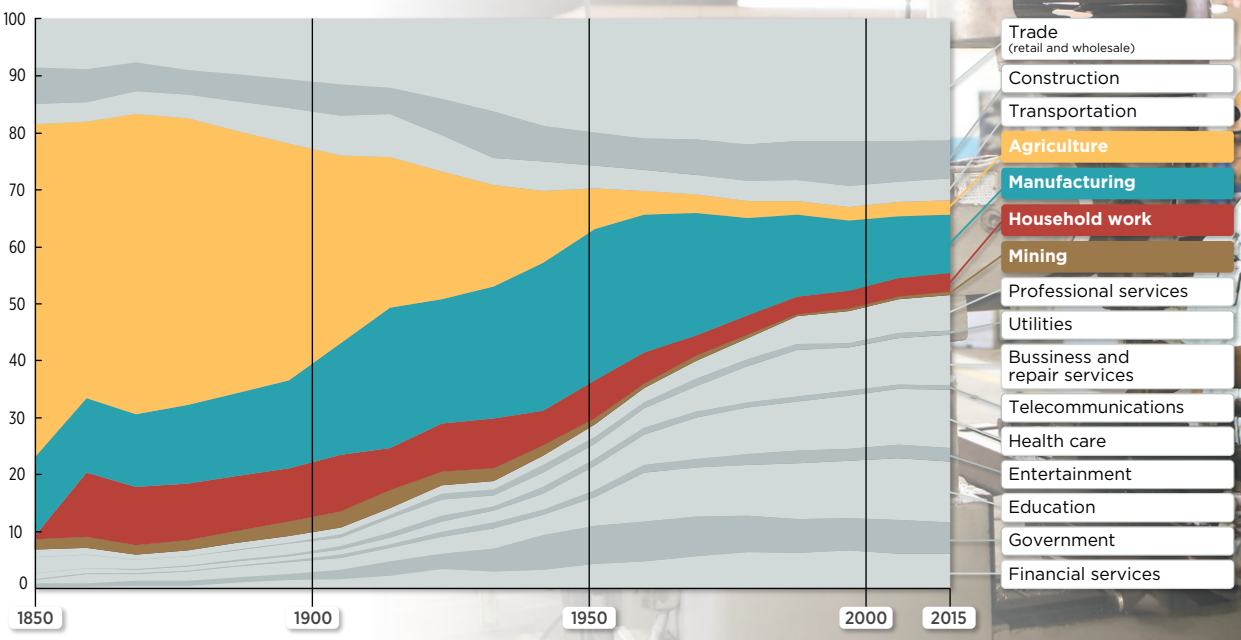
In every industrial revolution, technology replaced tasks that were previously allocated only to workers, but employment did not disappear; rather, it transformed. The graph below shows the evolution of employment in the United States between 1850 and 2015[10].

GRAPH 4. **PERCENTAGE OF WORKERS IN OCCUPATIONS WITH A HIGH RISK OF AUTOMATION**



Source: Inter-American Development Bank (2018)[9].

GRAPH 5. THE EVOLUTION OF EMPLOYMENT IN THE UNITED STATES BETWEEN 1850 AND 2015



Source: McKinsey & Company (2018).

We do not know exactly what will happen in the 21st century, but there is reason to believe that human beings will continue to have jobs. Some studies on the impacts of automation take for granted that it has the potential to destroy entire occupations[11], which is not very likely. If that were the case, then the introduction of ATMs would have resulted in the disappearance of employment for all people who worked as bank tellers. This, as we know, has not happened. In fact, since the introduction of ATMs in 1971, the employment of bank tellers has increased exponentially in the United States, from less than 10,000 employees to more than 400,000 in 2010[12]. Although some tasks that were carried out by bank employees have been automated, such as delivering money to people at the cashier's desk, many other tasks have not been automated, such as underwriting loans or mortgages or settling payments that cannot be made online. The same thing happens in the majority of occupations. Even though a number of tasks may be automated in all jobs, few occupations can be replaced completely by existing technologies. Although it may seem trivial, this distinction between tasks and occupations is essential for the results. Some recent estimates focusing on tasks have generated less dramatic figures for employment destruction. For the United States, the potential impact of automation on employment falls from the aforementioned 47% to just 9%[13].

A recent report[14] identified new occupations that are emerging in companies that use artificial intelligence as part of their production processes. Among others, these jobs include everything from

"trainers" for artificial intelligence systems to "explainers" to communicate the results of these systems and "sustainers" to monitor the performance of the systems, including their adherence to ethical conduct guidelines. None of these occupations existed until a few years ago; their emergence has been due to technology —in this case, artificial intelligence. In fact, the creation of new tasks and occupations was responsible for half of the new jobs created in the United States from 1980 to 2010.

What is certain is that, as yet, very little is known regarding the real impact of technology on employment, when all of its dimensions are taken into account[15]. For now, the few existing studies on this subject to measure the effects of the introduction of robots[16], have found negative effects on employment and/or wages. However, the lack of empirical evidence is noteworthy, especially if we place our focus on the Latin America and Caribbean region. Contributing to filling this void is one of the aims of this series, *The future of work in Latin America and the Caribbean*.

Will inequality increase?

For decades, Latin America and the Caribbean have been characterized as the most unequal region in the world. However, the last boom brought about major progress in reducing inequality [17]. The question now is whether this achievement will be threatened by the fourth industrial revolution or whether, on the contrary, technology will have an equalizing effect and help to close the existing gaps. Will the techno-

logical revolution affect everyone equally? Will there be greater income polarization?[18] Will it affect women more than men? Find out in the audios that we offer below.

What changes will intermediation technologies bring?

Beyond the world of robots, the other major technological trend attracting special attention is the **emergence of digital platforms** that connect citizens to carry out transactions, which we refer to as intermediation technologies. These technologies bring suppliers and buyers of services together, radically reducing transaction costs.

From an aggregate viewpoint, these systems accelerate economic growth, at least in the short-term. The direct effect of this technology is that it contributes to the amount of labor and capital available in the economy. A car that used to be parked for most of the day can now be used as a taxi. An apartment that was not used for half of the year can now become a rental accommodation. Talented individuals who did not have a market for their skills can now offer their services to practically the entire world. Indeed, greater use of capital and labor that were previously idle can have positive effects on countries' economic growth.

What impacts do these technologies have on individuals? On the one hand, they eliminate barriers to accessing work, which may generate employment for people who require a high degree of flexibility in their working hours. Being able to choose where, how, and when to connect may be very attractive for people taking care of young children or senior citizens —tasks for which women have traditionally been responsible. They may also facilitate work among senior citizens or students looking for part-time employment. In the United States, the proportion of female Uber drivers is greater than the proportion of women who drive traditional taxis (14% versus 8%), and the percentage of women who say that they work for Uber because it is a part-time job that enables them to balance employment with family responsibilities is much greater than that of men (42% versus 29%).

On the other hand, by removing transaction costs, together with advances in artificial intelligence, these technologies blur the relationship between worker and company and are leading to the emergence of new work practices that call into question the traditional figure of the salaried employee. Similarly, they facilitate the ability of companies to locate and hire people for specific tasks without the existence of an employment relationship, favoring the rise of the gig economy. For some people, this provides flexibility; for others, however, it entails the end of the protection and security offered by an employment contract.

These new ways of working also involve challenges for social security mechanisms. Traditionally, healthcare and pension systems were designed for salaried employees with specific hours working for a single employer, a framework far from that which has developed through the use of these new technologies.

The number of workers on these platforms is still limited but growing rapidly. Estimates of the percentage of individuals who work via these platforms vary between 3% and 4% for the United States, depending on the definition used (the most extensive definition includes those who receive complementary income and those who sell or rent assets). In the context of independent work in the United States and 15 European countries, 15% of workers (24.3 million individuals) use digital platforms for their job.

What impacts will aging have?

Let's start with the bad news: **an older society grows less**. The mechanism is clear: there are fewer potential workers per citizen, which leads to a slowdown in economic growth. Another major problem, and perhaps one of the most documented findings on population aging, is the pressure it puts on public finances by increasing the costs of healthcare and pensions[19].

However, some demographic forces and technologies may mitigate these negative effects on growth. For example, lower birth rates may increase women's participation in the labor market. Furthermore, smaller families tend to save more, which would lead to greater investment and growth[20].

Aging also stimulates the adoption of technology. The pressures of the demographic transition may accelerate the adoption and implementation of technological advances. The scarcity of workers may lead countries to adopt production methods more geared toward the adoption of technology. Evidence of this mechanism already exists. A study[21] found that automation through robots was most intense in countries where population aging is most pronounced.

But, beyond the macroeconomic effects, population aging will dramatically alter labor markets. In this new scenario, the demand for goods and services will change; primarily, the types of occupations that are most in demand will be modified. These changes will occur to cater to these citizens, as one in four people globally will be older than 60 years of age in 2100. Some examples of occupations that will be increasingly in demand include those in medical services and personal care and attention for senior citizens, which will give rise to job opportunities for those who train to work in these fields.

Employment projections for the United States, prepared by the Bureau of Labor Statistics (BLS), clearly note the influence of these two major trends. Both in percentage and absolute terms, a significant increase in occupations related to care and those related to the use of new technologies has been observed.

The experience of Japan, the country with the oldest population in the world, corroborates this forecast: from 2002 to 2016, the profession that grew the most was healthcare services.

What will happen in Latin America and the Caribbean? Although it is very difficult to precisely predict what the labor market will be like in the future, it is at least possible to analyze trends in the demand for occupations (and skills). This will be the subject of some of the coming installments of our series, in which we will analyze how the region's labor markets are reacting to all these tectonic shifts.

GRAPH 6. MOST RAPIDLY GROWING OCCUPATIONS

OCCUPATION	NUMBER OF NEW JOBS (PROJECTED), 2016-2026	2017 MEDIAN PAY
Personal care aides	777.600	$23.100
Combined food preparation and serving workers, including fast food	579.900	$20.180
Registered nurses	438.100	$70.000
Home health aides	431.200	$23.210
Software developers, applications	255.400	$101.790
Janitors and cleaners, except maids and housekeeping cleaners	236.500	$24.990
General and operations managers	205.200	$100.410
Laborers and freight, stock, and material movers, hand	199.700	$27.040
Medical assistants	183.900	$32.480
Waiters and waitresses	182.500	$20.820
Nursing assistants	173.400	$27.520
Construction laborers	150.400	$34.530
Cooks, restaurant	145.300	$25.180
Accountants and auditors	139.900	$69.350
Market research analysts and marketing specialists	138.300	$63.230
Customer service representatives	136.300	$32.890
Landscaping and groundskeeping workers	135.200	$27.670
Medical secretaries	129.000	$34.610
Management analysts	115.200	$82.450
Maintenance and repair workers, general	112.500	$37.670

GRAPH 6. OCCUPATIONS CREATING MOST NEW JOBS

OCCUPATION	GROWTH RATE, 2016-2026	2017 MEDIAN PAY
Solar photovoltaic installers	105%	$39.490
Wind turbine service technicians	95%	$53.880
Home health aides	47%	$23.210
Personal care aides	39%	$23.100
Physician assistants	37%	$104.860
Nurse practitioners	36%	$103.880
Statisticians	34%	$84.060
Physical therapist assistants	31%	$57.430
Software developers, applications	31%	$101.790
Mathematicians	30%	$103.010
Physical therapist aides	29%	$25.730
Bicycle repairers	29%	$28.390
Medical assistants	29%	$32.480
Genetic counselors	29%	$77.480
Occupational theraphy assistants	29%	$59.310
Information security analysts	28%	$95.510
Physical therapists	28%	$86.850
Operations research analysts	27%	$81.390
Forest fire inspectors and prevention specialits	27%	$37.380
Massage therapists	26%	$39.990

Source: United States Bureau of Labor Statistics (2018).

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AUDIO

THE ROLE OF THE STATE IN THE FUTURE OF WORK

Agustín Cáceres, Specialist at the IDB's Communications Division, interviews **Laura Ripani** and **Carmen Pagés**, Principal Specialist and Chief of the IDB's Labor Markets Division, respectively.

4 | What's new?

Can some effects of the fourth industrial revolution already be observed in Latin America and the Caribbean? Is salaried employment suffering due to the existence of intermediation platforms? It is probably too early to observe the effects of either of the two major trends on the future of work in Latin America and the Caribbean (especially the effects of population aging, whose consequences will be observed more gradually). Now, **what happens if we look backwards?**

In the last three decades, we have doubtlessly lived through a period of accelerated technological advances (e.g., the widespread distribution of computers, the emergence of the Internet, the appearance of cell phones, the decoding of the human genome). As such, it is worth asking whether this has modified any aspects of the region's labor market. To find out, we will take a snapshot of the labor markets in three large economies: Brazil, Chile, and Mexico.

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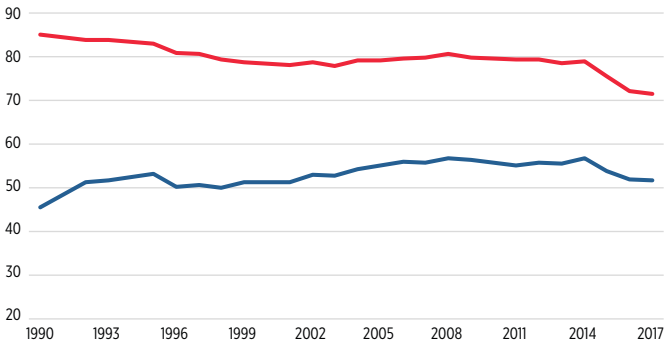
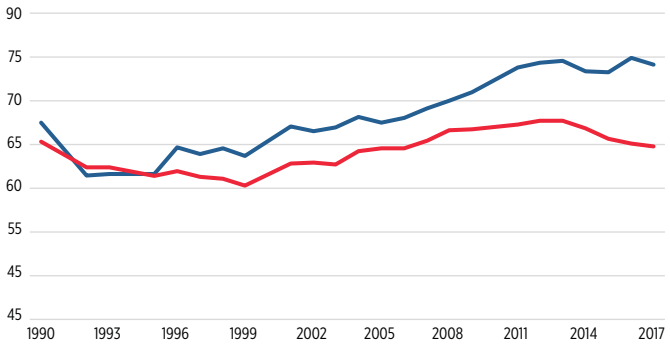
GRAPH 7. HOW WORK HAS EVOLVED IN BRAZIL, CHILE, AND MEXICO

BRAZIL

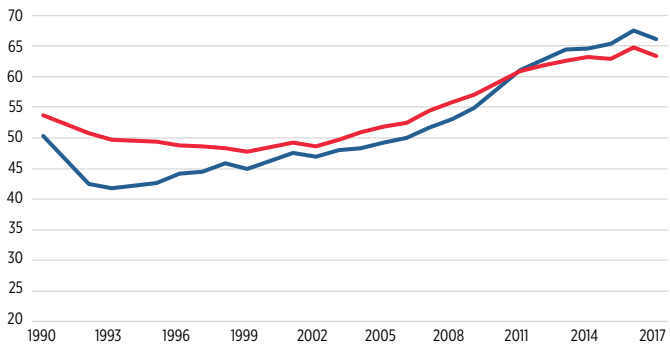
Employment rate
(Share of working age population)



Salaried employment rate
(Percentage of total employment)

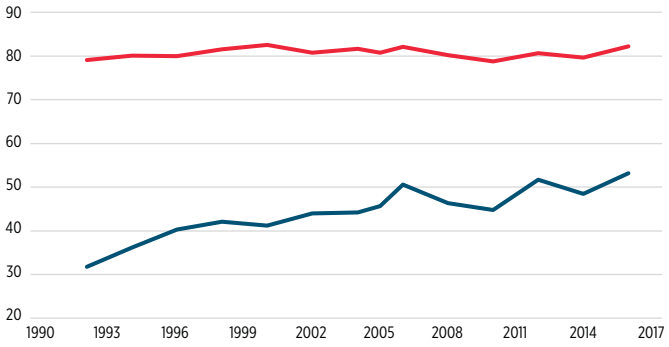


Formal employment rate
(Percentage of total employment)

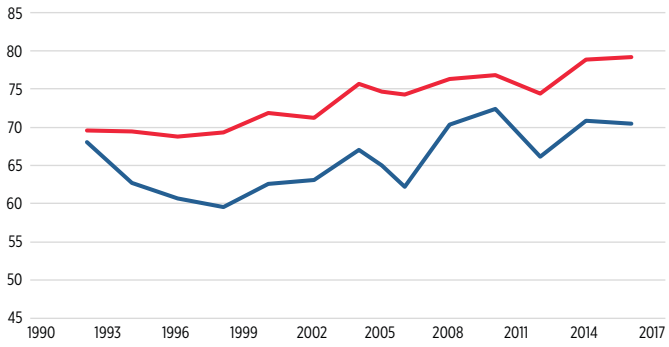


MEXICO

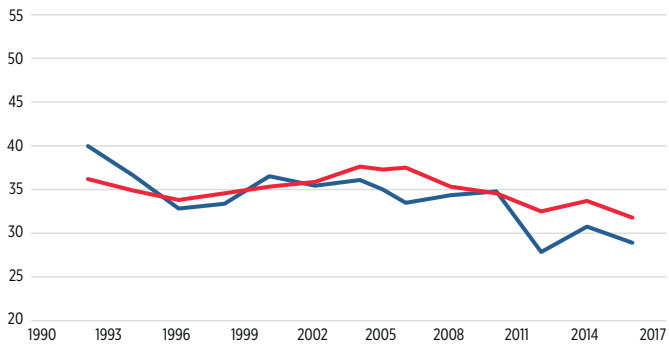
Employment rate
(Share of working age population)



Salaried employment rate
(Percentage of total employment)



Formal employment rate
(Percentage of total employment)

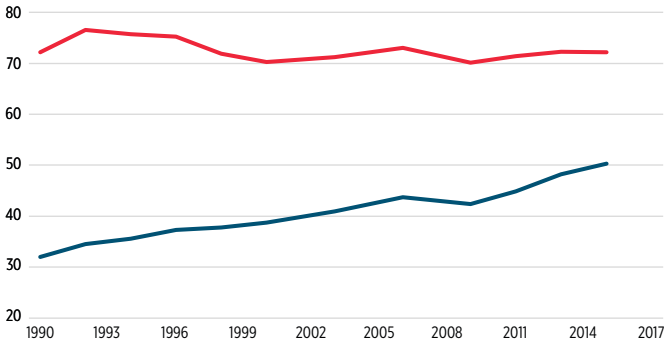


Source: Inter-American Development Bank (2018).

CHILE

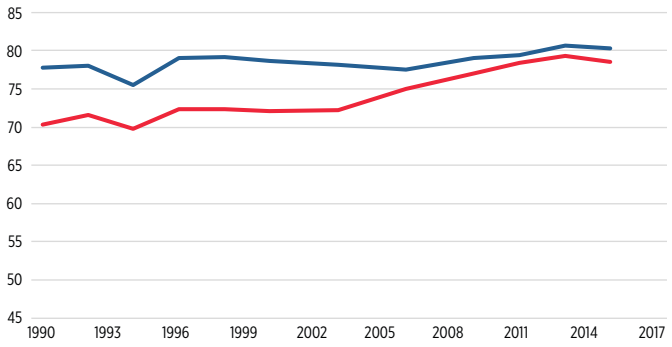
Employment rate

(Share of working age population)



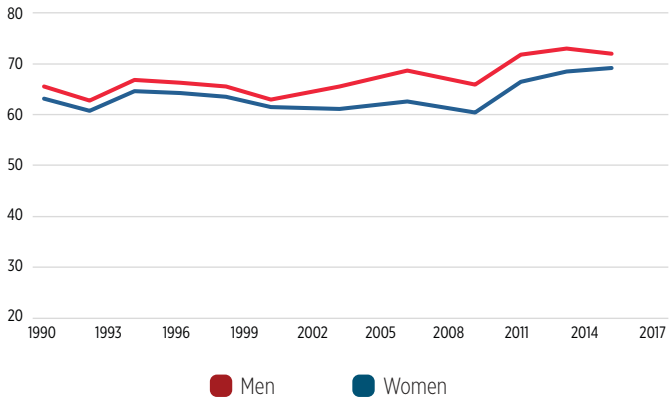
Salaried employment rate

(Percentage of total employment)



Formal employment rate

(Percentage of total employment)



Source: Inter-American Development Bank (2018).

Total employment grew gradually. In the last three decades, the percentages of working-age population in employment in these three countries increased by between 2 and 9 percentage points (with a decrease in Brazil, as a result of the recession in 2014–2015). This trend is primarily explained by the incorporation of women into the labor market, which increased by close to 20 percentage points in Chile and Mexico, and 10 percentage points in Brazil. In fact, this increase in participation, particularly among women, was one of the main drivers of economic growth in the region in recent decades.

In addition to the increase in total employment, the percentage of workers with an employment contract also increased (especially among men in Chile and Mexico, and women in Brazil). However, this did not necessarily lead to an increase in the number of formal sector jobs, which includes making pension contributions. This continues to be one of the major **pending challenges** for labor markets in the region, where most jobs are in the informal sector. While the percentage of jobs in Chile with access to social security grew slightly over the period, much formal employment was generated in Brazil (after a very poor decade in the 1990s), and Mexico was unable to translate the increases in salaried employment into more formal employment.

In these three decades, countries in the region continued their transition toward becoming **service economies**. Between 1990 and 2017, the percentage of jobs in the agriculture sector fell by 6.7 percentage points in Brazil, 6.1 percentage points in Mexico, and 5.5 percentage points in Chile. In Chile and Brazil (and to a lesser extent in Mexico), there was a clear decrease in jobs associated with manufacturing (at 3.1, 4.9, and 0.5 percentage points, respectively).

On the other side of the spectrum are occupations associated with the service sector, which generat-

ed the most jobs. As such, the occupations that account for the greatest increases, as percentages of total employed workers, include those related to providing relatively low-paid services: food preparation and services (2.8 percentage points in Mexico and 1.4 percentage points in Chile) and cleaning staff (1.9 percentage points in Mexico, 1.4 percentage points in Chile, and 0.8 percentage points in Brazil).

Clear indications show that occupations related to the technological and demographic transition are also increasing their weight in the economy. Demand for computer technicians is the second fastest growing among all occupations in Chile (1.6 percentage points) and is also showing substantial increases in Brazil and Mexico (1.1 and 0.5 percentage points, respectively). Similarly, occupations associated with the care of senior citizens and children also increased in weight in these three economies (1.2 percentage points in Brazil, 0.7 percentage points in Chile, and 0.6 percentage points in Mexico).

To better understand these revealing trends, we now have a new ally: big data. In addition to

GRAPH 8. INCREASES/DECREASES IN OCCUPATION TYPES

BRAZIL

CHANGES IN THE PROPORTION OF EMPLOYED INDIVIDUALS (%)		WORKERS (thousands) 1990	WORKERS (thousands) 2015	MEDIAN WAGE (US$ per hour) en 2015
Construction Workers	2,8%	2.991	7.459	$1,9
Administrative Staff	2,1%	4.499	9.266	$2,1
Business Operations and Financial Specialists	1,8%	1.049	3.348	$4,8
Education Specialist	1,3%	1.863	4.250	$4,2
Personal Care	1,2%	6.826	12.306	$1,6
Computing, Mathematics, and Physical Sciences Specialist	1,1%	143	1.200	$2,3
Security Services	0,9%	819	2.149	$2,2
Cleaning and Maintenance Staff	0,8%	1.995	4.013	$1,5
Trains, Airplanes, Ships	0,7%	611	1.672	$1,8
Transportation Staff: Taxi, Bus, Trucks	0,7%	1.765	3.501	$2,4
Artists	0,4%	532	1.260	$2,7
Food Preparation and Services	0,4%	472	1.101	$1,7
Biological Sciences Technicians	0,3%	575	1.209	$2,6
Physical Sciences Technicians	0,3%	505	1.093	$3,0
Installation, Maintenance and Repair Workers	0,2%	2.322	4.013	$2,4
Commerce Personnel	-1,0%	5.968	8.930	$1,7
Other	-1,6%	1.418	912	$5,6
Managers/Directors	-2,3%	4.001	4.497	$4,5
Production Personnel (Manufacturing)	-4,9%	5.489	4.593	$1,7
Agriculture, Fisheries and Forestry Personnel	-6,7%	10.505	11.140	$1,3

Source: Inter-American Development Bank (2018).

traditional sources of information, big data is increasingly useful and, in the case of Latin America and the Caribbean, represents an excellent opportunity to better understand what is happening in the labor market. For example, labor intermediation platforms capture a wealth of information on job seekers (what jobs they have as well as their qualifications and skills), and exactly what employers are looking for. This type of data has multiple advantages. First, it provides great detail on what types of jobs are being generated in the labor market, in real-time. It also gives us an idea about what skills those jobs require. However, the disadvantage is also clear: these data sources only represent the set of workers who are users of these platforms.

These advantages and disadvantages are revealed upon studying the jobs created (and reported) on LinkedIn during the last 10 years in Brazil, Chile, and Mexico. As expected, LinkedIn data is unable to capture the decrease in demand for agricultural occupations in any of these countries. However, this source of information opens a unique window for understanding what is happening within occupations with a strong emphasis on digital skills.

MEXICO

CHANGES IN THE PROPORTION OF EMPLOYED INDIVIDUALS (%)		WORKERS (thousands) 1992	WORKERS (thousands) 2016	MEDIAN WAGE (US$ per hour) en 2016
Food Preparation and Services	2,8%	2.014	3.434	$1,0
Cleaning and Maintenance Staff	1,9%	3.079	3.947	$1,1
Commerce Personnel	1,1%	7.274	7.551	$1,0
Business Operations and Financial Specialists	0,9%	907	1.339	$2,4
Other	0,8%	512	898	$1,0
Education Specialist	0,7%	1.487	1.774	$3,6
Personal Care	0,6%	447	765	$0,8
Computing, Mathematics, and Physical Sciences Specialist	0,5%	308	558	$3,3
Health Technicians	0,3%	545	676	$2,3
Transportation Staff: Taxi, Bus, Trucks	0,3%	2.377	2.427	$1,2
Artistas	0,1%	514	557	$2,4
Security Services	0,1%	1.268	1.254	$1,2
Managers/Directors	-0,5%	2.441	2.079	$3,3
Production Personnel (Manufacturing)	-0,5%	9.193	8.525	$1,1
Installation, Maintenance and Repair Workers	-0,7%	2.000	1.529	$1,7
Construction Sector Workers	-1,0%	4.180	3.486	$1,1
Physical Sciences Technicians	-1,0%	752	167	$2,1
Administrative Staff	-1,2%	4.228	3.432	$1,6
Agriculture, Fisheries and Forestry Personnel	-6,1%	10.632	6.950	$0,6

Source: Inter-American Development Bank (2018).

CHILE

CHANGES IN THE PROPORTION OF EMPLOYED INDIVIDUALS (%)		WORKERS (thousands) 1990	WORKERS (thousands) 2015	MEDIAN WAGE (US$ per hour) en 2015
Cleaning and Maintenance Staff	1,9%	82	248	$2,0
Computing, Mathematics, and Physical Sciences Specialist	1,6%	92	239	$7,9
Food Preparation and Services	1,4%	112	258	$2,0
Administrative Staff	1,1%	595	904	$2,8
Health Technician	1,0%	46	136	$3,2
Education Specialist	0,7%	203	334	$5,2
Personal Care	0,7%	115	208	$2,2
Security Services	0,6%	130	227	$2,5
Artists	0,5%	44	100	$3,7
Business Operations and Financial Specialists	0,4%	112	184	$5,5
Customer Services	0,2%	28	52	$2,4
Physical Sciences Technicians	0,1%	57	89	$4,3
Health Professionals	0,1%	48	71	$7,9
Commerce Personnel	-0,1%	575	795	$2,2
Construction Sector Personnel	-0,1%	484	663	$2,4
Installation, Maintenance and Repair Workers	-0,2%	158	207	$2,8
Transportation Staff: Taxi, Bus, Trucks	-0,3%	276	364	$2,8
Managers/Workers	-0,3%	259	340	$3,4
Other	-1,3%	299	326	$2,1
Production Personnel (Manufacturing)	-3,1%	578	584	$2,4
Agriculture, Fisheries and Forestry Personnel	-5,5%	703	590	$1,9

Source: Inter-American Development Bank (2018).

In line with aggregate data, occupations such as software development are increasingly in demand. It is therefore unsurprising that skills such as Web development and digital tools are the most highly demanded among new recruits. However, not all jobs oriented toward technological development are growing. Among the occupations that are contracting the most are IT consultants, specialists, and managers[22], in line with the trend of automating significant parts of these occupations.

This data, beyond being striking, may provide the first clues as to where demand for occupations and skills is headed. In any case, the effects of the fourth industrial revolution remain to be seen, as do the effects of population aging, whose impact on the labor market will be somewhat slower but progressive. How the region responds to these trends will be key to shaping the future of work in Latin America and the Caribbean.

GRAPH 9. INCREASES/DECREASES IN RECRUITS BY OCCUPATION TYPE

Source: Amaral et al. (2018).

How to address these challenges?

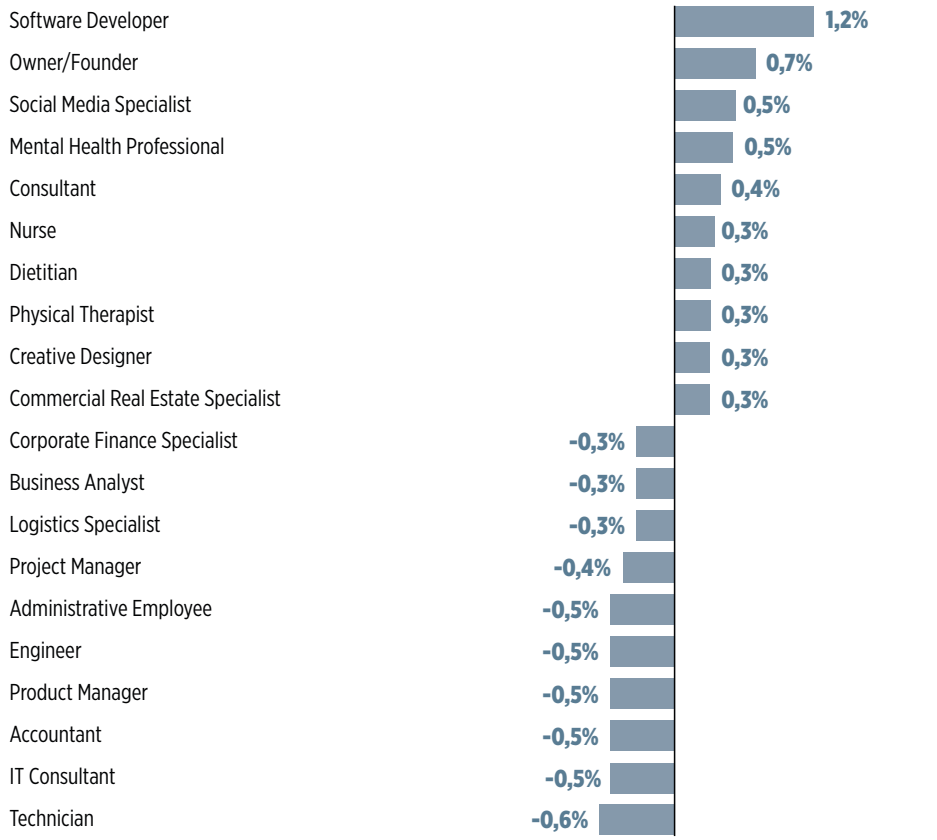
As the assessment becomes more complete, the need to act rapidly becomes increasingly clear. What actions could be implemented to take advantage of the opportunities and minimize the risks of the fourth industrial revolution? The major changes that are required can be posed on three levels: the state, company, and individual levels.

The state must undertake major transformations, which will arise from the technological and demographic transitions. Technology generates adaptation challenges (for example, due to the need to adjust regulations and labor laws to this new environment); modernization challenges, when it comes to incorporating technological advances for more efficient provision of services; and risk-mitigation challenges (for example, aiming to reduce the costs that this transformation has on companies and workers).

Demographics also entail significant dilemmas for the state. In addition to increasing fiscal pressure, the implementation of new technologies may break the foundations of the current welfare

CHILE

CHANGES IN HIRED INDIVIDUALS (%)



Source: Amaral et al. (2018).

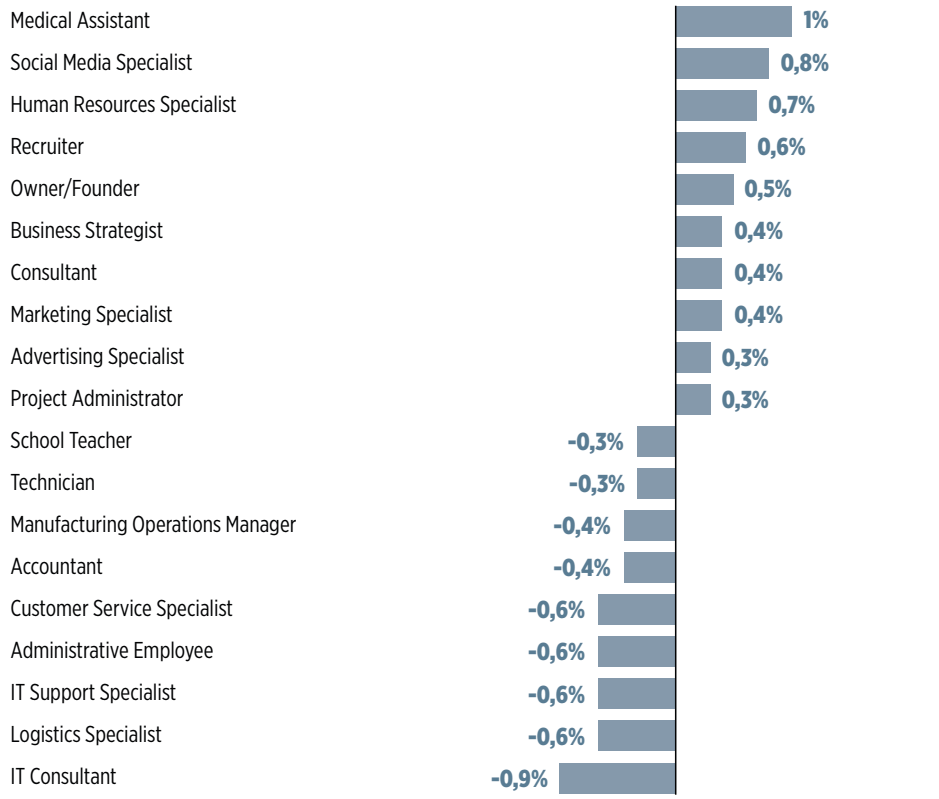
state, as it dilutes the traditional relationship between companies and workers. In this case, there is a risk that the number of contributors to social security systems will decrease, which is already meager in some countries in the region.

To take advantage of the opportunities provided by the fourth industrial revolution, **the state must leave behind its traditional role** in the labor sphere and adopt a new role, in accordance with the challenges posed.

Companies must also undertake a significant transformation to continue being competitive in this rapidly changing environment. Aside from making appropriate investments in technology, they must seek and hire staff who are capable of catalyzing innovations in products and processes. These change processes will imply a shift in the allocation of tasks between people and machines, which will require new skills. Together with the above, the increasing availability of on-demand work platforms will also enable a changing allocation of tasks between workers who are physically present in the company and the transfer of tasks to others who are hired through such platforms. In this process, it will be necessary to address some of the biases against workers that have existed in the labor market for

MEXICO

CHANGES IN HIRED INDIVIDUALS (%)



Source: Amaral et al. (2018).

more than 50 years, in part out of necessity, due to the lower availability of young people in such a market. Similarly, companies cannot simply be consumers of human capital. Given their privileged position as key players in this change and their knowledge of the skill requirements that this implies, companies must actively participate in identifying the required skills, together with the education and training sector, and partaking in public–private partnerships to collaborate in training to close skills gaps, such as by providing training spaces in the workplace through apprenticeship contracts[23].

To take advantage of the opportunities of the fourth industrial revolution, the state must leave behind its traditional role and adopt a new one, in line with the challenges posed

Finally, individuals must engage in continuous learning. If we want to take advantage of this new industrial revolution's potential, we must adapt, learn how to learn, and continuously refresh our knowledge. Studying only at school is not a viable solution, as the demand for skills is changing increasingly rapidly. Fortunately, increasing resources are available online to access knowledge. We must find the time and willingness (which is not always easy) to continue training ourselves, both in new technologies and in our soft skills. Furthermore, given that we are living for much longer, another transformation that we must address is the need to work for more years than our parents (possibly part-time and possibly using some of the opportunities provided by new technologies) to have a dignified old age.

Enough signals guarantee that the future of work, one way or another, will put us to the test. Faced with this reality, the worst response would be to do nothing and let the fourth industrial revolution hit the region head-on without anybody having taken action to better prepare institutions, companies, and workers. Revealing the future of work and understanding in greater detail the magnitude and nuances of the challenge that we are facing would be the best course of action. For this reason, throughout this series, we will attempt to shed light on some gray areas of the future of work and respond to the most pressing questions. On the receiving end of this text and our videos, audios, and graphs, we trust that there are committed readers who are willing to activate the changes that the region needs to ensure its success in the future of work.

If we want to take advantage of the potential of this new industrial revolution, we must adapt, learn how to learn, and continuously refresh our knowledge

5 | What next?

In the coming notes in this series, we will provide new data and evidence on three main aspects of the future of work in Latin America and the Caribbean:

1. **What are the main trends in the region, and how do they manifest themselves?**
2. **What impacts will these trends have?**
3. **What types of solutions can be designed from the perspectives of the state, the private sector, and individuals to address the challenges of the fourth industrial revolution?**

Some of the questions that we will examine in our notes include:

How will the education and healthcare professions evolve?

What are the emerging occupations and skills demands in the new labor market?

What impact will automation have on employment?

What are the opportunities and threats of the gig economy?

How can lifelong learning systems be built?

What will the future of work be like for women?

What will the new welfare state be like?

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OUR NEXT ISSUE

How will occupations in education and health evolve ?

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