The era of platforms and the development of data marketplaces in a free competition environment

Filipe Da Silva
Georgina Núñez

UNITED NATIONS

ECLAC

Thank you for your interest in this ECLAC publication

Please register if you would like to receive information on our editorial products and activities. When you register, you may specify your particular areas of interest and you will gain access to our products in other formats.

Register

UNITED NATIONS

ECLAC

www.cepal.org/en/publications

facebook.com/publicacionesdelacepal

www.cepal.org/apps

Project Documents

The era of platforms and the development of data marketplaces in a free competition environment

Filipe Da Silva
Georgina Núñez

UNITED NATIONS

ECLAC

This document was prepared by Filipe Da Silva, Consultant with the Division of Production, Productivity and Management of the Economic Commission for Latin America and the Caribbean (ECLAC), and Georgina Núñez, Economic Affairs Officer with the same Division.

The authors are grateful to Ignacio Navarro, expert on competition policy, and Pedro Isaac Alcalá, Director of the Digital Markets Unit of the Federal Commission on Economic Competition (COFECE) of Mexico, for their comments during the final review of the document.

United Nations publication
LC/TS.2021/173
Distribution: L

Printed at United Nations, Santiago
S.21-00763

This publication should be cited as: F. Da Silva and G. Núñez, "The era of platforms and the development of data marketplaces in a free competition environment", *Project Documents* (LC/TS.2021/173), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC), 2022.

Contents

Tables

Figures

Boxes

Diagrams

Summary

The data economy has presented challenges that go far beyond the scope of traditional regulatory frameworks and competition policies. The role of data, digitalization and the dynamic those factors have imposed on the economy have created significant challenges for regulatory authorities. At the heart of the debate is the impact of digitally-enabled business models and the digital platforms themselves. In this context, smaller enterprises or start-ups may suffer certain effects as a result of data concentrations by these platforms or even predatory acquisitions.

The digitalization of the economy, the digitally-enabled business model and the intensive use of data are also giving rise to opportunities for enterprises and governments. The creation of data marketplaces and the elimination of barriers to the free flow of data could boost innovation and productivity throughout the economy. Understanding the role of data and finding ways of pricing them transparently are therefore essential to generating dynamic data marketplaces that support interoperability and value creation.

Introduction

While a nearshoring wave and deglobalization of value chains are emphasized in international trade literature, globalization has, in fact, been expanded and boosted by flows of data and information (Lund and Bughin, 2019). Central to this "data globalization" process is the rise of digitally-enabled business models, which have eliminated the barriers of geolocation and information exchange in the trade of goods and services, as well as in relationships. According to the World Economic Forum (2018), by 2025, the revolution in B2B digital platforms alone could already be worth US$ 10 billion in added value owing to digitalization and the impact of its business models in different sectors.

Internet-based services have given rise to a transformation in the way that supply meets demand, which has only been possible because of the dissemination of information and communication technology. More recently, digital platforms, conglomerates and ecosystems have emerged at the heart of this transformation and have been able to change the dynamic of innovation, economic growth, and market competition. Platforms currently feature among the entities with the 10 highest market values[1] including traditional and non-traditional industries (see table 1). This is due to the ease with which these enterprises acquire market power through economies of scale, network effects and technology price dynamics.

Digital platforms are considered "native" to the Internet and the digital era, being designed from the start to benefit from network effects, improved global connectivity and the mass use of data. However, traditional industry is already known as digitized industry as it recognizes that digitalization is imminent and necessary for its survival. Beyond digitalization, many enterprises acknowledge that the digitally-enabled business model is a means of surviving and making the most of societal trends, such as data marketplaces. In this context, many start-ups and disruptive companies have adopted the digitally-enabled model as a way of entering markets. At the same time, this new economy and society are highly dependent on a good data flow, and the harmonization of regulations on protection and flow of data is emerging as a potential means of achieving efficiency in this area.

[1] According to the World Bank (2018), in the Russian Federation, the income from digital platforms already exceeds US$ 17 billion, representing 1% of Russian GDP.

Table 1
Platform dominance
(Billions)

2000				December 2010				March 2021			
Company	**Country**	**Sector**	**$**	**Company**	**Country**	**Sector**	**$**	**Company**	**Country**	**Sector**	**$**
Microsoft	United States	Software	588	Exxon Mobil	United States	Oil and gas	369	Apple Inc	United States	Platform	2051
General Electric	United States	Holding	475	PetroChina	China	Oil and gas	303	Microsoft	United States	Software	1778
NTT DoCoMo	Japan	Telecom	366	Apple	United States	Platform	296	Amazon Inc.	United States	Platform	1558
Cisco Systems	United States	Technology	349	Microsoft Corp.	United States	Software	239	Alphabet Inc.	United States	Platform	1393
Wal-Mart Stores Inc.	United States	Trade	286	ICBC Ltd.	China	Finance	233	Facebook Inc.	United States	Platform	839
Intel Corp.	United States	Technology	277	Petrobras	Brazil	Oil and gas	229	Tencent	China	Technology	753
NTT	Japan	Telecom	275	China Construction B.	China	Finance	222	Tesla Inc.	United States	Automotive	641
Exxon Mobil	United States	Oil and gas	266	Royal Dutch Shell	Netherlands	Oil and gas	208	Alibaba Group	China	Platform	615
Lucent Technologies	United States	Telecom	238	Nestlé	Switzerland	Manufacturing	203	Berkshire Hathaway	United States	Finance	588
Deutsche Telekom	Germany	Telecom	210	China Mobile Ltd.	China	Telecom	199	TSMC	Taiwan	Hardware	534

Source: Prepared by the authors, on the basis of data from Bloomberg.

In terms of the regulation and efficiency of the economy, closing digital divides and tax differentials between traditional enterprises and platforms is a major challenge that requires multilateral efforts between countries, as digital enterprises have benefited from regulatory issues and gaps owing to the innovative content of their business models. On the other hand, the complexity of the digital economy highlights the need to develop regulations that, while encouraging the prompt launch of new initiatives such as data marketplaces, protect user privacy and promote the development of companies that use the digitally-enabled model, while taking sectoral, regional and international inequalities into account. In this regard, it is urgent for regulators to understand the mechanism behind platforms and their business models in order to address the related risks and opportunities.

In the following section, we will discuss the types of digital platform and the impact of their business models on the economy in general and on the acceleration of digitalization. The third section presents the way in which countries in the region and around the world have tackled the challenges of regulating platforms. The fourth section concerns the emerging concept of data marketplaces, which raises the issue of the importance of data flows to the development of data marketplaces. The fifth section is focused on the need to price databases as a transparency mechanism for the market and as an incentive to promote data exchange. The last section lays out a number of conclusions.

I. Platforms and their business model

According to Parker, Van Alstyne and Choudary (2016), the overall purpose of a platform is to "look for matches or alignments between users and facilitate the exchange of goods, services or social capital, which enables the creation of value for all participants". Users are able to take advantage of the platforms by enjoying reductions in transactions costs, while enterprises benefit from the networks created by platforms.

Ruggieri and others (2018) argue that a platform[2] or business platform, is "an architecture, based on hardware and software, that functions as an organized hub in an ecosystem (see box 1) and with network effects, resources, transactions and relationships between individuals and various actors as consumer-users, professionals, enterprises, institutions, trading partners, etc. to co-create value". Traditional enterprises and platforms differ in how they utilize income. In the first case, enterprises work with a philosophy characterized by its "outward" approach. Platforms, for their part, have an "inward" model as a determinant of their success, i.e. they act by fostering the relationships established within their spaces of interaction. As a result, a platform operates by facilitating and promoting complex interactions between variety of users (e. g. producers and consumers), and thereby creating value.

[2] A digital platform is "a technological architecture that allows the development of its own IT functions and enables organizations to integrate the available technological platforms for information, computing and connectivity" (Sedera and others, xcz016; p. 367).

Box 1
Main platform concepts

- Digital platform: A digital platform is a technology-enabled business model that creates value by facilitating exchanges between two or more interdependent groups (ECLAC, 2018). Transactional platforms, for example, connect users with producers, facilitate transactions and enable enterprises to share information to strengthen collaboration or innovation in products and services. Non-transactional platforms, such as Facebook and Instagram, meanwhile, connect individuals and sponsors with a shared objective. Platforms are built around shared and interoperable infrastructure, are data-intensive and are characterized by interactions between different groups of users.
- Digital ecosystem: Gartner (2017) defines a digital ecosystem as an interdependent group of actors (enterprises, people and things) that share standardized digital platforms to achieve a mutually beneficial purpose. For example, Amazon has 43 companies within its digital ecosystem.

  Meyer (2019) identifies six categories of digital platforms in accordance with their purpose (figure 1): (i) marketplace; (ii) search; (iii) repository; (iv) communication; (v) community; and (vi) payment.

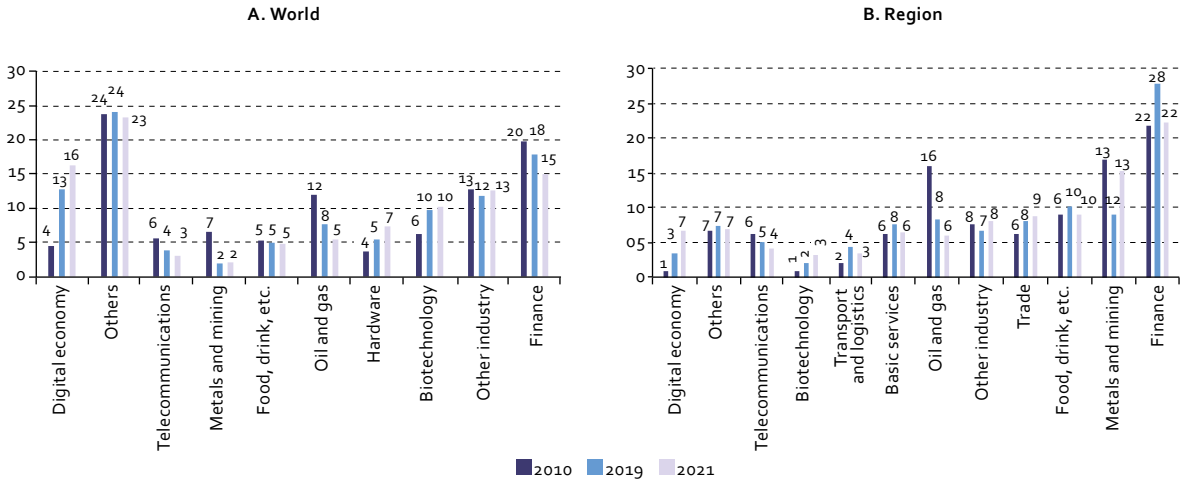
Figure 1
Digital platform categories

Source: R. Meyer, "Meyer's Management Models -episode 2: 'Digital Platform Map'", 2019 [online] https://blog.antwerpmanagementschool.be/en/ron-meyer-episode-digital-platform-map.

Source: Prepared by the authors, on the basis of Gartner, *Insights from the 2017 CIO Agenda Report: Seize the Digital Ecosystem Opportunity*, 2017; Economic Commission for Latin America and the Caribbean (ECLAC), *Data, algorithms and policies: redefining the digital world* (LC/CMSI.6/4), Santiago, 2018 and R. Meyer, "Meyer's Management Models -episode 2: 'Digital Platform Map'", 2019 [online] https://blog.antwerpmanagementschool.be/en/ron-meyer-episode-digital-platform-map.

The success of business models native to the digital economy, in particular digital platforms, is reflected in its significance and value in the global and regional markets spectrum. Figure 1 shows the reduced participation of traditional industries, such as the oil, mining and telecommunications industries, in the value of the market; those industries were previously known for having the companies with the world's highest market value. However, a significant growth in the digital economy is clearly visible from 2010 onwards. Of the ten biggest companies in the world, five are digital platforms and eight belong to the technology industry (see box 1).

Figure 2
Sectoral participation in market value globally and within Latin America[a]
(Percentages)



Source: Prepared by the authors, on the basis of data and classification from Bloomberg.
This figure uses a concordance between the Bloomberg ranking and ISIC Rev 4.

Industry participation in regional markets has followed the same trend as global industry participation.

According to Parker, Van Alstyne and Choudary (2016), the reasons for the success of the digitally-enabled business model are as follows:

- Platforms turn the traditional firm on its head – instead of focusing on the production of internal content, these enterprises promote the creation of content by users (people-to-people, people-with-machines, machines-to-machines). The rigid structure of the firm is therefore disappearing.
- Elimination of gatekeepers – enterprises have traditionally used slow internal processes to select strategies, products and so on, whereas platforms use an automatic and scalable community-based feedback mechanism to do so (through algorithms). An example of a gatekeeper is an editor who selects the best books to put on the front page of a website. This process is now done using algorithms and feedback, which enables economies of scale to be made and attention to be paid to market demands.
- New sources of value creation and supply – the idea of ownership, intensive use of capital and tangible assets restrict the growth of traditional industry compared to platforms.[3]
- Data-driven business – traditional industry uses agents and supervisors, among others, to control quality, whereas platforms use data-driven tools to carry out that task.

Another feature to be highlighted, which is product of the intensive use of data by digital platforms, is the possibility of price discrimination. Despite not being considered harmful per se, this is a strategy used to extract the greatest possible benefit from the consumer and requires significant information about the target audience. In the case of digital platforms, the use of Big Data makes it possible to implement such strategies successfully. Platforms have access to an immense amount of information about consumers through access to their browser histories, IP addresses, previous purchases, cookies and more, without needing to rely on physical shops, which enables them to work with higher net prices for those that have higher reserve prices and lower elasticity of demand.

[3] A network of hotels needs to build a new hotel and hire employees to cater to increased demand; a company like Airbnb can already increase its supply as long as there are rooms available in apartments around the world.

The digitally-enabled model has changed the way that enterprises generate income and the structure of value chains. Traditional enterprises use linear value chains, from producer to consumer, i.e. a straight line that involves research and development (R&D), product creation, marketing and commercialization. The digitally-enabled model encourages a complex interaction between producers, consumers and the platform itself, with each of these participants able to play a different role at a given time. Individuals, platforms and enterprises can thereby offer or contract services; during this process, they exchange, consume and, sometimes, create something of value together, i.e. value can be created, changed, exchanged and consumed in various forms, in various places and at various stages of the interaction.

While is it certain that traditional industry has economies of scale, digital platforms have economies of scale related to supply and demand. Such economies are, in fact, also shared with small enterprises, trading partners and software developers that, when using these platforms, are able to enjoy their networks. Traditional industry is generally characterized by the presence of significant economies of scale in relation to supply, such as the reduction of costs per unit owing to the expansion of a production plant. Platforms, in turn, are able to create value through the value that each added user generates for other users; economies such as these derived from demand are known as network effects.

Like economies of scale, network effects are not exclusive to digital platforms. The telecommunications industry is a good example of these effects. A telecom company that sells two phone lines only creates one possible connection; with four lines it creates six possible connections, with 12 it creates 66 and with 100 lines it creates 4,950 connections. In this regard, with the exception of the first two clients, the subsequent buyers will have increasing incentives to get a phone line. Digital platforms, on the other hand, enjoy network effects on two or more sides. For example, in the case of Uber, passengers attract more drivers and drivers attract more passengers ("cross-side network effects"). Such effects have given rise to use of the term "winner takes all" in the context of digital platforms as it is very difficult to dethrone a platform when it is established in the market through network effects.

However, the imbalance between supply and demand (indirect network effects) may cause negative network effects, i.e. a shortage of passengers leads to drivers leaving the platform and a shortage of drivers leads to passengers leaving the platform. The need to maintain a balance in the platform system is the reason behind free-ride promotions, better margins for drivers and other strategies usually implemented by digital platforms.

Another interesting characteristic of markets with network effects is their growth strategy. In the platform context, network effects enable them to expand through short-term incentives (passenger subsidies, free accounts), whereas traditional growth strategies are based on rapid growth, with a "get-big-fast" strategy, where, unlike with platforms, discounts and free goods are not enough to ensure customer loyalty.[4]

Oxera (2016) emphasizes that communication, entertainment, the marketplace, the possibility of buying products and services, and information are the main reasons why consumers use platforms. Enterprises turn to platforms to expand their target market, using a cheap feedback channel and saving money in comparison to opening traditional shops. This is why, according to ABDI (2021), many micro, small and medium-sized enterprises (MSMEs) already use digital platforms and data collection to leverage their business.[5]

The capacity to add new markets to marketplaces through partners and providers exists in traditional industry, although it is a significantly slower process. In addition, companies are easily able to identify potential improvements to their services as smaller and more innovative companies use their marketplace to find clients. If an innovation grabs the attention of clients, the platform will be interested in adding it to its system (Núñez and Da Silva, 2021).

[4] Some examples exclusively concern supermarkets, subsidized products encouraging people to visit shops, the majority at a sunk cost.

[5] See survey carried out by the Brazilian Industrial Development Agency and the Fundação Getúlio Vargas (FGV), entitled "Mapa de Digitalização das Micro e Pequenas Empresas Brasileiras" ("Digitalization Map of Micro and Small Brazilian Enterprises").

In table 2, Täuscher and Laudien (2018) present the main digitally-enabled business models for platforms. In their study, the authors found that the following focus areas of business models are the most used by digital platforms: (1) 'efficient transactions'; (2) 'digital product community'; (3) 'fans of a specific product'; (4) 'offline on-demand service'; (5) 'online service'; and (6) 'offline peer-to-peer review service'.

Table 2
Platform business model

Business model	Type of platform	Platform participants	Value creation	Transaction and product	Income extraction	Example
Efficient transactions	Web platform	C2C, B2B	A variety of products	Physical product	Share of commission and subscription; supply	Beepi
Digital product community	Web platform	C2C	Non-profit community	Physical and digital product	Share of commission; supply	Sellfy
Fans of a specific product	Web and mobile platform	B2C, C2C	Exchange of knowledge	Physical product	Share of commission; supply	HobbyDB
Offline on-demand service	Web and mobile platform	B2C	A variety of services	Offline product	Share of commission and subscription; supply	StyleSeat
Online product	Web platform	C2C, B2C	Innovative online service and social media	Online product	Share of commission and subscription; supply	iTalki
Offline peer-to-peer review	Web and mobile platform	C2C	Innovative online service community	Offline product	Share of commission (supply and demand); share of subscription (a third)	Airbnb

Source: K. Täuscher and S. M. Laudien, "Understanding platform business models: a mixed methods study of marketplaces", European Management Journal, vol. 36, No. 3, 2018.

The adoption of the digitally-enabled business model creates external factors that have an impact on other economic sectors, society and the environment. This type of business model is even changing the concept of ownership. Uber, for example, is intended to offer cheap journeys that will make people question the need to own a car (CNBC, 2016). This occurs because one of the logical principles of the digitally-enabled business model (see box 2 on the sharing economy) is the separation of the value derived from a good and the ownership of it (Parker, Van Alstyne and Choudary, 2016). Although there is a direct impact on sales in the automotive industry, the resulting changes are not restricted to this industry. The smaller number of vehicles in circulation would give rise to positive externalities, such as a reduction in the use of parking spaces and an increase in the number of cycle lanes; other effects include fewer vehicle insurance sales and reductions in pollution and traffic.

Of the innovative characteristics of the digitally-enabled business model, the use of data is perhaps the most important. The use of data runs through all stages of the production process of these enterprises, from the sale of targeted advertising to the analysis of trends that help to determine content that will be promoted using algorithms. It is notable that, despite not knowing the value of data, traditional enterprises are starting to understand that obtaining and using data is essential to their survival and to the adoption of the digitally-enabled model. Many of these enterprises already understand that, individually, they do not have sufficient capacity to accumulate the data needed to survive in the market, which has, in turn, led to proposals to create data markets and cooperatives. The data exchange mechanism, generally known as give-and-take markets, has attracted both technological and non-technological MSMEs (see annex), which indicates an urgency in this digital economy trend.

Box 2
Sharing Economy: rethinking the idea of ownership

Thanks to a combination of technological advances and a fall in technology prices among other factors, modern society is rife with products that are not used at their full capacity. This idleness and a meeting of economic, technological, political, social, and environmental factors contributed to creating what is known as the "sharing economy". This model works by using consumer relationships enabled by digital platforms, websites or smartphone applications that allow the rapid transfer of ownership. Sutherland and Jarrahi (2018) define the sharing economy as a system based on a type of efficient and scalable technology that brings together large networks of people and connects them with the goods and services that they need.

In the United Kingdom, it was estimated in 2014 that the value of the sharing economy was around 500,000 British pounds, and that this economy would be worth 9 billion pounds by 2025 (Rossotto and others, 2018). Uber, in the automotive sector, and Airbnb, in the accommodation sector, are perhaps the most famous companies in the sharing economy. The market value of Uber is approximately US$ 95 billion and that of Airbnb has reached US$ 93 billion, even with the impact of the COVID-19 pandemic. However, there are many enterprises that use this model.a PWC (2015) estimates that the sharing economy will reach a total of US$ 335 billion in 2025. Nevertheless, the value of the sharing economy presents a significant challenge for economist who have not yet developed a way of calculating the contribution of this business model to countries' GDP and do not know how to calculate its social and environmental benefits (WEF, 2016).

Source: Prepared by the authors, on the basis of W. Sutherland and M. H. Jarrahi, "The sharing economy and digital platforms: a review and research agenda", International Journal of Information Management, vol. 43, 2018; C. M. Rossotto and others, "Digital platforms: a literature review and policy implications for development", Competition and Regulation in Network Industries, vol. 19, No. 1-2, 2018; PriceWaterhouseCoopers (PWC), Sharing or Paring? Growth of the Sharing Economy, Hungary, 2015 and World Economic Forum, "How much is the sharing economy worth to GDP?", 28 October 2016 [online] https://www.weforum.org/agenda/2016/10/what-s-the-sharing-economy-doing-to-gdp-numbers/.
[a] Other examples include Amazon, mechanical turk, Taskrabbit, Zipcar, Crowdflower, Lyft, Couchsurfing, Car2go, Relayrides, Rent the Reuway, Timebanks, Sharetribe, Fiverr, Sweepsouth, Babylonia, Deskcamping, LandShare, Proper and Indiegogo.

Owing to the different ways in which platforms operate, their value creation and the regulatory challenges arising from their adoption, it is important to recognize the impact of their influence in different sectors and in the economy in general. In that regard, Mayer-Schönberger and Cukier (2013) contend that, to evaluate the impact of the digitally-enabled business model, it is important to know its value and to price data. At the same time, it is argued that their potential market must be considered in terms of the impact of network effects and not through the traditional system adopted by regulators (the example of Uber, cited by Ruggieri and others, 2018, p. 26). Although an assessment model has not yet been developed to identify the real impact of these enterprises on the economic fabric, there have already been very clear indications of the impact on the economy itself.

II. The impact of the digitally-enabled business model

The literature on business models6 shows how digital platforms create, share and capture value and compete in the markets. In contrast to the governmental sector, the private sector appears to have understood how these enterprises and business models work. According to Accenture (2016), 88% of Fortune 500 companies are looking to use the digitally-enabled model. Until recently, the digitally-enabled model was used exclusively by digitally native companies (Google, Apple, Facebook, Amazon, Airbnb and Uber, among others), characterized by on-demand services or the sharing economy. However, traditional companies, such as Nike, GE, Under Armour, Siemens and Inditex (Zara), are already developing their own platforms by building partnerships and acquiring companies.

However, it is not only about using network efforts to provide a marketplace; in reality, platforms such as Alibaba and Amazon provide intelligence through data.7 This data-driven model is one of the key factors determining the success of platforms. In 2016, Alibaba had already mapped the preferences of over 630 million consumers and offered its users a space with smart logistics, a customized service package and a credit system. Data is thereby monetized for personal use and sales. According to Accenture (2016), 49% of Alibaba's income comes from the sale of smart advertising. The revolution in this model has been seen in various markets around the world, as shown in table 3.

Implementation of the digitally-enabled model involves intensive use of data. In order to recognize the value of the data they have these enterprises use them as an integral part of their processes. Beyond the collection, use and reuse of data, these enterprises encourage data production in their interactive spaces (data on behaviour, consumption, experience, productivity, etc.). This, in turn, creates a multiplying cycle where the value of the data is multiplied by the number of users and partners in the ecosystem. The data are so important for the digitally-enabled business model that some countries have started to categorize them as "essential facilities", i.e. to have them regulated. As far as regulation is concerned, network effects, abuse of a dominant position, envelopment[8] (expansion of relevant markets), alliances, predatory and data-driven acquisitions, and the imposition of data barriers are the trends guiding the study of competition policies in the context of digital platforms (Rossotto and others, 2018).

---

[6] According to Zott, Amit and Massa (2011), there are three definitions of business models: (1) the concept of e-business made possible using information technologies within organizations; (2) strategic decisions relating to the concepts of performance, value creation and competitive advantage; and (3) management of technology and innovation.

[7] According to Accenture (2016), more than 37% of Alibaba's workforce is made up of scientists, engineers and those with technological talents employed in managing the database, machine learning and artificial intelligence.

[8] Definition: when a dominant platform (the enveloper) operating in a multi-sided market (the origin market) enters a second multi-sided market (the target market) by leveraging the data obtained from its shared user relationships (Condorelli and Padilla, 2020).

Table 3
Countries with platforms or technologies in the top 10 by market value

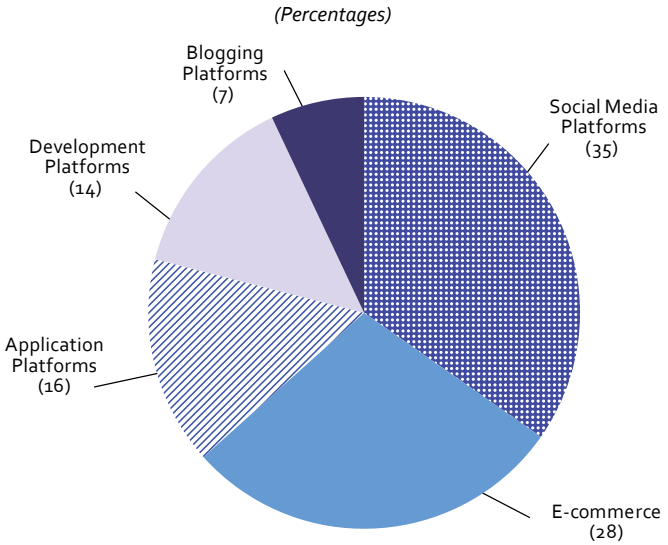
Country	Platform	Technology
United States of America	Apple, Alphabet, Amazon and Facebook	Microsoft and Tesla
Brazil	Magazine Luiza and XP investimentos	
Argentina	Mercado Libre	
Mexico		WALMART México
Belgium		Materialise NV
China	Alibaba, Pinduoduo, JD, NetEase and Baidu	NIO
France		Criteo SA
Germany	Jumia TECH-ADR	SAP SE and Trivago
Hong Kong	Futu Holdings and IClick Interactive Asia Group	
Israel	Wix and Fiverr Lt	Nice
Italy	Kaleyra	
Netherlands	Yandex	
Norway	Opera	
Singapore	JOYY	Karooooo
South Korea		Sk Telecom

Source: Prepared by the authors, on the basis of data from Macrotrends and Bloomberg, May 2021.

The adoption of the digitally-enabled business model is a trend that can be seen clearly among start-ups. Of the more than 13,000 start-ups in the AngelList database9, 4,840 are social media platforms (35%), 3,988 are e-commerce (28%), 2,179 are applications (16%), 1,948 are platforms for developers (14%) and 978 are blogs (7%) (see figure 2).

Figure 3
Participation of start-ups that use the digitally-enabled model in the AngelList database

(Percentages)



Source: Prepared by the authors, on the basis of data from AngelList.

As a business model, platforms are becoming the main way for the established market leaders to be able to enter adjacent markets and reinvent themselves in the digital era. The adoption of the digitally-enabled business model, such as for gig economy[10] platforms or the shared economy, can be a driver of business model innovation.

9 See [online] angel.co/.

10 The gig economy is characterized by an abundance of temporary and short-term work with independent contractors, often involving remote work using digital platforms.

A. FinTechs and open banking

The potential social benefits at stake after the creation of an innovation can only be enjoyed when there is a level playing field for all actors. So-called FinTech enterprises have revolutionized the status of "bankarization" (access to and use of banking services) in the region. For the most part, these enterprises act as digital platforms connecting consumers and products and using data as their main input. At the regional level, these enterprises have grown exponentially; the Brazilian start-up Nubank has expanded from 1.3 million clients to 40 million clients within the last six years (Statista, 2021).

Alongside the revolution triggered by FinTech companies, measures related to open banking are already beginning to be implemented in the region. Open banking is considered the future of the banking system[11] and has the potential to further revolutionize the impact of digital technology and digital platforms on society. The new actors in this market have grabbed the attention of the public and their more traditional competitors through the incorporation of technologies and the introduction of new products and business models. For this reason, traditional enterprises have embraced anti-competition exclusivity strategies, refusing access to infrastructure, worsening interconnection, managing the exchange rate, and using tied selling and bundling; such actions have been taken by competition agencies around the world. Table 4 shows the major competition-related measures launched by competition authorities in the region following the entry of new players into the financial system.

Table 4
Competition-related measures in the financial sector

CNDC-Argentina	CADE-Brazil	FNE/TDLC-Chile	COFECE-Mexico	Indecopi-Peru
2016 **I**nvestigation of the electronic payment method market and ex officio investigation against Visa sole acquirer (Prisma) and 14 banks. **2017** Acceptance by investigated parties of structural and behavioural compromise. **2019** Disinvestment of the banks in Prisma. **2019** Multi-acquiring	**2019** Administrative proceedings against four Banks for allegedly discriminating against a FinTech (Nubank). **2019** Administrative proceedings and preventive measures against Itaú and Rede for tied selling. **2019** Publishes study on the market for payment instruments.	**2013** FNE requests regulatory changes to promote competition in credit card acquisition. **2017** TDLC issues a recommendation promoting competition and a change of model. **2019** Supreme Court ruling ensuring greater competition and a change of model.	**2017** Opinion on a draft Fintech law. **2018** Fintech Act approved with recommendations from COFECE. **2018** Investigation of the market for systems of payment, the processing of which involves a clearing house for card payments.	**2018** Start of a market study to analyse current competition conditions in card payment systems.

Source: E. M. Greco and F. M. Viecens, "Fintech y BigTech: barreras a la entrada y a la innovación. Estado de situación en América Latina", Revista LATAM Digital, No. 1, 2020.

The process of creating open banking is based largely on the creation of Application Programming Interfaces (APIs) and data sharing; open banking depends on API standards and good data protection. The creation of such standards, which may be government-driven or market-driven, is what facilitates the entry of new actors and the creation of innovations. According to Greco and Viecens (2020), this disruptive innovation scenario "has obliged banks – the traditional actors – to rethink their competitive strategies and made regulatory authorities review the approach used to design pre-existing norms". Banking is known for its level of concentration, giving rise, in effect, to low competition for each currency

[11] White and others (2021) emphasize that the benefits of open banking are: greater access to financial services; increased user convenience and better product options; increased operational efficiency; improved protection against fraud; improved allocation of the work force; and less friction in data mediation.

in the hands of clients. In the traditional system, this occurs largely because banks are not familiar with the records consumers have with other banking institutions, which creates low competition for loans and economic inefficiencies. In that regard, the search for greater competition in the banking sector seems to have reached a disruptive stage as the sector is in the midst of a transformation caused by open banking.

White and others (2021) stress the economic benefits that can be obtained by adopting open banking. According to them, countries that adopt the practice in order to share financial data could achieve a GDP growth of 5% by 2030. The operation of open banking depends on the pillars of data flow, cyber security and data protection.

As digital platforms and their marketplaces have become tools for the digitalization of small enterprises, some are advocating open banking as a means of improving the situation of MSMEs and accelerating e-commerce (PYMNTS, 2021). Small enterprises could benefit from:

- Financing – open banking is the ability of traditional banks to share client data with third parties, as is the case with financial technologies or FinTechs. Open banking represents increased competition for every cent in client hands (individuals and MSMEs). This can be an opportunity for small enterprises that have had financing problems.
- Innovation in payment methods – open banking can create and improve payment methods offered by enterprises in e-commerce, reduce transaction costs and avoid excessive fees from traditional companies. Using client records, there is also the possibility of reducing online fraud.
- Banking as a service (BaaS)– enterprises can create ways of entering the financial system without the need to be regulated by that sector. Enterprises can create customized financial services or credit cards in accordance with the characteristics of their clients; this can create client loyalty and new sources of income.

While open banking offers traditional banks new opportunities for income, the use of data to create personalized services, a growing number of clients, digitalization and increased transparency, it also provides smaller banks with an opportunity, as for those in greatest need of financing. Categorized as high-risk, the MSME sector continues to have a low rate of penetration in the banking sector.[12] As a result, commercial banking has stayed away from SMEs as a whole. Open banking means that everyone, from start-ups to the technological challengers, can harness the power of data to provide better products.

Here are some open banking strategies that have been adopted around the world:

- In Singapore, in 2016 the monetary authority developed an API guide containing recommendations and processes. In 2018, the Government of Singapore launched a centralized data-sharing platform called APIX (Twimbit, 2020).
- In Australia, the competition authority and other institutions joined forces to create an API guide.
- New Zealand, Hong Kong and Japan have also created initiatives to promote open banking.
- In India, banks are obligated to share financial and non-financial data using standardized APIs (White and others, 2021).
- As in India, in Brazil large banks are obligated to participate in the open banking ecosystem[13].
- In the United Kingdom, regulations require large banks to adopt open banking.

[12] In Brazil, a survey carried out by SEBRAE (2020) has shown that 38% of MSMEs consider the banking system to be okay and 36% poor or very poor in terms of the support provided to such enterprises (in 2018 this figure was 61%).

[13] See [online] https://www.bcb.gov.br/pre/normativos/busca/downloadNormativo.asp?arquivo=/Lists/Normativos Attachments/51028/Res_Conj_0001_v1_O.pdf.

- In Mexico, In March 2020 the National Banking and Securities Commission (Comisión Nacional Bancaria y de Valores) published the country's first rules for open banking as part of the FinTech Act. However, despite the Brazilian approach, the implementation dates are unclear (Isabel, 2021).

The transformation process driven by digital platforms and currently facing society is encompassing the financial sector at the regional and global levels. The challenges arising from this range from regulation to improving conditions for market access. It is worth noting that it is not only new or natural actors that have been trying to access the financial sector. In Brazil, Facebook has asked the Brazilian Central Bank for permission to roll-out an innovation called "WhatsApp Pay", but the Central Bank has not allowed Facebook to enter the data-rich financial sector owing to doubts about the level of competition within the system and the protection of user data (Da Silva, De Furquin and Núñez, 2020). According to Carstens and others (2021) Big Tech in the financial sector can rapidly gather user data from their existing lines of business in e-commerce and social networks, taking advantage of the network efforts inherent in digital services. Because of this, regulating these enterprises with innovative business models and strategies, such as FinTech and digital platforms in general, is a considerable challenge and requires significant coordination efforts on the part of the various authorities responsible for all areas where such models and strategies are found. These challenges range from entry into new markets and regulation of employment to taxation.

III. Regulating platforms

Technological platforms have been monopolizing the attention of legislators and regulators, especially since the start of the COVID-19 pandemic. A lot of literature addresses the concerns raised by these platforms among those responsible for public policies. These include economic issues, free competition, privacy and use of data, cybersecurity, impact on freedom of expression, dissemination of fake news, impact on employment, and avoidance of national tax payments, among other matters. As a result of their broad impact, the regulation of platforms involves various ministries and services with different areas of focus (competition, privacy, transparency, health, tax collection, trade, security, innovation, etc.).

The European Union leads the way in the regulation of digital platforms. Through its Digital Markets Act (DMA), which will enter into force in 2023 (European Commission, n/d), it has created regulations intended primarily for so-called gatekeepers. According to the European Union, a gatekeeper is a company that has a prominent economic position, plays a strong role in intermediation, and has a well-established place in the market. The Digital Markets Act is aimed at promoting the fair use of data and interoperability and combating self-preference. In short, the proposal is intended to make the market more contestable. Under the Act, gatekeepers must report future acquisitions or mergers and techniques used to map consumer preferences.

- Intermediation services – for example, Amazon Marketplace or the Google app store.
- Search engines – for example, Google Search.
- Social media – for example, Facebook.
- Video sharing – for example, YouTube.
- Number-independent communications service – for example, Facebook Messenger.
- Operating systems – for example, Apple iOS.
- Cloud-based comparison – for example, Microsoft Azure.
- Advertising networks – for example, Google AdSense.

The Digital Markets Act also has an update component to address constantly changing digital markets. The feature allows them to: designate companies as gatekeepers; dynamically update the obligations of gatekeepers when necessary; and devise solutions to address systematic infringements of the rules under the Act. The Act also enables companies to remain vertically integrated if they provide access to substitute products or services in their platforms. Another important point is that the Act encourages potential competition, which is an issue that arose from the large number of Big Tech acquisitions during 2020 (Núñez and Da Silva, 2021). The European Union has therefore taken the lead by establishing very specific rules and creating a powerful tool to regulate digital platforms.

A. The approach of some countries in the region

With regard to the development of platforms in the region, a survey was submitted to the authorities of countries in the Pacific Alliance[14] (Chile, Colombia, Mexico and Peru) on the regulation of these companies and national digital agendas. In this context, the European Union has acquired a leadership role by managing to coordinate the regulation of digital platforms with its member States[15]; Latin American countries, in turn, have failed in their coordination efforts and, in some cases, have adopted unilateral measures.

In the case of Mexico, the national digital strategy was published on 6 September last year.[16] The topic is addressed at the national level by the National Digital Strategy Coordination, which is directly accountable to the Office of the President of the Republic. In the case of Colombia, there is a national coordination strategy: the National Development Plan[17] 2018–2022 "Pact for Colombia, Pact for Fairness" (Law No. 1955 of 2019), which addresses digital matters. It sets out a digital transformation that is intended to create a digital society connected to a high-quality Internet with a transformation component involving the use of data and new technologies in public administration, the production sector and territories.

In Chile, there is no digital agenda at the national level at present, although the Undersecretariat for Telecommunications has developed a "Digital Matrix" strategy intended to promote rights, infrastructure development and a reduction of the digital divide. Since 2018, Peru has had the Bicentennial Digital Agenda[18], which describes contains a strategy, goals and actions. Peru is developing a National Digital Transformation Policy19, which is part of its Digital Agenda and is intended to coordinate the interventions of actors in the public and private sectors, academia, and civil society around four central pillars: connectivity; digital education; digital governance; and the digital economy. Box 5 shows a qualitative comparison of the responses provided by the public sector on digital platforms in the four countries of the Pacific Alliance.

[14] Those participating in the survey were the authorities of: Mexico, through the Federal Telecommunications Institute; Colombia, through the Office of the President, where the issue is addressed; Chile, through Subtel, the Undersecretariat for Telecommunications; and the Presidency of the Council of Ministers, through the Digital Government Secretariat of Peru.

[15] See [online] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R1150.

[16] See [online] https://dof.gob.mx/nota_detalle.php?codigo=5628886&fecha=06/09/2021.

[17] See [online] https://www.dnp.gov.co/DNPN/Paginas/Plan-Nacional-de-Desarrollo.aspx.

[18] See [online] https://cdn.www.gob.pe/uploads/document/file/748265/PERU_AgendaDigitalBicentenario_2021.pdf.

[19] See [online] https://cdn.www.gob.pe/uploads/document/file/1413234/PERU%CC%81_Disen%CC%830Poli%CC%81ticaNacionalTransformacio%CC%81nDigital_2020.pdf.pdf.

Box 3
ECLAC survey on digital platforms

In 2020, ECLAC conducted a short survey on digital platforms for public sectors representatives of the Pacific Alliance countries. The aim was to gather information on the challenges facing governments as they try to devise legislation and regulations on technological platforms, as part of their digital agenda. The responses from the four countries described their organizations, positions, agendas, and major ongoing projects and plans, as well as the difficulty of designing public policies on technical and multidisciplinary issues, such as digital platforms. Approaches to national digital agendas and strategies differ in the four member States, as well as in the way in which each country coordinates work on digital topics; the scale and hierarchy of coordinating digital agendas is directly linked to the number of actors advancing the relevant public policies. These elements have an impact on the concrete progress of public policies and projects under the digital agenda. Increased coordination and a shared definition of aims facilitates the creation of the national position at the multilateral level.

There was a mixed response regarding the regulation of technological platforms and the efforts made in public policy. Future plans relating to platforms have been laid out in order to determine their impact on markets and services in terms of competition, increases in productivity, data protection and cybersecurity, as well as in interactions between citizens and the State. The table below summarizes the results of the survey.

Variables analysed[a]	Chile	Colombia	Mexico	Peru
National agenda or strategy	0	3	2	3
National coordination	1	3	2	3
Variety of actors	1	3	2	3
Practical operation	1	3	2	3
Coordination for multilateral discussion	1	2	2	3
Specific regulation of platforms	0	2	1	1
Data protection and cybersecurity of platforms	0	2	1	2

Source: Prepared by the authors, on the basis of information provided by the authorities of Chile, Colombia, Mexico and Peru
Note: The table shows a subjective estimate of the strength of each variable by jurisdiction, using the information provided in the responses received. It is a partial and limited interpretation of qualitative data and is intended only to summarize the findings of the analysis.
[a] Scale of presence of the variable: 3 – Strong; 2 – Average; 1 – Poor; 0 - None.

The four countries have very different levels of regulation. Colombia and Peru, for example, have made advances in regulating the digital ecosystem. In the case of Colombia, this has been done through policy documents issued by the National Council for Economic and Social Policy. Peru, in turn, uses national policies. In Mexico, there has not yet been a joint assessment of the state of platform regulation, although consensuses are slowly being built (in particular on data use). Chile, meanwhile, has shown that its regulation of platforms does not currently differ greatly from its regulation of Internet service providers.

Despite limitations, this exercise revealed solid governance and clear leadership, within a national strategy, that can provide significant advantages in moving forward with the multidisciplinary regulation of technically complex issues, such as technological platforms, and facilitating the potential development of relevant regional agreements and progress to that end. In this context, the possibility of reaching consensuses at the multilateral level, as has been done in other regions to their significant benefit, still seems distant. Despite the potentially very high cost of taking a long time to regulate technological platforms, greater effort will likely be required to adequately develop national and regional public policies.

Box 4
The State as a digital platform

Despite issues in competition and regulation, the digitally-enabled model is also seen by experts as an opportunity, including for countries in the region. In the survey detailed in box 5, the Colombian and Peruvian authorities told us that they see technological platforms as an opportunity to improve interaction between citizens and the State, which is why they have adopted the model to create State platforms in specific areas or as a single portal for a range of processes and entities.

Countries in advanced stages of digitalization have already started to adopt the GaaP model (Government as a Platform) to innovate in public services. GaaP is widely known as "the use of digital technologies to support problem-solving in collective action at various levels through software, data and shared services". For example, the United Kingdom has been implementing GaaP to encourage quick and cost-effective service growth for its citizens. Currently a total of 26 agencies already offer more than 100[20] public services. Estonia has also become a prime example of GaaP use. The main features of GaaP found in the literature are:

- Open government data
- Free access to data through APIs
- Regulation of the access and use of the data used

According to Tim O'Reilly, recognized as the creator of the GaaP service, the main points are openness; simplicity; participation; "learning from hackers"; data mining; experimentation; and leading by example.

Source: H. Margetts, and A. Naumann, "Government as a platform: What can Estonia show the world", University of Oxford, 2017 [online] https://www.politics.ox.ac.uk/materials/publications/16061/government-as-a-platform.pdf.

Despite a number of relevant initiatives in the region, there is still no coordination in platform regulation. Friedman (2017) makes an interesting proposal regarding the evolution of technology and regulatory efforts; while it is certain that it now takes us between 10 and 15 years to understand a new technology and then develop laws and regulations to protect society, how do we regulate when the technology has come and gone in the last seven years? This is a problem. Regulating something that is constantly changing is far from simple, although the exchange of experiences between authorities and governments makes the task more efficient. Some countries and economic blocs have stood out in recent years; for example, in the European Union, promising coordination efforts have been made on the regulation of digital platforms, and the Organisation for Economic Co-operation and Development (OECD) and the United Nations have developed coordination initiatives on data use and related taxation.

B. Digital taxes: closing competitiveness gaps

Beyond regulating competition and employment, business models in the digital economy, in particular those digitally-enabled models, present a number of challenges for tax systems. The significant complexity of transactions and difficulties in categorizing the type of economic activity and associated income are some of the problems that arise. On the other hand, the lack of a physical presence of companies and services that transcend geographical borders creates a great dependence on intangible assets, which are difficult to value. This has exposed weaknesses in the guidelines underpinning value-added tax (VAT) and income tax, although there is still no consensus on the need for a new international tax framework (ECLAC, 2019). These companies have chosen a location on the basis of tax incentives and, as a result, they create taxation gaps between local enterprises and digital platforms. Moreover, these companies, which depend heavily on national network structures, do not contribute by paying taxes to further develop these structures.

[20] https://governmentasaplatform.blog.gov.uk/2017/11/14/more-than-100-services-common-platforms/.

[21] Around half of OECD countries in Europe have announced, proposed or implemented a digital service tax on the gross income of large technological platforms using temporary measures (Asen and Bunn, 2021).

Faced with the difficulty of directly taxing digital enterprises, many countries have chosen to levy indirect taxes, such as VAT on digital services[21], i.e. a kind of import duty on the provision of certain electronic services that is applied to gross income (ECLAC, 2019). As of January 2020, 77 countries around the world have introduced this type of tax, including 12 countries in Latin America and the Caribbean.[22] Regarding the direct taxation of income from digital services or earnings from non-resident enterprises that provide digital advertising, services or content to a local user base, and despite the risks of potential double taxation and a lack of tax neutrality, some countries have adopted unilateral temporary taxation measures while they work towards comprehensive multilateral solutions. For example, China argues that digital enterprises must pay tax on data extraction, under the same rules as traditional industries' extraction of resources (Reuters, 2020). The European Union, the United Nations and OECD[23] have put in place initiatives to make progress at the multilateral level.

A number of problems have been identified in implementing a digital tax:

- Taxes based on a company's geographical location. Although digital enterprises pay taxes on their income in the country where their headquarters is located, they do not do so in the country where they make sales or where their users are located as they do not have a physical presence in those countries. In that regard, there is discussion of a localization system that goes beyond the physical presence of the enterprises and addresses a digital location, i.e. a "taxable digital presence" (European Commission, 2018), and can have an impact on tax inequalities between digital and local enterprises.
- Value creation in the digital economy. International standards on taxation of corporate income depend on the concept of value creation. In the digital economy, value is created by means of interaction between algorithms, users, sales tools and knowledge. As enterprises only pay tax in the country where their headquarters is located, the value contributed by users of social media platforms or e-commerce sites (i. e., through interaction) are not taken into account in corporate tax (European Commission, 2018). Assigning value to a user and their behaviour is an economic challenge.

Short-term tax distortions will remain a challenge for countries as long as there is no permanent solution.

Under a proposed interim measure from the European Union, there will be taxation of income generated through activities in which users contribute significantly to value creation and that it is complicated to tax under current taxation regulations. It proposed taxing:

- Income generated by online advertising sales
- Income created through intermediary services between users that can facilitate sales
- Income created from sales of user data

Companies with a total annual income of over 750 million euros and income in the European Union of over 50 million euros would be subject to this type of tax at a rate of 3%. The European Union also has a proposal to reform corporate tax rules so that earnings are registered and taxed where enterprises have significant interaction with users via digital channels.

On the other hand, like the European Union, the OECD/G20 initiative, in its most recent document (OECD, 2020), proposes a permanent solution that would apply to the earnings of digital enterprises. OECD proposes a six-tiered examination to identify enterprises that must pay taxes. A tax would be applied when: (1) the enterprise exceeds the overall income threshold; (2) certain business activities are carried out; (3) there is a second review of income; (4) there is a review of profitability; (5) there is a review of current profitability; and (6) there is an examination of the enterprise's connection to the jurisdiction to

[22] Tax proposals are based on: sales taxes; taxes on digital services; tax preferences for digital businesses; digital standard-setting rules; and gross withholding taxes on digital services.

[23] OECD and G20 have worked together in the context of the Base Erosion and Profit Shifting Project.

[24] See [online]: https://www.un.org/development/desa/financing/sites/www.un.org.development.desa.financing/files/2020-08/TAX%20TREATY%20PROVISION%20ON%20PAYMENTS%20FOR%20DIGITAL%20SERVICES.pdf].

determine whether it is necessary to impose localization. The United Nations, in turn, is already preparing a proposal on the taxation of sales of automated digital services under article 12B of the United Nations Model Tax Convention.[24]

At the regional level (see table 5), the approach to the issue is different to that seen in many countries around the world. Instead of creating a new tax, which may be temporary, countries including Argentina, Barbados, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay and Uruguay have decided to adapt VAT to the digital context. On the other hand, Peru (30%) and Uruguay (12%) have decided to apply a sales tax to these enterprises (ECLAC, 2019).

Table 5
Digital taxes around the world

Digital Service Tax (DST)		VAT adjustments	
Country	**Rate**	**Country**	**Rate**
Austria	5%	Argentina	21%
Belgiuma	3%	Australia	10%
Brazila	1-5%	Barbados	17.5%
Canada	3%	Bolivia (Plurinational State of)[a]	13%
Chile[a]	10%	Chile	19%
Spain[a]	3%	Colombia	19%
France	3%	Republic of Korea	10%
Hungary	7.5%	Costa Rica	13%
India	2-6%	Ecuador	12%
Israel	3-5%	United States	Determined by states (state juri sdiction)
Italy	3%	Iceland	22.5%
Kenya[a]	1.5%	Israel	16%
Mexico	3%	Japan	10%
New Zealand	2-3%	Mexico	16%
Paraguay	4.5%	New Zealand	15%
Poland	1.5%	Norway	25%
United Kingdom	2%	Paraguay	10%
Czechia[a]	7%	Peru[a]	18%
Tunisia	3%	Switzerland	7.7%
Turkey	7.5%	Turkey	18%
		Uruguay	22%

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of D. Bunn, E. Assen and C. Enache, Digital Taxation around the World, Washington, D.C., Tax Foundation, 2020; Vertex, "Resource library" [online] https://blog.taxamo.com/insights/, and Economic Commission for Latin America and the Caribbean (ECLAC), Fiscal Panorama of Latin America and the Caribbean, 2019 (LC/PUB.2019/8-P), Santiago, 2019.
[a] Draft laws.

Tax evasion contributes enormously to the "success" of digital enterprises. However, in the G7 (United States, Canada, Germany, Japan, France, United Kingdom and Italy) an agreement has been signed on the taxation of large corporations. In recent years, countries such as Ireland and Cyprus have benefited from a major influx of taxes owing to their attractive rate (12.5%), even though the G7 suggested a minimum rate of 15% on income originating abroad (Thomas and Lawder, 2021). The agreement signed by the G7 has accelerated the G20 and OECD proposals (OECD, 2021). The OECD recently established

a tax rate of 15% for large multinationals. The United States, in this context, supports the abolition of digital taxes as soon as a minimum tax for large corporations has been agreed (The Economist, 2021a). According to Luhby, Lobosco and Sullivan (2021), one of the financing solutions proposed in the Biden administration's infrastructure plan, worth US$ 2 trillion, is to put an end to steps taken by companies to change the location of their headquarters in order to pay less tax. According to The Economist (2021b), 40% of the earnings of multinationals are taxed in "tax havens".[25]

In terms of competition, local enterprises must pay all of their taxes. The tax advantage of digital companies not physically present in a sales location could create a new distortion that is not consistent with a neutral tax policy. In addition, the legal system that provides these enterprises with tax benefits, such as R&D incentives, the rapid depreciation of their assets or a "bundle" of patents, exacerbate inequalities in taxation.

Preferential tax systems, which include programmes with a shorter period of depreciation for intangible assets, have allowed digital enterprises to benefit from lower taxes. While the arguments behind these preferences are to stimulate innovation and attract investment in new technologies, the smaller tax burden arising from incentives has created a gap between the taxation of digital enterprises and that of other sectors.

[25] According to The Economist (2021b), in 2018 60% of the income of the Government of the British Virgin Islands came from multinational companies.

IV. The evolution of business models requires data flows and the creation of data marketplaces

One definition of the data marketplace could be similar to the definition of multi-sided platforms, where a digital intermediary (a market maker) connects data providers, data buyers and other providers of complementary technology. These markets may work by means of monetary value, using tradeable currency, or they may be configured as exchange markets where there is no monetary value (ECLAC, 2021).

The importance of sharing, exchanging and reusing data is clear when we consider that the value of data does not arise only from its primary use, but from its reuse too (Mayer-Schönberger and Cukier, 2013). Big technology companies have the ability to make acquisitions and extract the value from data through the creativity of their assets (data scientists, for example); however, small enterprises do not have the same capacity. In addition to the above, it is important to recognize that there will come a time when productivity growth and the creation of innovations, including in traditional industries, will depend heavily on sharing, exchanging, and reusing data.

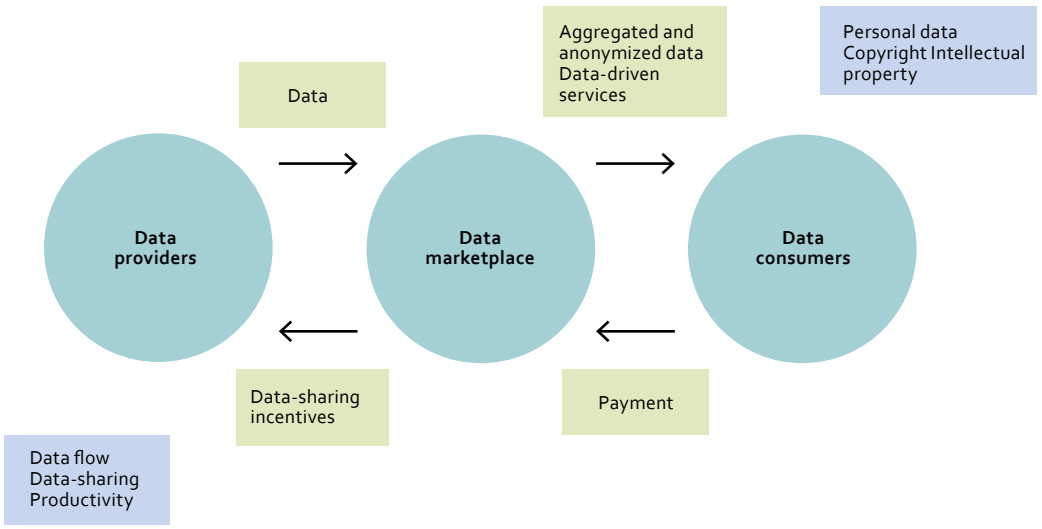
Data markets currently have very limited functions and are mainly B2B (business-to-business) markets. A consolidated data market should involve all economic actors, i.e. private entities, governments and citizens, as well as ensure the reliability of data in regard to its origin and the collection method used (Koutroumpis, Leiponen and Thomas, 2020).

Non-digital enterprises that have databases, mainly of clients, could earn income from the sale of information in these markets. Buyers, meanwhile, would have access to new databases that may guarantee them infinite possibilities for innovation. According to Deichmann and others (2016), the data market creates added value by building digital ecosystems and new opportunities for monetization: crowdsourcing (sharing data), supporting interoperability,[26] discoverability, and improving data quality. For Koutroumpis, Leiponen and Thomas (2020), open data markets are a source of knowledge spillover. According to a survey carried out by Mckinsey Analytics (2017), 17% of companies surveyed generate more than 20% of their income from data monetization and 15% of them generate between 11% and 15% of income from it.

[26] In the context of the digital ecosystem, interoperability is the capacity to transfer and provide useful data and other information through systems, applications or components (Gasser, 2015).

Data accumulation is a feature of the Internet of Things (IoT) and its use in the market is exponential, in line with the data being available to more enterprises. Diagram 1 summarizes the structural operation of a data marketplace, showing how the various actors interact in a specific marketplace. In general, "data exchange involves interaction between: (i) data providers (data creators, intermediaries or data sellers); (ii) data consumers (data collection, including by buying it, for various purposes); (iii) providers of data exchange services (providing technological infrastructure, managing and processing data in preparation, administration and anonymization activities); and (iv) the authority regulating or enabling data exchanges, usually through regulations, technical guidelines and the definition of standards" (Colombia, 2020).

Diagram 1
Illustration of a data market



Source: J. Deichmann and others, "Creating a successful Internet of Things data marketplace", McKinsey Digital, 2016 [online] https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/creating-a-successful-internet-of-things-data-marketplace.

The majority of database purchases take place using data marketplaces (or ecosystem for data exchanges), which are platforms where databases may be bought from various sources, normally stored in the cloud. The consolidation of data markets can show the potential of enterprises and create a new market for many others. Table 8 shows the various types of data markets that may be created, their characteristics and the risks of leaks or breaches of contract. According to Koutroumpis, Leiponen and Thomas (2020), while large data markets can be achieved with little regulation, smaller markets are only achievable with greater regulation.

Table 6
Data markets and their characteristics

Matching	Type of market	Terms of trade	Example	Risk	Transaction cost
One-to-one	Bilateral	Negotiated	Acxiom	Low	Low
One-to-many	Dispersal	Standardized	Twitter API	High	High
Many-to-one	Harvest	Implicit barter	Google Wage	Variable	High
Many-to-many	Multilateral	Standardized or negotiated	None	High	High

Source: Prepared by the authors, on the basis of P. Koutroumpis, A. Leiponen and L. D. Thomas, "Markets for data", Industrial and Corporate Change, vol. 29, No. 3, 2020.

The creation of government-financed data markets resembles the development of data interoperability policies to guarantee access to enterprises arriving late on the market. The typical network effects of the digital economy make data collection even more complicated as data often only become a relevant asset when there is a lot of them (Big Data). In this regard, entrants find themselves in the difficult position of having no data to access and compete with on the market, essential to overcoming the barriers imposed by network effects. The incumbents, on the other hand, are able to offer better services by using a large amount of data in their optimization process. Boosting data markets may therefore level the playing field for smaller competitors; the data market created by China is an example of the potential of such initiatives (see box 7).

Box 5
China and lending based on database evaluation

According to Boullenois (2020), the Government of China, recognizing the importance of data, has, since 2019, considered data a factor of production and has been trying to establish a data market to improve the dynamics of its economy.

In July 2015, the Chinese Government created the Data Asset Evaluation Centre in Zhongguancun,[a] which is responsible for evaluating and pricing databases. The purpose of the Centre is to establish a model based on data assets to evaluate enterprises (Yiyi, 2015). This model will help enterprises to: (1) be listed on the stock market; and (2) make public the most precise figures relating to their value in order to access financing. According to the author, "the Evaluation Centre will create an evaluation mechanism that separates the price of data assets into the share price, the social output price and the clearing price, as well as establishing an industry pricing structure and system".

Within approximately one year of operation, the Centre achieved an income of 59.8 million yuan (around US$ 10 million) and the data on the platform were used more than 2.3 billion times. At present, the number of data providers[b] already stands at more than 1.2 billion. For Yiyi (2015), the platform has been gaining regional coverage, becoming a regional data market. According to the China Council for the Promotion of International Trade (CCPIT, 2016), the evaluation and pricing model is based on the intrinsic value of data, the commercial, production, cost, economic and market value. The evaluation letter from the Zhongguancun Centre may also be used by potential shareholders of enterprises through the transfer of rights on data use (limiting their participation to 30% of the value of the enterprise).

Source: Prepared by the authors, on the basis of C. Boullenois, "China sets the rules for its new data economy", Technode, 2020 [online] https://technode.com/2020/08/04/china-sets-the-rules-for-its-new-data-economy/; L. Yiyi, "Zhongguancun launches data asset assessment center", Zhongguancun Science Park, 5 August 2015 [online] http://www.chinadaily.com.cn/m/beijing/zhongguancun/2015-08/05/content_21509252.htm, and information from the China Council for the Promotion of International Trade (CCPIT), 2016.
[a] See [online] http://www.chinadaily.com.cn/m/beijing/zhongguancun/2015-08/05/content_21509252.htm.
[b] Such providers are companies, institutions, governments or individuals that offer their own data or data under their control for exchange and sale.

Despite the benefits, in contrast to a government-backed market, a free market system (such as eBay) may create problems relating to, for example, strategic behaviour, illegal data collection, questionable quality of data and a lack of guaranteed reliability of data (Koutroumpis, Leiponen and Thomas, 2020). A potential solution is the creation of a "market maker" that may or may not operate for profit. As in the case of the European Union data market (see box 9), a government-backed market, the creation of a non-profit market maker was chosen. In this scenario, a market maker is an intermediary or facilitator that can identify behaviour patterns among participants in line with the security, privacy and competition requirements of the authorities. The market maker would match participants (data buyers

and providers), identify patterns and even assign value. The absence of a market maker makes it difficult to strengthen data markets. Box 8 details the example of the market maker that the Australia and New Zealand Banking Group tried to create.

Box 6
The New Zealand data market and its market maker

The Australia and New Zealand Banking Group (ANZ) has tried to develop a plan to share its databases. According to ANZ, the exchange of data could create advantages through the use of new databases and improve the bank's decision-making capabilities. However, upon encountering difficulties in aligning agreements, the institution discovered that it would take between 12 and 18 months to agree on a methodology, technology, and contracts in the data-sharing process. Moreover, the teams involved expressed their concern about the risks of sharing sensitive data in the bank's possession. The associated transaction costs resulted in a reduced incentive for the institutions involved in the agreement.

In order to identify problems, manage exchanges and accelerate new data partnerships, ANZ chose the Data Republic Senate platform (a market for official data). This platform enabled ANZ to simply data exchanges and control access to data and user permission, governance of flows, shared analysis and auditing, i.e. to play the role of a market maker.

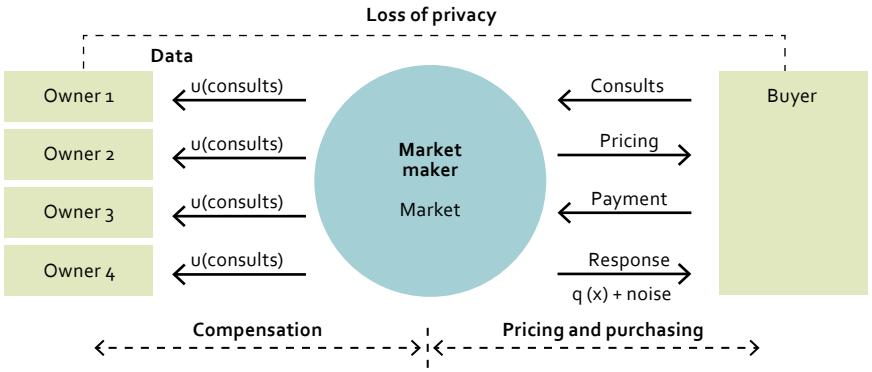
ANZ has accelerated its capacity to share data in the confidence that the commercial risk is under control and that customer privacy, as well as personal identifiable information, is protected, while the platform makes it possible to compare data sets without exchanging personal information. The platform also makes it possible to control specific licence terms about how and why data are provided in order to avoid exceeding the asset limits established by law. The results of the initiative were exponential; according to Data Republic, there was a 93% reduction in the time taken for parties to agree on data exchange and methodologies.

Source: https://www.datarepublic.com/case-studies and C. Dilmegani, "Data marketplaces: what, why, how, types, benefits, vendors", AI Multiple, 2021 [online] https://research.aimultiple.com/data-marketplace/#what-is-a-data-marketplace.

On the other hand, in a data market with monetary value (for profit), the market maker could discriminate, control prices and ensure the proper functioning of the data market in accordance with the quality of the data and the characteristics of the participating actors. For example, in Li and others (2014), data are valued more if they are unaltered.[27] Another pricing mechanism addressed in the literature is to connect the loss of privacy to monetary compensation. The role of the market maker, according to Li and others (2014), "is not to protect the assumption of privacy, but to ensure that prices are set in such a way that, irrespective of the disclosure acquired by the buyer, all of the individuals contributing are adequately compensated". Diagram 2 depicts a market maker and their role in assigning prices in line with the specifications required.

[27] Per Wilson and Rosen (2008), "data perturbation" is data security technology that adds "noise" to databases, ensuring the privacy of the registered individuals.

Diagram 2
Market maker



Source: C. Li and others, "A theory of pricing private data", ACM Transactions on Database Systems (TODS), vol. 39, No. 4, 2014.

A. Data marketplaces: the cases of the European Union and Colombia

Despite having strict rules on data management, for example, the General Data Protection Regulation (GDPR), the European Union is promoting data exchange and reuse (European Commission, 2020a) through three initiatives: the directive and the Support Centre for Data Sharing, the Open Data initiative and draft Data Governance Act. The Support Centre facilitates transactions in which data in the public or private sector is made available to other (public or private) organizations to be used and reused. The European Union introduced its Open Data directive in 2019. This established a shared regional framework on the exchange and availability of public data for the benefit of the population and has two pillars: transparency and fair competition. It guarantees free access to high-value databases for enterprises, academia, individuals, and public administration containing types of data including geospatial, earth and environmental observation, meteorological, statistical, company ownership and mobility data. In 2021, these three initiatives have been combined into the European Health Data Space and the Green Deal Data Space to ensure that the European Union is able to make better use of IoT data and data in general. The corresponding directive was adopted by member States in July 2021.

The governance initiative proposes making public sector data available for reuse, sharing data between enterprises in exchange for any kind of remuneration and allowing personal data to be used with the help of a "personal data-sharing intermediary". According to the European Commission (2020b), "businesses will benefit from a reduction in costs for acquiring, integrating, and processing data, and from lower barriers to enter markets. They will also see a reduction in time-to-market for novel products and services. This will enable small and large firms alike to develop new data-driven products and services". The European Commission has also suggested that data governance facilitate and guarantees security for those who, for example, have a rare illness and want to share their data to help research efforts. According to the statement made by Margrethe Vestager, Executive Vice-President of the European Commission for A Europe Fit for the Digital Age (European Commission, 2020c), the framework offers an alternative model the data management practices currently offered by Big Tech platforms

The intermediary is a fundamental part of the data governance proposal, working by means of exchange mechanisms, agreements, and technical standards, such as GDPR, and not making any profit from intermediation. Box 9 explains the data market creation initiative of the European Union. The proposal is important as a lot of data that were previously subject to intellectual property or data protection laws (such as medical data) can now be shared to promote innovation. This guarantees increased competition in the data market.

Box 7
The European Union data market

The President of the European Commission, Ursula Von Der Leyen, announced that it is the "digital decade" in the European Union. Big Data form part of this strategy and the European Commission is starting to prepare a regional data market that guarantees the global competitiveness and sovereignty of European data.[28]

According to the European Commission (2020), the widespread use of data could contribute to improving health care, create safer and cleaner transport systems, generate new products and services, reduce public service costs and improve sustainability and energy efficiency. "We hope for draft legislation on artificial intelligence (AI) throughout the [European Union] in the coming months and a Data Act during the year. At the same time, the Gaia-X initiative is intended to build Europe's own cloud infrastructure".

The European Commission identified five priorities to begin the Digital Decade initiative (Bonefeld-Dahl, 2021). These include:

- Invest in our digital future
- Digital for the Green Deal
- Supporting European innovation and entrepreneurial spirit
- Make 2021 the year of data
- Digital going global

The European Union wants to take advantage of its enormous amount of industrial data, 80% of which is not in use. Promoting the access of small enterprises to these data is crucial as only 12% of them are currently able to harness the potential of Big Data. Data are the engine of growth and the essential raw material in the development of AI. "The main challenge is to promote the availability of, access to and exchange of data, both within and outside the European Union. The most efficient way of doing this is collaboration between industries to take advantage of the best technologies available". The European Union strategy is also aimed at:

- Adopting legislative measures on data governance, access and reuse. For example, for data to be given by a company to a government in the public interest.
- Opening high-value data sets throughout the European Union.
- Investing 2 billion euros in a high-impact project to develop data processing infrastructure, data exchange tools, and governance mechanisms and architecture for data exchanges.
- Enabling access to secure, fair and competitive cloud services, facilitating the establishment of a procurement market for data processing services.

Source: Prepared by the authors, on the basis of C. Bonefeld-Dahl, "Europe's top 5 priorities to kick-start the digital decade", Euractiv, 2021 [online] https://www.euractiv.com/section/digital/opinion/europes-top-5-priorities-to-kick-start-the-digital-decade/ and European Commission, "A European strategy for data", 2020 [online] https://ec.europa.eu/digital-single-market/en/european-strategy-data).

Like the European Union proposal, the Colombian data marketplace initiative is being created with the aim of promoting the reuse of data. This initiative began through the partnership of the Government of Colombia with the World Economic Forum. The proposal is intended to create a governance framework for the exchange and use of data that will stimulate the creation of a data-driven economy and highlight its importance to strengthening the digital economy. Colombia is thereby considering data to be a strategic asset and starting to facilitate the transition to a data economy. Through this initiative, Colombia can become an example for other Latin American countries.

In 2020, a data marketplace model was created that includes aspects such as data governance, interoperability, a financial model, transactionality and user interfaces, and proof of concept. The protection, confidentiality and security of data are the pillars supporting the proper functioning of this market. Colombia identified its main objectives for 2020 as data valuation, the secure exchange of data, incentives, and rewards. It is hoped that the data marketplace can help to promote:

[28] The European Union also has a plan to promote data sharing with the United States. See [online] https://www.digitaleurope.org/resources/digitaleurope-priorities-for-relaunching-the-transatlantic-agenda/.

- Rapid decision-making prior to natural disasters, loss of biodiversity and outbreaks of disease.
- Better tools to tackle complex social challenges: poverty, health, employment.
- Efficient, real-time measurement of the Sustainable Development Goals.
- Greater levels of innovation through the use and exchange of data.
- Optimization of productive processes to increase productivity and competitiveness.

The creation of data markets has great potential to boost businesses in the digital economy, including traditional industries, although we should point out a number of barriers to building data marketplaces that could lessen the success of these markets:

- The heterogeneity of regulatory frameworks at the global, regional and local level. While it puts data protection standards in place, GDPR also enables member States to regulate specific data. In the case of the United States, every state has its own regulations.
- Reliability of data and their origin.
- Lack of trust of actors in the benefits of sharing data, leading to low participation.
- Normally, third parties have no responsibility for the use of personal data, as in the case of tracker apps, and it is not known who may be manipulating the data.
- A market maker or a participation agreement is important to ensure that data markets do not become black markets for personal data.
- Risk of disclosing business strategies and even promoting anti-competition practices.
- Legal restrictions of data use.

B. The importance of data pricing

The success of initiatives to create data marketplaces depends largely on pricing data. Many enterprises may or may not participate in these initiatives because they do not know the value of their data. Moreover, in terms of regulation, as noted by Núñez and Da Silva (2021), the real objective of enterprises making acquisitions is often to acquire data. In this sense, a horizontal acquisition can actually be configured as a vertical one owing to the resulting database crossover; indeed, levels of data concentration have been allowed that can be considered worrying in terms of competition and data protection.[29] In addition, little is known about the true value of large corporations or small enterprises entering the market when they use data as their main asset; the valuation proposal made by China seems to be moving towards resolving these asymmetries.

On the other hand, there is still no consensus on a methodology for pricing databases in terms of their corporate value or their raw value. In general, assets are assessed in three ways: in line with historical costs, with market value or with utility through the present value (Godfrey and others, 1997). At present, and despite it being possible to acquire a database, little is known about the costs, and little can be inferred about value from using it. Heckman and others (2015) stress that the pricing strategies introduced by vendors as they are not transparent in terms of storage, cleansing and transfer costs. This leads to a significant information asymmetry and therefore does not permit, and may even prevent, the participation of many actors in data markets.[30] As indicated previously, the use of a market maker can be a solution in such cases.

[29] For example, the crossover between databases on climate change and consumer demand can provide enterprises with the capacity to map preferences in line with climate. If it is cold, the algorithm will know exactly which product to offer to specific users.

Pricing difficulties are considerable; at present, the research areas in data pricing are the economy, marketing, e-commerce, databases and data management, operations research, business management science, machine learning and artificial intelligence. Pei (2021), in "A survey on data pricing: from economics to data science", reviewed the literature that aimed to address the topic of data by introducing to the analysis the idea of pricing raw data and corporate data. In the former case, there is extensive literature available, mainly in the area of data science. In contrast, there has been little discussion of pricing corporate data. This may be because of the difficulties and exponential nature of data in the corporate environment. In that field, data acquire a value through their use and reuse, in combination with other databases, the size of the markets of interest to the enterprises, interoperability or a lack thereof and creativity, among other factors.

Below is a proposal on how to price corporate data.

$$BDCV = \mu\alpha RD + \pi OC + \beta DSc + \mu\gamma ODB + \delta ERM$$

Description of variables:

- *BDCV* = corporate value of data in companies' balance sheets.
- *RD* = raw data. There are currently many pricing models for raw data that are based on the quality of data, the number of queries or tuples[31], stock trading, etc. (Pei, 2021; Heckman and others, 2015; Li and others, 2014; Yu and Zhang, 2017; Koutroumpis, Leiponen and Thomas, 2020; Muschalle and others, 2012; Kushal, Moorthy and Kumar, 2012) α is a proxy for the cost of the data.
- *OC* represents the operational costs and acquisition costs, such as the cost of storage, cleansing and manipulation. This variable will be given in gigabytes and π is a proxy for the cost of these processes. This information can be based on Windows Azure, for example.
- *DSc* represents the value and role of scientists in generating corporate value from databases. Here, data scientists are a proxy for the creativity, use and reuse of data; their role is therefore a major one as data do not, in themselves, represent significant value in companies' balance sheets. It is suggested that the accuracy of data be incorporated into the quality of the company's data scientists. β is a coefficient representing the added value generated by each data scientist.
- *ODB* are other databases. The combination of databases is one of the main creators of value in data use. γ indicates the acquisition or combination of new databases to supplement the original database.
- *ERM* is the extent of the relevant market. The combination of different databases and the extent of the relevant market are thought to create an incentive for intense and greater use of data. δ is a proxy for the impact of a large relevant market on the value of a database.
- $\mu = 1/age$ represents the rate of data depreciation. Data decreases in value over time. As has been stated in the text, data lose their ability to show consumer preferences, but they continue to be of value in more aggregated analyses. Companies may be asked to anonymize their data after a certain period of time. This factor in depreciation shows the need of digital enterprises to collect data collection and take an aggressive position in that area.

The dependent variable is expressed in value and the independent variables in gigabytes; the betas convert gigabytes to monetary value.

---

[30] The lack of transparency on data manipulation lowers the prices of all products on the market and leads to sellers with higher quality products choosing not to enter the market, as well as making it very risky to make a purchase without being certain of its quality. This creates market failures that require the relevant authorities to take action.

[31] List of elements.

An important feature to be added to the pricing model is the validity of data. For many industries, data do not lose value over time, whereas for many others time is the determining factor. In the case of companies such as Tesla and its AI-powered autopilot, the devaluation of data is slower as, for instance, it is difficult for road markings to change significantly. For retail companies, meanwhile, devaluation occurs at a faster pace as the preferences of individuals are change constantly. However, in this case, data continue to have value in the aggregate, for example to make a sales estimate for a region or area. Mayer-Schönberger and Cukier (2013) explain that data do not all lose value at the same pace and in the same way. This explains why some companies think that they need to keep data for as long as possible, including when regulators or the public want them to be deleted or anonymized after a certain period.

C. The importance of data flows to business models

As in digitally native sectors, such as e-commerce or digital platforms, data are important in traditional manufacturing. For the latter, the flow of data makes it possible to: 1) control and coordinate processes; 2) carry out R&D; 3) ensure the operation and management of value chains; 4) coordinate production; and 5) carry out after-sale services (needed to improve quality through feedback). Owing to the intensive use of data in many value chains, enterprises are often faced with regulatory problems in relation to data flows, primarily when they need to move personal data across borders. As we will see in table 6, the stages of development for products and value chains use data as input; in certain cases, such as in the transfer of data relating to employees or clients, this includes personal data. Very strict rules on the sharing of personal data can in fact have an impact on the participation of enterprises, in particular the smallest ones, in the markets.

Table 7
Business use of data

Control and coordinate processes	Carry out R&D	Ensure the operation and management of value chains	Coordinate production	After-sale
– Employee data – Market data – Planning and operations – Data from subsidiaries – Performance monitoring – Predicting demand – Training – Consumer data – Consumption of energy and inputs – Internal communication	– Market information – Social media data – Technical data – Design – Test results – Scientific data – Consumer data – Communication – Project information	– Customs data – Consumer data – Product tracking – Payments – Storage management – Route optimization – Communication – Sending data to logistics partners – Data sales – Quality control	– Data from sensors – Management of robots – Training – Diagnostics, maintenance and repair – Market data – Product data – Quality control – Technical data	– Performance data – Feedback from social media – Diagnostics – Data from third parties – Warehouse management

Source: Prepared by the authors, on the basis of information from the National Board of Trade, 2015.

In recent years, the flow of data and information has expanded and is driving globalization. Despite the ever more latent need to transfer data observed in the business models of companies, some countries have started to put in place regulations on the forced localization of data. In 2017, 37 countries had already implemented 67 forced localization barriers. At present, 62 countries have implemented 144 such barriers. In that regard, data localization[32] may undermine the impact of data-intensive services on

[32] According to Cory and Dascoli (2021), there are five main reasons for the adaptation of forced localization by governments: (1) erroneous interpretation of what privacy, data protection and cybersecurity are; (2) data sovereignty as a justification for digital protectionism; (3) censorship and surveillance; (4) it facilitates the implementation of laws and regulations; and (5) geopolitical risk and financial sanctions.

economic productivity and innovation (Cory and Dascoli, 2021). Initiatives such as the Machine Learning Ledger Orchestration for Drug Discovery, known as MELLODDY and described in box 10, depend on the free flow of data in the health sector to achieve their objectives. This requires national and international coordination, and the harmonization of regulatory frameworks helps to facilitate the access of the various market actors.

From the perspective of countries in the region, many of the most popular Internet services used in the region are often foreign and enormous quantities of data pass through the region or are stored outside it, mainly in countries with higher levels of development. In sum, information does not necessarily need to be stored and processed – and generally is not stored or processed – in the country where it is gathered. This highlights the need for a good data flow to feed the production chains of digital products and non-digital products (examples in table 6).

Box 8
Caso MELLODY
The pharmaceutical sector and the use of AI to cure diseases

The objective of the Machine Learning Ledger Orchestration for Drug Discovery (MELLODDY) project is to build a platform that uses combined databases from ten companies in the pharmaceutical industry. These data will be used to train an artificial intelligence mechanism that will make it possible to develop data-driven solutions for producing antibiotics. In this project, the use of blockchain technology ensures the security of this industry's sensitive data. This technology minimizes the risk of leaks of personal information[33] during the process of sharing data between the actors involved in the data markets. It is clear that not only can the improvement in data protection regulations help to ensure privacy, but that the improvement in the use of technology can also benefit processes for sharing sensitive data. The companies involved are: Amgen Research, Astellas Pharma, AstraZeneca, Janssen Pharmaceutica, Bayer, Boehringer Ingelheim, GlaxoSmithKline, Institut de Recherches Servier, Merck KGaA and Novartis.

Source: Melloddy [online] https://www.melloddy.eu.

The exchange of sensitive data therefore requires a legal framework for data protection that facilitates data exchange and does not act as a barrier to the protection of personal data, intellectual property or types of data that may or may not be shared (Colombia, 2020). MELLODY and the use of data in manufacturing are proof of the impact that data exchange can have on the productivity of traditional enterprises. There are regulatory frameworks in Latin America and the Caribbean that are moving in this direction and are important to closing the gaps between the region and countries and blocs that have already made progress in this area.

1. Regional and international data processing

The flow of data has been constantly addressed in international agreements worldwide (UNCTAD, 2021). Notable trade agreements are the multilateral WTO/Joint Initiative, the Comprehensive and Progressive Agreement for TransPacific Partnership Agreement, the Regional Comprehensive Economic Partnership and the Trade in Services Agreement.[34]

At the regional level, we have initiatives that are moving towards strengthening regulations to promote productivity through data and data-sharing. The Digital Economy Partnership Agreement (DEPA)

[33] The COVID-19 pandemic has accelerated these partnership processes through vaccine production. Some of them were even subject to cyberattacks.

[34] Other agreements and initiatives (UNCTAD, 2021): OECD Privacy Guidelines, OECD Principles for Internet Policy Making Council of Europe Convention 108 and 108+, APEC privacy initiatives, ASEAN data-related frameworks, African Union Malabo Convention, Digital Economy Partnership Agreement, Ibero-American Data Protection Network (RIPD), Digital Agenda for LAC (eLAC) and G20 Data Free Flow with Trust.

between Chile, New Zealand and Singapore is moving in this direction. Other examples are the USMCA and the regional digital market of the Pacific Alliance. Lastly, at the national level, the emerging digital market in Colombia is also worthy of mention.

- **DEPA** - DEPA (Chile, 2020), between Chile, New Zealand and Singapore, is the first digital partnership agreement. In its Module 9, entitled "Innovation and the Digital Economy", the parties acknowledge that cross-border data flows enable data-driven innovation. It also recognizes that innovation can be improved within the context of regulatory testing environments for data exchange (including personal information) and considers data to be an asset.
- **The United States-Mexico-Canada Agreement or USMCA** - As in the case of DEPA, Chapter 19 of this Agreement on digital trade (Mexico, n/d) establishes that the parties should not impose a forced localization of servers or restrictions to cross-border data flows. It also establishes rules on filtering, blocking and net neutrality, as well as on data security.
- **The proposal for a regional digital market[35] in the Pacific Alliance** - In addition to the aim of boosting e-commerce, this proposes: improving access to digital services and products; accelerating the development and adoption of high-speed networks; improving regional connections; promoting the harmonization of roaming and the deployment of new protocols enabling connections between more devices; reducing barriers to digital trade; improving technical and legal interoperability; promoting online trust, privacy, data protection and cybersecurity; and analysing the importance of intellectual property and how to facilitate trade in the digital environment.

DEPA, in contrast to the Pacific Alliance proposal for a regional digital market and the rules in USMCA, is broader in its interpretation of the role of data. The idea behind the regional digital market and USMCA is largely to eliminate non-tariff barriers in digital trade between the countries involved. DEPA, in contrast, interprets data as an asset and an essential input in the survival and innovation of companies. The digitalization of traditional and manufacturing companies, as well as the survival of digital enterprises, requires an approach closer to the DEPA proposals. On the other hand, it is important to note that the contents of the regional digital market proposal point towards greater investment in infrastructure, which is critical to continuing the datafication of the economy. The three agreements share the proposal to not impose barriers on the flow of data, which, in turn, may have positive repercussions in other countries in the region.

It is vital to take advantage of the opportunity offered by an emerging digital market to create transparent regulations, perhaps shared by all countries, that will attract investment and bring about the improvement in productivity that the region needs by means of data and data flows. It is important to recognize that adoption of the digitally-enabled model, the increasing digitalization of traditional manufacturing and the penetration of the digital into our lives transforms the topic of data flows from a trivial matter to a decisive factor in development (UNCTAD, 2021) and well-being. Moreover, data protection must be understood as a determining factor in a cross-border data flows; there is a resulting need for an effort to harmonize very different standards and regulations that may have repercussions in varying areas, including international trade, making it difficult for companies to achieve scale and operate in different markets.

What economic and social benefits could be obtained by harmonizing the legal frameworks on protection, data market creation and the free flow of data throughout the region? It is essential to improve

[35] It is estimated that digitalization could add between US$ 9.62 billion and US$ 13.886 billion annually to a country's GDP. In addition, the spillover of the regional digital market could create added value of US$ 21.33 billion over five years. The annual impact of digitalization could mean an increase to GDP of 0.66% for the countries of the Pacific Alliance (ECLAC/I&JPN, 2020).

understanding of what is at stake. Trends in technology, and the resulting investment by companies, require a legal framework that allows them to exchange data in key areas of development, such as biotechnology, mobile technology, geolocation, robots, neural networks, sensors, telemetry, IoT and sensitive data (for innovation in the medical field). A free flow of data is an essential condition in the business models of companies. Despite the benefits of harmonizing regulations, according to ECLAC/I&JPN (2020) we are still a long way from harmonization at the regional and international levels.[36] We will now highlight some cases of digitalization and use of the digitally-enabled business model where the flow of data is critical.

D. The use of data and the digitally-enabled model in traditional industry

Early signs of digitalization in traditional manufacturing are an example of business investment trends. Technological development is driving the digitalization of traditional industry, disruptive technologies such as IoT, additive manufacturing, AI, blockchain, quantum computing, robotics, 3D printing, drones and cryptocurrencies have been used to transform traditional industries. Sectors including transport, financial services, manufacturing, education, health care, agriculture, retail trade, media and entertainment have been affected by disruptive technological changes that have enabled the sectoral implementation of the shared economy and the gig economy. As mentioned previously, the idea of property and closed and inflexible businesses have not been part of the business models prevailing in recent years, in the context of the digital economy. At the same time, analysis of macrodata is becoming a source of competition, productivity growth, innovation and a consumer surplus.

Data-sharing can revolutionize the production processes of numerous enterprises, irrespective of their size. For example, data could feed algorithms to predict maintenance needs and identify errors in systems or machinery or in tracking products or components, among other uses. This is case of Predix (Someone, 2018), an IoT platform developed by General Electric that uses "digital twins"[37] to make predications relating to climate, maintenance, and the condition of physical assets in factories around the world.

Optimizing manufacturing processes may be of significant financial benefit to companies owing to the importance of participating in data markets to accumulate and exchange data. According to a study by the World Economic Forum (2017), the potential of optimization is estimated to be worth around US$ 100 billion from data exchange; this potential is of particular importance to small enterprises. Manufacturing data can be used for: (1) optimizing capital; (2) tracking products through production chains; (3) tracing product and process condition in the chains; (4) the digital exchange of characteristics; and (5) tracing origins. In sectors such as agriculture, for example, the major advantage of exchanging and participating in data markets is the possibility of finding patterns in the aggregated data (Celik, 2019).

1. Technological agriculture in Brazil

This digitalization process has also been taking place in Latin America. In Brazil, according to Brasilagro (2020), Brazilian agriculture is one the country's most important production sectors and its products account for approximately 21.4% of GDP. Within Latin America, Brazil has become the leader in the technological development of Agtech, which between 2018 and 2019 enjoyed a 232% growth in the number of start-ups (Jardim, 2018). Table 7 shows the performance of noteworthy Agtech companies in Brazil.

---

[36] There are countries in the region whose legal frameworks have been recognized after using the strategies in the three regulation harmonization strategies in the literature: harmonization, alignment and regulatory minima. The European Union considers Argentina and Uruguay fit to receive data flows. Chile and Brazil have developed regulations that follow the same lines as GDPR. Lastly, the Digital Agenda for Latin America and the Caribbean (eLAC 2022) puts forward the use of a regulatory minima strategy.

[37] The digital twins are a complete digital representation of individuals, objects, places or processes that can be used to reconstruct, simulate, test and predict behaviour, performance and products in the real world.

Table 8
Digitalization case studies

Main points	Solinftec	Agrosmart	Jetbov
Tool	Management software	Management software	Management software
Type of data	From agricultural equipment, workers, weather stations and other sources	Data analytics, data science, connectivity, cloud computing, IoT, sensors, geolocation, satellite images, etc.	Data analytics, geolocation, animal nutrition, etc.
Proposal	Managing agricultural production	Optimizing the production process	Compiling, uploading to the cloud and processing data to provide indicators, reports and displays
Countries	11 countries in the Americas	Latin American countries, the United States and Israel	Three in Latin America, two in Africa and one in Europe
Technologies	AI, neuronal networks, sensors, telemetry and deep learning	Software and sensors	Sensors, cloud computing, machine learning and AI
Users	120,000	110,000 hectares	2,000 farms
Data flow	Significant	Significant	Significant
Productivity	20%	20%	42%
Sustainability	30%	Savings of 60% in water and 40% in energy	

Source: Prepared by the authors, on the basis of the websites of the outstanding companies.

Agtech is dedicated to the digitalization of agricultural activity through the use of IoT, Big Data, blockchain, AI, biotechnology, mobile technology, geolocation, robots and remote sensors. At its heart, this is data-driven innovation (ITIF, 2014) where data are used to create value and to improve competitiveness and social progress. These advances have only been possible owing to the technology that has facilitated the collection, analysis, storage, sharing and use of information (Castro and Travis, 2013). In this context, clear regulatory frameworks, that make it possible to create a data exchange ecosystem, are very important.

2. Automotive industry: modernizing to become a data-driven sector?

The automotive industry is one of the major players in the region and a significant recipient of foreign investment. For countries such as Brazil, Argentina and Mexico, this industry can even be considered a barometer for the economy. Confronted with the success of Tesla[38], traditional enterprises have further accelerated their investments and agreements to realise their stakes in these markets. The vehicles that Tesla and Google produce have a smart operating system fed by various sensors that continually collect and transfer data to the companies' headquarters. These data are key to building autopilots using AI. Traditional companies, upon entering these markets, are in search of the main production input for driverless vehicles: data. This includes strategic alliances, such as the following:

- Ford and Android signed a six-year contract to use the Android system in Ford cars; production will begin in 2023. In addition, according to Wayland and Novet (2021) and Valdes-Dapena (2021), Google is going to help Ford to digitize its plants and value chains, as well as helping to process the data collected by cars through AI.
- Cruise, General Motors and Microsoft are joining forces to commercialize driverless vehicles (Cruise, 2021).
- Volkswagen and Microsoft are agreeing to produce driverless vehicles. According to Microsoft (2021), Volkswagen's software company, Car.Software Organization, will collaborate with Microsoft to build a cloud-based automated driving platform in Microsoft Azure.

[38] Tesla is an American car company that is currently one of the companies that has invested most and made the most progress in AI and driverless and electric vehicles; however, it does not have plants in Latin American and Caribbean countries.

- Apple and Hyundai-Kia will not work in a partnership, but Hyundai will act as Foxconn; it will act as a coadjuvant in the production of Apple smartphones.
- Hyundai-Kia also has its own driverless vehicle initiative in partnership with Aptiv, which includes the development of "robotaxis" (LeBeau and Reeder, 2021)

The natural development of digitalizing manufacturing requires the authorities to pave the way to enable this process to progress to the benefit of companies, consumers and the economy in general. Improved productivity, greater environmental sustainability, transparency in processes, personalization and economies of scope and scale are among the potential benefits of the future digitalization of manufacturing that is permeating other industries.

The digitalization of traditional industry has been largely driven by the innovation that start-ups have brought to the market. Developments in the Brazilian Agtech industry are one example of this, although those that stand out most are FinTechs. Núñez and Da Silva (2021) suggest that start-ups are often one of the major sources of innovation in the digital economy —in some cases, start-ups are created for the sole purpose being acquired later by bigger players—, although they unfortunately experience predatory acquisitions and abuses of dominant positions by incumbents for the same reason. It is therefore very important for digitalization and economic dynamics for the playing field to be levelled so that these companies can continue to play their disruptive part.

V. Conclusion

In view of the imminent datafication of the economy, at the Latin American and Caribbean level there are already signs of transformation in traditional industries, such as the automotive industry, and of penetration of the digitally-enabled business model. Governments and relevant authorities have the complex task of following the trends at play in digital markets and even of being one step ahead of them in order to take advantage of the opportunities that these businesses bring to the region. At the same time, digital platforms have proven to be a problem for regulation and competition and use a business model that has the potential to transform the dynamic between governments and the private sector. It is therefore important to understand such models to seize opportunities and reduce potential threats to the performance of small disruptive companies.

The concentration levels and winner-takes-all dynamic of markets with network effects emphasizes the pressing need to regulate platforms, value data and create data markets. At the same time, there is a need for normative frameworks compatible with the development of data-driven business models. Some regional initiatives have moved in that direction (DEPA, USMCA and the regional data market). However, coordination is needed at the regional level to reach the optimal level of harmonization of regulations in order to ensure a good data flow. Promoting digitalization and data exchange must be an integral part of government policy; it could be considered a new industrial policy strategy as one of the main effects of data exchange is improved productivity in manufacturing. In sum, it is crucial to harmonize regulatory frameworks, for countries to coordinate in the face of rapid technical development and to strengthen institutional frameworks to confront all challenges.

Bibliography

ABDI (Brazilian Agency for Industrial Development) (2021), *Maturidade digital das MPEs brasileiras.*

Accenture (2016), *Five Ways to Win with Digital Platforms* [online] https://citizen-entrepreneurs.com/wp-content/uploads/2020/11/Accenture_Long-Report_Digital-version.pdf.

Asen, E. and D. Bunn (2021), "What European OECD Countries Are Doing about Digital Services Taxes", Tax Foundation [online] https://taxfoundation.org/digital-tax-europe-2020/.

Azevedo, D. (2021), "Copa-Cogeca – EU code of conduct on agricultural data sharing by contractual agreement", Support Centre for Data Sharing [online] https://eudatasharing.eu/examples/copa-cogeca-eu-code-conduct-agricultural-data-sharing-contracual-agreement.

Bonefeld-Dahl, C. (2021), "Europe's top 5 priorities to kick-start the digital decade", Euractiv [online] https://www.euractiv.com/section/digital/opinion/europes-top-5-priorities-to-kick-start-the-digital-decade/.

Boullenois, C. (2020), "China sets the rules for its new data economy", Technode [online] https://technode.com/2020/08/04/china-sets-the-rules-for-its-new-data-economy/.

Carstens, A. and others (2021), "Regulating big techs in finance", *BIS Bulletin*, No. 45, Bank for International Settlements (BIS).

Castro, D. and K. Travis (2013), "Data Innovation 101: An Introduction to the Technologies and Policies Supporting Data-driven innovation" [online] https://www2.datainnovation.org/2013-data-innovation-101.pdf.

Celik, S. (2019), "Data sharing in the agricultural sector", Support Centre for Data Sharing [online] https://eudatasharing.eu/examples/data-sharing-agricultural-sector.

Chile (2020), *Acuerdo de Asociación de Economía Digital* [online] https://www.subrei.gob.cl/docs/default-source/acuerdos/depa-espanol.pdf?sfvrsn=970cce83_2.

CNBC (2016), "CNBC transcript: interview with Travis Kalanick, CEO and co-founder of Uber" [online] https://www.cnbc.com/2016/03/28/cnbc-transcript-interview-with-travis-kalanick-ceo-and-co-founder-of-uber.html.

Colombia (2020), *Economía de intercambio de datos. Data Marketplaces - Conceptualización para su implementación en Colombia*.

Condorelli, D. and J. Padilla (2020), "Harnessing platform envelopment in the digital world", Journal of *Competition Law & Economics*, vol. 16, No. 2.

Cory, N. y L. Dascoli (2021), "How Barriers to Cross-Border Dataflows Are Spreading Globally, What They Cost, and How to Address Them" [online] https://itif.org/publications/2021/07/19/how-barriers-cross-border-data-flows-are-spreading-globally-what-they-cost.

Cruise (2021), "Cruise and GM team up with Microsoft to commercialize self-driving vehicles" [online] https://www.getcruise.com/news/cruise-and-gm-team-up-with-microsoft-to-commercialize-self-driving-vehicles.

Da Silva, F., J. De Furquim and G. Núñez (2020), "La libre concurrencia en la economía digital: las micro, pequeñas y medianas empresas (mipymes) en América Latina y el impacto del COVID-19", *Project Documents* (LC/TS.2020/142), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).

Deichmann, J. and others (2016), "Creating a successful Internet of Things data marketplace", McKinsey Digital [online] https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/creating-a-successful-internet-of-things-data-marketplace.

Dilmegani, C. (2021), "Data marketplaces: what, why, how, types, benefits, vendors", AI Multiple [online] https://research.aimultiple.com/data-marketplace/#what-is-a-data-marketplace.

ECLAC (Economic Commission for Latin America and the Caribbean) (2021), *Foreign Direct Investment in Latin America and the Caribbean, 2021* (LC/PUB.2021/8-P), Santiago.

(2018), *Data, algorithms and policies: redefining the digital world* (LC/CMSI.6/4), Santiago.

ECLAC/I&JPN (Economic Commission for Latin America and the Caribbean/Internet & Jurisdiction Policy Network) (2020), *Internet & Jurisdiction and ECLAC Regional Status Report 2020* (LC/TS.2020/141), Santiago.

_____(2019), *Fiscal Panorama of Latin America and the Caribbean, 2019* (LC/PUB.2019/8-P), Santiago.

European Commission (n/d), "The Digital Markets Act: ensuring fair and open digital markets" [online] https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_en.

_____(2020a), *Proposal for a Regulation of the European Parliament and of the Council on European Data Governance* (2020/0340/COD), Brussels.

_____(2020b), "A European strategy for data" [online] https://ec.europa.eu/digital-single-market/en/european-strategy-data.

_____(2020c), "Speech by Executive Vice-President Margrethe Vestager on the Data Governance Act and the Action Plan on Intellectual Property", 25 November [online] https://ec.europa.eu/commission/commissioners/2019-2024/vestager/announcements/speech-executive-vice-president-margrethe-vestager-data-governance-act-and-action-plan-intellectual_en.

_____(2018), "Fair Taxation of the Digital Economy", 21 March [online] https://ec.europa.eu/taxation_customs/fair-taxation-digital-economy_en.

Friedman, T. L. (2017), *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations. Version 2.0 with a New Afterword*, Picador USA.

Gartner (2017), Insights from the 2017 CIO Agenda Report: Seize the Digital Ecosystem Opportunity.

Gasser, U. (2015), "Interoperability in the digital ecosystem", Research Publication, No. 2015-13, Berkman.

Godfrey, J. and others (1997), *Financial Accounting Theory, Third Edition,* New York, John Wiley and Sons.

Greco, E. M. and F. M. Viecens (2020), "Fintech y BigTech: barreras a la entrada y a la innovación. Estado de situación en América Latina", *Revista LATAM Digital,* No. 1.

Heckman, J. R. and others (2015), "A pricing model for data markets", *iConference 2015 Proceedings*.

Isabel (2021), "The state of Open Banking in Latin America", Belvo, 29 April [online] https://belvo.com/blog/the-state-open-banking-latam/.

ITIF (Information Technology and Innovation Foundation) (2014), "100 data innovations", 23 January [online] https://itif.org/publications/2014/01/23/100-data-innovations.

Jardim, F. (2018), "Brazil Agtech Market Map: 338 Startups Innovating in Agricultural Powerhouse", AFN [online] https://agfundernews.com/brazil-agtech-market-map-338-startups-innovating-in-agricultural-powerhouse.html.

Koutroumpis, P., A. Leiponen and L. D. Thomas (2020), "Markets for data", *Industrial and Corporate Change,* vol. 29, No. 3.

Kushal, A., S. Moorthyand and V. Kumar (2012), "Pricing for Data Markets" [online] https://courses.cs.washington.edu/courses/cse544/11wi/projects/kumar_kushal_moorthy.pdf.

LeBeau, P. and M. Reeder (2021), "Apple and Hyundai-Kia pushing toward deal on Apple Car", CNBC, 3 February [online] https://www.cnbc.com/2021/02/03/apple-and-hyundai-kia-driving-towards-deal-on-apple-car.html.

Li, C. and others (2014), "A theory of pricing private data", *ACM Transactions on Database Systems (TODS)*, vol. 39, No. 4.
Luhby, T., K. Lobosco and K. Sullivan (2021), "Here's what's in Biden's infrastructure proposal", CNN, 21 April [online] https://edition.cnn.com/2021/03/31/politics/infrastructure-proposal-biden-explainer/index.html.
Lund, S. and J. Bughin (2019), "Next-generation technologies and the future of trade", VoxEU, 10 April [online] https://voxeu.org/article/next-generation-technologies-and-future-trade.
Margetts, H. and A. Naumann (2017), "Government as a platform: What can Estonia show the world", University of Oxford [online] https://www.politics.ox.ac.uk/materials/publications/16061/government-as-a-platform.pdf.
Mayer-Schönberger, V. and Cukier, K. (2013), *Big Data: A Revolution that Will Transform How We Live, Work, and Think,* Houghton Mifflin Harcourt.
Mckinsey Analytics (2017), "Fueling growth through data monetization", 1 December [online] https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/%20fueling-growth-through-data-monetization.
Mexico (n/d), "Capítulo 19: comercio digital" [online] https://www.gob.mx/cms/uploads/attachment/file/465801/19ESPComercioDigital.pdf.
Meyer, R. (2019), "Meyer's Management Models -episode 2: 'Digital Platform Map'" [online] https://blog.antwerpmanagementschool.be/en/ron-meyer-episode-digital-platform-map.
Microsoft (2021), "Volkswagen Group teams up with Microsoft to accelerate the development of automated driving", 10 February [online] https://news.microsoft.com/2021/02/10/volkswagen-group-teams-up-with-microsoft-to-accelerate-the-development-of-automated-driving/.
Muschalle, A. and others (2012), "Pricing approaches for data markets", *International Workshop on Business Intelligence for the Real-time Enterprise*, Berlin/Heidelberg, Springer.
Núñez, G. and F. Da Silva (2021), "Free competition in the post-pandemic digital era: the impact on SMEs", *Project Documents* (LC/TS.2021/15), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
OECD (Organisation for Economic Co-operation and Development) (2021), "130 países y jurisdicciones se integran en un nuevo y ambicioso marco para la reforma fiscal internacional", 1 July [online] https://www.oecd.org/centrodemexico/medios/beps-if-impuestos-digitales.htm.
_____(2020), *Statement by the OECD/G20 Inclusive Framework on BEPS on the Two-Pillar Approach to Address the Tax Challenges Arising from the Digitalisation of the Economy – January 2020, Paris.*
Oxera (2016), Benefits of Online Platforms.
Parker, G. G., M. W. Van Alstyne and S. P. Choudary (2016), *Platform Revolution: How Networked Markets are Transforming the Economy and How to Make Them Work for You,* WW Norton & Company.
Pei, J. (2021), "A survey on data pricing: from economics to data science", I*EEE Transactions on Knowledge and Data Engineering.*
PWC (PriceWaterhouseCoopers) (2015), *Sharing or Paring? Growth of the Sharing Economy,* Hungary.
PYMNTS (2021), "Open eCommerce: open banking as the new eCommerce accelerator in the U.K. and Europe" [online] https://www.pymnts.com/study/open-banking-ecommerce-uk-europe-security-payments-digital/.
Reuters (2020), "China should consider digital tax for large tech firms collecting copious amounts of user data, regulator says", South China Mornind Post, 16 December [online] https://www.scmp.com/tech/policy/article/3114200/china-should-consider-digital-tax-large-tech-firms-collecting-copious.
Rossotto, C. M. and others (2018), "Digital platforms: a literature review and policy implications for development", *Competition and Regulation in Network Industries*, vol. 19, No. 1-2.
Ruggieri, R. and others (2018), "The impact of digital platforms on business models: an empirical investigation on innovative start-ups", *Management & Marketing. Challenges for the Knowledge Society*, vol. 13, No. 4.
SEBRAE (Brazilian Micro and Small Business Support Service) (2020), "Financiamento dos Pequenos Negócios no Brasil 2013-2020" [online] https://datasebrae.com.br/wp-content/uploads/2021/01/Pesq_Financiamento-2020_Final.pdf.
Sedera, D. and others (2016), "Innovating with enterprise systems and digital platforms: a contingent resource-based theory view", *Information & Management,* vol. 53, No. 3.

Annex

Annex 1
Data markets around the world

- London Dataset[39] which is an open data market with more than 900 databases.
- The Agrifood Data Marketplace[40]
- Data brokers: Acxiom (consumer data), Bloomberg (financial data) y LexisNexis (insurance data).
- The CROSS-CPP marketplace[41] which is a data market for sensors.
- Data trading Alliance[42] (Japan)
- Big-data trading platform[43] (Japan)
- Personal data bank of Japan[44]
- Copa and Cogeca[45] - According to Azevedo (2021), this partnership of cooperatives has drawn up a code of conduct on the exchange of agricultural data with the European Union.
- Dawex is a marketplace where 13,000 organizations are already exchanging data.
- JoinData, founded in 2017 by Dutch agricultural cooperatives, has launched a platform for exchanging digital data.
- Amsterdam Data Exchange (AMDEX).
- DANS (Data Archiving and Networked Services).
- CurieuzeNeuzen – more than 50,000 individuals are sharing data to measure heat and drought.

---

39 See [online] https://data.london.gov.uk/.
40 See [online] https://agrimetrics.co.uk/.
41 See [online] https://www.cross-cpp.eu/big-data-marketplace.
42 See [online] https://data-trading.org/.
43 See [online] https://asia.nikkei.com/Business/Business-trends/Big-data-trading-platform-to-launch-in-Japan-next-month.
44 See [online] https://asia.nikkei.com/Economy/Japan-takes-step-toward-enormous-bank-of-personal-data.
45 Copa represents over 13 million farmers and their families, while Cogeca represents the interests of 22,000 agricultural cooperatives. Together they represent 66 organizations within the member States of the European Union.
46 See [online] https://data.iota.org/#/.

- International Data Spaces (IDS) Association (multi-sided platform): IDS forms the basis for a data market based on European values, i.e. the confidentiality and security of data, equality of opportunities within a federated design and the guarantee of data sovereignty for the data creator and trust between actors.
- IOTA Data Marketplace.
- JoinData, fundada en 2017 por cooperativas de agricultores holandeses, ha lanzado una plataforma de intercambio de datos digitales.
- Amsterdam Data Exchange (AMDEX)
- DANS (Data Archiving and Networked Services)
- CurieuzeNeuzen - más de 50 mil ciudadanos compartiendo datos para medir el calor y la sequía
- International Data Spaces (IDS) Association (multi-sided platform): IDS forms the basis for a data market based on European values, i.e. the confidentiality and security of data, equality of opportunities within a federated design and the guarantee of data sovereignty for the data creator and trust between actors.
- IOTA Data Marketplace[46]

Diagram A1
Alibaba digital ecosystem and digital enablers

Source: C. M. Rossotto and others, "Digital platforms: a literature review and policy implications for development", Competition and Regulation in Network Industries, vol. 19, No. 1-2, 2018.

Diagram A2
Amazon digital ecosystem

Source: B. Talin, "What is a digital ecosystem? – Understanding the most profitable business model", MoreThanDigital, 21 October 2021 [online] https://morethandigital.info/en/what-is-a-digital-ecosystem-understanding-the-most-profitable-business-model/.

The data economy has presented challenges that go far beyond the scope of traditional regulatory frameworks and competition policies. The role of data, digitalization and the dynamic those factors have imposed on the economy have created significant challenges that the regulatory authorities must confront. At the heart of the debate is the impact of digitally-enabled business models and the digital platforms themselves. In this context, many enterprises, particularly small ones, are facing unfair competition from digitally native companies.

The digitalization of the economy, the digitally-enabled business model and the intensive use of data are generating opportunities for enterprises and governments. The creation of data marketplaces and the elimination of barriers to the free flow of data have the potential to improve innovation and productivity in the economy. From a fiscal perspective, understanding the role of data and pricing them are therefore essential to closing gaps and levelling the playing field. Moreover, it is primarily start-ups and disruptor companies that benefit from the pricing of databases.

ECLAC

Economic Commission for Latin America and the Caribbean (ECLAC)
Comisión Económica para América Latina y el Caribe (CEPAL)
www.eclac.org

LC/TS.2021/173