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Contents

Explanatory notes

The following symbols have been used in the tables in this publication:

… Three dots indicate that data are not available or are not separately reported.

— A dash indicates that the amount is nil or negligible.

A blank space indicates that the concept under consideration is not applicable or not comparable.

– A minus sign indicates a deficit or decrease, unless otherwise indicated.

. A full stop is used to indicate decimals.

/ A slash between years (e.g. 2022/2023) indicates a 12-month period falling between the two years.

- The use of an en dash between years (e.g. 2022–2023) indicates reference to the complete number of calendar years involved, including the beginning and end years.

Reference to "tons" indicates metric tons and the world "dollars" refers to United States dollars, unless otherwise specified.

Individual figures and percentages in graphs and tables may not always add up to the corresponding total because of rounding.

Where next for Latin America?
The two faces of the new
Latin American capitalism

Jorge Katz

Abstract

In Latin America, "islands of modernity" associated with a new biological and digital paradigm in the exploitation of natural resources and the production of services and manufactures coexist with vast segments of the population mired in insecurity, poverty, stagnation and social exclusion. This structural dualism reflects a growing gap between a modern segment of society that emulates the behaviour patterns of developed nations and a segment that lags behind, in which labour informality, basic material deprivations and rising citizen insecurity predominate. The lack of an appropriate theory of development capable of examining institutional and regulatory fragility, the capture of State resources by large corporate groups and a lack of long-term policies reflect this internal divide. At the same time, the external divide with South-East Asian countries is widening. This article argues that a new social covenant is needed if growth is to be attained and income distribution is to improve.

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I.   Introduction

The research agendas and academic output of professional economists are often conditioned by the economic and sociopolitical environment in which they happen to live. This makes it perilous to assume that the economy normally behaves in the way suggested by the dominant theory, which conceives the functioning of the major economic aggregates as reflecting a generic, universal model and is only marginally concerned with issues specific to the institutional environment of developing nations. This is particularly true when we consider proposals for State intervention (or non-intervention) related to the functioning of the economy.

We have to accept that the received literature as presented in the major journals of the discipline, in the information disseminated by the international media and in the topics discussed by professional economists are all heavily influenced by what happens in developed countries. Only sporadically are the problems of developing nations and the institutional circumstances under which they have to be dealt with discussed. There is a lingering belief that the peripheral economies are a backward version of more mature economies, which are reluctant to apply strict market rules that would eventually allow them to close the relative gap with the developed world. It is almost never accepted that different forms of capitalism prevail worldwide, each with an idiosyncratic and distinctive economic and institutional set-up that needs to be understood on its own terms.

Some of us believe that economics is not an exact science but a discipline rife with imperfect information, uncertainty and intangible factors that are difficult to measure. For these reasons, differences in ground rules and in the behaviour of economic agents, the way in which companies and consumers react to economic policies and the way firms and individuals develop their expectations for the future are strongly influenced by local circumstances. This state of affairs cannot be ignored, nor can it be assumed that reality will in the long run adapt to the theoretical model proposed by the dominant narrative in the discipline. As Robert Solow put it in his 1987 Stockholm lecture when he received the Nobel Prize in Economics for his contribution to neoclassical growth theory: we are asked to regard this theoretical construction as a model of the functioning of capitalism but this is not convincing, since the markets for goods and for labour look like imperfect pieces of social machinery with important institutional peculiarities and do not seem to behave at all like transparent and frictionless mechanisms for converting the consumption and leisure desires of households into production and employment decisions (Solow, 1988, pp. 310 and 311). In other words, not even the author honoured for providing the discipline with the neoclassical growth model now taught at the world's leading universities loses sight of the institutional peculiarities that prevent a social optimum from being achieved. It is clear that these peculiarities are necessarily specific to each country and region.

The second section of this paper critically examines the relationship between the view proposed by the dominant theory and its heuristic value for understanding situations that are strongly influenced by institutional features and norms and customs specific to each national (or even subnational) setting, market failures and forms of collusion among firms, and State capture by national and international corporate groups. This being so the policy lessons emerging from a model that assumes properly functioning institutions and markets must be treated with great caution when examining the issues that require attention in the peripheral world, where market failures, collusion and State capture by large corporations are the rule rather than the exception.

In the case of developing countries it is crucial to ask, for example, why so many of them have fallen into a phase of stagnation that has now lasted for years, despite having tried different government programmes to break out of this situation. It is also necessary to ask why, in a number of cases, there are clear signs of deindustrialization and loss of competitiveness in low-technology manufacturing sectors, such as footwear, apparel and technically unsophisticated capital goods, with markets increasingly being captured by South-East Asian companies that displace small and medium-sized local firms.

Other pertinent questions are why the world of SMEs is facing so many difficulties to incorporate digital technologies and automation in production processes and thus achieve productivity improvements, opting instead to revert to the assembly of imported parts and components; why quality jobs are not being generated and informality is growing in labour markets; and why poverty and social exclusion are increasing and access to merit goods such as drinking water, urban sanitation services and primary health care, whose provision should be an inescapable obligation of the State, is not improving. These questions often do not arise in developed countries, and when they do it is without the same degree of intensity as in many peripheral countries.

Notwithstanding the situation of decline described in the previous paragraph, it must be acknowledged that, from the point of view of the long-term transformation of capitalism in peripheral countries, it only partially reflects the contemporary scene. Many developing countries, especially in Latin America, are rich in natural resources, both renewable and non-renewable, and many of these activities are currently transitioning towards a new production paradigm resulting from changes in the world's knowledge frontier in biology, genetics, computer science and process digitalization, the use of artificial intelligence and data mining. Owing to these changes, some businesses engaged in the exploitation of natural resources and the provision of services are gradually moving towards novel, science-based forms of production organization. Although this is still an incipient phenomenon in the developing world, it seems to be signalling a long-term trend that is unlikely to stop.

In other words, the new Latin American capitalism has followed a path in which stagnation, deindustrialization and rising poverty and social exclusion coexist with islands of modernity where efforts are being made to move towards a new paradigm of industrial organization. The new Latin American capitalism exhibits, then, a new pattern of structural dualism that cannot be ignored. These issues are addressed in the third section of the paper, which argues that the new development model has resulted in a growing gap between different segments of society and in new forms of institutional complexity that are contributing to a worsening of democratic governance and an increase in social tensions and urban insecurity. The gap between the modern segment of society and the segment that is lagging behind has widened, social discontent has increased, personal security has deteriorated greatly and various forms of social confrontation have proliferated. This situation is presumably a response to the poor long-run performance of the economy and the greater inequality prevailing today, but it has also been facilitated by the increasing role played currently by illicit activities associated with the increasing availability of drugs and with the opacity and scarce regulation of financial activities exploiting social marginalization. Governments have become increasingly unable to handle these new issues and social discomfort has clearly grown.

To put it differently, the new Latin American model of social and economic organization no longer seems to be manageable exclusively by means of conventional market instruments and policies, as has been attempted in the past. Instead, it calls for new forms of intervention in which the provision of merit goods (drinking water, urban sanitation services, better primary health care and improved public education) and the delivery of goods for collective use that would help to reduce poverty and social exclusion could be delivered concomitantly with policies favouring the transition to digitalization and automation of the production matrix, the upgrading of workforce skills to halt the advance of informality, and support for local small and medium-sized enterprises, so that they can more successfully confront the competition from South-East Asian companies.

The fourth section of the paper argues that in this new phase of Latin American capitalism, in which poverty and secular stagnation coexist with incipient modernization in isolated parts of the economy, local factors, i.e. the ground rules and internal forces of each society that determine the conduct and expectations of economic agents, become central to our understanding of society's behaviour and to the design and implementation of public policies capable of adequately dealing with the growing complexity of national economies.

Looking at matters from this perspective leads us to adopt a critical view of the analytical framework offered by the dominant theory, which operates on the basis of a universal model of economic behaviour according to which the free functioning of markets and competition adequately guides the development path of the economy. In this theoretical framework, State interventions can only be justified by market failure, but the theory lacks a true understanding of the institutional complexity of the environment in which each country operates. Nor does it recognize the importance of local factors or the extent to which these idiosyncratic domestic features condition the political economy of each particular national scenario. When incorporating the notion that local factors matter and that each country's institutional specificity cannot be ignored in the design of public policy, it becomes clear that our discipline still lacks a theory of economic development which adequately incorporates many of these significant institutional and non-market forces. Local realities are normally approached from the perspective of the logic of the generic, universal model provided by the dominant theory, and little consideration is given to the fact that the institutional framework and ground rules of each national case have a profound influence on the behaviour of the economy. State capture by large corporate groups constitutes a feature of each local political economy that calls for specific local action. Technological knowledge cannot just be brought in from abroad as if it were a ready-made set of artefacts and user manuals that can be easily integrated into the national scene. Local institutions and human resources with the skills to adapt and use said knowledge are needed, and how to attain them constitutes a much more complex and demanding issue than that envisaged by the dominant growth theory.

Producing shoes is not the same as producing, for example, copper, salmon, soybeans, fruit, wine, health services, wind or solar energy, environmental care programmes or seeds adapted to the local requirements of any given country. Specific local biological, physical, sanitary, environmental and even political conditions are central features of the production organization model that must be taken into account. Technological knowledge specific to each locality is required. Technicians and professionals are also needed, as are institutes to train them and regulatory agencies and State supervisory bodies to monitor compliance with standards and ground rules tailored to the characteristics of each local environment.

All this said, it is clear that the new capitalism of the peripheral world calls for a theory which can facilitate understanding of the macro and micro, institutional and regulatory spheres, non-market aspects and the need for public and merit goods of various kinds, and not just conventional market rules and competition. There is a need for new forms of collective action and new models of social organization that must be devised locally in order to revitalize the production matrix and restore growth and equity.

The fifth and final section of the paper presents a brief reflection on the future. Three major issues are currently priorities in peripheral countries. The first is how to deal with industrial stagnation and the incipient deindustrialization currently being experienced in many countries of the periphery. This phenomenon is fuelling growing informality in labour markets, a lack of opportunities and, ultimately, poverty and social exclusion that lead to the deterioration of governance.

The second issue has to do with the shift towards Industry 4.0 models of production organization, both in sectors that exploit natural resources, such as agriculture, stockbreeding, mining, forestry and non-conventional energy generation, and also in a wide range of services, including health and financial services, e-commerce, the electrification of transport systems, and many others. A central element in this process is the role to be played by the generation and dissemination of domestic technological capabilities and the local production of equipment and artefacts adapted to the domestic specificity of the newly emerging production organization models.

In addition to the above, a third issue has recently emerged that should be taken into consideration: the negative impact of the health crisis caused by the coronavirus disease (COVID-19) pandemic, which continues to affect activity levels, impeding job creation and worsening the social exclusion

that was already occurring because of the countries' stagnation. The impact of the health crisis has added further drama to the pattern of persistent economic and social decline inherited from the past. However, it must be acknowledged that the consequences differ from country to country, depending on the role adopted by government authorities, the greater or lesser scale of fiscal subsidies, rates of vaccination and follow-up of registered cases, the greater or lesser efficiency of primary health-care services and other factors. It is now clear that it will take long years and substantial efforts in the delivery of public health, education and community support to make up the ground lost, especially in the poorest segments of the population, but also in middle-class sectors that have now joined the impoverished sections of society. It is a matter not only of restoring jobs, but also of understanding that the health crisis has resulted in more complex and intangible problems affecting the mental and psychological health of large sections of the community and giving rise to new forms of uncertainty and insecurity that require urgent consideration.

The situation is further aggravated by the impact of the Russian Federation's invasion of Ukraine and its recessionary and inflationary effect on the world economy. There can be no doubt that this has particularly affected the peripheral world, as energy imports have become more expensive and the supply of intermediate inputs for domestic production, both primary (fertilizers) and industrial (parts and components for industry, medical supplies), has suffered. At the same time, however, new trade opportunities have opened up in food, agricultural products, and so forth. The impact of these new world circumstances will no doubt differ among countries and each one will have to craft a specific and individual response.

Lastly, and no less worryingly, there is the growing climate of tension and uncertainty in the world economy resulting from China's global advance and the intention it has repeatedly manifested of gaining control of raw materials critical to the future digitalization of its production matrix (e.g. lithium and rare earths). Also worth noting is China's intention of gaining access to land with high agricultural productivity and to water reserves and energy sources that can meet its needs in the future. These issues and the way each developing country chooses and is able to manage its relationship with China, constitute another open-ended topic that has so far been scarcely explored by developing nations, but that will demand serious consideration in the future.

The preceding paragraphs have provided a rough outline of the broad spectrum of issues that Latin American countries will have to face over the coming decades. Short- and medium-term interventions will be needed to gradually tackle poverty and social exclusion, to attain progress in the delivery of merit goods such as drinking water, urban sanitation, education and public health, and to improve the urban security situation, which has deteriorated sharply in recent years. These are tasks that will require an enormous amount of new resources and new sources of long-term financing, for which a new social covenant will be required if government intervention is at all possible. It is not just a fiscal and tax reform that is needed, but also a new public-private cooperation model that would reduce problems such as tax evasion, corrupt practices and illegal activities associated with the drug trade.

In addition to the above, however, it will also be necessary to undertake further-reaching programmes aimed at restructuring the production structure in order to gain more competitiveness and productivity growth across the economy. New windows of opportunity will no doubt open up in the future as a result of digitalization and the development of new digital services for manufacturing activities. Progress will have to be made in the decarbonization of agricultural production, in stockbreeding and mining, improving the traceability and digitalization of production processes and restructuring the energy production sector through the replacement of fossil-based energies with wind, solar or tidal energy. It will also be necessary to develop and strengthen the local engineering service industry in such a way that local digital service providers are able to meet the needs of the new Industry 4.0 production organizational models that will be developed in the future.

The magnitude of the tasks facing the State clearly far exceeds the resources available today. This means that a debate on priorities will be needed, bearing in mind that the State's resources are at present severely compromised as a result of tax evasion and subsidies being granted large domestic and international corporate groups. This is a huge topic of concern. If there is to be any prospect of developing the social safety net that is so badly needed at present to reduce poverty and exclusion and, simultaneously, of implementing industrial policies for a successful transition to modern production infrastructure, a new public-private covenant is clearly required.

The magnitude and complexity of the tasks that need to be tackled indicates the need for new social rules and priorities that could secure the greater, permanent, long-term funding required to undertake the necessary reforms. The current fragile state of the economy and the deteriorating rules of democratic governance in many countries in the region suggest that, in spite of the scale of the challenges ahead, there are not many possible alternatives, as the secular stagnation of the economy and the increasing problems of governability clearly indicate that profound changes are required if growth and more equity are to be attained in the future.

II. Dominant theoretical agendas in economics and their impact on developing countries

The 1930s, a decade marked by the deep recession in the world economy between 1929 and 1933, saw the emergence of two major schools of thought that exerted a major impact on the way economists discuss the issues of development and growth, as well as the role of the State in the economy.[1] John Maynard Keynes, with *The General Theory of Employment, Interest and Money* (Keynes, 1936), and Joseph Schumpeter with *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process* (Schumpeter, 1939) and *Capitalism, Socialism and Democracy* (Schumpeter, 1942), marked out the path that has been travelled in more recent years by dozens of professional economists studying the workings of capitalism and the role of the State in the economy.

The two authors had very different objectives. Keynes was inspired by the desire to find a solution to the crisis in the world economy and the wide gap between real and potential output in those years. He concluded that State intervention and a proactive government fiscal policy were the way forward. Schumpeter, meanwhile, sought to explain the ultimate genesis of capitalism, the driving force behind its evolution and transformation over time, and found that innovation, the replacement of the old by the new, was the essence of this ongoing transformation in society's production and institutional matrix.

Starting from a microeconomic perspective, Schumpeter provides an overview of the evolution of the organizational model of society, of how actors, institutions, rules of competition and forms of social organization change over time and are replaced by others through disruptive innovations that transform the way things are done. Keynes, for his part, and working from a macro perspective, seeks to describe how the economy functions and how short-run equilibrium and full employment can be restored. The solution is not to cut wages but to increase public spending and aggregate demand in order to close the gap between actual and potential output. It is the closing of this gap that is to increase the level of employment, and not the reduction of wages paid to workers, as postulated by classical economics.

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[1] It is important to mention the voluminous output of Karl Marx, written almost a century earlier, which inspired Schumpeter's thinking in his formative and working years in Vienna and Germany. Marx's writings have also influenced the thinking of economists such as Paul Sweezy, Paul Baran and M. Kalecki and the Faculty of Economics at Cambridge University (United Kingdom) under the leadership of Joan Robinson and Nicholas Kaldor. Unfortunately, Marx's contributions are hardly discussed today in the world's leading universities.

It is clear that Keynes's and Schumpeter's writings present two very different ways of looking at the behaviour of the production structure and social organization. What the two have in common, however, is that they deal exclusively with the functioning of developed countries.[2][3] Their work does not reflect how capitalism works in the peripheral economies, nor do they take into consideration the role of natural resources in growth, a subject that will be examined in more detail in later sections of this monograph.

Keynes's ideas quickly became pre-eminent in academia, and Keynesian thinking was clearly dominant in the 1950s and 1960s, underpinning the role of the State and fiscal spending as pillars of countercyclical policy and growth. The New Deal in the United States and the 1942 Beveridge Report in the United Kingdom set the direction. Growth, employment and the protection of individuals from catastrophic situations that they could not cope with by themselves, such as unemployment, were seen as requiring active government intervention.

Unsurprisingly, then, developed countries had a clear bias in favour of industrial policy at the time, looking favourably on the role of the State as a driver of industrialization in the peripheral world. This same outlook spread to developing countries, and the public sector adopted a proactive attitude towards the establishment of various industries, particularly iron and steel, petrochemicals, pulp and paper, but many others too. Financial institutions such as the Production Development Corporation (CORFO) (Chile), Nacional Financiera (NAFIN) (Mexico), the National Bank for Economic and Social Development (BNDES) (Brazil) and the National Development Bank (BND) (Argentina) played a central role, reflecting the extent to which developing nations were influenced by ideas from more mature countries.

Keynesian theorizing also underpinned the growth of social spending, especially in areas such as health, education and social security. In a number of peripheral countries, an incipient home-grown welfare state emerged, marked by the institutional idiosyncrasies of each society. The case of Argentina and the emergence of trade union power is emblematic of this experience of creating a welfare state mired with strong local idiosyncratic features.

In contrast, the 1970s brought great winds of change. For one thing, the international situation entered a highly turbulent phase associated with the two oil crises of 1973 and 1979 and the Viet Nam war. The United States economy experienced a deep recession with inflation that lingered for many years, affecting interest rates and strongly impacting developing countries. The changing political climate in the United States and the United Kingdom led to the election of conservative governments that sought to weaken the role of trade unions in the life of their respective countries and to radically reduce the role of the State. A subsidiary role for the State was advocated, and the free play of market forces was prioritized in the adjustment towards economic equilibrium with a view to achieving full employment.

These institutional and policy changes were echoed in academia. Building on the ideas of economists at the University of Chicago, a new analytical paradigm challenged the Keynesian view of the role of the State and the belief that fiscal policy was necessary to achieve equilibrium with full employment. The new classical economics arrived in the company of rational expectations and Walrasian long-run equilibrium theory in the writings of Lucas and Rapping (1969), Lucas and Sargent (1978) and Lucas and Prescott (1971), among others, who argued that State intervention was unnecessary because prices efficiently fulfilled the role of guiding the economy towards equilibrium with full employment.

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[2] Schumpeter's argument is constructed on the basis of a detailed study of five economic sectors (automobiles, textiles, railways, iron and steel and energy) in three developed countries (Germany, the United States and the United Kingdom). In Keynes, meanwhile, there is no reference to sectors or the micro level, no mention is made of specific companies, and the argument revolves around the major economic aggregates. Shortly afterwards, John Hicks (1937) stylized Keynes's thinking with the IS-LM model for a closed economy. Then Robert Mundell and Marcus Fleming extended this idea to an open economy with free movement of capital. This is now the core model used in economics teaching in the world's leading universities.

[3] In recent years, a new school of authors has sought to bridge the gap between Keynes's aggregate demand and Schumpeter's thinking about structural change. This novel approach combining Keynes's ideas with Schumpeter's is an interesting contribution to contemporary theory, albeit one that still pays little attention to the idiosyncrasies of the developing world.

This ideological shift led on to the consideration of the State as a subsidiary agent in the economy. Areas such as health care, education and pensions came to be seen as ones in which private provision would do a better job than public provision. The public sphere lost ground to the private one, while individualism gained ground in society.

This political and theoretical shift in the developed country debate had a great impact on peripheral countries, which went through a deep structural crisis in the 1980s associated with the Mexican moratorium of 1982 and the large increase in interest rates imposed by the adjustment process in the United States. The 1980s became a "lost decade" in terms of growth, reflected in stagnation, rising unemployment, poverty and social exclusion. State support for industrialization disappeared, and the need for national efforts at technology creation were considerably reduced. Importing technology from developed countries came to be seen as an adequate substitute, reducing the need for local investment in research and development (R&D). The industrialization process entered a phase of stagnation, and specialization in exports of raw materials with little domestic value added intensified. These issues are discussed in the next section of this paper.

III. The lost decade and economic management based on inflation targeting and the pursuit of short-term financial equilibrium

The oil crisis already mentioned, the lack of external financing, the conditionality clauses imposed by the international lending agencies refinancing the debt of developing countries and the installation of severely repressive military governments in Argentina, Brazil, Chile, Uruguay and other countries of the region led to the adoption of economic management programmes based on the external opening of the economy, market deregulation, the privatization of public companies and the prioritization of inflation targets and short-term financial equilibrium. Long-term policies to transform the production matrix of the economy were largely neglected. The new public policies induced a profound transformation of the production and institutional environment in developing nations.

The industrializing policies of the post-war period were gradually dismantled. A well-known Argentine finance minister went so far as to say that the best industrial policy was one that was not implemented.

In developed countries, however, State action continued to play a central role in driving technological progress, supporting the development of the Internet and biotechnologies, and strengthening international institutions in the field of industrial property rights through the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement. In these countries, the State did not abandon its role as regulator of the economy, nor did it abandon the need for a safety net through the provision of merit goods as can be seen in the case of the Medicare programme in the United States.

Contrariwise, peripheral countries prioritized the pursuit of short-term financial equilibrium, while at the same time they gave up on production development and innovation, cut education and public health spending and moved to privatize pensions, favouring the creation of private pension funds. As a consequence of this new public policy framework, manufacturing industry entered a phase of stagnation and a number of economies in the region began to experience incipient deindustrialization. Government failures were regarded as more serious than market failures, and collusion practices between business firms and the capture of public subsidies by large domestic and international corporations were largely ignored.

Increased macro volatility, falling investment rates, stagnating industrial productivity and State capture by large corporate groups made the financial situation of the State extremely critical and led to sever economic contraction. The State was forced to reduce social spending and discontinue measures aimed at combating poverty and social exclusion, and the social divide became more entrenched.

The above discussion suggests that the dominant theoretical paradigm emerging from developed countries is not always suited to the needs of peripheral capitalism. Economics is very much an art; it is not only governed by universal rules and micro-level equilibrium fundamentals, but depends crucially on the institutions, habits and customs of each national context. This explains why the language of short-run equilibrium, the neglect of production development policies and the lack of a long-term growth strategy have caused many developing countries to fall into a phase of secular stagnation in recent decades, resulting in a growing deterioration of governance. The theoretical contributions of the new classical economics, based on an abstract view of the economy that prioritizes rational expectations and the logic of the invisible hand, have not yielded the expected results in countries where Gabriel García Márquez's magic realism seems much closer to reality than Robert Lucas's long-term Walrasian equilibrium.

IV. Digital industries, bioeconomics, artificial intelligence: towards a new production paradigm

In parallel to the process so far described, a new and unexpected phenomenon has emerged in the last two decades, associated with a large number of changes at the global knowledge frontier in areas such as biology, genomics, computer science, process digitalization, the use of artificial intelligence and data mining. These changes are cross-cutting and disruptive and do not only affect the industries where the goods and artefacts of these sectors are produced, but rapidly spread to other fields such as banking, health care, consumption patterns and the ways in which individuals interact in society. All this is leading to a new systemic process of transformation of the production, social and institutional framework.

As part of this process, agriculture, animal husbandry, fruit growing, mining, forestry and numerous service production sectors such as health care, banking, e-commerce and many others have proceeded towards digitalized and networked processes of production organization. Knowledge-intensive services are beginning to develop in primary activities that include the production of seeds, vaccines and bioproducts in agriculture, genetic improvement in animal husbandry, the use of sensors and digital data management equipment in mining, improvements in water and energy use, the gradual spread of traceability techniques in many primary production processes, new transport techniques associated with electromobility, and much more. This is a dynamic process involving the emergence of new cross-cutting technologies that are gradually being incorporated in different areas of the production structure and lead to new forms of corporate and consumer behaviour in many different sectors of economic activity.

It is understandable that this pattern of production and social transformation could not have been part of Schumpeter's vision of the creative destruction process that characterize capitalism when he was writing in the 1930s. Theory did not pay much attention to natural resources at that time, or to services. These sectors were thought in those years to be low productivity activities and unresponsive to technological change. Moreover, the concept of the resource curse arose in the 1970s, the thinking being that an abundance of natural resources can lead to Dutch disease episodes, to exchange-rate appreciation and to structural dualism in the production structure of the economy.

Today it is understood that this macro-level view fails to encompass the profound micro-level implications of the changes referred to, which are penetrating the models used to organize production in industries not previously considered to be innovative. This means that there is now a need to look at these issues from a much more systemic perspective and to think of industrial activities as being more strongly interrelated with natural resources and services, blurring boundaries that until recently seemed insurmountable. The industrialization of natural resources means that industry and services are now tending to combine and complement each other. This has crucial analytical implications, demanding consideration of what industrialization is all about.

The appearance of new science-based ways of producing commodities, of bringing to market new products based on organic processes and green technologies with a lower environmental impact, and of incorporating artificial intelligence and data mining has made it possible to map out a vast territory of possible future changes in the production structure. Thus, the understanding of what the boundaries of the industrial sector actually are has been enriched and new paths are opening up for potential access by knowledge-intensive small and medium-sized local enterprises as providers of digital services and process technologies tailored to each particular model of production organization. Of course, all this is neither automatic nor straightforward, but requires a profound institutional transformation and the creation of new technological capabilities and regulatory agencies to accompany the spread of the new biodigital paradigm. This once again brings to the fore the role of the State as a promoter and regulator of growth and as a builder of the new institutions required for the transition to twenty-first century production organization models. This is an institution-building process that each society will undoubtedly have to undertake within the framework of its own history and political circumstances, but which developing nations will at some point have to go through.

All the above reinforces the idea that the new biodigital paradigm is an open-ended process which involves a wider notion of what manufacturing production is all about. We do not need to abandon the idea of industrialization as such, but we do need to incorporate the notion that biotechnologies, genetics and the digital industry open up a vast array of new opportunities to produce high value added products and services in each country, thereby diversifying the production structure and generating quality jobs, even in commodity-based activities (Bisang and others, 2006; Anlló and Bisang, 2015).

The need for local suppliers of equipment and engineering services is perhaps one of the central features of the new organizational model for the future. What is required is not to think that importing technology from abroad is the only possible alternative, but to consider that building a local base of subcontractors for engineering services and the provision of technological know-how tailored to the different local settings opens up a wide range of new opportunities. Local engineering companies are moving ahead with the installation of pilot plants to experiment and to develop process improvements, and are building prototypes with a view to more efficient substitution and maintenance of imported equipment, automation of tasks right along the production line and adaptation of new techniques to local conditions. It is in this field that countries' technological density is gradually increasing and the technological sophistication of peripheral societies is growing and will continue to do so in the future. It is local engineering SMEs employing biologists, chemical and hydraulic engineers, soil specialists, environmental sustainability technologists, vaccine geneticists, water stress specialists and many others that need to move ahead with the creation of new process know-how and the design of the equipment needed to establish new production sectors.

The transformations associated with biotechnology, genetics and the use of digital technologies in the field of natural resources are making it possible to advance along paths which were difficult to imagine only two decades ago, but which reveal the enormous vitality of the new production paradigm taking shape in these segments of the production matrix. New fields for adaptive innovation are appearing, as are fresh opportunities for local high-technology SMEs that could open up new

niches in world markets on the basis of a new paradigm that is still in its infancy. Local universities and technical schools should be supported in encouraging the training of technicians and professionals in these new fields and facilitating the emergence of local enterprises that can gradually make their way into these activities. National development banks must once again play a crucial role in financing such programmes, as they did in the post-war years. Although the structural transformation process is still very incipient, the expansion of this modern segment of the production matrix seems to be moving ahead at a significant pace.

Natural resource-based sectors are shaped by a logic of dynamic interdependence among the firms that exploit the resource, their suppliers of intermediate inputs and engineering services, State regulators overseeing these companies and monitoring their environmental impact, and the local community where the resource is exploited This logic is quite different from the neoclassical logic of the isolated producer that operates on the basis of an arm's-length relationship with its competitors and suppliers and responds exclusively to price signals. This dynamic interdependence is graphically depicted in diagram 1.

Diagram 1
Dynamic interdependence in natural resource-based industries
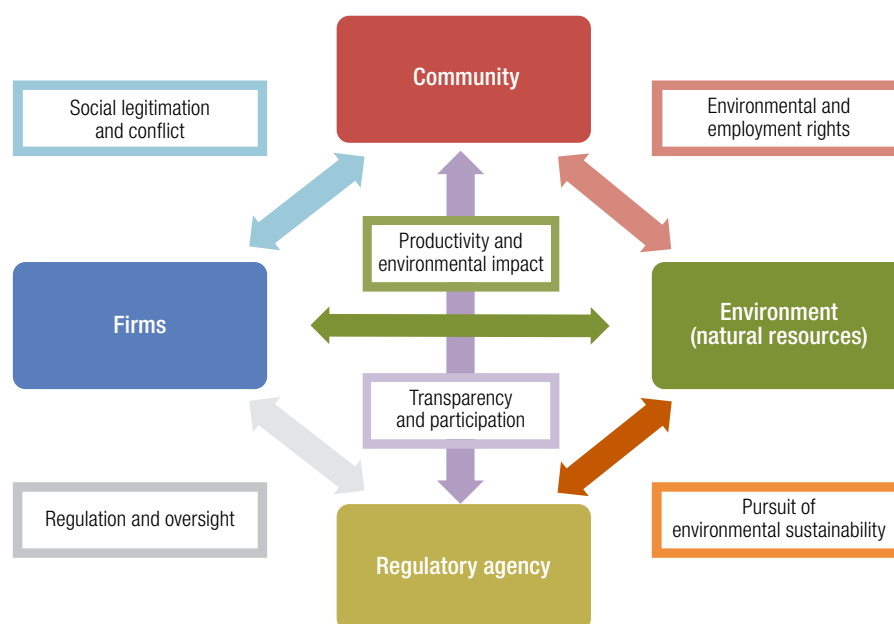
Source: Prepared by the author.

These industries follow a development path in which all the agents involved in the production chain undergo learning processes and accumulate technological capabilities over time. This gradually shapes changes in market structure and in firm and industry behaviour.

This evolutionary process requires a variety of public goods and an appropriate design of sectoral industrial policies that take into account the needs of the industry, starting with access to the initial package of technological know-how and the qualified human resources needed in the start-up period. Thereafter, the focus shifts to support for the development of local engineering subcontractors, the construction of pilot plants and research infrastructure, an appropriate regulatory framework that secures competition and the displacement of SMEs, and environmental oversight bodies that safeguard the sustainability of the natural resource over time and monitor the sector's impact on the biosphere.

Schools, medical posts, road infrastructure and digital connectivity are also required, since production in these industries is usually carried out in remote regions that lack such services. In other words, industrial policy should be conceived as a sequence of stage- and location-specific interventions to resolve the changing needs that arise in the process of growth of these activities. One possible way of representing this idea is shown in diagram 2.

Diagram 2
Phases in sectoral development and industrial policy issues

1. Technology and human resources
Support the creation of a local technology and human resource base suited to the country's situation. Create technical schools and tertiary-level courses.

8. Resource management
Evaluate the capacity of collective action and public regulation to cope with the resource.

2. Firms and their learning
Support firms' efforts and learning curve.

7. The local community
Social licence. Mitigation initiatives. Sustainability of other local activities such as small-scale fishing.

3. Morphology of the industry
Protection for SME competition and mergers and acquisitions.

Long-term evolution

6. Macro aspects
Control the impact of the international commodity price cycle. Support exports and public R&D spending.

4. Supplier development
Support the development of local engineering firms at pilot plants and R&D initiatives.

5. Regulatory agencies
Finance regulatory learning in the public sector and ex ante risk management.

Various public goods are required in each of these areas

Source: Prepared by the author.

This logic of evolutionary growth phases advanced here is closely related to the Schumpeterian narrative of innovation as a transformative force in capitalism. Although Schumpeter does not concern himself with natural resources as such, it can be intuitively understood that his analytical logic provides a useful tool to look at what is beginning to happen in peripheral capitalism at the dawn of the twenty-first century on the basis of science-based industrial organization models in the area of natural resources and in the provision of digital services.

This is a production paradigm that is just beginning to be emerge in peripheral countries. Both adopters of the new processes and producers of digital equipment and services have a long way to go before it will be possible to speak of a consolidated production paradigm. The process began earlier and has advanced quickly in developed countries, but it is clearly beginning to take shape in countries such as Argentina, Brazil, Chile, Colombia, Mexico and Uruguay as well, albeit with something of a lag relative to the international technological frontier. Nevertheless, these countries have made remarkable progress in the last decade, with many locally owned SMEs participating. The small size of these companies is still a limiting factor in their ability to compete with the large transnational firms that sell engineering services or with Chinese or Indian companies, which have entered the field in more recent years. This highlights the need to look at the issue from the perspective of the infant industry theory that indicates

that these new activities demand support during the learning and installation process until they mature. The presence of large international engineering companies in these markets undoubtedly poses a serious threat to the development and consolidation of local companies capable of competing with them. However, the greater versatility of the latter in adapting to local needs gives them a major comparative advantage over large international companies that only offer generic technology packages and have little incentive to adapt them to the specific requirements of each particular context.

V. Looking ahead: stagnation and growing poverty, new disruptive technologies, uncertainty, new players in the global economy and a deteriorating domestic governance environment

The picture presented so far provides a broad outline of the situation facing developing countries today. Three main topics have been highlighted. First, the stagnation of the manufacturing sector that these countries have been experiencing since the debt crisis. We argue here that this has resulted from the lack of a long-term production and technological development strategy and the consequences of having uncritically pursued short-term fiscal and financial equilibrium macro management of the economy.

Second, the impact of the transition to Industry 4.0 industrial organization models associated with process automation and digitalization, robotics, the use of artificial intelligence and other technological modernization processes. The transition has already started in many developing countries. Although it has so far only been implemented by a small group of firms in countries such as Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay, it appears to be an irreversible phenomenon which demands careful examination and public sector support for the future.

In addition to the two above-mentioned themes, a third topic that demands urgent consideration is how to recover from the recent COVID-19 health crisis. A clear priority is to revitalize primary health-care teams, improve the provision of vaccines and medicines, reinforce the physical infrastructure of hospitals and health centres and restore the morale of medical and paramedical staff, which has deteriorated considerably in recent years. These matters will undoubtedly require huge State expenditures in countries where public finances are clearly under severe strain.

Together with the above, there is an urgent need to modernize and upgrade the competitive capabilities of the domestic production structure to advance new production activities catering for the new consumption patterns that are emerging in world markets, the transition towards renewable energy sources, appropriate management of water resources, and progress with electromobility and the decarbonization of production processes.

This division between urgent issues that require action in the short and medium term and structural issues that should be addressed in parallel but with a longer-term perspective prompts reflection on the need to restructure the role and size of the State and to build new institutions that can revitalize investment and support the accumulation of domestic technological capabilities. The available resources are clearly insufficient, so there is need of a new social covenant that could involve fiscal and tax reform capable of providing long-term financing to ensure economic growth based on a more equitable path with greater social inclusion. A central element of this whole process is that the new social covenant must be geared towards improving democratic governance and the narrowing of the gap between the modern segment and the segment that is lagging behind, which is characterized by extreme poverty and social exclusion.

This brings us back to the central topic of the role of the State in the economy and the need for new models of public-private cooperation that could simultaneously act to reduce the inequality gap that has opened up in society and the productivity stagnation that has significantly damaged competitiveness in global markets, while aiming for the long-term transformation of the production structure. It clearly brings out the role for the State in creating new institutions, expanding expenditure on R&D programmes, funding innovation and supporting the development of domestic technological capabilities in SMEs, while implementing policies to reduce poverty and social exclusion. In a context where the functioning of competition rules is heavily affected by market failures associated with collusion among firms, tax evasion and the capture of public resources by large corporate groups, the right way to advance towards a more cooperative public-private programme of future action that can secure permanent, long-term resources to address the vast array of issues that need to be dealt with, becomes a major question. How to develop trust and mutual cooperation among sectors of society that are more prone to confrontation than to accepting an honest dialogue with each other, is clearly the central question that remains unanswered in the developing world in the quest for a better future.

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Informality, social protection and welfare during the COVID-19 crisis in four Latin American countries[1]

Santiago Poy and Ramiro Robles

Abstract

We compare the effects of labour market shocks and social policy responses on people's welfare following the outbreak of the COVID-19 pandemic in Argentina, Brazil, Chile and Uruguay. We assess the role of formal and informal sector labour incomes and social transfers in the changes observed in the distribution of income and welfare. We worked with harmonized household survey microdata and performed a microdecomposition analysis by income source. In all four countries, the loss of earnings was the main mechanism behind the loss of income, and developments in the informal sector were crucial in explaining the rise in poverty. The effects of transfer incomes on welfare varied by country in terms of both the size of their impact and their consequences for equity.

Keywords

JEL classification

Authors

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I.   Introduction

The coronavirus disease (COVID-19) pandemic unleashed an international socioeconomic crisis whose consequences have by no means dissipated. In 2020, the great lockdown resulted in global output dropping by 3.3%, one of the largest contractions since the Great Depression (IMF, 2020). Estimates by the International Labour Organization (ILO) indicate that 16% of potential hours worked were lost in 2020 because of the impact of health measures (ILO, 2021). The recovery of the global economy in 2021, while substantial, was not only regionally and sectorally heterogeneous but also unstable because of rising inflation and international financial volatility (ECLAC, 2022). Meanwhile, employment has yet to return to pre-pandemic levels.

The biological substratum of the disease meant that it was global in character. This aside, though, it is clear that the way countries weathered the pandemic cannot be separated from the way their societies were configured. Latin America and the Caribbean was the region hardest hit by the COVID-19 pandemic, in multiple dimensions. First, as of the end of 2021, the region accounted for 28.4% of all COVID-19 deaths in the world, with only 8.4% of the world's population. Second, the region's GDP fell by more than twice as much in 2020 (6.8%) as global output (ECLAC, 2022), and more jobs were lost than in the rest of the world (ILO, 2021). These results would suggest that the pandemic interacted with the special features of Latin America's socioeconomic structure and welfare regimes (Filgueira and others, 2020; Lustig and Tommasi, 2020).

The aim of this article is to examine how labour market shocks and social policy responses affected welfare after the outbreak of the COVID-19 pandemic in four Latin American countries: Argentina, Brazil, Chile and Uruguay. Although valuable aggregate information on the socioeconomic and employment impacts of the pandemic is available (ECLAC, 2022; ILO, 2021), what has been lacking is a thorough comparative examination that exposes the mechanisms behind the observed changes in income distribution and levels of welfare. As a hypothesis for further investigation, it may be surmised that the fragmented nature of the region's labour markets played a key role in the loss of welfare that affected households and individuals, while the differences in the scale and scope of the social policy implemented by States must have meant that this played a variable role in terms of its ability to cushion the effects of the crisis. The aim of this article is therefore to expose the mechanisms behind the changes in welfare that occurred after the outbreak of the pandemic relative to the previous situation.

One of the characteristic features of Latin America is its structural heterogeneity, a term that refers to productive and technological gaps between sectors, economic activities and firms (Abeles, Lavarello and Montagu, 2013; Cortés and Salvia, 2019; Infante, 2011). These divides are manifested in labour markets with a high prevalence of informal sector employment (occupations in very low-productivity sectors) and substandard working conditions, reinforced by the chronic economic instability of peripheral countries (Ffrench-Davis, 2015; Schteingart, 2018). In the absence of extensive unemployment insurance systems, and in the face of inadequate demand for labour in the formal sectors, the informal sector has traditionally functioned as a haven from unemployment. A recent report by the Inter-American Development Bank (IDB) noted that, prior to the COVID-19 pandemic, 39.3% of Latin America's economically active population was in the informal sector (Acevedo and others, 2021).

In this context, the COVID-19 pandemic had distinctive effects on labour markets in the region. The pandemic destroyed jobs most especially in services, commerce and construction, affecting non-wage and informal workers most severely (Weller, 2020). A crucial element of this crisis was the decoupling of the traditional adjustment mechanism in the region's labour markets, with sanitary restrictions leaving the informal sector unable to play its role as a "haven" for the labour force (Acevedo and others, 2021; Beccaria and Maurizio, 2020; Bertranou and Maurizio, 2020). The pandemic also intensified trends towards labour market restructuring, with increased employment in health-related sectors, e-commerce, the platform economy and knowledge-based services (Weller, 2020). Acevedo and others (2021)

estimate that the informal sector will grow again in the post-pandemic economic recovery because of people's need to recoup income lost during the health emergency.

Latin America has traditionally been characterized by fragmented welfare regimes (Filgueira, 1998), which have fostered very unequal degrees of social inclusion (Martínez Franzoni and Sánchez-Ancochea, 2016). This stratification has generally tended to reproduce the stark divides associated with the structural heterogeneity and segmentation of labour markets. The size of the surplus labour force in the informal sector has limited the viability of universal protection arrangements, while productive heterogeneity has resulted in a limited ability to finance such instruments (Tokman, 2007). During the 2000s, in a favourable global context, greater fiscal space and economic growth allowed both contributory and non-contributory social protection systems to expand. The proportion of the population covered by conditional cash transfers rose from 3.6% to 20.2% between 2000 and 2016 (Cecchini and Atuesta, 2017), while the proportion of older persons covered by pensions rose from 51.5% to 77.1% in the same period (Arenas de Mesa, 2019). This expansion was accompanied by persistent segmentation of the types of social coverage along socioeconomic lines (Filgueira, 2015; Martínez Franzoni and Sánchez-Ancochea, 2016). At the same time, in the absence of progressive tax reforms to make the funding of non-contributory protection systems viable, the fiscal sustainability of social protection systems in a context of economic stagnation has been called into question.

Where social protection was concerned, the authorities' reaction to the crisis caused by the COVID-19 pandemic varied from country to country, reflecting the broader characteristics of welfare regimes but also the political orientation of governments and epidemiological developments. According to Filgueira and others (2020, p. 50), the measures applied can be classified into two types: resources transferred directly to households and individuals, and exemptions and credits for households and families. The former, which are the focus of interest here, comprised social security-related actions, non-contributory transfers and in-kind transfers such as school meals and food baskets. New benefits targeting people particularly affected by the pandemic were created in many Latin American countries, such as the Emergency Family Income (IFE) in Argentina and Chile, the Ñangareko food assistance programme in Paraguay, the Universal Grant in the Plurinational State of Bolivia, the Universal Family Grant in Peru and Emergency Aid in Brazil (Filgueira and others, 2020). In addition, governments took spending measures to support enterprises and thence formal sector employment.

Substantively, this article presents a comparative study of four countries that share a number of structural features, albeit to differing degrees, like the stark productivity gaps between and within sectors that indeed are a feature of Latin American economies generally (Ffrench-Davis, 2015). According to Infante (2011), the region's countries can be classified into three groups: countries with moderate structural heterogeneity, which have the smallest productivity gaps; countries with high structural heterogeneity, which have large sectoral gaps and the lowest levels of income and output per employee; and a group of countries with intermediate structural heterogeneity, close to the average for Latin America. The four countries chosen for the analysis are situated at the moderate or intermediate levels of the structural heterogeneity classification (Infante, 2011). This means that they have attained higher levels of development and have a denser production fabric and more institutionalized labour markets than the average for the region. These four countries generate almost 40% of the region's output and a third of total employment (ECLAC, 2019) and are among the countries with the lowest rates of informality (ILO, 2021).

However, there are great differences in the size of their economies: the GDP of Argentina and Brazil is much larger than that of Chile and, especially, Uruguay (see table 1). If per capita GDP is taken as a proxy for welfare, it is possible to group Argentina, Chile and Uruguay together, in distinction to Brazil. Chile and Uruguay are countries with more open economies (as measured by the level of exports in relation to GDP) than Argentina or Brazil, while Chile is characterized by the substantial contribution from primary activities (agroindustry and mining). The extent of structural heterogeneity in all four economies is reflected in the large share of employment in the informal sector, although there are also significant differences in this respect, with much lower rates in Chile and Uruguay than in Argentina or Brazil.

Table 1
Selected countries: selected socioeconomic indicators, latest year with information available

Indicator	Argentina	Brazil	Chile	Uruguay
GDP *(Millions of purchasing power parity (PPP) dollars)*[a]	985 205	3 127 524	496 085	78 121
Per capita GDP *(PPP dollars)*[a]	21 507	14 615	25 821	22 415
Industry share of GDP *(Percentages)*[b]	15.5	9.6	8.7	10.7
Primary activities as a share of GDP *(Percentages)*[c]	10.7	11.6	17.8	7.1
Exports as a share of GDP *(Percentages)*[a]	18.3	20.1	31.9	31.5
Investment as a share of GDP *(Percentages)*[a]	17.1	18.9	25.3	18.4
Employment rate *(Percentages)*[d]	53.3	54.6	58.3	56.6
Unemployment rate *(Percentages)*[d]	9.8	11.9	7.2	8.9
Urban informal sector as a share of total urban employment *(Percentages)*[d]	41.3	40.6	28.1	35.0
Incidence of poverty (poverty line: US$ 5.50 a day in PPP) (2019) *(Percentages)*[e]	7.3	17.6	2.5	1.0
Gini coefficient (2019)[e]	0.428	0.545	0.438	0.378

Source: Prepared by the authors.
[a] World Bank, 2021.
[b] CEPALSTAT [online] https://statistics.cepal.org, 2021.
[c] CEPALSTAT, 2021: includes agriculture, stockbreeding, hunting, fishing, forestry and mining and quarrying.
[d] CEPALSTAT, 2019 (except Chile, where the data are for 2017).
[e] Prepared by the authors from national household surveys.

While social protection systems and, more generally, welfare regimes in the countries of the region have tended to reproduce the structural fragmentation of labour markets (Filgueira, 2015), there are some differences between the selected countries. Following the early work of Mesa-Lago (1989), who identified groups of countries that were "pioneers" in the implementation of social insurance systems, Filgueira (1998) distinguished three types of welfare regimes in the region. Countries with "stratified universalism" have broad social coverage, variable benefits and high degrees of inequality associated with employment status. This type of regime has historically characterized Argentina, Chile and Uruguay. Countries with "dual" welfare regimes have tended to combine a pattern of strong stratification with territorial heterogeneity. This model has predominated in Brazil and Mexico. "Exclusionary" regimes, lastly, have predominated in the Andean countries and Central America, being characterized by non-inclusive social security systems as a result of State capture by elites (Del Valle, 2010).

The four selected cases share similarities in the context of the region, which is characterized by pervasive and persistent structural heterogeneity and highly fragmented labour markets. Moreover, all four countries have developed extensive welfare regimes, albeit access and benefits are segmented. For the purposes of comparative study, then, these are countries that share marked structural features, albeit to differing degrees. At the same time, as described below, the four countries were impacted differently by the economic crisis resulting from the pandemic and, in addition, implemented different public policy strategies.

The next section presents the impact of the pandemic on the economies of the four selected countries and describes the policy responses implemented. The third section presents the data sources and describes the microdecomposition methodology used. The fourth section discusses the empirical results, and the final section presents the conclusions of the study.

II. The impact of the COVID-19 pandemic and policy responses in four Latin American countries

The COVID-19 pandemic hit the countries of the region particularly hard, owing to the structural fragility of their economies vis-à-vis external trade and financial flows and the need to implement rigorous mobility restriction measures. However, the macroeconomic effects of the pandemic varied from one Latin American country to another, owing to differences in their capacity to respond to the crisis, the severity of the lockdown measures applied and the dynamics of their economies in previous years (ECLAC, 2022). The economic crisis peaked in the second quarter of 2020, after which there was an incipient recovery.

In Latin America, the crisis was driven by all components of aggregate demand, although the main role was played by private consumption. The sectors most affected were manufacturing, construction, commerce and transport (ECLAC, 2022). The four countries considered in this study experienced dissimilar economic effects after the outbreak of the pandemic, while deploying containment measures of varying strictness (see figure 1). Argentina was the country where per capita GDP fell the most and where the restrictions applied were the most severe, while in Uruguay per capita GDP fell less sharply and less severe restrictions were applied. However, the cases of Brazil and Chile show that the relationship between restrictive measures and economic effects is not direct, revealing the fundamental role that developments in world trade flows played in the aggregate economic performance of the countries.

Figure 1
Selected countries: year-on-year changes in per capita GDP
and restrictions on human mobility, 2020
(Percentages and values on a scale of 1 to 100)
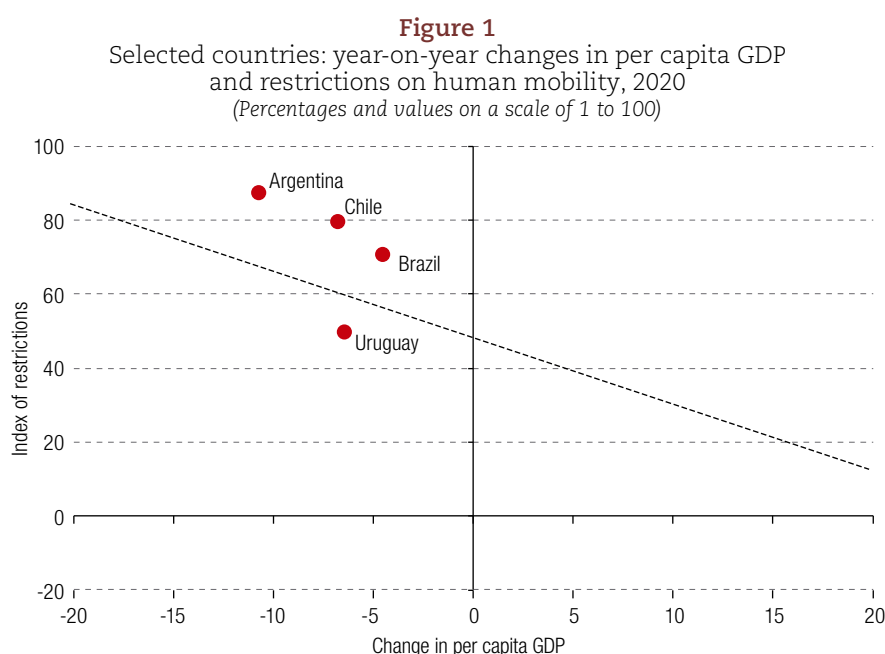
Source: Prepared by the authors, on the basis of data from the World Bank and Blavatnik School of Government of the University of Oxford, "Oxford COVID-19 Government Response Tracker (OXCGRT)".

The regressive effects of the health crisis on labour market aggregates have also been documented (Weller, 2020). ILO has highlighted the massive loss of hours worked globally and especially in the countries of the region (Maurizio, 2021). Household surveys showed an unprecedented drop in employment rates in the four selected countries (see figure 2). This reduction was the immediate effect of mobility restrictions and was reflected not by an equivalent increase in the unemployment rate, but by a rise in inactivity (Bertranou and Maurizio, 2020). An analysis of the composition of the employment rate before

and after the outbreak of the pandemic reveals the different roles played by the various economic and occupational sectors in its evolution: while employment in the public sector remained unchanged, the largest contractions in relative terms took place in the informal sector.[2]

Figure 2
Selected countries: composition of the employment rate,
fourth quarter of 2019 and fourth quarter of 2020
(Percentages of the total population)

■ Informal sector ■ Formal public sector ■ Formal private sector
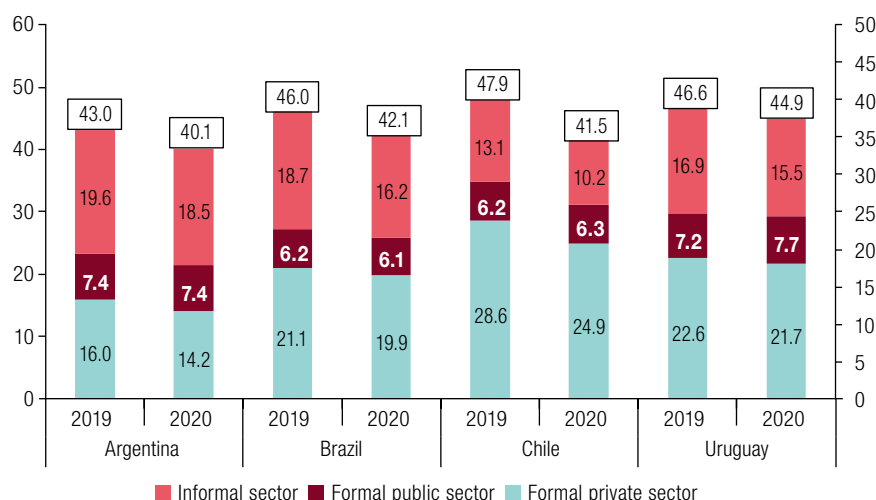
Source: Prepared by the authors on the basis of household survey microdata.

Governments worldwide had to implement policy measures to mitigate the economic impact of the crisis. The massive shutdown of activities necessitated the implementation of some form of income support. This was particularly challenging in Latin America because of the strong effect that the shutdown of activities had on the informal sector, in which a substantial portion of the population is employed (Beccaria and Maurizio, 2020). Although the four countries analysed had more developed welfare regimes than the regional average, their policy responses were characterized by the development of ad hoc institutional architectures that were subjoined to existing ones, while being sensitive to epidemiological developments in each country.

In Argentina, State efforts combined two components. First, extraordinary top-up payments were approved for beneficiaries of the contributory pension and retirement system and for recipients of non-contributory transfers (the Universal Child Allowance (AUH), food card and old age, disability and invalidity pensions). The period for which unemployment insurance benefits were paid was also increased, as were the amounts. The main innovation in the area of social protection was the introduction of the Emergency Family Income (IFE): a set of successive extraordinary non-contributory transfers designed for wage earners in low-quality jobs, informal sector workers and unemployed persons without contributory insurance (Rubio and others, 2020; Poy and Pla, 2022). Second, the government implemented policies aimed at sustaining employment levels and the activity of formal private enterprises affected by the mobility restrictions. Layoffs were banned, credit lines for SMEs were extended and various fiscal relief measures were put in place. The most important initiative was the Emergency Aid Programme for Employment and Production (ATP), which included the deferral of employer contributions and payment by the State of up to 50% of workers' net wages (subject to a maximum of two minimum wages).

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[2] It is important to note that the data in figure 2 are limited to the fourth quarter of each year for reasons of comparability, and in 2020 there was already an incipient economic recovery by this time. Other information suggests that the impact of the COVID-19 pandemic on the informal sector was much more substantial than is indicated by the figures presented here (Maurizio, 2021).

Brazil also implemented a combination of new social interventions and reinforcement of existing social protection programmes. Some of the most important of the former were the easing of the conditions for entering and remaining in the Bolsa Família transfer programme, advance payment of benefits to contributory pension recipients and the option of making one-off withdrawals from the pension fund. Innovative social policies included the Emergency Aid programme. This scheme, which achieved high coverage, consisted of successive monthly transfers with a total of up to five instalments and was targeted mainly at informal sector workers. Later, it also incorporated groups of people who were economically inactive but deemed vulnerable (Filgueira and others, 2020). As for measures targeting formal employment, the government implemented the Emergency Employment and Income Preservation Benefit, calculated as a percentage of the unemployment insurance that workers would be entitled to in the event of dismissal (ILO, 2021).

Chile also introduced innovations and modified existing schemes. An extraordinary grant was made to households that were registered in the various conditional transfer systems, the Single Family Allowance (SUF) and the Subsystem of Security and Opportunities (SSyOO). As in the cases described above, the Emergency Family Income (IFE) was a novel instrument created in response to the pandemic. With per capita amounts that decreased according to the number of household members, this instrument targeted households with no formal income or with formal income below a certain threshold (Rubio and others, 2020; Filgueira and others, 2020). With respect to formal sector employment and income, the Chilean government established various tax relief measures and expanded credit lines for small and medium-sized enterprises. At the same time, the resources of the Solidarity Unemployment Fund were increased and the criteria for access to and use of unemployment insurance were made more flexible. Thus, the contribution requirements for access to the benefit were successively reduced, people working in domestic service were incorporated into the scheme, and companies were allowed to reduce working hours in exchange for workers becoming eligible for part of the insurance payment (ILO, 2020).

Lastly, Uruguay is a special case. In contrast to the three countries just discussed, the Uruguayan government did not implement an extraordinary quantitative increase in per capita social spending during the COVID-19 pandemic (ECLAC, 2020). Nor did it introduce novel social policy transfer programmes in response to the emergency. Nonetheless, on an exceptional basis, payments under the two main conditional transfer mechanisms, the Uruguay Social Card and the Family Allowance - Equity Plan, were successively doubled (Rubio and others, 2020; Velásquez Pinto, 2021). With regard to support measures for formal sectors, the government created the Coronavirus Fund, and the unemployment insurance scheme was made more flexible to accommodate temporary workers, workers who were temporarily laid off or had their hours reduced and workers in the economic activities Most affected by the pandemic (ILO, 2020).

Figure 3 shows the relationship between the economic impact of the pandemic, as measured by changes in per capita GDP between 2019 and 2020, and the scale of the policy response implemented, as expressed by the increase in per capita social spending. The values associated with the horizontal axis show that the greatest economic impact was in Argentina, a country whose economic outlook was already negative because of a macroeconomic crisis that had begun in 2018. Brazil, Chile and Uruguay performed similarly. In contrast, the vertical axis shows the significant difference in policy responses: Brazil increased per capita social spending the most, followed by Argentina and Chile. Uruguay, on the other hand, performed very moderately in terms of consolidated public social spending. As described above, the response of the Uruguayan State combined limited assistance, centred on the use of existing instruments, with relatively few restrictions on mobility.

Selected countries: changes in per capita GDP and per capita social spending, 2019–2020
(Percentages)
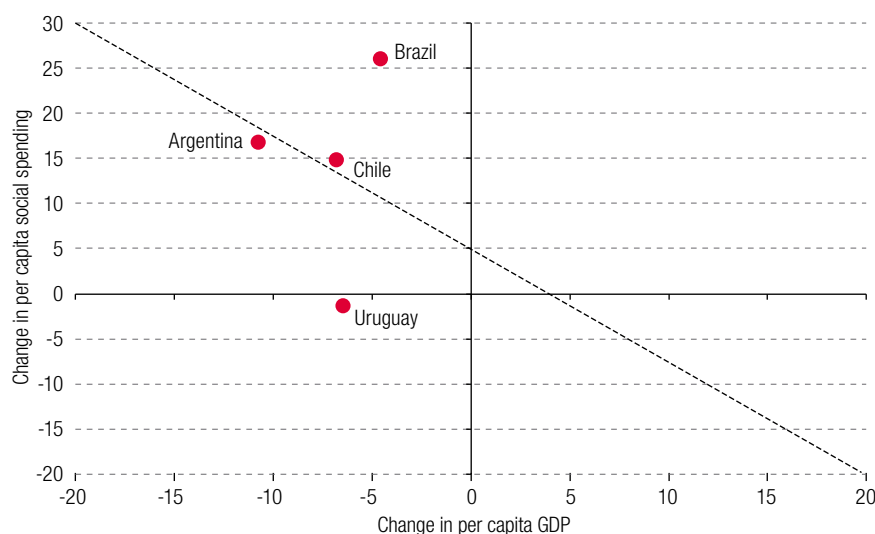
Source: Prepared by the authors, on the basis of data from the World Bank and Economic Commission for Latin America and the Caribbean (ECLAC).

III. Methodology

1. Data sources

The information in this article comes from household surveys that are regularly conducted by national statistical offices in the different countries selected. The main purpose of these surveys is usually to collect information on occupations, employment and income. They also provide data on the sociodemographic characteristics of the population and households. In all cases, the incomes recorded by the surveys are disposable, i.e., net of tax liabilities.

The data for Argentina come from the Permanent Household Survey (EPH) conducted by Argentina's National Institute of Statistics and Censuses. EPH is a quarterly survey that collects information on employment and income in 31 urban areas of 100,000 inhabitants and more, representing 62% of the total population. The survey provides information on the labour and non-labour income sources of all household members. In the context of the pandemic, a mixed (face-to-face and telephone) EPH survey system was implemented, depending on the epidemiological situation of each locality (INDEC, 2020).

In the case of Brazil, the information was compiled from the Continuous National Household Survey (PNAD-C), implemented by the Brazilian Institute of Geography and Statistics (IBGE). This is a quarterly survey aimed at analysing activity, employment and unemployment indicators. The survey covers both urban and rural areas and is representative of the entire Brazilian territory. PNAD-C records information on labour and non-labour income, but only in the fourth quarter of each year in the case of the latter.

The information for Chile comes from the Supplementary Income Survey (ESI), which is applied in the fourth quarter of each year as a supplementary module of the National Employment Survey (ENE). ENE, a labour force survey conducted by the National Institute of Statistics (INE), does not capture information on personal incomes. The purpose of ESI is to capture the labour incomes of persons

classified as employed in ENE, as well as other sources of household income.[3] This is a nationwide operation, representative of urban and rural areas (INE of Chile, 2021).

For Uruguay, lastly, the information was compiled from the Continuous Household Survey (ECH). ECH is conducted monthly in urban and rural areas of Uruguay and captures information on the sociodemographic characteristics, occupations and incomes of the population and households. The survey methodology of ECH was modified in 2020 from that of previous years, incorporating two significant changes: first, a rotating panel design (replacing the previous cross-sectional method) and, second, a telephone survey procedure, given the epidemiological context (INE of Uruguay, 2021).

The use of different information sources made various methodological decisions necessary. First, it was decided to restrict the analysis to urban areas with a view to homogenizing the comparison between the four countries chosen. Second, the income concept used was current disposable income. In particular, the welfare measures described below were computed net of imputed rental income (a normal practice in Brazil, Chile and Uruguay but not followed in Argentina). Third, it should be noted that the epidemiological context forced national statistical offices to make changes to their usual data collection procedures that affected implementation methods and the type of sampling. These changes limit the comparability of sources between 2019 and 2020, so all the comparisons that follow should be treated with reserve. Notwithstanding, it must be stressed that these are the most robust sources of information available for an analysis like the one presented here. Fourth, to maintain comparability between countries, it was necessary to limit the analysis to the fourth quarter of each year. This decision was based on the availability of microdata. While we consider the fourth quarter of 2020 to be representative of the socioeconomic dynamics induced by the pandemic, it may well be conjectured that the situation reflected by the findings presented here would look worse if the two quarters in which the effects of the restrictive measures were most severe (the second and third quarters of 2020) were included.

In accordance with this article's objective of explaining the mechanisms behind the changes in welfare that followed the outbreak of the pandemic, the different income sources whose role is to be assessed were defined (see table 2).

Table 2
Operational definition of the income sources analysed

Income type	Source	Operational definition
Labour	Formal private sector income	Wages and salaries and self-employment income in private sector establishments with more than five employees. Self-employment income of own-account workers engaged in activities requiring professional qualifications.
	Formal public sector income	Wages and salaries for work in public sector establishments.
	Informal sector income	Wages and salaries and self-employment income in establishments with up to five employees in the private sector and in private households. Self-employment income of own-account workers engaged in activities not requiring professional qualifications.
Non-labour	Retirement and pension income	Income from retirement, old-age and/or other pensions, whether contributory or non-contributory.
	Income from social transfers	Income from family allowances, social benefits and assistance, conditional cash transfers and study grants.
	Other non-labour income	Other non-labour income not included in the above. This includes property income, maintenance payments, transfers between individuals and remittances, among other items.

Source: Prepared by the authors on the basis of data from national household surveys.

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[3] Beginning in 2021, the ESI was due to be discontinued and a Labour Income Module (MIT) to be incorporated into ENE, according to information from the Chilean INE.

2.   Microdecompositions

This study uses current per capita family income net of tax liabilities and without imputed rental income to assess changes in welfare after the onset of the COVID-19 pandemic relative to the previous situation. The per capita income y_{pc}^h of household h can be formalized as the sum of the individual incomes, y_i, of the n members of the household with income, divided by the number of household members c_h.

$$y_{pc}^h = \frac{1}{c_h} \sum_{i=1}^{n} y_{ih} \qquad (1)$$

If there are two income sources, a labour income source (y_{ih}^L) (and a non-labour income source (y_{ih}^{NL}), equation (1) can be reformulated as:

$$y_{pc}^h = \frac{1}{c_h} \left(\sum_{i=1}^{n} y_{ih}^L + \sum_{i=1}^{n} y_{ih}^{NL} \right) = y_{pc}^{L_h} + y_{pc}^{NL_h} \qquad (2)$$

In turn, it follows from the above that it is possible to express per capita family income in terms of the sources defined in table 2. To this end, the individual incomes from each of these sources were aggregated at the household level, giving:

$$y_{pc}^h = y_{pc}^{FS_h} + y_{pc}^{PS_h} + y_{pc}^{IS_h} + y_{pc}^{R\&P_h} + y_{pc}^{Transf_h} + y_{pc}^{ONL_h} \qquad (3)$$

In (3), *FS* is per capita labour income earned in the formal private sector, *PS* that earned in the formal public sector and *IS* that earned in the informal sector. Meanwhile, *R&P* is per capita income from retirement and pension payments, *Transf* is social transfers and *ONL* is other non-labour incomes. Equation (3) can be used to decompose the contribution of the different income sources to the observed change in per capita family income and, more generically, in any distributional indicator (Azevedo, Inchauste and Sanfelice, 2013). According to Bracco, Gasparini and Tornarolli (2019) and Obando and Andrián (2016), because ϑ is a distributional indicator, the cumulative distribution function of per capita family income will be a function of F(.):

$$\vartheta = F \left(y_{pc}^h, (y_{pc}^{FS_h}, y_{pc}^{PS_h}, y_{pc}^{IS_h}, y_{pc}^{R\&P_h}, y_{pc}^{Transf_h}, y_{pc}^{ONL_h}) \right) \qquad (4)$$

Given the distribution function accumulated in two time periods, F_t and F_{t+1}, and the known values of the distributional indicator (e.g., average income, the poverty rate or the Gini coefficient), Azevedo, Inchauste and Sanfelice (2013) propose the construction of a counterfactual distribution. In this approach, observations are arranged into quantiles by income (per capita income in this case) in each period, and the average of each of the variables introduced in (2) in period t is obtained. These characteristics are then assigned to each household or person in the same quantile in period $t + 1$. As an example, in the case of per capita labour income, individuals are arranged into quantiles by their income in periods t and $t + 1$, and for each quantile in period $t + 1$ the observed value of labour income is replaced by the average labour income in period t of the households in that quantile (Azevedo, Inchauste and Sanfelice, 2013). This procedure allows counterfactual cumulative distribution functions, F*, to be computed by adding one variable at a time. As the above-mentioned authors point out, this procedure is dependent on the way the simulations are arranged; accordingly, an average of the decompositions following all possible paths is computed, this being known as the Shapley-Shorrocks decomposition (Azevedo, Inchauste and Sanfelice, 2013).[4]

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[4]   Previous studies in which this methodology has been applied to examine changes in poverty or inequality include those by Azevedo, Inchauste and Sanfelice (2013), Bracco Gasparini and Tornarolli (2019), Obando and Andrián (2016) and Sánchez Torres (2015).

The distributional indicators analysed here are average per capita family income, the Gini coefficient of inequality and the poverty rate. Incomes were converted into purchasing power parity (PPP) dollars for comparability. In the case of the poverty rate, two standard measures were considered: the more usual US$ 5.50 PPP and a US$ 10 PPP measure, which takes into account the degree of economic development of the countries included. The latter is the boundary that separates poverty and vulnerability from "middle class" status, according to a World Bank study (Ferreira and others, 2013).

IV. Results

1. Descriptive analysis

Figure 4 provides a descriptive approximation of what happened between 2019 and 2020. It analyses the changes in average per capita family income and in the Gini coefficient following the outbreak of the COVID-19 pandemic. In all four countries, an aggregate or generalized process of impoverishment is observed, albeit of varying intensity. The economic impact of the crisis on real per capita family income was smallest in Chile and Uruguay, ranging from -6% to -8%. The effect was much greater in Argentina and Brazil, where per capita household incomes changed by an average of some -14%. From the microdecomposition analysis, it will be seen below what underlying factors explain the differences in magnitude of these results. Figure 4 also shows that the crisis resulting from the pandemic seems to have had different effects on inequality: while the Gini coefficient remained practically unchanged in Chile and Uruguay, there was a movement in Argentina and Brazil towards greater equity in conjunction with the impoverishment already referred to.[5]

Figure 4

Selected countries: changes in average per capita family income (constant values) and in Gini coefficients (constant values) between the fourth quarter of 2019 and the fourth quarter of 2020

(Percentages)
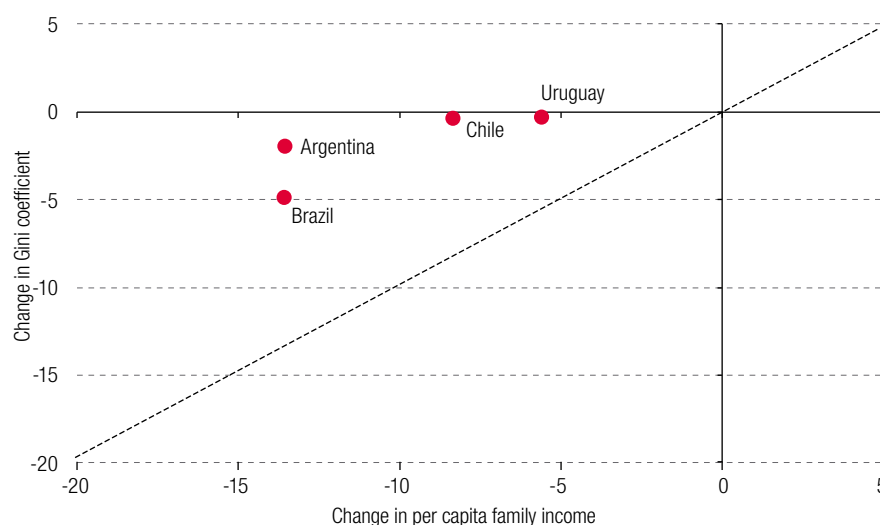
Source: Prepared by the authors on the basis of data from national household surveys.

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[5]   The expression "equity by impoverishment" was coined by Fernando Cortés and Rosamaría Rubalcava (1991) for Mexico and refers to the peculiar dynamics that economic crises can produce. Since the mechanisms behind the situation analysed in Mexico are different from those involved in the situation we present here, it is perhaps more appropriate to refer in this case to "equity with impoverishment".

The above approximation can be disaggregated by analysing growth incidence curves. These were originally developed to evaluate the role of economic growth in improving the incomes of the poorest people (Ravallion and Chen, 2003) but can be generalized to analyse changes in average income between quantiles of the distribution between two time periods. Figure 5 presents growth incidence curves for the per capita family income quintiles in the four countries analysed. Applied to our analytical context, the curves can be used to analyse the magnitude of income loss by quintile and thence to detect some implications for inequality.

Figure 5
Selected countries: growth incidence curves for per capita family income,
fourth quarter of 2019 to fourth quarter of 2020
(Percentages)

A. Argentina

B. Brazil

C. Chile

D. Uruguay

—— Change in real per capita family income —— Average
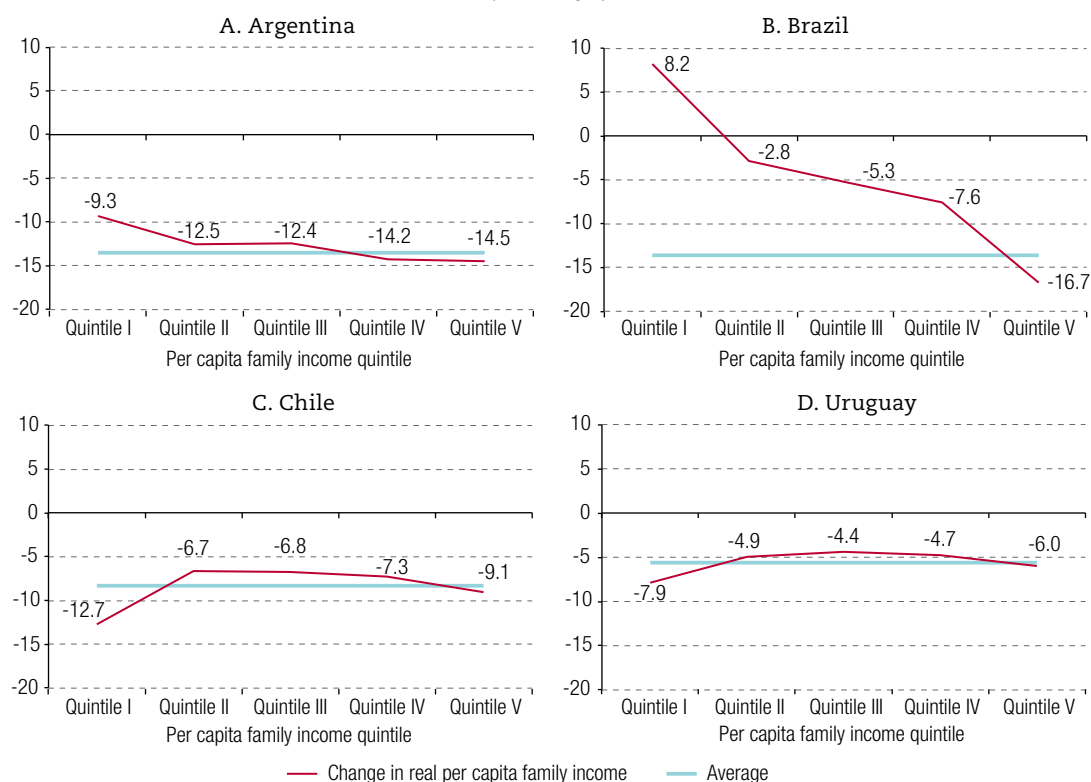
Source: Prepared by the authors on the basis of data from national household surveys.

The curves describing each case depict the unequal distribution of losses between the per capita family income quintiles between the end of 2019 and the end of 2020, when these losses are compared with average income for each country and between countries. As mentioned, there is a general pattern of real income impoverishment in the population, worse in Argentina and Brazil and somewhat more moderate in Chile and Uruguay. Not only do levels of impoverishment differ, however, but so do the underlying social distributional processes, as figure 5 reveals.

From the descriptive analysis, two very different types of growth incidence curves emerge in the four countries analysed. On the one hand, the growth incidence curves describing the situations in Argentina and Brazil, where overall losses of real income were greater, clearly show that incomes declined more steeply in the upper quintiles than in the lower quintiles. In Brazil, real per capita income in the first quintile actually improved (8.2%). A distinctive feature of both countries was the large loss of income in the fifth quintile (14.5% in Argentina and 16.7% in Brazil) and, in Argentina, in the fourth quintile as well (14.2%).

On the other hand, the growth incidence curves of Chile and Uruguay present a different configuration. In a context of declines in overall per capita income that were more moderate than in the other two countries, it was the average incomes of people in the bottom quintile that were worst affected. In contrast, the middle and top quintiles in these countries experienced smaller losses of a similar magnitude.

In sum, the descriptive information allows us to delimit two types of distributional reconfiguration in the countries analysed as a result of the COVID-19 economic and health crisis: (i) a direct impact on the welfare of the population, manifested by the substantial decline in average real incomes that took place in all the countries (but was larger in Argentina and Brazil than in Chile or Uruguay); and (ii) a less direct impact on the inequality of income distribution resulting from a differential dynamic of impoverishment, with this being more acute in the lowest quintiles in Chile and Uruguay and in the upper middle quintiles in Argentina and Brazil. This differential dynamic makes it necessary to investigate the role of the various income sources in the welfare changes that occurred in the context of the COVID-19 pandemic and, in particular, to examine how each circuit and source of monetary income influenced changes in per capita income overall and in the different quintiles.

2. Factors explaining the distribution and welfare changes

Table 3 presents the application of the decomposition methodology set out in equation (4) (Azevedo, Inchauste and Sanfelice, 2013) to the year-on-year changes in average per capita family income in PPP dollars. The decomposition by income source makes it possible to answer the question of what underlying factors explain the aggregate losses in the income levels of the population during the COVID-19 crisis in the four countries studied.

Table 3
Selected countries: decomposition of changes in per capita family income, by income source, between the fourth quarter of 2019 and the fourth quarter of 2020
(Percentage points)

Income source	Argentina	Brazil	Chile	Uruguay
Labour incomes	-11.1	-8.4	-11.7	-4.2
Formal private sector income	-6.0	-3.6	-8.2	-2.6
Formal public sector income	-1.6	-1.0	0.1	0.9
Informal sector income	-3.4	-3.9	-3.6	-2.5
Non-labour income	-2.5	-5.1	3.4	-1.4
Retirement and pension income	-1.3	-4.5	1.1	0.9
Transfer income	1.2	2.3	3.4	-0.4
Other non-labour income	-2.4	-2.9	-1.1	-1.9
Total	-13.5	-13.6	-8.3	-5.6

Source: Prepared by the authors on the basis of data from national household surveys.

The loss of labour income was the crucial mechanism behind the sharp reduction in average per capita family incomes. The crisis caused by the pandemic was regressive for the labour market, and some sources of income disappeared or were abruptly curtailed in the four countries studied. Labour income from the formal private sector played the decisive role in the loss of per capita income. The economic crisis triggered by COVID-19 clearly affected the ability of firms to pay wages and salaries, while at the same time reducing the incomes of self-employed professionals and small and medium-sized businesses. This occurred despite the great fiscal effort made by the region's States to sustain the payment of wages and salaries in the private sector, which is revealing of the magnitude of the crisis.[6]

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[6] The scale of the influence of formal private sector labour incomes on changes in average per capita family incomes is connected to the share of this source in total family incomes, which ranges from 35% (Argentina) to 54.1% (Chile); in fact, it constitutes the bulk of labour income.

The reduction of labour incomes in the informal sector was also important in explaining the deterioration of per capita family incomes. The loss of jobs, hours worked and income in informal occupations was reflected in household income levels. The restrictions imposed on human mobility entailed a sudden reduction in income from occupations of this type, some of which rely heavily on intensive interpersonal contact. At the same time, these activities were generally ill-suited to remote working arrangements and difficult to include in State interventions aimed at sustaining wages and salaries.

Labour incomes in the public sector played a much more limited role in the loss of per capita income (in Argentina and Brazil), or even offset some of the decline in other incomes (especially in Uruguay). The public sector's ability to continue paying wages and salaries to its workers during the crisis and the need to take on more staff (in view of the health situation resulting from the pandemic) could explain these results.

Non-labour income also contributed to the reduction in per capita family income during the COVID-19 crisis. Retirement and pension income contributed negatively to per capita income in Argentina and Brazil and played a positive, albeit very limited, role in Chile and Uruguay. Overall, this behaviour highlights the limited role of these types of social policy benefits in the context of the economic crisis. In contrast, income from social transfers played a positive and very significant role in mitigating the impact of the crisis. These are policies such as the Emergency Family Income in Argentina and Chile and Emergency Aid in Brazil. It is clear that this positive role was confined to those countries that actually increased their social spending, while in Uruguay such transfers did not play any role in cushioning the crisis.

Households' other non-labour income, especially that from property and other rents, maintenance payments and remittances, played a crucial role in the aggregate decline in per capita family income. The dissaving experienced by traditional upper middle-income sectors (who were unable to work for some months) and its consequences for bank deposits, together with the freezing of rents and greater difficulty in receiving remittances from abroad, could be the fundamental explanatory mechanisms in this process.

The above analysis needs to be supplemented by a specification of the role of the various income sources in the different per capita income quintiles (see table 4). The exercise of decomposing income changes is useful for examining average welfare and distributional outcomes in respect of per capita income in accordance with social and employment considerations and social policy parameters. In this respect, it can be conjectured that the role played by these sources should present some differences depending on the position of households in the socioeconomic stratification scale.

The crisis caused by the pandemic had a regressive effect on the labour market across the board. However, a detailed analysis reveals different behaviour in the different income quintiles. In all four cases analysed, incomes in the first quintile were particularly eroded by employment developments in the informal sector. At the other extreme, incomes in the fifth quintile were most affected by the loss of formal private sector earnings resulting from declines both in wages and salaries and in profits from people's own businesses, while informal sector earnings played a secondary role. In Argentina, Brazil and Chile, losses of employment income in the middle quintiles were also substantial and were explained by developments in both the formal private sector and the informal sector.

State intervention through social transfers played a compensatory role in Argentina, Brazil and Chile, as discussed above, but this effect was dissimilar across income quintiles. Such transfers were decisive in sustaining the incomes of the first two quintiles in Argentina and Brazil. In Chile, on the other hand, they contributed positively to per capita income up to the fourth quintile, which is evidence that the social assistance provided during the pandemic was less targeted. In Uruguay, as already noted, these benefits do not seem to have played an important role in sustaining incomes in the context of the economic crisis. The greater impact of transfers in moderating or preventing loss of income in the first two quintiles in Argentina and Brazil, in the context of a transversal loss of labour income, could explain the particular shape of the growth incidence curves analysed earlier, with a bias in favour of the lower quintiles of the distribution.

Table 4
Selected countries: decomposition of changes in per capita family income, by income source
and by quintile, between the fourth quarter of 2019 and the fourth quarter of 2020
(Percentage points)

Country	Income source	Quintile I	Quintile II	Quintile III	Quintile IV	Quintile V
Argentina	Labour incomes	-10.8	-11.2	-9.1	-13.5	-10.6
	Formal private sector incomes	-4.3	-6.8	-2.1	-5.3	-7.6
	Formal public sector incomes	-1.8	-1.6	-2.4	-3.2	-0.7
	Informal sector incomes	-4.8	-2.9	-4.7	-4.9	-2.4
	Non-labour incomes	1.5	-1.3	-3.3	-0.8	-3.9
	Retirement and pension incomes	-2.3	-3.6	-3.9	0.6	-0.9
	Transfer incomes	5.7	3.8	2.3	0.6	0.1
	Other non-labour incomes	-1.8	-1.6	-1.7	-2.0	-3.1
	Total	-9.3	-12.5	-12.4	-14.2	-14.5
Brazil	Labour incomes	-15.1	-12.0	-10.5	-8.1	-8.0
	Formal private sector incomes	-3.2	-4.5	-5.7	-3.0	-4.0
	Formal public sector incomes	-0.7	-0.5	0.3	-2.0	-1.6
	Informal sector incomes	-11.2	-7.0	-5.2	-3.0	-2.4
	Non-labour incomes	23.3	9.2	5.3	0.4	-8.7
	Retirement and pension incomes	-2.7	-5.4	-0.8	-3.2	-5.3
	Transfer incomes	28.1	15.5	7.1	4.5	-0.3
	Other non-labour incomes	-2.1	-0.9	-1.0	-0.9	-3.1
	Total	8.2	-2.8	-5.3	-7.6	-16.7
Chile	Labour incomes	-15.7	-15.9	-16.0	-12.1	-9.1
	Formal private sector incomes	-7.4	-9.2	-10.8	-9.2	-6.9
	Formal public sector incomes	-0.4	-1.0	-0.6	-0.2	0.6
	Informal sector incomes	-7.9	-5.7	-4.7	-2.7	-2.8
	Non-labour incomes	3.1	9.3	9.3	4.8	0.1
	Retirement and pension incomes	-3.4	1.5	2.7	1.7	0.9
	Transfer incomes	7.6	8.1	7.1	4.2	0.7
	Other non-labour incomes	-1.2	-0.3	-0.6	-1.0	-1.5
	Total	-12.7	-6.7	-6.8	-7.3	-9.1
Uruguay	Labour incomes	-4.7	-6.1	-2.5	-2.1	-5.1
	Formal private sector incomes	-1.3	-0.2	-0.9	-2.4	-3.9
	Formal public sector incomes	0.0	-0.7	0.8	3.1	0.4
	Informal sector incomes	-3.3	-5.2	-2.4	-2.8	-1.6
	Non-labour incomes	-3.2	1.2	-1.8	-2.6	-0.9
	Retirement and pension incomes	0.6	3.0	-0.1	-0.7	1.6
	Transfer incomes	-0.1	-0.3	-0.3	-0.6	-0.3
	Other non-labour incomes	-3.8	-1.5	-1.4	-1.4	-2.2
	Total	-7.9	-4.9	-4.4	-4.7	-6.0

Source: Prepared by the authors on the basis of data from national household surveys.

By applying the approach developed in equation (4) to changes in the Gini coefficient (see table 5), it is possible to identify the role of the different income sources in changes in distributional inequality. In general, the effect of the decline in labour income was to increase inequality, albeit very modestly. This was mainly because of the clear pro-inequality role played by the loss of labour income from informal sector occupations. Non-labour family income, in contrast, played a decisive role in reducing inequality. This was mainly due to the role of social transfer income. Thus, the application of new emergency instruments in the context of the COVID-19 pandemic and the strengthening of existing ones had a positive, albeit moderate, effect in cushioning the rise in the Gini coefficient. The only exception in this regard is Uruguay.

Table 5
Selected countries: decomposition of changes in the Gini coefficient, by income source,
between the fourth quarter of 2019 and the fourth quarter of 2020
(Points of the Gini coefficient)

Income source	Argentina	Brazil	Chile	Uruguay
Labour incomes	0.2	0.8	2.1	0.0
Formal private sector incomes	-0.4	0.3	1.1	-0.4
Formal public sector incomes	0.1	-0.4	0.0	-0.4
Informal sector incomes	0.5	0.9	1.0	0.8
Non-labour incomes	-1.0	-3.5	-2.1	-0.2
Retirement and pension incomes	0.1	-0.4	-0.2	-0.3
Transfer incomes	-0.9	-2.8	-1.9	-0.1
Other non-labour incomes	-0.2	-0.3	0.0	0.2
Total	-0.8	-2.6	-0.2	-0.1

Source: Prepared by the authors on the basis of data from national household surveys.

Lastly, table 6 shows what happened to monetary poverty in the four countries and the role played by the different income sources in the changes observed. As noted, we are working here with two absolute PPP monetary poverty lines of US$ 10 and US$ 5.50. The changes in poverty levels reveal that the evolution of absolute deprivation was very closely related to changes in per capita family income.

Table 6
Selected countries: decomposition of changes in the monetary poverty rate (using poverty
lines of US$ 10 and US$ 5.50 in purchasing power parity), by income source,
between the fourth quarter of 2019 and the fourth quarter of 2020
(Percentage points)

Income source/poverty line	Argentina		Brazil		Chile		Uruguay	
	US$ 10	US$ 5.50	US$ 10	US$ 5.50	US$ 10	US$ 5.50	US$ 10	US$ 5.50
Labour incomes	4.4	1.4	4.5	3.0	6.0	3.6	1.7	1.1
Formal private sector incomes	1.7	0.6	2.0	0.8	3.7	2.2	0.4	0.4
Formal public sector incomes	0.8	0.0	0.2	-0.1	-0.1	-0.2	-0.3	-0.4
Informal sector incomes	1.8	0.8	2.3	2.2	2.5	1.6	1.6	1.1
Non-labour incomes	0.0	-1.1	-1.3	-2.9	-3.7	-2.1	0.2	0.0
Retirement and pension incomes	0.6	0.3	1.4	1.0	-0.5	-0.3	-0.7	-0.7
Transfer incomes	-1.4	-1.5	-3.6	-4.6	-3.6	-2.1	0.0	-0.2
Other non-labour incomes	0.8	0.2	1.0	0.7	0.4	0.3	0.9	0.9
Total	4.4	0.3	3.2	0.1	2.3	1.5	1.9	1.0

Source: Prepared by the authors on the basis of data from national household surveys.

A detailed analysis of the information shows that changes in labour incomes contributed to an increase in poverty in all the countries. Income from the low-productivity informal sector played a more decisive role in increasing monetary poverty than income from the formal sector, especially when the US$ 5.50 PPP line is considered, something that is related to the impacts on the bottom two quintiles of the distribution described above. However, it is clear that the deterioration of the labour market as a whole also affected the formal sectors. Accordingly, the negative role of formal private sector incomes in monetary poverty could be related in turn to the socioeconomic performance of the lower middle-income quintiles.

Social transfer incomes played a decisive role in the evolution of monetary poverty, cushioning the impact of the COVID-19 crisis. With the exception of Uruguay, whose characteristics have already been described, social policy transfers reduced the increase in income poverty that would have occurred by between 1.4 percentage points (Argentina) and 3.7 percentage points (Brazil and Chile) if the US$ 10 PPP poverty line is taken, and by between 1.5 percentage points (Argentina) and 4.6 percentage points (Brazil) if the US$ 5.50 PPP poverty line is taken.

V.   Conclusions

The worst health effects of the COVID-19 pandemic seem to have subsided after an extensive lockdown followed by a new normal with many changes in daily life. In contrast, the economic consequences are far from over. The world economy is in turmoil, beset by geopolitical shifts, crises in global supply chains, an energy crisis and higher inflation. In Latin America, the economic recession associated with the pandemic came on top of the gradual stagnation and socioeconomic deterioration that characterized the second decade of the twenty-first century. In this context, the region faces renewed challenges in its pursuit of a path of economic development with social equity and environmental sustainability.

This article has examined how the welfare and economic inequality situation in Argentina, Brazil, Chile and Uruguay was affected both by the economic crisis caused by the COVID-19 pandemic and by their governments' compensatory social policy responses. The general premise of the study is that the impacts of the crisis should be assessed in the light of the structural configuration of labour markets in the region's countries and the characteristics of their welfare regimes. By addressing the ways in which the crisis impacted income distribution and living conditions, the study has provided material for a broader reflection on the constraints currently affecting labour markets and welfare regimes in the effort to achieve adequate welfare thresholds.

A first finding is that the COVID-19 crisis led to impoverishment across the board, observable in the decline in average per capita incomes. This reduction in monetary income was mainly explained by labour market developments: according to the microdecompositions presented, the decline in household labour incomes (due to loss of jobs and hours worked and reduced remuneration) was the main factor underlying the erosion of average per capita income. However, the structural processes behind the loss of income were not homogeneous across the income distribution. In the bottom quintile of the distribution (with differences in magnitude between countries), this deterioration was more strongly driven by developments in the informal sector, while in the top quintile, the deterioration of incomes in the formal private sector was more important. In the middle quintiles, the effects of income losses from both labour sources were combined, demonstrating the magnitude of the crisis.

A second finding was that there was clearly a degree of independence between changes in welfare and inequality. The decline in average per capita income was not necessarily coupled with higher inequality. This was generally due to the crucial role of social transfers, especially in Argentina, Brazil and Chile. While income from labour activities, both formal and informal, led to a distributional deterioration (an increase in the Gini coefficient), State action played a decisive role in cushioning the process. This dynamic was most in evidence in Argentina, Brazil and Chile (the countries that increased their level of social spending the most of the four considered in this study). In the case of Uruguay, on the other hand, transfers had practically no distributional consequences.

A third important finding is that the social protection policies implemented by governments in the context of the health emergency also played a key role in relation to poverty. Here we refer to standard PPP poverty lines of US\$ 10 and US\$ 5.50, used for strictly comparative purposes. One consequence of the COVID-19 pandemic and the restrictive measures implemented was a significant increase in poverty in all four countries analysed. From the microdecompositions carried out, it was found that the determinant of this trend was the loss of households' labour income, and especially informal sector income. At the same time, it was documented that income transfer policies had a large poverty-reducing effect, which varied from case to case. Given that this study used microdata for the fourth quarter of 2020, it is possible that the effects described may have been further-reaching in the quarters when human mobility was more restricted, which could not be considered here.

The isolation and restrictive sanitary measures taken in response to the outbreak of COVID-19 highlighted the structural fragmentation of the labour market and the socioeconomic fragility in which

the living conditions of the Latin American population are reproduced. The results of this study suggest two main conclusions. First, the structural heterogeneity of labour markets remains an obstacle to improving the material living conditions of households, something that is demonstrated by the decisive role played by informal sector activities in the livelihoods of many Latin American families. This being so, efforts must be made to reduce the sectoral socioproductive gaps impeding the convergence of living conditions and to improve the quality of jobs.

Second, the persistent institutional weakness of Latin American labour markets and the resulting stratification of welfare regimes are obstacles to the achievement of social equity in the face of crises and shocks. Although the study was limited to what happened during the pandemic, it is clear that these conclusions also apply to the situation of economic stagnation and rising inequality that our region has been experiencing. In this context, there is a need to develop new, more inclusive welfare systems that are less dependent on people's labour market situation and more capable of providing social protection and inclusion. In particular, it is becoming urgent to discuss income insurance mechanisms that can enable the entire population to lead a decent life.

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Legal frameworks and specialized institutional frameworks for the social and solidarity economy in Latin America

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Abstract

This article analyses recent changes in social and solidarity economy (SSE) policies in eight Latin American countries: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico and Uruguay. It outlines the institutional rules that limited or added to States' policymaking capacity, as well as examining progress on legislation and regulations and changes in specialized institutional frameworks. The information was obtained through an extensive review of documents and databases produced by government and academic institutions and social and solidarity economy organizations. The conclusion reached is that the concept has multiple interpretations, with specific characteristics in each country, and that it is being shaped and developed continuously. The article covers the different policy approaches to the social and solidarity economy, as reflected in legal frameworks, and also whether specialized institutional frameworks exist in the cases analysed.

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I.   Introduction

Since the 1980s, various academic institutions, social organizations, international organizations and government authorities have accepted the use of the term social and solidarity economy (SSE) and have defined the concept, to identify the specific characteristics of SSE and the organizations and enterprises that are part of it. There has also been influence from papal documents, popular, trade union and agrarian movements, theoretical contributions from the fields of humanism, ecology and feminism, and particularly attempts to recover the ancestral and cultural practices of aboriginal peoples. The outcome of this is a concept with multiple interpretations, reflecting specific characteristics in each country.

The concept of SSE has been expanded and integrated into legislation, institutions and public policies (ICA, 2020). The International Labour Organization (ILO) recognizes "the contribution of the SSE to poverty reduction, to inclusive societies, to the transition from the informal to the formal economy, to enabling recovery and to building resilience" (ILO, 2022). The Organisation for Economic Co-operation and Development (OECD), in the *Recommendation of the Council on the Social and Solidarity Economy and Social Innovation*, notes the role of the social economy, among other areas, in building inclusive societies, contributing to economic growth, ensuring a twin transition (green and digital), creating jobs, engaging youth, promoting gender equality, addressing informal employment, supporting the work integration of disadvantaged groups and contributing to economic and social resilience. The Recommendation also recognizes the need "to develop institutional and legal frameworks, policies and measures to support the social economy in reaching its full potential" (OECD, 2022).

The United Nations Inter-Agency Task Force on Social and Solidarity Economy (TFSSE, 2014, p. iv) has stated that the SSE "refers to the production of goods and services by a broad range of organizations and enterprises that have explicit social and often environmental objectives, and are guided by principles and practices of cooperation, solidarity, ethics and democratic self-management". For its part, the 110th Session of the International Labour Conference held that the SSE, according to national circumstances, "encompasses enterprises, organizations and other entities that are engaged in economic, social, and environmental activities to serve the collective and/or general interest, which are based on the principles of voluntary cooperation and mutual aid, democratic and/or participatory governance, autonomy and independence, and the primacy of people and social purpose over capital in the distribution and use of surpluses and/or profits as well as assets" (ILO, 2022, p. 2). In addition, the SSE comprises various forms of enterprises and organizations. The most common are cooperatives and mutual societies, but they are not the only ones: community associations and organizations, social enterprises and foundations are other examples (Fonteneau and others, 2011).

In view of these considerations, we propose analysing the institutional rules that limit or add to States' capacity to formulate policies on the SSE. To do this, we outline the regulatory frameworks and government institutions specialized in the SSE in eight Latin American countries: Argentina, Brazil, Colombia, Chile, Costa Rica, Ecuador, Mexico and Uruguay.[1] The overall aim of this review is to compare public policies to promote the SSE, based on identification and characterization of applicable legislation and the supporting institutional framework established in these countries in the twenty-first century.

The methodology applied was to treat the selected countries as case studies. The aspects analysed were those related to public policies, legislation and the institutional frameworks of the SSE. The information was obtained through an extensive review of documents and databases produced by government and academic institutions and SSE organizations.

This section is followed by a presentation of the specific characteristics of the chosen aspects of each country, and the last section offers general conclusions.

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[1] These countries participated in the work of Co-operatives of the Americas and the Economic Commission for Latin America and the Caribbean (ECLAC) under the project "Productive development and spatial heterogeneity in Latin America: institutions and capacity-building in regional productivity policy programming and implementation" (see Correa, 2022).

Juan Pablo Martí, Mario Radrigán, Dalia Borge, Hugo Jácome, Leandro Pereira,
Marietta Bucheli, Juan José Rojas and Mario Schujman

II.   Analysis of the regulatory framework and specialized institutional framework for the social and solidarity economy

The characteristics of the regulatory framework and institutional framework of each of the countries analysed are presented below.

1.   Argentina

In Argentina, there are multiple experiences of SSE enterprises and organizations that are deeply rooted in associative practices to meet needs and support the reproduction of life. In the country, the concept of the social economy is used to refer to cooperatives —including plan-based cooperatives—[2] and mutual societies. In 2019, there were 8,618 active cooperatives, 17,818,197 members and 193,760 jobs (either through employment or as members of worker cooperatives). In the case of mutual societies, in 2019 there were 3,785 in operation, with 3,057,402 active members and 33,326 employees.[3]

In terms of legislation and regulations, the country's constitution does not protect or promote the SSE, cooperatives or mutual societies. However, the SSE has been addressed in terms of institutions and law at the provincial level (through social economy secretariats and specific legislation in almost all provinces). At the national level, Law No. 20337 of 1973, which governs cooperatives, is a generic and principled law, but it does not meet current circumstances. However, no progress has been made on updating the regulatory framework, for fear of worsening the existing situation. The prevailing legal framework for mutual associations comprises Law No. 20321 of 1973, with non-substantial amendments introduced through Laws No. 23566 of 1988 and No. 25374 of 2000, and a regulatory resolution of the National Institute for Associations and the Social Economy (INAES) (Resolution No. 1036/2001), which provides for the formation of unions or associations by such organizations.

In addition, many organizations that are part of SSE adopt the legal form of associations. *Asociaciones civiles* and *simples asociaciones* are two forms of associations regulated in the National Civil and Commercial Code (Law No. 26994 of 2014).

The specialized institutional framework and resulting public policies have been characterized, at the national level, by inclusion in social policies, and they are embodied by INAES, which reports to the Ministry of Productive Development (Decree No. 157/20). Decrees No. 420/96 and No. 721/10 established the current composition and structure of INAES, and most importantly propose that the organization be federalized and gives cooperative and mutual confederations a majority of the seats on its board of directors.

INAES issued Resolution No. 1000 of 2021, which is innovative as regards most of the issues related to the SSE.[4] This resolution is a major step forward and also a breakthrough as a resolution issued by the authority and not a law.

Public policies on the SSE are set out in a variety of different regulatory instruments, which in many cases have not been maintained. The exception may well be policies on establishment of work cooperatives, which began in 2003 with the Manos a la Obra programme, were strengthened in 2009 with

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[2]   These examples of association mostly call themselves part of the "popular economy". The Confederation of Workers of the Popular Economy (CTEP) defines the popular economy as economic processes immersed in popular culture, based on accessible means of work and unprotected labour (Grabois and Pérsico, 2017). However, precise statistical information on this universe is not available. Data for 2022 show 3.2 million workers in the National Register of Popular Economy Workers (RENATEP) (Law No. 27345 of 2016).

[3]   Data from INAES (2019).

[4]   Associations and cooperative groups linked to the popular economy have yet to be fully regulated and defined in law and are identified as "pre-cooperative groups".

the Argentina Trabaja programme and were partially maintained, despite changes in government since then. From 2019 onward, there is no specific promotion of creating cooperations from social plans, but support is offered to those than still exist and new popular worker cooperatives are created, arising from social movements or as part of local projects, aiming to address severe labour and poverty problems.

There are multiple interministerial programmes for all SSE categories, for example the programmes of the National Institute for Agricultural Technology (INTA) or the National Institute of Industrial Technology (INTI). Not all of them are association-based propositions, but together they offer significant support.

2.   Brazil

In Brazil, there are multiple definitions of the SSE. Serva and Andión (2006) propose classifying SSE organizations into three categories: (i) cooperatives; (ii) third sector entities (non-governmental organizations (NGOs), foundations and institutes); and (iii) solidarity-based economic enterprises.

In addition, cooperatives are generally divided into the pioneering side, with a more entrepreneurial profile, as represented by cooperatives linked to the Organization of Brazilian Cooperatives (OCB), and the solidarity-based side, represented by the National Union of Solidarity-based Cooperative Organizations (UNICOPAS) (Pinho, 2004; Alves, 2019). According to Sistema OCB (2020), there are 5,314 cooperatives, 15.5 million cooperative members and 428,000 employees. In the case of UNICOPAS, the only figures available are that there are currently 2,500 cooperatives and 800,000 cooperative members in the country (UNICOPAS, n.d.).

In terms of the regulatory framework, two milestones are of note: (i) creation of the Organization of Brazilian Cooperatives in 1969; and (ii) enactment of the General Law on Cooperatives (No. 5764) in 1971. More recently, in 2015, Bill No. 519 on Cooperative Societies and the National Cooperatives Policy was introduced.

The current institutional framework for cooperatives is centred around the Secretariat of Family Agriculture and Cooperatives (SAF), and comprises the Community Development Department (DDC), Cooperatives and Market Access Department (DECAM), Productive Structuring Department (DEP) and Agricultural Credit Management Department (DGCF).

The third sector includes organizations and entities focused on non-profit actions, such as NGOs, foundations, business institutes, philanthropic entities and international cooperation agencies. In terms of associations, four private institutions are particularly noteworthy in Brazil: (i) the Group of Institutes, Foundations and Companies (GIFE); (ii) the Ethos Institute for Business and Social Responsibility; (iii) the Institute for Business Citizenship (ICE); and (iv) the Brazilian Association of NGOs (ABONG).

Mapping was last performed at the national level in 2016 by the Brazilian Institute of Geography and Statistics (IBGE, 2019), counting a total of 236,950 entities. In terms of regulatory frameworks, the third sector is regulated by Laws No. 9637 of 1998 and No. 9790 of 1999 —and its amendment by Decree No. 3100 of 1999— and the new framework established by Law No. 13019 of 2014.

Solidarity-based economic ventures are part of what is known in Brazil as the solidarity side of cooperatives. Between 2003 and 2018, a public policy was implemented, supervised by the National Secretariat of Solidarity Economy (SENAES), having been created in the Ministry of Labour and Employment under Decree No. 4764 of 2003 and overseen by Professor Paul Singer. In 2012, through Bill No. 4685, a proposal was presented for a national solidarity economy policy, with solidarity-based economic ventures and the creation of a national solidarity economy system. The bill was passed by the lower house of the National Congress in 2017 and by the upper house in 2019. It then returned to the lower house, where, in May 2023, it was still awaiting final adoption. While the bill was being debated, Law No. 13928 was enacted in 2019, which established 15 December as National Solidarity Economy Day.

Juan Pablo Martí, Mario Radrigán, Dalia Borge, Hugo Jácome, Leandro Pereira, Marietta Bucheli, Juan José Rojas and Mario Schujman

Other important regulatory instruments linked to the institutional framework of the solidarity economy include: (i) Law No. 11110 of 2005, establishing the National Targeted Production Microcredit Programme, to encourage job creation and income generation among micro-entrepreneurs in the popular economy;[5] (ii) Decree No. 7357 of 2010, which governs the National Popular Cooperative Incubator Programme (PRONINC); (iii) Decree No. 7358 of 2010, which governs the National Fair Trade and Solidarity-based Trade System; (iv) Law No. 12690 of 2012, establishing the National Programme to Promote Worker Cooperatives (PRONACOOP); and (v) Decree No. 8163 of 2013, relating to the National Programme to Support Associations and Social Cooperation.

From 2016 onward, especially during the Government of President Bolsonaro (2019–2022), public policy on the solidarity economy was dismantled in Brazil. Under Provisional Measure No. 726 of 2016 of the Government of President Temer, SENAES was transformed into an office of an undersecretary and its budget was cut. In 2019, following elimination of the Ministry of Labour and Employment, through Provisional Measure No. 870 and Decree No. 9674, the Bolsonaro Government also eliminated the office of the undersecretary and created the Department of the Solidarity Economy in the newly created Ministry of Citizenship, with an even larger cuts to technical staff and the budget. According to Morais and Bacic (2020), this new structure reflects —in addition to the elimination of SENAES— fragmentation of the public policy that previously connected urban and rural areas and a shift in the notion of public policy, by linking the cooperatives on the solidarity side to a policy that is focused on assistance rather than empowerment.

The solidarity economy in Brazil was mapped twice in the context of the Solidarity Economy Information System (SIES). The first mapping was conducted between 2005 and 2007, and the second between 2009 and 2013, yielding figures of 22,000 and 19,700 solidarity economy enterprises, respectively. In 2014, an attempt was made to establish a national register of solidarity economy and fair-trade enterprises, and to create a national observatory on the solidarity economy in Brazil. However, the institutional changes that eroded national public policy on the solidarity economy cut short the progress on these initiatives.

3.   Chile

In Chile, the concepts of the social economy and the solidarity economy or the combined concept of the SSE are employed infrequently and largely limited to academic circles, even though one of the authors who coined the Spanish term "economía solidaria" was the Chilean Luis Razeto (1985, 1986, 1993 and 1998).

In recent decades, the main influences on the SSE in Chile have been linked to the International Centre of Research and Information on the Public, Social and Cooperative Economy (CIRIEC), especially through its Spanish arm, as well as to the work of the Intercontinental network for the promotion of social and solidarity economy (RIPESS) (see, for example, EESC (2017) and RIPESS LAC (2019)).

In both academia and in civil society, alternative terms are found to those of social or solidarity economy, coming from similar traditions, such as popular economy, general interest economy, civil economy and the non-profit sector. In recent years a number of other concepts have been added, such as social enterprise or venture, social innovation, the collaborative economy, B Corporations, Economy for the Common Good (ECG), circular economy and the fourth sector (Gatica, 2011; Muñoz and others, 2016), which are being developed and looking for their own space.

In Chile, the following entities can be considered part of the SSE: mutual societies, cooperatives, foundations and private non-profit corporations, trade associations, community organizations, unions and Indigenous organizations, among others (for more details see Pérez de Uralde, 2006).

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[5]   According to Razeto (1998), the "popular economy" refers to the small groups of people and families that combine and jointly manage their scarce resources to perform, through cooperation and mutual assistance, activities that generate income or provide goods and services that satisfy basic needs for work, food, health, education and housing, for example.

Three longitudinal studies using a similar methodology have focused on third-sector non-profit entities, producing important information on the situation of the SSE in Chile: those by Irarrázaval (2006 and 2016) and Irarrázaval and Streeter (2021). These studies found that the total number of active legal entities in this sector was 108,946 in 2005, 230,399 in 2015 and 321,319 in 2020, indicating a threefold increase.

There is no SSE law in the country. The only precedent is the drafting by the executive branch of a bill to promote the social economy and social enterprises, between 2014 and 2016, which was never introduced in the National Congress for discussion and examination.

In this context, a range of active legal bodies can be identified that determine rules for and govern establishment, management and supervision of each of the types of entities that make up the SSE.

Historically, different units have existed within public institutions, which are each responsible separately for the different types of entities that make up the SSE. Examples include the Department of Cooperatives in the Ministry of Economic Affairs, Development and Tourism, the Department of Legal Entities in the Ministry of Justice and Human Rights, in the case of foundations and private non-profit corporations and the agency National Indigenous Development Corporation (CONADI), which reports to the Ministry of Social Development and Family, in the case of Indigenous communities and associations. In 2014, the Division for Associations and the Social Economy (DAES) was created in the Ministry of Economic Affairs, Development and Tourism, merging the existing Department of Cooperatives and the Trade Associations and Consumer Associations Unit; to date, it is the only public institution in Chile that has employed the concept of the social economy.

In 2018, the Division was renamed the Division for Associations, and, in January 2021, its name changed again to Division for Associations and Cooperatives, which it retains to this day.

In Chile, there are no government development programmes or institutions that aim to build the SSE as a whole or have such a task in their statutes. However, traditionally programmes and instruments have existed that have focused on the various entities in the SSE separately and in a fragmented manner.

There is also no formal cross-sectoral organization that brings together the various SSE stakeholders or entities, and some of the stakeholders at the sectoral level have no institutional representation or very weak representation. In the last 40 years, efforts have been made to create a platform or rallying point for the various SSE actors, but these have not been successful or have remained highly informal (see, for example, CONFECOOP, 1987).

4. Colombia

There is no legal definition of the SSE in Colombia. Since 1998, the concept of the solidarity economy has been used, but in reference to what in other countries is known as the social economy.

According to Álvarez (2017), various approaches that define solidarity economy enterprises in Colombia:

- Non-profit entities, a concept influenced by the evolution of the third sector in English-speaking countries and the non-profit sector. This approach is supported by the Tax Statute set out in Decree Law No. 624 of 1989, which governs non-profit entities that neither reimburse contributions nor distribute surpluses, in any way and with any denomination, either directly or indirectly, during their existence or when they are dissolved or liquidated, among other requirements (Colombia, 1989, Article 19, paragraph 3, amended by article 140 of Law No. 1819 of 29 December 2016).

- The social economy, a concept stemming from the European traditions of cooperative associations and cooperative democracy. The approach is based on Law No. 79 of 1988, which regulates forms of cooperatives, and Law No. 454 of 1998, which defines the

solidarity economy as a socioeconomic, cultural and environmental system made up of the set of social forces organized as associations, identified by solidary, democratic and humanistic self-management practices, which are not profit-driven and work for the comprehensive development of humanity as the subject, stakeholder and purpose of the economy (Colombia, 1998, article 2).

This dissonance causes enormous confusion with respect to the management required from the State (Álvarez, 2017).

In 2021, the National Council on Economic and Social Policy (CONPES) approved the guidelines for preparation of the Public Policy for Development of the Solidarity Economy, which defines the solidarity sector as a union of the solidarity economy (cooperatives, mutual societies, employee funds and the forms of solidarity-based associations set forth in Law No. 454) and solidarity-based development organizations (community organizations, voluntary work, some associations such as those of reintegrated former combatants or of victims of armed conflict, foundations and corporations).

Article 3 of Decree No. 4122 of 2011 stipulates that the purposes of the Special Administrative Unit for Solidarity Organizations include designing, adopting, managing, coordinating and implementing programmes and projects to promote, plan, protect, strengthen and develop solidarity-based organizations and to comply with the provisions of Colombia's Constitution. The Rural Development Agency strengthens associations and contributes to improved living conditions for people in rural areas (ADR, 2021).

The Office of the Superintendent for the Solidarity Economy supervises and monitors most companies in the solidarity economy, with the exception of companies linked to transport, health, public administration, surveillance, and financial firms (Álvarez, 2018, p. 61).

Inequality within the political system occurs because of factors such as a failure to reach agreements among different professional organizations and solidarity economy organizations with regard to the content of public policy, or because public policy is formulated independently. The body of ideas of stakeholders and policymakers must therefore be organized, to define the ideal and desired structure of public policy.

5. Costa Rica

In Costa Rica the first elements of the concept of social economy began to appear in the late 1990s, through leaders of cooperative movements, influenced by the French and Spanish movements (Utting and Morales, 2016). Since the cooperative movement was represented in the Workers Assembly of the People's Bank for Community Development,[6] that body established the guidelines for the institution to become the financial arm of the social economy. The Assembly proposed the first conceptual interpretations regarding the social economy, which remained in place until 2014 and influenced the authorities, leading in 2015 to a declaration of public interest in promotion, creation, development and formalization of groups, organizations and enterprises of the SSE, through Executive Decree No. 39089-MP-MTSS, which was subsequently amended through Decree No. 39835-MP-MTSS, to include the concept of the SSE, its principles and the component organizations.

Executive Decree No. 39089-MP-MTSS already referred to the SSE and not only to the social economy. It is defined as the set of economic and business activities carried out in the private sphere by various entities and organizations, to satisfy the collective interests of the people that comprise them and the general social economic interest of the territories where they are located (Costa Rica, 2015, para. VI). Decree No. 39835-MP-MTSS includes in the SSE cooperative associations, solidarity-based associations,

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[6] The People's Bank for Community Development is a non-State public-law institution, created in 1969 to provide economic protection and welfare to workers, artisans and smallholders, by promoting savings and credit.

community associations,[7] associations that manage water and sewage systems, worker-owned public limited companies, foundations engaged in business, associations of producers or workers, professional associations, artists' associations or associations of others engaged in business, Cantonal Agricultural Centres and entities engaged in business created by specific rules or special laws, whose guiding principles and operating rules reflect the principles governing the SSE, as established in article 5 of the decree.

The impetus in public policies to develop the SSE is based on regulations that have promoted cooperatives, solidarity-based bodies and community development associations, among others, since the early 1940s. The institutional framework for the SSE is currently regulated by three decrees: Executive Decree No. 38874-MTSS of 2015, establishing the Directorate for the Social and Solidarity Economy and Social Mobility in the Ministry of Labour and Social Security; Executive Decree No. 39089-MP-MTSS which, in addition to declaring its public and national interest, urges public institutions to develop, promote and strengthen the SSE, and ensure its sustainability (Costa Rica, 2015); and Decree No. 39835-MP-MTSS which, as well as defining the principles and stakeholders in the SSE, establishes the functions of the Directorate for the Social and Solidarity Economy in the Ministry of Labour and Social Security (Costa Rica, 2016, art. 7). In 2018, the Presidential Council for the Social and Solidarity Economy (CPESS) was established, to formulate and promote public policies that foster the creation, consolidation and development of associative enterprises.

The document *Política Pública de Economía Social Solidaria 2021–2025* (Costa Rica, 2020) sets out policy guidelines, analyses the SSE and identifies lines of action, as well as parameters that should direct the efforts of the Directorate for the Social and Solidarity Economy. It includes three main lines of action: the institutional services and inter-agency coordination model, reform of the regulatory framework and knowledge management. According to the policy, more than 6,000 social economy organizations are registered in Costa Rica, including: solidarity-based associations (1,467), cooperatives (671), rural water supply management associations (1,418), worker-owned public limited companies (134), agricultural centres (76), and comprehensive development associations (2,850). There is no data on the number of associations, foundations and civil societies that are also part of the Costa Rican SSE.

Regarding promotion, since 2015 the Government of Costa Rica has been supporting the SSE, seeking to combine these formulas, including cooperatives, into a single voice. However, this is not yet reflected in financial resources earmarked for such purposes. At present, the institutional framework for cooperatives is the area that enjoys conditions that enable its activities to be financially sustainable, based on a robust regulatory structure. This poses a dilemma for the authorities, as they may either promote the cooperative and SSE sectors with a view to sharing the resources already earmarked for the former or may establish new legislation with these aims for the SSE, but which also encompasses the cooperative sector. This topic is currently under debate.

6. Ecuador

In Ecuador, the conceptualization of the popular and solidarity economy and its recent regulatory framework both draw on Latin American and European debates on the social economy and solidarity economy. They were considered during the political process that took place when the Constituent Assembly was formed in 2008. Article 283 of the Ecuadorian Constitution states that the economic system is social and solidarity-based and recognizes the human being as both a subject and a purpose. The Organic Law on the Popular and Solidarity Economy (LOEPS) enacted in 2011 expanded on the definition of this economic sector. Article 1 of the Law defines the popular and solidarity economy as the form of economic organization, whereby members, individually or collectively, organize and undertake

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[7] Community Development Associations (ADC) are formal grassroots organizations made up of neighbours who share goals to improve their community economically and socially (Mondol Velásquez, 2009, p. 69).

processes of production, exchange, marketing, financing and consumption of goods and services, to meet needs and generate income, based on relationships of solidarity, cooperation and reciprocity, prioritizing work and the human being as the subject and purpose of their activity, aimed at living well, in harmony with nature, over appropriation, profit and capital accumulation (Ecuador, 2011).

One key element of institutionalization of the popular and solidarity economy sector is recognition of the socioeconomic parties that make up the sector. Article 8 of LOEPS states that it is made up of the community, associative and cooperative sectors and popular economic units. Popular economic units are defined in article 73 of LOEPS as those engaged in activities such as the care economy, one-person, family or domestic enterprises, retailers and artisan workshops, among others (Ecuador, 2011). However, when applying the regulatory framework, public policy and sector's institutional framework, the fact that members have the option of undertaking economic processes individually creates some ambiguity, since suitable institutionalization of solidarity principles in these processes is found in collective, associative and cooperative relationships, but not individually.

Despite these and other ambiguities, the regulatory framework for the popular and solidarity economy provides a basic institutional structure that —although it can be improved— contributes significantly to construction and strengthening of the sector, with a view to it being on a more equal footing with other economic sectors, including the public and the private capitalist sectors.

Part of the institutional structure of the popular and solidarity economy comprises the public (State) institutions created under LOEPS, established around four pillars —supervision, regulation, control and development— with entities consolidating the sector in each of their areas of responsibility. The Interinstitutional Committee for the Popular and Solidarity Economy supervises the sector, which entails establishing and coordinating policies on development, promotion and incentives, operation and monitoring, to strengthen the sector and its organizations, as well as evaluating policy implementation (Ecuador, 2011, art. 142).

The sector is regulated based on two subsectors, financial and non-financial, owing to their specific characteristics. Financial sector activities are regulated by the Financial Policy and Regulation Board, which is governed by the Organic Monetary and Financial Code (2014). Real sector activities are regulated by the Ministry of Economic and Social Inclusion.

The Office of the Superintendent for the Popular and Solidarity Economy (SEPS) is responsible for monitoring the economic activities of the organizations and individuals in the sector as well as for conferring legal personality (article 146 of LOEPS). The Office is part of the transparency and social area, which brings together all of the State entities responsible for monitoring that are independent from the executive branch of government.

Several entities were created to develop the sector, including the National Institute for the Popular and Solidarity Economy (IEPS), which is responsible for preparing and implementing plans, programmes and projects to develop and promote the sector (articles 153 and 154). The National Corporation for Popular and Solidarity-based Finance (CONAFIPS), a second-tier public financial institution, was created to provide financial services to organizations in the popular and solidarity financial sector, such as savings and credit cooperatives (article 158). The Corporation for the Deposit Guarantee Fund, Liquidity Fund and Private Insurance Fund (COSEDE) was established to guarantee the deposits of members of savings and credit cooperatives.

Lastly, some programmes implemented at the policy level have contributed to development of the sector, such as preferential access to public procurement processes, quotas for products in major supermarket chains and collection of statistical information on the sector, mainly by SEPS. There are currently 447 savings cooperatives and 4 mutual home savings and credit societies, with more than 5.3 million members. In the non-financial sector, there are currently 15,809 organizations, including cooperatives, associations and community organizations, with more than 527,000 members (SEPS, n.d.).

7. Mexico

In Mexico, the first aspects of the social economy appeared in the mid-nineteenth century, when savings banks, cooperatives and mutual societies emerged, mainly formed by urban and rural workers. However, each of these forms of association was recognized differently. In the case of cooperatives, the first General Law on Cooperative Enterprises was enacted in 1927 and was amended three times, in 1933, 1938 and 1994. In contrast, mutual societies, upon being included in August 1935 in the General Law on Insurance Institutions and Mutual Societies, became subject to law that was purely commercial and privatizing.

The social sector of the economy was recognized in the country's Constitution in 1983, when article 25 of the Constitution of the United Mexican States was amended to grant the sector legal coverage as a specific and differentiated sector of the Mexican economy. The social sector is made up of an estimated 60,943 associative entities, including 29,000 ejidos (communal land), 2,000 agrarian communities and nearly 2,000 social solidarity enterprises. There are 18,038 cooperatives, with a total of 8,875,186 cooperative members (Rojas, 2022).

The regulatory framework that applies to entities in the social sector of the economy is built around the Social and Solidarity Economy Law, enacted on 23 May 2012, which regulates matters relating to paragraph 8 of article 25 of the Constitution of the United Mexican States.

Each of the different types of associations in the social sector of the economy are regulated in turn by specific laws. These laws include the Agrarian Law of 1992, applicable to ejidos and agrarian communities, the Social Solidarity Enterprises Law of 1976, and the General Law on Cooperative Enterprises of 1994.

Of the forms of association in the social sector of the economy, the one that has resulted in the largest body of law is the cooperative enterprise (*sociedad cooperativa*). In addition to the four previous versions of the General Law on Cooperative Enterprises, in 2009 the Law to Regulate the Activities of Savings and Loan Cooperative Enterprises was enacted, to prevent fraud in such entities. In 2007, section XXIX-N was added to article 73 of the Constitution to establish the concurrent power of the national congress and local congresses to issue laws to promote cooperatives at the state level (Mexico, 2007).

One of the provisions of the Social and Solidarity Economy Law established the National Social Economy Institute (INAES), conceived as the institutional focal point for the federal government, responsible for implementing public policy to promote the social sector of the economy. At the state level, there are only departments for development and promotion of the SSE in Mexico City, Chihuahua and Puebla. At the municipal level, although there are no reliable official statistics, it is estimated that there are no more than a dozen municipalities with a public agency in charge of promoting cooperatives and the SSE.[8]

The savings and loan cooperative subsector has been subject, since the beginning of the twenty-first century, to strict regulation and oversight, involving most of the public agencies involved in management of the financial sector, ranging from the Ministry of Finance and Public Credit (SHCP) to the National Banking and Securities Commission (CNBV).

In terms of formulating and implementing public policies to promote the SSE, INAES has created instruments since 2013 and has continued to work in this area. In 2015, the Social Economy Development Programme (PFES) was published, which remained in place until 2020, offering subsidies to strengthen the entrepreneurial capacities of social sector organizations or to undertake new associative ventures. In fiscal years 2021 and 2022 no budget was allocated to the programme, leaving it extremely vulnerable and casting doubt on its continued existence.

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[8] The cases of the municipalities of Othón P. Blanco (state of Quintana Roo), Xalapa (state of Veracruz), Puebla (state of Puebla) and Tijuana (state of Baja California) stand out.

Lastly, the institutional framework for the SSE and the legislation and public development policies implemented in recent years have led to agreements and disagreements between the traditional cooperative movement and emerging SSE organizations. With regard to points on which the two segments agree, they are both clearly resisting the economic and labour exclusion caused by the application of a neoliberal model since the early 1980s and have therefore taken various actions of protest and have lobbied the centres of power where public policy that affects them is decided. Unfortunately, other than issuing joint statements or both attending events for reflecting on or analysing the sector, the two have not successfully shaped a shared agenda for action and are even further from forming standing bodies for coordination and collective action. Essentially, a shared identity is still lacking, meaning that there is some degree of mutual distrust.

8.   Uruguay

In Uruguay, the term SSE is generally understood to refer to both the traditional forms of associations that form the social economy sector (cooperatives, mutual societies, associations and foundations) (Chaves and Monzón, 2007) and to emerging forms of associations, which are referred to as the solidarity economy.

In terms of the organizations in the social economy, cooperatives have a long history and are found in all sectors of economic activity and throughout the country. The cooperative movement can be divided into different subsectors: agriculture, savings and credit, labour, housing and consumption (Bertullo and others, 2004; Terra, 2015). The Cooperatives Law (No. 18407) of 2008 established the relevant legal framework and created the National Institute for Cooperatives (INACOOP) as a body to promote the sector. In 2020, INACOOP had recorded 3,684 cooperatives (2,174 housing cooperatives, 1,245 labour cooperatives, including social cooperatives, and 265 agricultural, savings and credit, and consumer cooperatives) (Martí, 2022). The latest data on the number of cooperative members is from 2008, when 1,223,531 were reported (Cabrera, Dornel and Supervielle, 2010). A 2022 report found a total of 25,148 jobs in cooperatives registered with social security, corresponding to 1.6% of the economically active population (Astiazarán and Castiglia, 2022). Mutual societies emerged in the second half of the nineteenth century, linked to religious or immigrant groups and concentrated in the health sector, although they were also present in other sectors. Lastly, there are many non-profit civil associations and foundations, but the statistical data available is not sufficient to quantify them. A huge variety of civil associations operate in various sectors (such as sports, culture, education and trade unions). The legislation is fragmented and regulates the different types of associations; however, foundations are regulated by Law No. 17163 of 1999 (Martí, Romero and Méndez, 2010).

The concept of the solidarity economy was first used in the late twentieth century, in the context of implementation of neoliberal policies and emergence of new forms of associations that were different from traditional cooperatives. These organizations have come together in the National Coordinator of the Solidarity Economy (CNES), which defines the solidarity economy as a collective, dynamic and transformative construction that entails incorporating values of solidarity into economic theory and practice; one that puts people at the centre and acts in the different stages of economic activity: production, consumption, distribution and finance (CNES, n.d.). In short, the definition of the solidarity economy is less concerned with the legal form and more concerned with its aims and its means of achieving them (Guerra, 2010).

There are two studies on the structures and characteristics of solidarity economy organizations in Uruguay. The first, conducted from 2007 to 2009, concluded that the ventures had strengths relating to social management and weaknesses in economic areas (Guerra, 2010). More recently, the work of Torrelli and De Giacomi (2018) demonstrated that more than 1,000 ventures of different types existed (family, collective and networks), creating around 5,500 jobs (less than 0.5% of the economically active population), whose key characteristics were cooperation, self-management, solidarity and performance of economic activities.

When the Frente Amplio party entered government in 2005, some spaces opened up for State recognition of the solidarity economy: a tentative legislative progress, a fragile institutional framework and some isolated public policies. In terms of legislative recognition, the most noteworthy instrument is the 2008 Cooperatives Law, which stipulated that INACOOP should promote study and research of the SSE and propose a legal framework for its development and promotion (article 187, section M). In 2014, INACOOP began working on a draft bill, which culminated in 2019 with the passage of Law No. 19848 on the social and solidarity economy. Its purpose is to recognize, foster and support the SSE (article 1) and to declare of national interest, the promotion, dissemination, promotion and development of the SSE in any of its forms (article 2). In terms of the institutional framework, Law No. 19848 entrusts INACOOP with public policies and with promotion, registration of organizations, policymaking, monitoring and evaluation (Uruguay, 2019).

INACOOP has programmes to support cooperatives through training and financing, which are also open to solidarity economy ventures. Some sectors of the cooperative movement have questioned INACOOP allocating resources to non-cooperative organizations. This not only reflects a dispute over resources, but also a refusal by some more traditional cooperative stakeholders to recognize themselves as part of the SSE.

III. Summary and conclusions

This review shows that the concept of the SSE is defined in a variety of ways in the countries analysed. The sector is recognized to different degrees by the State, either at the constitutional level (Colombia, Ecuador and Mexico) or in specific laws and their respective institutional framework, and in some countries the use of the concept is more limited (Chile).

The organizations in the sector are of three types in the countries examined. Firstly, cooperatives —in different forms— are a vital part of the sector. Secondly, there are formal non-profit organizations —such as mutual societies, foundations, associations, employee funds and philanthropic bodies— characterized, in addition to being formal, by having a limited market presence, providing community services and not distributing any surpluses. These first two forms are generally linked to the concept of the social economy (Chaves and Monzón, 2007). Lastly, the third type comprises organizations, which are often informal, born from poor, marginalized and excluded sectors of the population and communities, characterized by resistance to and response to the capitalist economy.[9] This last type is the one most closely linked to the concept of the solidarity economy.

Latin America has contributed very actively at the global level to formulation of the concept of the SSE —the term itself originating from the region— thanks to the work of academics such as Luis Razeto, Paul Singer, Pablo Guerra and José Luis Coraggio and internationally recognized grassroots social leaders.

Globally, regulatory recognition of the SSE and formulation of sector-oriented legislation has progressed considerably in recent decades, forming a broad foundation of both constitutional recognition and framework laws on the social economy or the SSE, which are making further progress possible. This international trend has also been seen in Latin America. Some of the countries in the region have even recognized the existence of the SSE in their constitutions: Colombia, in articles 58, 64 and 333 of the prevailing 1991 Constitution; Ecuador, in article 283 of its Constitution of 2008; and Mexico, in article 25 amended in 1983 of its Constitution. Table 1 summarizes the legal frameworks for the SSE in the countries covered in this study.

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[9] In some of the countries analysed, such as Argentina and Ecuador, there are also individual initiatives linked to what is known as the popular economy. Whether or not such initiatives should be included in the SSE is a matter of debate; the argument of those who consider that they should be included is based on a lack of division between labour and capital (Coraggio, 2011).

Juan Pablo Martí, Mario Radrigán, Dalia Borge, Hugo Jácome, Leandro Pereira, Marietta Bucheli, Juan José Rojas and Mario Schujman

Table 1
Latin America (selected countries): regulatory framework
for the social and solidarity economy (SSE)

Country	Regulatory framework
Argentina	• Cooperatives: Law No. 20337 of 1973; mutual associations: Law No. 20321 of 1973; *asociaciones civiles* and *simples asociaciones*: Law No. 26994 of 2014. • There is no specific legal recognition of the SSE.
Brazil	• Cooperatives: Law No. 5764 of 1971; worker cooperatives: Law No. 12690 of 2012; third sector: Laws No. 9637 of 1998 and No. 9790 of 1999, Decree No. 3100/99 and Law No. 13019 of 2014. • Law No. 13928 established National Solidarity Economy Day. • A bill, which is in the final stage of passage, would establish a national policy for the solidarity economy and solidarity-based economic enterprises, and create a national system for the solidarity economy.
Chile	• Regulated cooperatives: Law No. 20881 of 2016. • There is no specific legal recognition of the SSE.
Colombia	• The solidarity economy: Law No. 454 of 1998. • Regulated cooperatives: Law No. 79 of 1988; Special tax treatment of non-profit organizations: Decree Law No. 624 of 1989.
Costa Rica	• Law on Cooperative Associations and creation of the National Institute for Cooperative Development (INFOCOOP): Law No. 4179 of 1968; community development (communal associations): Law No. 3859 of 1967; foundations: Law No. 5338 of 1973; solidarity-based associations: Law No. 6970 of 1984; worker-owned public limited companies: Law No. 7407 of 1994.
Ecuador	• Organic Law on the Popular and Solidarity Economy (LOEPS) of 2011.
Mexico	• Social and Solidarity Economy Law (2012); ejidos and agrarian communities: Agrarian Law of 1992; Social Solidarity Enterprises Law of 1976; General Law on Cooperative Enterprises of 1994.
Uruguay	• Law No. 19848 of 2019 on the social and solidarity economy. • Cooperatives: Law No. 18407 of 2008; foundations: Law No. 17163 of 1999; associations: Decree Law No. 15089 of 1980.

Source: Prepared by the authors.

The information in the table shows, firstly, that all countries analysed have a legal framework that recognizes the specific characteristics of cooperatives. In general, cooperatives were first recognized in law in the first half of the twentieth century, but most countries updated their laws in the second half of the century, and they remain in place: Costa Rica in 1968, Brazil in 1971, Argentina in 1973, Colombia in 1988 and Mexico in 1994. Legislation on cooperatives was updated more recently in Uruguay (2008) and Chile (2016). Ecuador is a special case since its legislation on cooperatives was updated through LOEPS in 2011.

Secondly, in some cases, the regulatory framework recognizes the specific characteristics of other types of organizations that "are guided by principles and practices of cooperation, solidarity, ethics and democratic self-management" (TFSSE, 2014, p. iv). Such organizations that have been recognized in law include mutual societies in Argentina (1973); third-sector organizations in Brazil (1998, 1999 and 2014); non-profit organizations in Colombia (1989); the communal development movement (communalist), solidarity-based associations and worker-owned public limited companies: in Costa Rica (1967, 1984 and 1994, respectively); ejidos and agrarian communities in Mexico (1992), and foundations in Uruguay (1999).

Thirdly, progress with respect to the SSE differs from country to country. Some have recognized the SSE in their constitutions and have specific framework laws (Colombia, Ecuador and Mexico), some have a legal framework, but no constitutional framework (Uruguay) and others have neither (Argentina, Brazil, Chile and Costa Rica). In the case of the last group of countries, in Costa Rica the declaration of public interest of SSE initiatives and their institutional inclusion is not regulated by a law, but by decrees. In Brazil, a bill on the SSE has been before Congress for 10 years. In a group of countries, the SSE is recognized in relatively recent specific legislation: Colombia (1998), Ecuador (2011), Mexico (2012) and Uruguay (2019). However, there are significant differences between the countries with broad and developed legislation (Colombia, Ecuador and Mexico) and Uruguay, whose legislation has a more limited scope.

In those cases where there is a framework law for the SSE, it varies greatly from country to country, owing to:

• The different traditions and histories of the various stakeholders in the SSE that have influenced the formulation of the legal framework.

- Historical references to different legal bodies that regulate different SSE organizations (such as mutual societies, cooperatives, ejidos, foundations and associations), which cannot always be harmonized into a single framework law.

As is the case with definitions of the SSE, in Latin America some regulatory frameworks for the sector are first-generation and therefore need to mature and be improved, accompanied by evaluation of results. This is particularly important because almost all of the regulatory frameworks are only little more than a decade old.

Table 2 summarizes the situation of public institutions related to the SSE in the Latin American countries analysed.

Table 2
Latin America (selected countries): institutions specializing in the social and solidarity economy

Country	Specialized institutions (year of creation)
Argentina	National Institute for Associations and the Social Economy (INAES) of the Ministry of Productive Development (1996)
Brazil	Department for the Solidarity Economy of the National Secretariat for Urban Social and Productive Inclusion, of the Ministry of Citizenship (2019)
Chile	Associations and Cooperatives Division of the Office of the Undersecretary for the Economy and Small Businesses, of the Ministry of Economy, Development and Tourism (2020)
Colombia	Special Administrative Unit for Solidarity-based Organizations of the Ministry of Labour (2011)
Costa Rica	Directorate for the Social and Solidarity Economy of the Ministry of Labour and Social Security (2015) and the Presidential Council for the Social and Solidarity Economy (2018)
Ecuador	National Institute for the Popular and Solidarity Economy (IEPS) of the Ministry of Economic and Social Inclusion (2009)
Mexico	National Social Economy Institute (INAES) of the Secretariat of Welfare (2012)
Uruguay	National Institute for Cooperatives (INACOOP), linked to the executive branch through the Ministry of Labour and Social Security (2008)

Source: Prepared by the authors.

The information presented for the eight countries reveals progress and setbacks:

- In several countries of the region there is a general tendency to develop institutional support and public policies focused broadly on social economy or SSE organizations, for example, Ecuador and Mexico.

- In most of the cases in which there has been progress on establishing a framework of public institutions for the SSE, it has originated from and modified the previous institutional framework that was linked to the cooperative sector (for instance, in Chile and Uruguay). In other cases, specific institutional frameworks were created; in Costa Rica it remains in place, while in Brazil it was scrapped during the Bolsonaro administration.

- Changes have not always been maintained over time and on more than one occasion processes have undergone transformations and setbacks (Brazil and Colombia), or changes in terms of position in the hierarchy or inclusion in public institutions (Argentina).

Comprehensively comparing public policies to develop and promote the SSE is a more complex task, as basic information is generally not available on available funds, programme coverage or the number of persons who benefit from initiatives. Institutional frameworks often face constant resource shortages and earmarked public funds frequently decline as public policy prioritizes other areas or owing to fiscal deficits.

In terms of cross-sectoral integration, the level of development of platforms for collective coordination is low. The networks or organizations for cross-sectoral integration of different SSE stakeholders that do exist in some countries (such as Costa Rica or Uruguay) are relatively weak and unsuccessful in organically combining efforts by the key stakeholders in the social economy.

This is because of two factors that make it difficult to establish a strong and recognized cross-sectoral SSE body:

- The different views of SSE stakeholders on their role in a cross-sectoral integration body, including not even considering such a space necessary, contrary to statements by the International Cooperative Alliance (ICA, 2020).

- The lack of integration entities at the sectoral level or the weakness of different SSE stakeholders.

Another aspect that is clearly apparent in some countries (for example, Ecuador) and in others more indirectly (such as Argentina), either in legal definitions or in social and economic practices, is the characterization and definition of the popular economy and its links with the SSE. This area offers considerable room for future research, to add to the understanding of how individual or family economic practices to support households and for subsistence are related to and interact with networks of SSE organizations.

Lastly, the formulation of the concept of the SSE and the power dynamics among the different stakeholders both play a key role in its consolidation. The governments and social and economic stakeholders in the SSE that have been most active in promoting consolidation and recognition of the sector have generally repeatedly made progressive political proposals and been clearly critical of existing development models. Furthermore, although the more traditional stakeholders in the SSE, such as conventional cooperatives, mutual societies, foundations and non-profit associations may be considered to be part of the processes of social change, some of those involved in the segments of the SSE that have emerged most recently view them as conservative.

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When RateMyProfessors met Google Scholar: students' evaluations and professors' looks and research[1]

Rómulo A. Chumacero, Ricardo D. Paredes and Tomás Reyes

Abstract

We take more than a million student evaluations of almost 200,000 professors from the RateMyProfessors website and link them with information on the research productivity of almost 3,000 professors in Google Scholar to provide a systematic characterization of the relationship between student evaluations and the characteristics of the classes, universities and professors concerned and to test whether students' appreciations are conditionally related to research productivity. The study concludes that although how "easy" and "interesting" students consider a course to be are the most important determinants of their evaluations, there is a "looks" or "beauty" premium, with no systematic racial, age or gender component. Surprisingly, research productivity is either not significant or is negatively related to the assessment of a professor's teaching abilities.

Keywords

JEL classification

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I.   Introduction

Most higher education institutions use student evaluation of teaching (SET) instruments to assess performance on the courses they offer (Dommeyer, Baum and Hanna, 2002; Dommeyer and others, 2002). SET instruments are important because they provide teachers with immediate feedback and information on how students perceive their classes, which they can use to improve their performance. They also provide information to academic managers responsible for assigning courses and to prospective future students about a teacher's characteristics. These are some of the reasons why SET instruments have been employed by staff administrators to determine promotions, while accreditation agencies have favoured them as a proxy for good academic management.

However, although SET instruments provide a metric of student opinions, they can be misused (Jones, Gaffney-Rhys and Jones, 2014). Individual evaluations may be determined by factors different to those that experts associate with teaching quality and, more importantly, may be subject to systematic biases and lack of validity (Onwuegbuzie, Daniel and Collins, 2009). Thus, students may value a course that is relatively easy over a rigorous one, or favour a personal characteristic of the professor, such as appearance, that is not necessarily related to quality.

On the management side, given that some professors also conduct research, a proper evaluation by faculty administrators should consider the relationship between the two activities. Professors face a trade-off between time spent on research and teaching (although it may be the case that time spent on research is a valuable input for teaching). Whether research contributes to undergraduate teaching, as public policies that subsidize research from student fees may suggest, needs to be tested empirically. Furthermore, Carlozzi (2018) warns about confirmation bias in research, something that may also affect administrative decisions. When classifying researchers by their attitude towards SET instruments, he found that lead authors with negative views on these were 14 times as likely to score below a predicted estimate, based on RateMyProfessors (RMP) evaluations.

Moreover, SET instruments are usually summarized in a descriptive statistic (average), which may mask relevant information and lead to mistaken conclusions. Misuse of SET instruments can adversely affect the work environment and create grade inflation (Abrami and Mizener, 1985; Dowd, 1988; Goldman, 1990; Blunt, 1991; Marsh and Bailey, 1993; Benson and Lewis, 1994; Johnson, 2003; Onwuegbuzie, Daniel and Collins, 2009).

As SET instruments are not usually accessible to students, informal evaluations have emerged through open websites. RMP is probably the most popular, with more than 19 million evaluations of 1.7 million teachers from over 7,500 institutions (RateMyProfessors, 2020). Its value as a source of teacher ratings relies on a reasonably high correlation with institutional evaluations (Sonntag, Bassett and Snyder, 2009).

This paper uses that database, which is substantially larger than those employed by most studies, to assess the relevance of different variables in the way students evaluate their teachers and to relate their evaluations to their subjective impressions and the academic productivity of the professors concerned. The paper's main methodological contribution is to link the evaluations made in RMP with professors' academic record from Google Scholar (GS). This association allows us to evaluate the relationship between a professor's role as a teacher and as a researcher. We also analyse the written comments left by students on the RMP website to identify positive (affectionate, uplifting, etc.) or negative (resentful, angry, etc.) responses from the tone of the language used. With this information, we can evaluate the main determinants of the average evaluation obtained by a professor on RMP.

The rest of the paper is organized as follows. Section II briefly reviews the literature on RMP evaluations. Section III provides a simple theoretical model that explains the results obtained here. Section IV describes the dataset used. Section V presents the main statistical properties of the evaluations and conducts statistical exercises to better characterize the determinants of the evaluations. Lastly, section VI concludes.

II.   Literature review

The debate on SET instruments gathered strength in the United States and Canada with the growing popularity of evaluations through open websites, with RMP being probably the most popular. RMP includes five variables in each evaluation: (i) "easiness", meaning the ability to get good grades without much effort; (ii) "helpfulness", meaning teachers' willingness to answer questions, particularly outside the classroom; (iii) "clarity" in classroom exposition; (iv) "overall quality"; and (v) "hotness", associated with looks or beauty.[2] The first three variables are measured on a Likert scale from 1 to 5. Overall quality is an average of helpfulness and clarity, while hotness is a dummy variable associated with the specific question of whether the student considers the teacher physically attractive (RateMyProfessors, 2020).

RMP has not been free of criticisms. Sonntag, Bassett and Snyder (2009) analysed its validity by comparing the website with evaluations carried out through the Individual Development and Educational Assessment (IDEA) survey. Using over 600 RMP evaluations for 126 teachers at Lander University, they found a Pearson correlation of 0.69 between the IDEA and RMP quality scores.[3] The easiness dimension and the average grade were also highly correlated. The authors concluded that RMP yielded results similar to those of institutional evaluations. Using a sample of 399 professors in RMP, Otto, Sanford and Ross (2008) found a positive correlation between clarity and helpfulness and a negative correlation between these variables and the variance in easiness.[4]

Boswell (2016) compared the effects of students' RMP evaluations and university-administered evaluations on teacher's self-efficacy, defined as the set of beliefs that determine how well a person can execute a plan of action in prospective situations, and concluded that while teachers thought RMP was less accurate and less serious, the feedback provided by the two evaluations influenced professors equally.

Some researchers have reported a "halo effect" in RMP evaluations, meaning that only students with extreme opinions participate (Felton and others, 2008; Clayson, 2013). The timing of evaluations also seems to be an important variable. Using a sample of 25 teachers at a medium-sized university in the United States, Legg and Wilson (2012) found that evaluations carried out at the beginning of a course yielded lower scores than those carried out at the end, and that the "easiness" results changed depending on the timing of the assessment.

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[2]   RMP was founded in May 1999 by John Swapceinski. It was acquired in 2005 by Patrick Nagle and William DeSantis, who resold it in 2007 to Viacom. Cheddar acquired RMP in 2018. During this time, RMP has made changes to the format of its questionnaire. We construct our database from information available up to 2018.

[3]   A value of 1 in the Pearson correlation index represents a perfect positive correlation and a value of -1 a perfect negative correlation.

[4]   A related literature has evaluated similarities and differences in evaluations of face-to-face versus online courses (Rovai and others, 2006; Kelly, Ponton and Rovai, 2007; Dziuban and Moskal, 2011).

Using the evaluations of 94 teachers at the University of Texas, Hamermesh and Parker (2005) found beauty to have a highly significant effect on scores. Similarly, Bonds-Raacke and Raacke (2007), Johnson and Crews (2013), Freng and Webber (2009) and Riniolo and others (2006) found a positive conditional correlation between overall class quality and beauty. Indeed, Freng and Webber (2009) suggested that "hotness" accounted for a substantial part of the variance in quality ratings.

Considering a larger sample, Felton and others (2008) replicated previous studies and found a correlation of 0.6 between hotness and overall class quality, which is over twice as high as that identified in earlier work (Felton, Mitchell and Stinson, 2004). Sen, Voia and Woolley (2010) used a sample of economics professors at 16 universities and their RMP information to evaluate the effects of "hotness" on salaries, teaching quality and research productivity. They found that "hotness" generated significant earnings premiums and was highly correlated with teaching productivity but not research productivity.

Green, Mixon and Treviño (2005) presented evidence for self-selection, with more attractive prospective professors tending to choose more liberal arts-oriented colleges or universities over research-oriented colleges or universities. Mixon and Smith (2013) took a random subset of 200 professors from the RMP data and concluded that more attractive professors traded on their appearance by offering more rigorous courses.

Regarding the relationship between research and teaching, different hypotheses exist. One stresses scarcity of resources resulting in a trade-off between the time spent on research and that used to prepare classes (see, for instance, Fox, 1992; Cretchley and others, 2014; Walstad and Allgood, 2005; Arnold, 2008). A negative correlation between research and teaching quality could also be the result of specialization, with some professors specializing in teaching and others in research in the light of comparative advantages (see, for instance, Hollywood and others, 2020).

In contrast, other authors argue that most professors consider research a valuable input for good teaching. Barnett (1992) suggest that research, in a context of discovery, is vital for good teaching (see also Neuman, 1992; Becker and Kennedy, 2005). Uz Zaman (2004) argues for complementarity between research and teaching, resulting, among other things, from the increase in critical thinking abilities that research generates. In the same vein, McCaughey (1994) reports that most academics recognize that their research agenda shapes their teaching programmes.

Ramsden and Moses (1992) find that a commitment to teaching correlates negatively with research; however, differing information sources and small samples mean that the empirical relationship between teaching and research is not conclusive. Feldman (1987) reviews 43 studies and finds a weak positive correlation between teaching as assessed by students and research productivity. Hattie and Marsh (1996), in a meta-analysis based on 58 studies, conclude that there is no correlation between research and teaching. Cadez, Dimovski and Zaman Groff (2017) find that research productivity is not related to teaching quality, but that research quality is positively related to teaching quality. Palali and others (2018) find for the Netherlands that a better research record is not reflected in master's students' evaluations and that bachelor students give lower scores to teachers with better research.

Lastly, teachers' age and gender have also proved to be important factors in teaching evaluations. Stonebraker and Stone (2015) found that age negatively affected teaching evaluations. However, when they restricted the sample to the professors students found hot, the age effect vanished. Meanwhile, using students' questionnaires, Clayson (2020) found that students learnt more from older professors but that younger ones were more helpful. She also found that students preferred male to female professors, particularly when they focused on learning.

III. A simple model

This section presents a simple model to illustrate the possible interactions between the time spent on research and teaching activities.

Consider a professor interested in maximizing his or her utility, which depends on consumption (c) and leisure (l):

$$max\ u(c,l) \tag{1}$$

subject to the constraints:

$$c \leq y(t,\ r,\ w,\ x),$$
$$1 = l + t + r,$$
$$t \geq t_0, \tag{2}$$
$$r \geq r_0$$

where y is the income generated by teaching (t) and research (r) activities, while w and x are their respective compensation. It is also assumed that the individual has one unit of time which has to be divided between leisure, teaching and research. Lastly, t_0 and r_0 are the minimum time required by the administrator to be spent on each activity.[5]

From the first order conditions of the maximization problem, we obtain:

$$u_c\,y_t + k_t = u_c\,y_r + k_r \tag{3}$$

where v_z represents the derivative of function v ($v = u,y$) with respect to variable z ($z = c,t,r$) and k_z is the multiplier associated with the constraint for time spent on activity z ($z = t,r$).

This simple model has interesting implications for the decision as to how to allocate time between teaching and research. For example, consider that income y is determined by:

$$y(t,\ r,\ w,\ x) = wt + xr \tag{4}$$

Furthermore, assume that $w > x$; i.e., the compensation for teaching activities exceeds that for time spent on research. As no special value (in terms of preferences) is placed on time spent on research, the teacher devotes r_0 of his or her time (the minimum required) to research. In that case, the time spent on teaching must satisfy:

$$u_c w + k_t = k_r > 0 \tag{5}$$

If the optimal time spent on teaching (subject to the constraint that $r^* = r_0$) is such that it exceeds the minimum required ($t^* > t_0$), it can be determined by maximizing (1) subject to (4) and $r^* = r_0$. Otherwise, the constrained optimization would imply that $t^* = t_0$. Conversely, if $w < x$, then $t^* = t_0$ is the time spent on teaching, and what must be determined is whether the optimal time spent on research is r_0 or whether it exceeds this.

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[5] Instead of considering t and r as time spent on each activity, these variables could reflect their respective quality.

In either case, if remuneration is greater for one activity than the other, any amount of time that exceeds the minimum required teaching and research time will be spent on the activity with higher compensation. In the event that $w = x$, since the teacher has no preference between the two activities, he or she will either devote the minimum required to both (if the time constraints are binding) or will be satisfied with any combination of the two, as in this case they are perfect substitutes.

The examples above spell out the obvious: time spent on one activity implies less time for the other. If spending more time on one activity results in professors getting better at it, the fact that there is a trade-off between the two means that the quality of their teaching and thence their evaluations may be affected as a result.

Lastly, consider the case in which time spent on research can help to improve the quality of teaching, i.e.:

$$y(t, r, w, x) = w(r)t + xr \tag{6}$$

where $w(r)$ depends on r. Thus, the productivity of teaching also depends on research.

The maximization of (1) subject to (2) and (6) leads to:

$$u_c w + k_t = u_c(w_r + x) + k_t \tag{7}$$

where w_r is the derivative of w with respect to r. If $w_r > 0$, it is possible to have internal solutions for the time spent on teaching and research, even if $w > x$. In this case, the link between time spent on research and the "quality" of teaching may ameliorate the time trade-off.

Summarizing, this section presents a simple model that sets out the linkage between time spent on teaching, its quality, and time spent on research. As is clear, there is a trade-off in terms of time spent on each activity (and presumably a quality trade-off too). There may be a positive association between time spent on research and the quality of teaching, with the experience gained by researching improving the quality of teaching and more than compensating for the time trade-off.

IV. The data

This section describes the data and sample construction. Data were collected from two main sources: the RateMyProfessors.com website and GS academic profiles.

1. The RMP database

RMP is a popular platform where students evaluate their professors. The evaluations and comments are publicly available on the website. We used a web crawler to download information on 1,281,193 professors rated on RMP. For all professors, we obtained their name, the name and location of the university where they taught, the department to which they were affiliated, the number of student evaluations, and whether students found them attractive.

Many of these professors had very few evaluations, so we kept only those with 20 or more in order to obtain representative indicators.[6] This criterion left 197,037 professors in the sample, and we downloaded specific data from the RMP database for each of these, such as the overall quality of the professor, how easy and interesting students found their classes, and written comments.

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[6] Since our analysis focuses on the average score received by each professor, 20 is a large enough number of observations to provide a reliable estimate of the central trend of the evaluations.

We then used the Linguistic Inquiry and Word Count (LIWC) software to analyse each written comment. The software provides a score for different language dimensions according to the percentage of words relating to that dimension. Dimensions include "anger" (identified from words such as "hate" and "annoyed"), "positiveness" (words such as "nice" and "sweet") and "negativeness" (words such as "hurt" and "nasty").

We classified each professor's department into standardized faculties or schools. The 930 different departments professors belonged to were manually classified into categories such as architecture and planning, engineering, humanities, arts, social sciences, and business and management.[7] Since gender information is not provided by RMP, we used an algorithm to assign a gender to each professor based on text analysis of his or her name.[8]

We supplemented the RMP data with two other sources. First, we found that the 197,037 professors identified from RMP belonged to 2,583 different universities, and we matched each of these universities to the World Ranking Web of Universities (WRWU).[9] Second, we looked for each professor on GS to see if he or she had an academic profile available, and if that was the case we proceeded as described in the next section.[10]

2. The GS database

We complemented the data from RMP with data from GS (scholar.google.com). In GS, professors can create profiles and make them available to track their citations and manage their academic articles.

We used a script to automate the process of pairing each RMP professor with a GS profile.[11] This methodology yielded 2,401 perfect matches in which both the professor's and the university's names were written identically. The methodology also threw up multiple imperfect matches, and we manually checked the 10,000 most likely ones, finding 434 additional matches.[12]

The final list of professors for whom information was available on both RMP and GS included 2,835 individuals. For each of them, we obtained a variety of information from GS such as the number of articles the professor had published, the number of times these articles had been cited, and his or her h-index and i10-index.[13]

Lastly, we supplemented these data with information gathered manually about each professor's appearance. For each of the 2,835 professors, we collected two of the most recent photos appearing on the Internet and evaluated physical attributes such as skin colour, eye colour, age and weight. While there are different approaches to assessing beauty, including related aspects such as dominance (see Paredes, Pino and Díaz, 2019), we selected 10 research assistants to share this highly time-consuming task, employing several mechanisms to keep their criteria consistent throughout the process.[14] Each

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[7] We were unable to classify 18 departments (e.g., "Honours", "Graduate Studies").

[8] The algorithm is based on the dictionary from the Gender programme written by Jörg Michael. This contains more than 40,000 first names, covering most names used in the United States, Europe, China, India and Japan. We did not get a match for 7.6% of the names; in these cases, the gender was deemed to be unknown (e.g., "G.R. Williams", "Professor Agarwal", "Yartz").

[9] We found 1,925 exact matches, in which the university names reported by RMP and WRWU matched perfectly. For the remaining 658 university names, we manually searched for the best possible match. We were unable to find a match for 182 universities.

[10] The list of variables and their definitions for the sample of 197,037 professors from RMP are given in annex A1.

[11] Pairing the information from the two databases was not trivial, since professors' names could be written differently. For each professor, the script first searched GS for the name as reported by RMP. It then compared the two names and his or her university, as reported by RMP and GS, and assigned scores depending on how similar they were.

[12] These 434 manually accepted matches were not recognized properly by the script, mainly owing to the use of abbreviations in the input texts (e.g., "Sam" instead of "Samuel", "Penn State University" instead of "Pennsylvania State University").

[13] Both indices are designed to capture the quantity and quality of publications. The h-index is an author-level metric that measures both productivity and the citation impact of publications. It is based on the set of most cited papers and the number of citations they have received in other publications. The i10-index for an author measures the number of publications that have at least 10 citations.

[14] Having an exogenous assessment of a professor's looks by research assistants yields a metric for "beauty" that is not potentially contaminated by other characteristics of the professor's which may affect the evaluations of students who know him or her.

research assistant received a list of professors and a handbook with specific instructions on how to tabulate each physical attribute.[15] We provided answers to common questions research assistants might have and asked each research assistant to review 10 professors first. We then reviewed their initial work, gave them feedback and asked them to continue, leaving a comment about any attribute of a professor that caused them doubts. We then took a random sample of 150 professors to check their work. We noticed that most inconsistencies related to attributes marked with a comment and so decided to review all attributes thus marked in the full sample.[16]

V.   Results

1.   Results from the RMP database

The RMP database provides information that is useful for gauging how "overall teaching quality" as measured by student assessments relates to professors' personal and academic characteristics and to the universities and schools where they teach. We are particularly interested in two aspects included in the RMP database: students' assessment of "easiness" and of how "interesting" a course is.

We first consider the whole database obtained from the RMP website (RMP database). The main advantage of this database is its size, while its main drawback is that it does not have detailed information on professors' personal and academic characteristics. For example, while RMP asks students to evaluate whether a professor is "hot", it does not report other basic characteristics such as the professor's gender.

To assess professors' academic characteristics, we searched for them in Google Scholar and matched them with the information found there. Google Scholar has more precise personal information on professors featured there in addition to their academic achievements, such as the impact factor of research, papers published, etc. Thus, for instance, if a photograph of the professor is available, we use it to obtain more physical characteristics than can be gleaned from the dichotomous "hot or not" question of the RMP database.

Table 1 presents summary statistics for the variables considered to be determinants of professors' evaluations in the RMP database. In addition to the usual summary statistics, the last column presents the Pearson correlation of each variable with the average quality of professors.

As can be seen in table 1, 90.3% of the professors evaluated teach in the United States, 9.6% in Canada and most of the remainder in the United Kingdom. Professors' evaluations are negatively correlated with their university's ranking, i.e., professors at better-ranked universities have (on average) marginally worse ratings.[17] This result also holds when we consider professors at the 50 top-ranked universities. Male professors are (marginally) better evaluated and professors appearing on Google Scholar (marginally) worse, although they account for only 1.4% of the professors in the database.

Interestingly, a personal characteristic that strongly correlates with the assessment of a course's quality is the teacher's "hotness". Likewise, "easier" courses tend to be evaluated better. How interesting students perceive a course to be also appears to make an important contribution to positive evaluations, however.

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[15] See annex A2 for this material.

[16] The additional variables available for the sample of 2,835 professors with information from GS and their definitions are listed in annex A3.

[17] A better-ranked institution has a lower number associated with it for the Ranking variable.

Table 1
Descriptive statistics for professors' ratings in the RateMyProfessors database

	Mean	Median	Standard deviation	Correlation
University characteristics				
United States	0.903	1.000	0.295	0.051
Canada	0.096	0.000	0.295	-0.051
Ranking	2 767.512	1 809.000	2 686.703	0.097
Top 50	0.070	0.000	0.255	-0.013
Personal characteristics				
Male	0.658	1.000	0.474	0.005
Hotness	0.077	0.000	0.175	0.402
Academic characteristics				
Google Scholar	0.014	0.000	0.119	-0.007
Ratings				
Quality (average)	3.676	3.791	0.827	1.000
Easiness (average)	3.104	3.103	0.773	0.601
Interesting (average)	3.357	3.368	0.540	0.526
Anger (average)	0.497	0.353	0.545	-0.398
Anxiety (average)	0.368	0.227	0.519	-0.421
Certainty (average)	2.159	2.084	0.717	0.119
Negative (average)	2.250	1.894	1.474	-0.669
Positive (average)	8.023	7.680	3.256	0.717
Sadness (average)	0.268	0.217	0.269	-0.240
Tentative (average)	3.047	3.026	0.827	-0.328
Word count (average)	37.059	37.911	8.319	-0.123
Words per sentence (average)	12.922	12.818	2.321	-0.271

Source: Prepared by the authors.
Note: Correlation denotes the Pearson correlation coefficient between a variable and the average overall teaching quality of the course.

The comments left by students on the RMP website were also available to us, and we found that the more negative responses were (i.e., the more they conveyed anger or anxiety, or the more hesitant they were, for example), the worse the average student assessment was. Meanwhile, positive comments (i.e., comments containing positive feedback or words conveying certainty) correlated positively with students' assessments.

However, correlations are not enough to describe the determinants of student assessments of course quality. Furthermore, since a number of these variables are correlated with one another, correlations do not serve to ascertain their relative importance.

Table 2 presents the results of a linear regression, with the average overall quality rating in student assessments as the dependent variable. This regression shows that the geographical location of the university is not a relevant characteristic in students' evaluations, but its ranking is. The relationship is non-linear, since while better-ranked universities tend to be initially associated with poorer evaluations, after a certain ranking (approximately 6,000, out of almost 12,000) the relationship reverses.

Table 2
Determinants of overall teaching quality ratings in the RateMyProfessors database

Variable	Coefficient	Standard error	t-statistic	Probability
Constant	0.8785	0.1869	4.699	0.000
United States	0.1129	0.1350	0.836	0.403
Canada	-0.0269	0.1350	-0.199	0.842
Ranking	9.69E-06	1.18E-06	8.239	0.000
Ranking squared	-8.43E-10	1.29E-10	-6.536	0.000
Top 50	-0.0191	0.0042	-4.546	0.000
Male	0.0117	0.0021	5.686	0.000
Hotness	0.4864	0.0080	60.614	0.000
Google Scholar	0.0134	0.0083	1.617	0.106
Easiness	0.8672	0.0455	19.060	0.000
Easiness squared	-0.1735	0.0148	-11.705	0.000
Easiness cubed	0.0141	0.0016	9.035	0.000
Interesting	-0.3356	0.1123	-2.989	0.003
Interesting squared	0.2971	0.0341	8.705	0.000
Interesting cubed	-0.0400	0.0034	-11.750	0.000
Anger	-0.0120	0.0028	-4.245	0.000
Anxiety	-0.0630	0.0033	-18.860	0.000
Certainty	0.0438	0.0015	29.106	0.000
Negativeness	-0.1208	0.0016	-77.031	0.000
Positiveness	0.0949	0.0006	154.459	0.000
Sadness	-0.0382	0.0049	-7.861	0.000
Tentativeness	-0.0723	0.0014	-50.469	0.000
Word count	0.0141	0.0002	78.864	0.000
Words per sentence	-0.0285	0.0006	-51.046	0.000
Architecture	-0.1058	0.0208	-5.086	0.000
Engineering	-0.0370	0.0078	-4.722	0.000
Humanities	0.0490	0.0060	8.192	0.000
Business	0.0777	0.0066	11.758	0.000
Science	0.1326	0.0062	21.236	0.000
Health	-0.0160	0.0095	-1.682	0.093
Other	-0.0465	0.0127	-3.647	0.000
Not classified	0.0681	0.0361	1.888	0.059
R-squared	0.7330	Mean dependent variable		3.676
Adjusted R-squared	0.7330	Standard deviation dependent variable		0.827
Standard error of regression	0.4270	Akaike information criterion		1.138
Residual sum of squares	35 990	Schwarz criterion		1.140
Log likelihood	-112 085	Hannan-Quinn criterion		1.139
F-statistic	17 448	Probability (F-statistic)		0.000

Source: Prepared by the authors.
Note: White heteroskedasticity-consistent standard errors. Number of observations included: 197,029.

Male professors tend to be better evaluated, but although the coefficient is significant, its magnitude is not that great (0.0117 points more on a scale from 1 to 5). Appearing in Google Scholar is not statistically significant. By contrast with these minor effects, "hotness" is an important predictor of student ratings. The difference in the average quality rating between a situation in which no student considers a professor "hot" and one in which everyone does is 0.4864 points. Whether this means that

"good-looking" professors are "better" at teaching or that there is a "beauty" premium is abundantly discussed in the literature (Hamermesh, 2011). In any event, the "beauty" premium appears to be more important than the other personal characteristics considered.

As regards "easiness" and how "interesting" courses are, we also find a non-linear relationship. While "easier" courses are better rated, there is a diminishing premium on "easiness". By contrast, there is an increasing premium for how "interesting" a course is, up to a certain point, after which it decreases.[18] More importantly, "easiness" contributes marginally more to a good evaluation than how "interesting" a course is.

Regarding feelings and emotions expressed in the written comments, as expected, negative feedback tends to be associated with a lower average quality and positive feedback with the opposite. Presumably students who write comments have more extreme opinions. For example, an average of one more word signalling anger is associated with 0.012 of a point less in the average evaluation. Interestingly, negative feedback is "numerically" more important in absolute terms. Thus, a negative comment penalizes an evaluation more than a positive comment enhances it.[19]

Lastly, table 2 also shows the faculties where professors teach. As the categories used are qualitative, the results reported take professors in faculties of education as a basis of comparison. The evidence shows that professors in business, humanities and science faculties tend to be better evaluated and those in engineering, architecture and health faculties marginally worse evaluated.

Summarizing, when all the observables are considered together, some factors are more important than others in describing what lies behind students' perception of the quality of the courses they take. By far the most important determinants are, first, how "easy" and, second, how "interesting" a course is. Excluding "hotness", the other factors are not statistically significant or are only weakly correlated with the average assessment. Notably, neither research as measured by a dummy variable indicating whether the professor appears in GS nor a better university ranking is an important factor in predicting how students evaluate the quality of teaching.[20]

2. Results when the RMP database is merged with the GS database

Besides the evaluation of all professors in the RMP database that has already been considered, two of the aspects mentioned above merit a more thorough examination: how important appearance ("hotness") is and what the relationship between teaching and research is. The RMP database suggests that "hotness" is relevant and more important than, for example, the ranking of the university or whether the professor conducts research.

To analyse these aspects in depth, we shall now consider only the sample of professors appearing in GS. This reduces the number of observations to 2,835 professors out of the initial 197,037. One benefit of this reduction is that we can more precisely measure teachers' academic productivity (as measured by the impact factors of their research). We also have access to more information on their looks from their profiles and photos. The impact factors can help provide a better understanding of the relationship between research and teaching for professors who are actively involved in the former. The photographs can provide a rough impression of "looks" uncontaminated by other characteristics of the person (such as personality, self-confidence, etc.) that influence the perception students have. They also provide more detailed knowledge of professors' physical characteristics.

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[18] Average quality assessment is maximized when the average evaluation is approximately 4.5 (out of 5).

[19] It could be that the direction of causality is the opposite, i.e., emotions expressed in describing a course may be a result of its quality.

[20] Of course, students at universities with different rankings are not directly comparable.

Table 3 shows the descriptive statistics for the variables considered, and table 4 shows the results of a regression that includes variables capturing physical attributes and academic characteristics (publications and impact factors) as determinants of average overall quality.

Table 3
Descriptive statistics derived from the Google Scholar database

	Mean	Median	Standard deviation	Correlation
University characteristics				
United States	0.799	1.000	0.401	0.061
Canada	0.201	0.000	0.401	-0.063
Ranking	854.160	370.000	1 378.762	0.081
Top 50	0.155	0.000	0.362	-0.046
Personal characteristics				
Male	0.799	1.000	0.401	0.051
Aged less than 40	0.193	0.000	0.394	0.080
Aged between 40 and 55	0.534	1.000	0.499	0.069
Bald	0.144	0.000	0.351	-0.019
Friendly	0.782	1.000	0.413	0.078
Bright eyes	0.404	0.000	0.491	0.074
Caucasian	0.854	1.000	0.353	0.124
African-American	0.018	0.000	0.132	-0.053
Indian	0.070	0.000	0.255	-0.036
Pale skin	0.621	1.000	0.485	0.050
Brown skin	0.303	0.000	0.460	-0.020
Black hair	0.251	0.000	0.433	-0.050
Blond hair	0.105	0.000	0.306	0.013
Brown hair	0.359	0.000	0.480	0.078
Grey hair	0.259	0.000	0.438	-0.064
Thin	0.061	0.000	0.239	-0.012
Average build	0.759	1.000	0.428	0.027
Tall	0.131	0.000	0.338	0.081
Average height	0.194	0.000	0.396	0.045
Good looks	0.168	0.000	0.374	0.120
Average looks	0.668	1.000	0.471	-0.012
Hotness	0.082	0.000	0.177	0.404
Academic characteristics				
Number of publications	82.481	43.000	187.503	-0.123
Citations	2 166.393	696.000	5 119.203	-0.067
H-index	16.150	13.000	13.839	-0.125
I10-index	28.378	15.000	49.647	-0.108
Evaluations				
Quality (average)	3.631	3.722	0.765	1.000
Easiness (average)	2.928	2.933	0.661	0.521
Interesting (average)	3.399	3.419	0.496	0.489
Anger (average)	0.494	0.363	0.532	-0.345
Anxiety (average)	0.385	0.233	0.559	-0.406
Certainty (average)	2.124	2.027	0.726	0.123
Negative (average)	2.428	2.096	1.514	-0.632
Positive (average)	8.118	7.671	3.294	0.668
Sadness (average)	0.267	0.213	0.274	-0.271
Tentative (average)	3.148	3.137	0.854	-0.298
Word count (average)	36.708	37.700	8.921	-0.113
Words per sentence (average)	12.635	12.602	2.249	-0.277

Source: Prepared by the authors.
Note: Correlation denotes the Pearson correlation coefficient between a variable and the average overall teaching quality of the course.

Table 4
Determinants of overall teaching quality derived from the Google Scholar database

Variable	Coefficient	Standard error	t-statistic	Probability
Constant	0.3558	0.3081	1.155	0.248
United States	0.0754	0.0854	0.883	0.377
Canada	-0.0845	0.0879	-0.961	0.337
Ranking	3.43E-05	1.63E-05	2.110	0.035
Ranking squared	-2.88E-09	1.84E-09	-1.561	0.119
Top 50	-0.0257	0.0263	-0.978	0.328
Male	0.0521	0.0235	2.217	0.027
40 or younger	0.1157	0.0307	3.768	0.000
Between 41 and 55	0.0874	0.0236	3.709	0.000
Bald	0.0301	0.0253	1.190	0.234
Brown skin	-0.0133	0.0422	-0.314	0.753
Black hair	-0.0665	0.0510	-1.302	0.193
Blond hair	-0.1462	0.0523	-2.794	0.005
Brown hair	-0.0392	0.0478	-0.821	0.412
Grey hair	-0.0731	0.0500	-1.461	0.144
Bright eyes	0.0372	0.0192	1.940	0.053
Caucasian	0.1689	0.0418	4.040	0.000
African American	-0.0380	0.0833	-0.455	0.649
Indian	0.0941	0.0526	1.789	0.074
Pale skin	0.0043	0.0434	0.099	0.921
Thin	0.0220	0.0396	0.557	0.578
Normal weight	0.0300	0.0229	1.310	0.190
Tall	0.0381	0.0265	1.435	0.151
Normal height	0.0198	0.0222	0.893	0.372
Friendly	0.0549	0.0222	2.473	0.014
Hotness	0.4449	0.0502	8.859	0.000
Good looks	-0.0102	0.0324	-0.315	0.753
Normal appearance	0.0245	0.0251	0.972	0.331
Publications	-0.0003	0.0002	-2.306	0.021
Publications squared	8.81E-08	5.54E-08	1.590	0.112
Citations	-1.70E-06	2.43E-06	-0.700	0.484
H-index	0.0011	0.0015	0.714	0.475
I10-index	-0.0001	0.0004	-0.137	0.891
Easiness	0.3124	0.0984	3.175	0.002
Easiness squared	-0.0200	0.0158	-1.262	0.207
Interesting	0.7553	0.1652	4.571	0.000
Interesting squared	-0.0689	0.0244	-2.823	0.005
Anger	0.0040	0.0218	0.183	0.855
Anxiety	-0.0711	0.0262	-2.712	0.007
Certainty	0.0535	0.0128	4.168	0.000
Negativeness	-0.1143	0.0123	-9.262	0.000
Positiveness	0.0852	0.0047	18.005	0.000
Sadness	-0.0255	0.0415	-0.615	0.538
Tentativeness	-0.0673	0.0121	-5.572	0.000
Word count	0.0118	0.0016	7.276	0.000
Words per sentence	-0.0201	0.0054	-3.727	0.000
Architecture	-0.2388	0.1077	-2.218	0.027
Engineering	-0.1230	0.0598	-2.057	0.040
Humanities	-0.0826	0.0552	-1.497	0.134
Business	0.0152	0.0581	0.261	0.794
Science	-0.0867	0.0566	-1.531	0.126
Health	-0.1119	0.0991	-1.130	0.259
Other	-0.2930	0.1758	-1.666	0.096
Not classified	0.0186	0.0949	0.196	0.845
R-squared	0.706202	Mean dependent variable		3.630257
Adjusted R-squared	0.700035	Standard deviation dependent variable		0.771407
Standard error of regression	0.422492	Akaike information criterion		1.135425
Residual sum of squares	450.7118	Schwarz criterion		1.258022
Log likelihood	-1 410.13	Hannan-Quinn criterion		1.179863
F-statistic	114.5157	Probability (F-statistic)		0.000

Source: Prepared by the authors.
Note: White heteroskedasticity-consistent standard errors. Number of observations included: 2,579.

The results are roughly consistent with those for the whole sample. There are no statistical differences in assessed quality between countries; average ratings tend to be lower in better-ranked universities; and negative emotions tend to be more correlated with worse evaluations than positive emotions with better ones. Furthermore, "easiness" has a positive but decreasing impact on the evaluation of course quality. However, one important difference is that in this sample of professors, the more "interesting" a course, the more highly valued it is (at a decreasing rate), and this is the most important contributor to the overall assessment of the course's quality. Thus, there is a difference in priorities between "easiness" and "interesting" in the case of professors who appear on GS and presumably are more active in research.

Regarding personal characteristics, male professors have slightly better ratings and "hotness" continues to be an important factor. However, very few of the specific physical characteristics mentioned in table 4 systematically help to predict the quality of a course, and in general the magnitudes are very small.

Academic productivity, whether measured by number of publications, citations or impact factors, is either irrelevant or detrimental to ratings. A possible explanation for this is that time spent on research and teaching compete.[21] Another possible explanation may be that research and teaching are complementary on graduate courses but the RMP evaluations cover mainly undergraduate courses, something the data do not allow us to differentiate. At any rate, the evidence robustly indicates that active research is not necessarily associated with better evaluations for teaching.

Figure 1 shows how the importance of factors is reversed when the RMP database is compared with the GS database. It shows, that is, that the question of how interesting the course is becomes a more important factor in the case of professors who have a research track record, as evidenced by their presence on GS.

Figure 1
Contributions of "easiness" and "interesting" to professors' evaluations by students
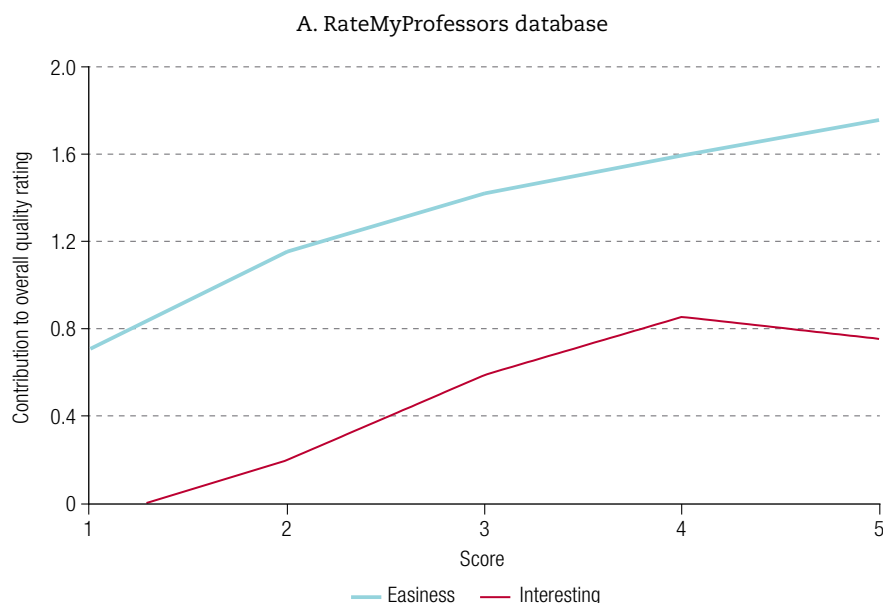
A. RateMyProfessors database

B. Google Scholar database
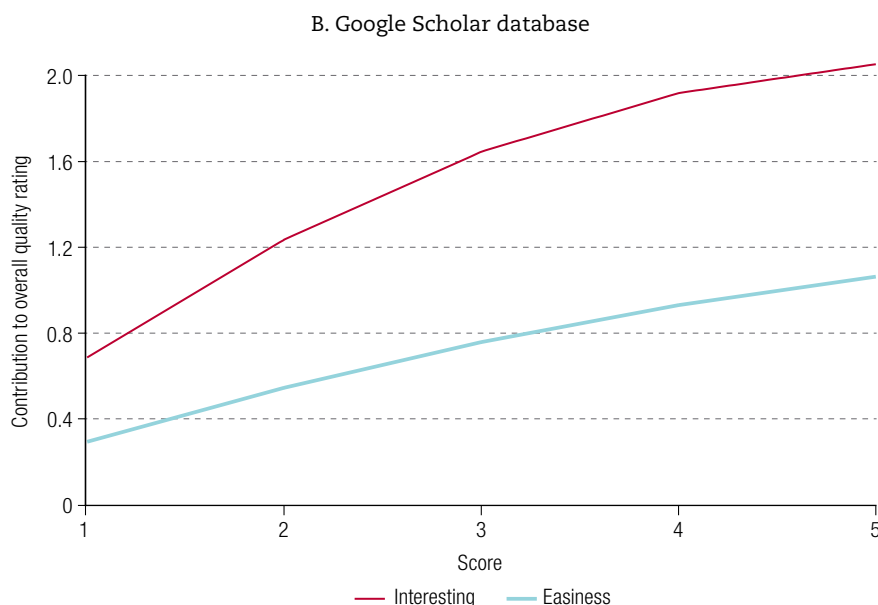
Source: Prepared by the authors.
Note: The charts show the contribution made by a given score for each of the characteristics to the overall rating. For example, when the estimates of table 2 (RateMyProfessors database) are used, a score of 3 for "easiness" contributes 1.42 points to the overall quality rating, while when the table 4 estimates (GS database) are used, a score of 3 for "interesting" contributes 1.65 points to overall quality rating.

Summarizing, if we consider only professors whose research record can be tracked and ascertain further physical characteristics, we find that (qualitatively) the main results hold good. How "easy" and "interesting" courses are prove to be the main determinants of student quality ratings. There is a significant "beauty" premium that does not depend on systematic characteristics such as race or skin, eye or hair colour. It is more detrimental to professors' evaluations if they elicit negative emotions than it is beneficial if they elicit positive emotions. Lastly, there is if anything a negative association between academic productivity and teaching quality as rated by student evaluations.

VI. Concluding remarks

Whilst the use of open voluntary websites, and RMP in particular, has been criticized, there are at least three elements that make them worth describing and analysing. First, overall RMP ratings have been reported to correlate reasonably well with formal evaluations. Second, the popularity of RMP is growing, and it affects students' decisions as well as being a source of immediate feedback for professors. Lastly, it provides information for analysis of a volume and richness not available elsewhere.

In this paper, we use the RMP data set to describe the main characteristics affecting the quality of teaching, as reported by students. From the evaluations of almost 200,000 professors on the site, almost 3,000 of which could be linked to information in GS, we find that the main determinants of the perceived quality of a course are how "easy" and how "interesting" it is. How "easy" and how "interesting" a course is positively affect its quality ratings at a decreasing and increasing rate, respectively. We also find a "beauty" premium that is not systematic with respect to race, skin colour or other personal characteristics of the professors. Lastly, we find that research productivity is either insignificant or detrimental in evaluations of teaching.

Our study concludes that research seems to compete with teaching quality. If professors mainly have incentives to research, the quality of teaching may suffer. Furthermore, since students value "easiness" in their ratings, they may not be receiving the quality of education required to form competent future professionals. Exploring and understanding the reasons behind these findings may yield important implications for academic policies and decisions. Thus, the existence of a beauty premium and the possibility that an emphasis on research reduces teacher ratings give cause to reflect on the value schools set on student assessments and the costs of focusing exclusively on research.

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Annex A1

Full list of variables for the sample of 197,037 professors from RateMyProfessors

University characteristics:

- **United States:** Dummy variable that takes the value 1 if the professor's university is in the United States. Source: RMP.
- **Canada:** Dummy variable that takes the value 1 if the professor's university is in Canada. Source: RMP.
- **Ranking:** Ranking of the professor's university, with a lower number being better. Source: World Ranking Web of Universities (WRWU).
- **Top 50:** Dummy variable that takes the value 1 if the Ranking variable is less than or equal to 50. Source: WRWU.

Personal characteristics:

- **Male:** Dummy variable that takes the value 1 if the professor is male. Source: algorithm based on the gender/nam_dict dictionary written by Jörg Michael.
- **Hotness:** Dummy variable that takes the value 1 if the number of students on RMP who find the professor "hot" minus the number who do not is 20 or larger. Source: RMP.

Academic characteristics:

- **Google Scholar:** Dummy variable that takes the value 1 if the professor has a Google Scholar academic profile. Source: Google Scholar.

Evaluations:

- **Quality:** This measures a professor's quality as perceived by students. It is computed by RMP as the average between "helpfulness" and "clarity". Helpfulness is measured on a Likert scale from 1 ("No help here") to 5 ("Saved my semester"). Clarity is measured on a Likert scale from 1 ("Say what??") to 5 ("Crystal clear"). Source: RMP.
- **Easiness:** This measures how easy students find the class on a Likert scale from 1 ("Hardest thing I've ever done") to 5 ("Show up & pass"). Source: RMP.
- **Interesting:** This measures how interesting students find the professor on a Likert scale from 1 ("Meh") to 5 ("It's my life"). Source: RMP.
- **Anger:** Percentage of words in the student's comment that denote anger (words such as "hate" and "annoyed"). Source: RMP and Linguistic Inquiry and Word Count (LIWC) software.
- **Anxiety:** Percentage of words in the student's comment that denote anxiety (words such as "worried" and "fearful"). Source: RMP and LIWC.
- **Certainty:** Percentage of words in the student's comment that denote certainty (words such as "always" and "never"). Source: RMP and LIWC.

- **Negativeness:** Percentage of words in the student's comment that denote negative emotions (words such as "hurt" and "nasty"). Source: RMP and LIWC.

- **Positiveness:** Percentage of words in the student's comment that denote positive emotions (words such as "nice" and "sweet"). Source: RMP and LIWC.

- **Sadness:** Percentage of words in the student's comment that denote sadness (words such as "crying" and "sad"). Source: RMP and LIWC.

- **Tentative:** Percentage of words in the student's comment that denote tentativeness (words such as "guess" and "perhaps"). Source: RMP and LIWC.

- **Word count:** Number of words in the student's comment. Source: RMP and LIWC.

- **Words per sentence:** Average number of words per sentence in the student's comment. Source: RMP and LIWC.

Department characteristics:

- **Architecture:** Dummy variable that takes the value 1 if the professor's department is part of a school of architecture and planning. Source: manually classified on the basis of the department's name as reported by RMP.

- **Engineering:** Dummy variable that takes the value 1 if the professor's department is part of a school of engineering. Source: manually classified on the basis of the department's name as reported by RMP.

- **Humanities:** Dummy variable that takes the value 1 if the professor's department is part of a school of humanities, arts and social sciences. Source: manually classified on the basis of the department's name as reported by RMP.

- **Business:** Dummy variable that takes the value 1 if the professor's department is part of a school of business and management. Source: manually classified on the basis of the department's name as reported by RMP.

- **Science:** Dummy variable that takes the value 1 if the professor's department is part of a school of science. Source: manually classified on the basis of the department's name as reported by RMP.

- **Health:** Dummy variable that takes the value 1 if the professor's department is part of a school of health and welfare. Source: manually classified on the basis of the department's name as reported by RMP.

- **Other:** Dummy variable that takes the value 1 if the professor's department is part of a school of education, law, agriculture, counselling or sports. Source: manually classified on the basis of the department's name as reported by RMP.

- **Not classified:** Dummy variable that takes the value 1 if the professor's department could not be classified under any of the previously mentioned faculties or schools. Source: manually classified on the basis of the department's name as reported by RMP.

Annex A2

Instructions for research assistants participating in the project

It is very important that you read this entire set of instructions before starting to gather the information required.

Introduction

Each research assistant cooperating in this project will be assigned a group of professors. For each professor, you will have identifying information such as the name of the professor and the university where he/she teaches, and a unique numerical identifier assigned to that professor (ID). Based on the identifying information, you have to find two current photos of the professor and save them with names ID_1 and ID_2. Then, you have to complete a database with variables related to the physical characteristics of the professor. Below is a list of the variables; when a qualitative assessment of a professor's physical appearance is required, please be as objective as possible.

Variables

A. Gender

    0.   Female

    1.   Male

B. Skin colour

    0.   Pale

    1.   Brown

    2.   Dark

C. Race

    0.   Caucasian/White/Latin

    1.   African/Caribbean

    2.   Indian/Arab

    3.   Chinese/Japanese/Asian

D. Age

    0.   Less than 40

    1.   Between 40 and 55

    2.   More than 55

E. Eye colour

   0.   Black/brown

   1.   Green/blue

F. Hair colour

   0.   Black

   1.   Blond

   2.   Brown

   3.   Grey

   4.   Red

G. Bald

   0.   Yes

   1.   No

H. Weight

   0.   Thin/underweight

   1.   Average build

   2.   Overweight

I. Height

   0.   Tall

   1.   Average

   2.   Short

   3.   Not available

J. Looks

   0.   Attractive

   1.   Average

   2.   Unattractive

K. Friendly

   0.   Friendly

   1.   Unfriendly

Annex A3

Variables for the sample of 2,835 professors with a Google Scholar profile

Additional academic characteristics:

- **Number of publications:** Number of articles written by the professor. Source: Google Scholar.

- **Citations:** Number of citations of all articles written by the professor. Source: Google Scholar.

- **H-index:** Index measuring a professor's productivity and impact. A professor with an index of H has published H papers, each of which has been cited at least H times. Source: Google Scholar.

- **I10-index:** Number of articles with at least 10 citations. Source: Google Scholar.

Additional personal characteristics:

- **Less than 40:** Dummy variable that takes the value 1 if the professor is less than 40 years old. Source: visual inspection of two photographs of the professor.

- **Between 40 and 55:** Dummy variable that takes the value 1 if the professor is between 40 and 55 years old. Source: visual inspection of two photographs of the professor.

- **Bald:** Dummy variable that takes the value 1 if the professor is bald. Source: visual inspection of two photographs of the professor.

- **Friendly:** Dummy variable that takes the value 1 if the professor looks friendly. Source: visual inspection of two photographs of the professor.

- **Bright eyes:** Dummy variable that takes the value 1 if the professor has clear (e.g., green or blue) eyes. Source: visual inspection of two photographs of the professor.

- **Caucasian:** Dummy variable that takes the value 1 if the professor looks Caucasian, White or Latin. Source: visual inspection of two photographs of the professor.

- **African-American:** Dummy variable that takes the value 1 if the professor looks African-American or Caribbean. Source: visual inspection of two photographs of the professor.

- **Indian:** Dummy variable that takes the value 1 if the professor looks Indian or Arab. Source: visual inspection of two photographs of the professor.

- **Pale skin:** Dummy variable that takes the value 1 if the professor has pale or light skin. Source: visual inspection of two photographs of the professor.

- **Brown skin:** Dummy variable that takes the value 1 if the professor has brown or dark skin. Source: visual inspection of two photographs of the professor.

- **Black hair:** Dummy variable that takes the value 1 if the professor has black hair. Source: visual inspection of two photographs of the professor.

- **Blond hair:** Dummy variable that takes the value 1 if the professor has blond hair. Source: visual inspection of two photographs of the professor.

- **Brown hair:** Dummy variable that takes the value 1 if the professor has brown or brunette hair. Source: visual inspection of two photographs of the professor.

- **Grey hair:** Dummy variable that takes the value 1 if the professor has grey hair. Source: visual inspection of two photographs of the professor.

- **Thin:** Dummy variable that takes the value 1 if the professor looks thin or underweight. Source: visual inspection of two photographs of the professor.

- **Average build:** Dummy variable that takes the value 1 if the professor seems to be of average build or healthy weight. Source: visual inspection of two photographs of the professor.

- **Tall:** Dummy variable that takes the value 1 if the professor looks tall. Source: visual inspection of two photographs of the professor.

- **Average height:** Dummy variable that takes the value 1 if the professor seems to be of average height. Source: visual inspection of two photographs of the professor.

- **Good looks:** Dummy variable that takes the value 1 if the professor looks attractive. Source: visual inspection of two photographs of the professor.

- **Average looks:** Dummy variable that takes the value 1 if the professor has average looks. Source: visual inspection of two photographs of the professor.

The short-run consequences of the erosion of economic freedom for growth and institutions in Latin America: an unorthodox experimental review of the twenty-first century

Rafael Acevedo and María Lorca-Susino[1]

Abstract

How economic growth can be improved is a question that has always divided researchers, but it is one of the utmost importance, bearing directly on prosperity, quality of life and human well-being. The research presented here is an experimental review whose purpose is to evaluate the causal effects that the erosion of economic freedom has had on the economic growth rate, corruption, democracy, the transparency of laws, media censorship and judicial constraints in 19 Latin American countries during the twenty-first century. The results show that for each percentage point erosion of economic freedom, the economic growth rate is between 0.3 and 1.6 percentage points lower the following year, while institutions deteriorate in comparison with those of countries where economic freedom has not been eroded. These findings confirm that a freer economic environment not only benefits these countries economically in the short run but improves other regional variables in the long run.

Keywords

JEL classification

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I.   Introduction

The question of how economic growth can be improved has always divided researchers. Finding ways and means to increase economic growth is of the utmost importance, as it is directly related to prosperity, quality of life and human well-being (Pritchett, 2000). This study aims to contribute to the vast literature on the subject with a new approach oriented towards identifying the short-run consequences of the erosion of economic freedom for the economic growth rates and institutions of 19 countries in Latin America in the twenty-first century.

Development and institutional economists have long argued that increased State interventionism, understood as a decrease in economic freedom, would negatively affect economic growth rates and institutions. Nevertheless, understanding and analysing economic growth is a thorny and sensitive matter, owing to the many endogenous and exogenous factors that affect countries' performance.

This research paper uses the differences-in-differences statistical method to measure the short-run causal effects of high- and low-intensity erosion of economic freedom on economic growth and six specific institutions in 19 Latin American countries. The data are from the Fraser Institute (2021), Feenstra, Inklaar and Timmer (2015) (now the Penn World Table) and Coppedge and others (2021) (now the V-Democracy Dataset) and cover the period from 2000 to 2019. The results demonstrate that the erosion of economic freedom hurts economic growth and the institutions analysed in the short run.

The evidence suggests that the more intensively economic freedom was eroded, the worse the effect on institutions and the greater the loss of economic growth at a statistically significant level different to zero the following year. However, when the intensity with which economic freedom was eroded was low, the results were not significant. Thus, it was necessary to use a specification that allowed us to measure the effects of changes in economic freedom on economic growth and institutions.

The results demonstrate that our identification strategy is appropriate and the differences found are the causal effect of the erosion of economic freedom. The evidence is that the greater the erosion of economic freedom, the greater the damage to economic growth and institutions.

Some researchers explain the differences in living standards between countries by small but prolonged differences in economic growth, defined by Pritchett (2000, p. 221) as "the power of compound interest, over long periods". This interpretation considers only the results of economic performance and not other characteristics that could affect the economic growth rate (Acevedo and Lorca, 2021).

Understanding what factors may positively or negatively affect the economic growth rate of a country is a concern for development economists, who have not agreed on a universal answer.

There are two main sources of growth: (i) the addition of inputs (physical capital and labour) and (ii) innovation, technological change or, in technical economic terms, total factor productivity. The former is termed brute force and the latter smart growth by Robert Solow, who argued that smart growth was more important than brute force (more inputs) in generating additional output over time (Solow, 1956; among others). Acemoglu and Robinson (2019) argue that institutions have a positive and significant impact on economic growth. Gallup, Sachs and Mellinger (1999) show that a country's geography plays a fundamental role in economic development (see also Fujita, Krugman and Venables, 1999; Boschma and Frenken, 2006; Coe, Kelly and Yeung, 2019; Combes, Mayer and Thisse, 2008; Dicken, 2003; Lee and Wills, 1997; Carvalho and Barros, 2019; Chen, 2019; De Oliveira, 2019; Kaneko and others, 2019). Others have demonstrated that culture and institutions explain why some countries grow faster than others (Acemoglu and others, 2019; Ghardallou and Sridi, 2020; Acemoglu, Robinson and Verdier, 2017; Bennett and others, 2017; Faría and others, 2016; Alesina and Guiliano, 2015; Fernández, 2011; Guiso, Sapienza and Zingales, 2006; Bueno de Mesquita and Downs, 2005; Di Tella and Schargrodsky, 2004; Glaeser and others, 2004; Acemoglu, Johnson and Robinson, 2002; Hofstede, 2001; Landes, 1999;

among others). There are other factors affecting economic growth. Halperin, Siegle and Weinstein (2005) find that corruption and military violence negatively affect it, while democracy is essential to it. Bueno de Mesquita and Downs (2005) argue that political freedom is a factor in economic growth. Lastly, Gwartney and others (2019) identify a strong positive relationship between economic freedom and economic growth (see also Bergh and Bjørnskov, 2019; Erdal, 2004; Williamson and Mathers, 2011; Saurabh, 2007; Faría and Montesinos, 2009; Pitlik, 2002).

However, there is no generally accepted position on these conclusions in the literature, and there are no reliable findings to support the relationship between the variables mentioned and economic growth (Sturm and De Haan, 2001; Doucouliagos and Ulubaşoğlu, 2006; Sturm, Leertouwer and De Haan, 2002; Ram, 2000). Acevedo and Lorca (2021) explain that the Latin American countries had a difficult turn of the century, with numerous social, political and economic shocks that have impacted the economic development of the region. Ecuador dollarized its economy in 2000, while El Salvador did so in 2001. Between 2002 and 2003, the Bolivarian Republic of Venezuela, the largest oil exporter in the region, suffered a political crisis and strikes by oil workers. The increase in oil prices between 2005 and 2006, with a peak in 2011–2012, also affected the social, economic and political performance of the region. The uniqueness of each of the countries analysed and the geopolitical importance of the region within the Americas guided our search for reliable evidence to establish a short-run causality connecting economic freedom to economic growth rates and institutional characteristics such as corruption, democracy, transparent laws, media censorship and judicial constraints in the first 19 years of the twenty-first century. To this end, we sought to determine whether countries had less economic growth and worse institutions in the year after a reduction in their economic freedom.

This research paper is organized as follows. Following this introductory section, section II sets out the programme of analysis, describing the data and presenting a brief historical background for the erosion of economic freedom in the region, an overview of the identification strategy, and the assumptions we followed. Section III uses three different specifications to estimate the effects of the erosion of economic freedom, obtaining results which confirm that our identification strategy is appropriate. Section IV provides the results of the robustness tests. Lastly, section V summarizes our findings and conclusions.

II. The programme of analysis

This study conducts an experimental review to evaluate the causal effects of the erosion of economic freedom on economic growth rates, corruption, democracy, the transparency of laws, media censorship and judicial constraints in a sample of 19 Latin American countries. Its methodology follows Duflo (2001), Qian (2008) and Miguel and Kremer (2004), among others. Our study differs from theirs in that our programme of analysis centres on the erosion of economic freedom, which may be repeated in different or consecutive years during the period of analysis. Our experimental design allows us to measure short-run differences in economic growth rates and certain institutions between countries where economic freedom was eroded and those where it was not.

1. The data

We created a panel data set for the period 2000–2019 using information from the Penn World Table (version 10) for Argentina, the Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the Plurinational State of Bolivia and Uruguay. We extended this data set with variables from the Fraser Institute (2021) for economic freedom, the International Country Risk

Guide (ICRG) for corruption produced by PRS Group (ICRG Researchers, 2020), and the V-Democracy Dataset (Coppedge and others, 2021) and the Polity5 Project (Center for Systemic Peace, 2020) for institutional variables. Other sources were Hofstede (2001), ECLAC (n.d.) and the *Human Development Report* of the United Nations Development Programme (UNDP, 2020) for our control variables. Table 1 summarizes the statistics and sources of the main variables.

Table 1
Description and summary statistics

Variable	Source	Summary statistics				
		Observations	Mean	Standard deviation	Minimum	Maximum
Economic growth	Penn World Table 10	361	0.02734	0.0875	-0.8097	0.2705
Corruption	PRS Group International Country Risk Guide (ICRG)	342	3.6380	0.8637	1	5
Democracy	Polity5 Project	360	7.6360	2.5231	-3	10
Transparent laws	V-Dem Project	380	0.5085	1.0597	-2.524	2.647
Censorship effort (media)	V-Dem Project	380	1.2442	0.9144	-2.379	3.222
Judicial constraints	V-Dem Project	380	0.5928	0.2713	0.007	0.969
Intensity	Fraser Institute	361	-0.0209	3.2684	-22.617	22.794
Erosion	Fraser Institute	167	-1.9745	2.9087	-22.617	-0.128
Economic freedom	Fraser Institute	380	6.8851	0.9237	2.720	7.970

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.

The variables are:

- Economic growth: the growth rate of expenditure-side real gross domestic product (GDP) per capita at chained purchasing power parity in 2017 dollars, taken from version 10 of the Penn World Table.

- Corruption: the scale of corruption within the political system as measured by the ICRG. To analyse the results, we inverted the original scale, allowing us to expect a negative relationship.[2] For the purposes of this research, the corruption index ranges from 0 to 6, with 0 being least corrupt and 6 most corrupt.

- Democracy: we used the revised combined polity score (Polity2) from the Polity5 Project as a proxy for democracy. This score has been widely used in research that involves analysis of democracy, such as Rhaman, Anbarci and Ulubaşoğlu (2022) and Janus (2022). The advantage of using Polity[2] is that it converts all the standardized authority scores into conventional polity scores. This is done by subtracting the level of institutionalized autocracy from the level of institutionalized democracy, with scores ranging between -10 and +10, where +10 is strongly democratic and -10 strongly autocratic.

- Transparent laws: we used the values for transparency and predictable enforcement of laws provided by the Varieties of Democracy (V-Dem) Project. The lower the index value, the more arbitrary the way laws are applied and created and the lower the level of legal transparency and predictability in the country. The highest value is 4, denoting a situation of transparency and predictability.

- Censorship effort (media): a proxy for direct or indirect government attempts to censor print or broadcast media, provided by the V-Dem Project. A low index value indicates that censorship attempts are more direct and routine. The highest value is 4, which indicates that efforts to censor the media are rare and not routine.

---

[2] The ICRG measures corruption on a scale of 0 to 6, with 0 being a very low level of corruption and 6 a very high level. Reversing the original scale does not affect the size of the coefficients obtained in our estimations, only their sign.

- Judicial constraints: this index value, provided by the V-Dem Project, measures the extent to which the executive branch of the government respects the constitution and complies with court rulings and to which the judiciary can act independently. The lowest score is 0 and the highest is 1.

- Intensity: percentage point change in the economic freedom score published by the Fraser Institute (2021).

- Erosion: this is the programme variable. It equals intensity that is negative and means that the country has suffered a diminution of its economic freedom score in a specific year. If "erosion" is zero, the country's economic freedom score either increased or did not change from the previous year.

- Oil exporter: a control dummy taking the value 1 if the country is an oil exporter and 0 otherwise. We did not consider the quantity of oil exported because this dummy suffices to classify Latin American countries as oil exporters or non-oil exporters. Oil rents as a share of GDP were considered in our robustness tests.

- Individualism: Hofstede (2001) ranks countries on an individualism index. The highest-scoring country is Argentina (most individualistic), and since this research is focused on Latin America, we took Argentina as the benchmark. For this study, we are interested not in determining the absolute level of individualism in the countries but in classifying them as more or less individualistic. Accordingly, we used the following procedure to create a dummy for each country i, with 0 signifying less individualistic and 1 more individualistic:

$$Dummy_{ind_i} = 0 \text{ if } \frac{indv_{score_i}}{indv_{score_{ARG}}} < 0.5 \tag{1}$$

$$Dummy_{ind_i} = 1 \text{ if } \frac{indv_{score_i}}{indv_{score_{ARG}}} \geq 0.5 \tag{2}$$

- Education: mean years of education for adults and expected years of education for children as published by UNDP (2020).

2. The programme: erosion of economic freedom

Historically, the degree of economic freedom in Latin American countries has varied in a cycle reflecting the tension between public policies to strengthen State interventionism, thereby reducing economic freedom, and to liberalize, thereby restoring it (Packenham, 1992). An individualized analysis shows that some countries, namely Argentina, the Bolivarian Republic of Venezuela and Nicaragua, have undermined economic freedom more than others. Nevertheless, the rest of the countries in the region have also experienced policies damaging to economic freedom.

Figure 1 shows both the pattern of changes in the economic freedom scores of each country and the average for the region. The left panel shows that most observations range within an interval of -3 to 3 percentage points of change. It is also possible to see the outliers, countries that have suffered some shock to their economic freedom score that falls outside that range. The most significant cases are the Bolivarian Republic of Venezuela, with the largest trough and peak (around -22 in 2002 and 22 in 2017), and Argentina, whose scores fell outside the range in 13 of the 19 years covered by the chart (only in 2003, 2004, 2006, 2007, 2008 and 2011 were they within the range). Other countries experienced outlier changes in their economic freedom scores in certain years. This is an important finding that will be analysed in the subsequent sections.

Figure 1
Latin America: changes in economic freedom scores, 2000–2020
(Percentage points)
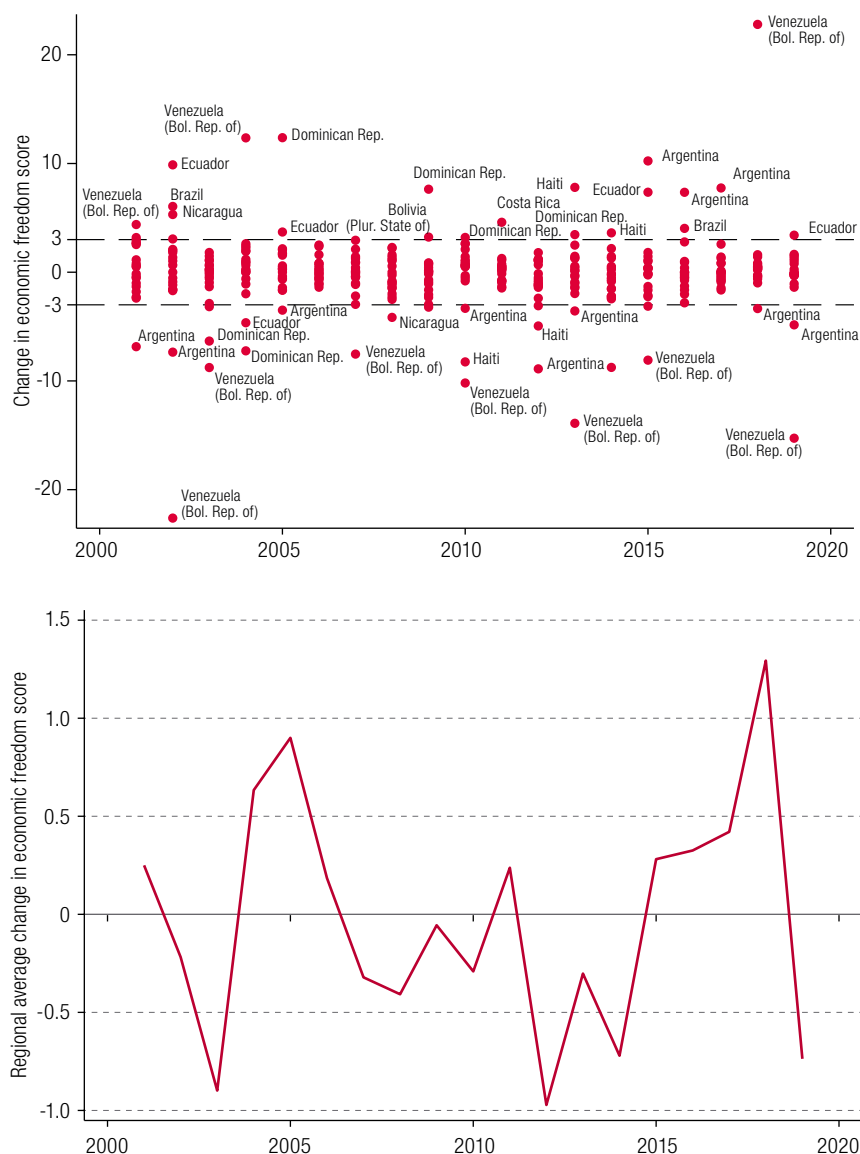
In 2002, the Bolivarian Republic of Venezuela experienced a major strike in the oil sector, and President Chávez was temporarily overthrown, but returned to power and implemented policies that began the largest nationalization process in the region. Between 2005 and 2006, rising oil prices allowed President Chávez to fund his political project and launch the largest left-wing movement in the region. In Argentina, President Kirchner had a similar agenda. Thus, economic freedom in Argentina and the Bolivarian Republic of Venezuela was attacked by these presidents, while similar policies were pursued (Forero, 2005) in countries such as Brazil, Ecuador, Nicaragua and the Plurinational State of Bolivia (Bhojwani, 2021). As Anselmi (2017, p. 411) points out, this period is known for "the great rise of Pan-South American leadership with the spread of 'Left turn' in all of the countries of the area".

The spread of these ideas meant that the countries of the region experienced various degrees of reduction in economic freedom. The countries with the fewest years of erosion in their economic freedom were Colombia (three years) and Chile (four years), while the rest of the countries experienced an erosion of economic freedom lasting six or more years. This came to the attention of scholars, some of whom have contributed research to the literature dealing with the effects of economic freedom on economic growth. While some have found evidence of a positive effect (Gwartney and others, 2019, among others), others have found support for the hypothesis that there is a negative relationship or none (Doucouliagos and Ulubaşoğlu, 2006). Santiago, Fuinhas and Marques (2020) argue that this negative relationship could be possible, given specific characteristics, such as ageing or non-existent infrastructure.

The recent literature on economic growth in Latin American countries has explained that the fiscal multiplier is negatively affected by economic freedom (Acevedo, Mora and Young, 2021), while pointing out that certain countries maintained an aggressive fiscal policy during the years in which economic freedom was restored. It could also be the case that while some of the countries have experienced a gradual or dramatic increase in economic freedom, conditions had been so badly undermined beforehand that the private sector has never been able to operate freely. The Bolivarian Republic of Venezuela increased its economic freedom score by about 22 percentage points between 2017 and 2018 but still had a score of 3.34 in 2018 and remained the most unfree country in the world. A similar shock raised Argentina's score to 5.17 in 2015 from 4.69 in 2014 but left it among the 10 most unfree countries in the world.

An important characteristic of the region is that it includes some of the world's largest exporters of oil and other commodities, which gives governments a high degree of fiscal independence. Acevedo and others (2022) find that the higher the degree of such independence, the greater the damage to countries' political development. They also discuss a potential confounding factor: specific political and institutional conditions. They determine that the liberalization of specific areas of the economy, including through tax cuts, open trade and sound money, could help revive the economy. However, they conclude that if those economic reforms are not accompanied by institutional reforms, or if governments are fiscally independent from citizens, liberalization of the economy will not have the same positive effect as in countries with good institutions, low fiscal independence or both.

3.   Identification strategy

The literature suggests that economic freedom has an impact on economic growth and institutions (Bennett and others, 2017; Faría and others, 2016; Faría and Montesinos, 2009; Glaeser and others, 2004; among others). Some authors have included lagged changes in the Fraser Institute index of economic freedom as an independent variable, and there is a large empirical and theoretical body of literature contending that the data from the *Economic Freedom of the World* (EFW) survey are statistically significant as explanatory variables for economic growth and other institutions (Lawson, Murphy and Powell, 2020). Following the literature, the identification strategy in this research goes by whether a country's EFW index score has fallen in the last year to determine whether it is a treated or a control unit.

Following Hall and Lawson (2014), who explain that some researchers use percentage changes in the EFW index instead of raw scores to avoid any possibility of endogeneity and selection bias, we used percentage changes, because to do otherwise would mean assuming that a country losing or gaining 1 point when its score was high (e.g., 10) would experience the same effect as one losing or gaining 1 point when its score was very low (e.g., 1). By using percentage changes, we assume that the effect is an increasing function.

For the whole sample, the EFW score shows a growth rate of 0.021%, but mean erosion (negative intensity only) is -1.97%. The intensity of the treatment is an increasing function of the change in the EFW score. The effect of the erosion of economic freedom should decrease for countries with low-intensity erosion. High-intensity erosion occurs when there is a negative change in the EFW score larger than the average of the negative growth rates.[3]

Table 2 shows the differences in means of our set of variables for the treated and control groups. The table also illustrates different panels to analyse the effects by intensity. The differences observed in this table can be interpreted as the short-run causal effects on these specific variables of the erosion of economic freedom in Latin American countries. For this, we assume that if countries had not experienced an erosion of their economic freedom, there would be no systematic differences between treated and control units.[4]

Table 2
Differences in means for treated and control groups, by intensity

	Economic growth (1)	Corruption (2)	Democracy (3)	Transparent laws (4)	Censorship effort (media) (5)	Judicial constraints (6)
Panel A: whole sample						
Difference	-0.0204**	0.1843*	-0.5805**	-0.2122*	-0.2577**	-0.0746**
	(0.01)	(0.094)	(0.278)	(0.115)	(0.101)	(0.028)
	0.64	0.50	0.65	0.58	0.80	0.80
Panel B: high-intensity versus untreated						
Difference	-0.0566***	0.4249***	-1.7138***	-0.4715***	-0.6635***	-0.1745***
	(0.017)	(0.136)	(0.4015)	(0.169)	(0.148)	(0.044)
	0.59	0.97	0.90	0.79	0.98	0.97
Panel C: low-intensity versus untreated						
Difference	-0.0051	0.0716	-0.0947	-0.1037	-0.0879	-0.0328
	(0.007)	(0.108)	(0.269)	(0.124)	(0.105)	(0.032)
	0.20	0.16	0.10	0.20	0.21	0.26
Panel D: high-intensity versus low-intensity						
Difference	-0.0514**	0.3533**	-1.6190***	-0.3678*	-0.5755***	-0.1417***
	(0.02)	(0.142)	(0.523)	(0.197)	(0.177)	(0.049)
	0.53	0.85	0.84	0.56	0.91	0.85

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. Power $(1-\beta)$ is the statistical power estimated using the means, standard deviations and observations of each group at a significance level of 5%; the alternative hypothesis of the statistical power test is $H_A = m_2 < m_1$ for all variables and, for corruption only, $H_A = m_2 > m_1$, where m_2 is the experimental group and m_1 is the control group.

The results in table 2 show that the economic growth rate and institutions were negatively impacted in countries where economic freedom was eroded (see panel A). In the year following the erosion of economic freedom, the economic growth rate was around 2.04 percentage points lower on average than in countries where economic freedom was not eroded, at a 5% level of statistical significance. Institutions in those countries were also affected, with corruption increasing by around 0.18 points on the original scale (out of 6). The results for democracy, transparent laws, judicial constraints and censorship effort (media) all worsened. However, only in the analysis of censorship effort (media) and judicial constraints was statistical power found to be as high as 0.8, meaning that the experimental groups for the other variables might be too small for a general conclusion to be drawn.

As Duflo (2001, p. 798) explains, "the identification assumption should not be taken for granted". Duflo used an experimental control group to prove that there was no systematic difference from her

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[3]   If erosion < -1.97%, the unit is classified as high-intensity.

[4]   A unit means a country, which can be a treated unit in one year and a control or untreated unit in another year.

control group. Nevertheless, Duflo took her experimental control group from the very regions she was analysing. As our experiment lacks a specific treatment period, any country may or may not be treated during the period of study. In fact, there is no country in our sample that did not experience a reduction in economic freedom at some point during the years analysed.[5][6] Thus, we do not have an experimental control group like Duflo (2001).

However, our unorthodox experimental design classifies countries by the intensity with which economic freedom is eroded, and this provides us with an experimental test for our results. Thus, our identification assumption can be tested via the study. When countries are classified as experiencing a high-intensity erosion of economic freedom, the negative effects on the variables analysed should be greater. Then, countries experiencing low-intensity erosion should evince a smaller difference from the control group than those experiencing high-intensity erosion. Lastly, differences between the high- and low-intensity groups should be smaller than those between the high-intensity and control groups but greater than those between the low-intensity and control groups.

Moving on to panel B, the differences between countries with high-intensity erosion of economic freedom and countries with no erosion of economic freedom are more marked and are statistically significant at the 1% level, with statistical power increasing to at least 0.8. The short-run causal effect of high-intensity erosion of economic freedom is to reduce economic growth by some 5.7 percentage points; although this is significant at the 1% level, statistical power is below 0.8. In addition, these countries experienced a level of corruption 0.43 points higher on average than the untreated group along with a deterioration in the other institutions, with all these results being statistically significant at the 1% level.

In panel C, we failed to obtain statistically significant and statistically powered results for the differences between countries with low-intensity erosion of economic freedom and those with no erosion. Lastly, panel D reports the differences between countries where economic freedom was eroded with different levels of intensity. The results show the expected outcomes: the greater the erosion, the greater the deterioration of institutions and loss of economic growth, with all results being statistically significant and different from zero.

All the results obtained in our analysis are evidence that our experimental design using differences-in-differences to measure short-run causal effects is not built on an inappropriate identification assumption. However, improving the estimation requires the use of techniques that permit the inclusion of more covariates to control for confounding effects. The following sections show results more convincingly arrived at via more advanced methodologies based on the assumption of this strategy.

III. The effects of the erosion of economic freedom

1. Basic results

Our design can be generalized in a linear regression to encompass different levels of intensity. It is assumed that a higher-intensity erosion of economic freedom yields a deterioration of institutions and a lower economic growth rate. The following equation shows the regression estimated for our model (table 3) and allows us to measure the difference:

$$v_{ij} = c_1 + \alpha_{1j} + \beta_1(T_{i(j-1)}) + \delta_1(X_i) + \varepsilon_{ij} \tag{3}$$

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[5] The countries with the fewest years of exposure to erosion of economic freedom were Colombia (three years) and Chile (four years), with the rest of the countries analysed experiencing erosion for six or more years.

[6] Including an experimental control group from other regions of the world is not within the scope of this research and would not provide a reliable measure of identification bias.

where v_{ij} is a variable for country i in year j (letting v be the economic growth rate, corruption, democracy or any of the other dependent variables we are using in this study), c_1 is a constant and α_{1j} is a period fixed effect. $T_{i(j-1)}$ is the treatment variable that allows us to obtain results by groups, taking a value of 1 if economic freedom in country i was eroded in year $(j-1)$ or the country is considered high-intensity or low-intensity,[7] and a value of 0 if the country is in the comparison group (untreated or with low-intensity erosion of economic freedom, depending on the specification). X_i is a vector of country-specific variables. Our coefficient of interest is β_1, which shows the average difference in the dependent variable between countries where economic freedom was eroded or which experienced high-intensity or low-intensity erosion[8] and the comparison group.

Table 3
Basic results: effects of the erosion of economic freedom on growth and institutions

	Economic growth (1)	Corruption (2)	Democracy (3)	Transparent laws (4)	Censorship effort (media) (5)	Judicial constraints (6)
Panel A: whole sample						
Differences	-0.016* (-0.009)	0.263*** (-0.08)	-0.731*** (-0.227)	-0.291** (-0.114)	-0.275*** (-0.092)	-0.092*** (-0.028)
F-statistic	3.397	8.975	10.236	2.236	5.821	3.539
R^2	0.182	0.375	0.416	0.128	0.276	0.188
Observations	342	304	324	342	342	342
Panel B: high-intensity versus untreated						
Differences	-0.054*** (-0.017)	0.547*** (-0.125)	-1.729*** (-0.349)	-0.623*** (-0.182)	-0.567*** (-0.142)	-0.218*** (-0.045)
F-statistic	2.717	6.099	8.622	2.042	5.759	3.686
R^2	0.214	0.381	0.479	0.17	0.365	0.269
Observations	232	208	219	232	232	232
Panel C: low-intensity versus untreated						
Differences	-0.004 (-0.006)	0.138 (-0.087)	-0.322 (-0.212)	-0.14 (-0.12)	-0.147 (-0.096)	-0.039 (-0.03)
F-statistic	4.624	9.461	10.313	2.842	4.8	3.805
R^2	0.262	0.429	0.457	0.179	0.269	0.226
Observations	296	259	279	296	296	296
Panel D: high-intensity versus low-intensity						
Differences	-0.042* (-0.022)	0.365*** (-0.129)	-1.013** (-0.486)	-0.466** (-0.226)	-0.419** (-0.18)	-0.154*** (-0.054)
F-statistic	2.307	5.759	5.757	1.318	3.897	2.426
R^2	0.266	0.475	0.472	0.171	0.379	0.275
Observations	156	141	150	156	156	156

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: Reported β_1 (see equation (3)). * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. All specifications include period fixed effects and control for oil resources, educational attainment and individualism. Estimations including separate figures for the educational attainment and individualism variables are available upon request to the authors.

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[7] Equation (3) was estimated four times: (i) using the whole sample; in this case, $T=1$ for all units in which economic freedom was eroded, irrespective of the intensity; (ii) high-intensity vs. untreated; in this case, $T=1$ for all units in which economic freedom was intensely eroded, and $T=0$ for all untreated units; units for which erosion was low are not included in this estimation; (iii) low-intensity vs. untreated, where $T=1$ if erosion of economic freedom in the unit was low-intensity, and $T=0$ if the unit is untreated; units for which erosion of economic freedom was high-intensity are not included in this estimation; and (iv) high-intensity vs low-intensity; in this case, $T=1$ if units experienced high-intensity erosion, and $T=0$ if units experienced low-intensity erosion; untreated units are not included in this estimation.

[8] β_1 shows the average difference in the values of the dependent variable between the units for which $T=1$ and $T=0$, following the same model of estimating the equation four times.

Table 3 shows the results obtained. As expected, they are similar to those in table 2. Panel A compares the values for the dependent variables between countries that experienced an erosion of economic freedom and those that did not, regardless of intensity. The expected outcome is confirmed: countries where economic freedom was eroded exhibited an average annual economic growth rate around 1.6 percentage points lower than countries where this did not occur. This result is statistically significant at the 10% level. If we look at the overall institutional variables, the results suggest that countries in which economic freedom was eroded had worse institutions the following year, with corruption higher by an average of 0.26 points at a 1% level of statistical significance. Not only did these countries have to deal with the consequences of high corruption, but it was also observed that democracy was weaker, with a score 0.73 points lower at the 1% level of statistical significance. The importance of judicial constraints on the executive branch is precisely that there should be an institution with enough power and autonomy to shackle the Leviathan, as explained by Acemoglu and Robinson (2019). Here, the results show that countries scored 0.09 points lower for this institution following the erosion of economic freedom. Lastly, repression of the media (a proxy for free speech) seems to have increased following a deterioration of economic freedom, and laws seem to have been created and applied more arbitrarily and less transparently. Our results include oil resources, individualism and educational attainment as control variables, allowing us to check that our estimates have not been affected by omitted characteristics or mean reversion.

Looking at Panel B, which sets a situation of high-intensity erosion of economic freedom against one without erosion, all the estimates are statistically significant at the 1% level and have the expected sign. The results suggest that countries where there was an intensive erosion of economic freedom had an economic growth rate about 5 to 5.4 percentage points lower than countries where there was not. All institutional variables were also affected. For example, corruption was around 0.55 points higher, democracy was 1.73 points weaker, there were more media restraints and fewer judicial constraints, and laws were more arbitrary and less clear.

Lastly, panel C compares a situation of low-intensity erosion of economic freedom with one of no erosion, and panel D compares a situation of high-intensity erosion with one of low-intensity erosion. The results are not statistically significant when the low-intensity group is compared with the untreated group (panel C). However, panel D shows that our identification strategy is appropriate, since the effect reflects an increasing function (the difference between the high-intensity group and the untreated group is greater than the difference between the high-intensity group and the low-intensity group).

Although the results show that our assumption is satisfied, the coefficient could be slightly overestimating or underestimating the effect of the erosion of economic freedom on the variables studied or failing to capture the true effect when all observations are used owing to the specification of the model. In other words, the results suggest that the erosion of economic freedom hurts institutional variables and economic growth. However, at low-intensity levels of erosion of economic freedom, the results obtained are not statistically significant. It is therefore necessary to use a specification that captures the effect of intensity.

2. Measuring the causal effect of intensity: fixed effect evidence

Duflo (2001) and Qian (2008) use a reduced form that consists of generalizing the identification strategy to an analysis of interaction terms. In our study, we cannot adopt a specification similar to the one used by these authors. Duflo (2001) studies the impact of the programme by considering individuals from different regions with different intensities in the specific year in which the programme began. However, our study has a very limited number of subjects (19 countries), and the programme is applied at different

times, which explains the need to conduct an unorthodox experimental review. It could be argued that we might increase our sample size. However, our study is focused specifically on 19 Latin American countries. It could also be argued that having different treatment periods might limit the experiment, but what we are analysing is the short-run impact. A wider sample and comparisons between different regions, or between developed and developing countries, might be options for further research.

Our results support our identification strategy and assumption that the causal effect is an increasing function of the intensity level. Nevertheless, our initial results failed to find a statistically significant effect from low-intensity erosion of economic freedom. For this reason, we used equation (4) to test the effect of intensity, defined as the percentage change in the EFW index:

$$v_{ij} = c_1 + \alpha_{1j} + \beta_1 Z_{i(j-1)} + \delta_1(X_i) + \varepsilon_{ij} \tag{4}$$

where $Z_{i(j-1)}$ is the change in the EFW score of country i in the year $(j-1)$, and the rest of the terms remain the same as in equation (3). With this specification, the expected sign of our parameter of interest β_1 is negative when the dependent variable is corruption and positive otherwise.[9]

Table 4 reports the results of equation (4). These results show all expected signs and are statistically significant at the 10% level at least. For each percentage point that a country's economic freedom is eroded in the current year, economic growth the following year is expected to be 0.3 percentage points lower relative to another country where there was no erosion. This means that, on average, treated units, which is to say– countries in which economic freedom was eroded ordecreased, had an economic growth rate around 0.6 percentage points lower than countries with zero change in economic freedom (0.6 comes from multiplying 0.003 by the average erosion observed in our sample, -1.97). This result allows us to compare treated and control units, as defined for this experiment. The difference in economic growth rates between treated and untreated units would then be around 1.1 percentage points,[10] which is fairly close to our basic result.

Table 4
Ordinary least squares evidence for the effects of intensity

Coefficient	Dependent variable					
	Economic growth	Corruption	Democracy	Transparent laws	Censorship effort (media)	Judicial constraints
Intensity	0.003* (0.001)	-0.043*** (0.013)	0.126*** (0.037)	0.040** (0.018)	0.036** (0.014)	0.040** (0.018)
Educational attainment	0.069 (0.055)	-5.896*** (0.474)	16.443*** (1.349)	3.999*** (0.679)	3.826*** (0.547)	3.999*** (0.679)
Individualism	-0.001 (0.009)	-0.218*** (0.078)	0.293 (0.221)	-0.178 (0.111)	0.258*** (0.090)	-0.178 (0.111)
Oil resources	-0.032*** (0.010)	0.390*** (0.087)	-2.533*** (0.248)	-0.286** (0.125)	-0.838*** (0.101)	-0.286** (0.125)
Constant	-0.056 (0.042)	7.610*** (0.345)	-3.245 (2.150)	-2.421*** (0.516)	-1.686*** (0.417)	-2.421*** (0.516)
F-statistic	3.400	9.036	10.347	2.159	5.658	2.159
R^2	0.182	0.377	0.418	0.124	0.271	0.124
Observations	342	304	324	342	342	342

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: All regressions include period fixed effects. * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. Estimations including separate figures for the educational attainment and individualism variables are available upon request to the authors.

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[9] With this specification we are testing all changes in the sample, both positive and negative. The analysis for corruption, for example, if $\beta_1 < 0$, is that an erosion of 1 percentage point in the EFW score has the effect of increasing corruption by β_1 points of its scale (out of 6 points).

[10] We obtained this number as the difference between the impact on the economic growth of treated units (0.6) and untreated units (obtained by multiplying 0.003 by 1.66, i.e., the average of all positive and zero changes in the economic freedom scores of our sample).

We defined high-intensity erosion as a situation in which countries' economic freedom was eroded by more than the average of all negative changes in economic freedom. The mean value of the high-intensity units is around 5. Plugging this average into the results of the specification, we find that these countries had an economic growth rate around 1.5 percentage points lower than those countries with zero change in their economic freedom score (we obtained this number by multiplying 0.003 by 5). Comparing this with all units that exhibited no erosion in their economic freedom, we estimate that countries with high-intensity erosion grew by around 2 percentage points less. The difference between our basic results and this new estimation is due to the correction of estimation bias and the potential heterogeneity of confounding factors by using a wider sample.[11]

Lastly, with low-intensity erosion,[12] countries grow 0.25 percentage points less than countries with zero change in economic freedom and 0.75 percentage points less than untreated units. The effect on corruption is statistically significant at the 1% level for each percentage point of erosion in a country's economic freedom. The result is an increase in corruption of 0.043 points on its scale (out of 6 points). Democracy is another institution that is affected in the short run. At 1% statistical significance, for each percentage point of erosion in a country's freedom, democracy deteriorates by 0.126 points. Transparent laws, censorship efforts (media) and judicial constraints are also negatively affected, at 5% statistical significance, when countries' economic freedom decreases. These results support the evidence previously found about the short-run causal effects of the erosion of economic freedom on these economic and institutional variables. Annex A3 presents a robustness test that controls for oil rents; the results are qualitatively similar, with statistical significance increasing for some coefficients and decreasing for others.

3. Measuring the causal effects of a pure exogenous intensity shock

The results shown in section B above can be interpreted as the short-run causal effects of changes in economic freedom scores on our set of dependent variables. Since this research aims to measure the causal effects of the programme, namely the erosion of economic freedom, our interpretation has focused on negative intensity or negative changes. However, our definition of the programme could be considered endogenous, and is less likely to be exogenous, because our treatment is defined for all those country-years in which there is a decline in the economic freedom score. For that reason, and considering the characteristics of our study, we built a vector autoregressive (VAR) model that includes the potential effects of our variables on changes in economic freedom. This model is more rigorous for the purposes of our experiment, as it corrects any possible endogeneity problem in our treatment and should show whether or not our findings are signalling the correct causality. The model is represented by the following equations:

$$Z_{i(j-1)} = \alpha_1 + b_{1j} + \gamma_1 Z_{i(j-2)} + \gamma_2 v_{i(j-2)} + \gamma_3 (X_i) + \mu^z_{i(j-1)} \tag{5}$$

$$v_{ij} = c_1 + \alpha_{1j} + \beta_1 \widehat{\mu^z_{i(j-1)}} + \delta_1 (X_i) + \varepsilon_{ij} \tag{6}$$

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[11] With the basic results model, we estimated the differences in means of the dependent variables for each group of interest, applying some controls. With these new specifications, however, our model measures the impact on our dependent variables of changes in economic freedom scores, be they positive, zero or negative, with a greater number of total observations included in the estimations.

[12] When we talk about "erosion", we are referring to negative changes. Mathematically, then, low intensity is: $-1.97 \leq$ low intensity < 0. In our sample, the average observation among those values is -0.80.

Equation (5) captures the potential effects of the overall relationship of our variables to changes in economic freedom. In this case, μ_{ij}^z could be interpreted as an exogenous shock to economic freedom. As we were seeking to measure the effect of a pure exogenous shock, we introduced $\widehat{\mu_{ij}^z}$ from equation (5) into equation (6), which is equivalent to equation (4).

Table 5 reports the results from equation (6). The evidence suggests that, at a 5% level of statistical significance, there is a short-run effect on corruption and democracy from the erosion of economic freedom. Corruption increases by 0.031 points for each percentage point that economic freedom is eroded, while democracy deteriorates by 0.086 points for each percentage point of erosion. Perhaps the most important finding, though, is that when erosion is considered as a pure exogenous shock, its effect on economic freedom is more significant at the 1% level. It further transpires that for each percentage point that a country's economic freedom score is eroded, its economic growth is around 0.41 percentage points lower than that of the countries in which there was no erosion. With these findings, we would expect treated countries to have grown around 0.81 percentage points less than those countries where economic freedom was not eroded. Considering these results, the difference between treated and untreated units is around 1.5 percentage points, while that between units with high-intensity erosion and untreated units is around 2.8 percentage points and that between units with low-intensity erosion and untreated units is 1.01 percentage points. For the rest of the variables, the results show the expected sign but are not statistically significant.

Table 5
Effects of intensity: vector autoregressive (VAR) model evidence

Coefficient	Dependent variable					
	Economic growth	Corruption	Democracy	Transparent laws	Censorship effort (media)	Judicial constraints
Intensity	0.0041*** (0.001)	-0.0313** (0.013)	0.0863** (0.038)	0.0143 (0.018)	0.0170 (0.014)	0.0015 (0.004)
Educational attainment	0.0735 (0.057)	-5.7981*** (0.478)	16.1874*** (1.364)	3.9170*** (0.682)	3.7516*** (0.551)	1.3338*** (0.172)
Individualism	0.0040 (0.009)	-0.2294*** (0.078)	0.3423 (0.224)	-0.1686 (0.112)	0.2665*** (0.090)	0.0005 (0.028)
Oil resources	-0.0324*** (0.010)	0.4025*** (0.088)	-2.5799*** (0.251)	-0.2948** (0.126)	-0.8456*** (0.101)	-0.0736** (0.032)
Constant	0.0419 (0.041)	7.5903*** (0.356)	-2.9780 (2.178)	-2.3154*** (0.518)	-1.5907*** (0.418)	-0.2989** (0.130)
F-statistic	3.7724	8.5754	9.8129	1.9209	5.3369	2.9478
R^2	0.1999	0.3646	0.4072	0.1119	0.2594	0.1621
Observations	323	304	322	342	342	342

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: All regressions include period fixed effects. * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. Estimations including separate figures for the educational attainment and individualism variables are available upon request to the authors. These results were obtained with the VAR model and are the estimations of equation (6).

IV. Robustness

To test the robustness of our results, we removed from our sample all observations that were outliers with respect to our treatment, which allowed us to eliminate any potentially large influence from individual observations that could drive the results. If the individual influence of observations that produce a large shock for economic freedom scores was what made the results statistically significant (or not), our assumptions and identification strategy could be inappropriate. Annexes A1 and A2 show the descriptive

statistics and trend of our subsample (the original one without outliers) and are equivalent to table 1 and figure 1. In our experimental design, erosion is considered high-intensity for the purposes of the robustness tests in countries where it exceeded the average of negative changes or mean erosion (-1.027% for our subsample).

Table 6 is the equivalent of table 2, without outliers. The results are less statistically significant and coefficients are lower following correction of the individual influence of outliers. However, the negative difference of 1.9 percentage points in the average annual economic growth rate of treated relative to untreated countries is very close to that obtained in table 2 and is significant at the 5% level. If we look at panel B, the difference between high-intensity and untreated units decreases to 3.4 percentage points, a figure that is statistically significant at the 1% level. With this test, the difference between groups in their scores for transparent laws is not statistically significant, while the other institutional variables are significant in some of the panels. The results in this table are important because they support our initial findings and show that, while the difference on transparent laws loses significance, the rest of the differences are statistically significant and the estimates of the effects of the programme are not driven by individual influences.

Table 6
Differences in means for treated and control groups, by intensity, without outliers

	Economic growth (1)	Corruption (2)	Democracy (3)	Transparent laws (4)	Censorship effort (media) (5)	Judicial constraints (6)
Panel A: whole sample						
Differences	-0.019** (0.009)	0.155 (0.104)	-0.509* (0.286)	-0.147 (0.123)	-0.217** (0.106)	-0.076** (0.031)
Panel B: high-intensity versus untreated						
Differences	-0.034*** (0.013)	0.241* (0.133)	-1.225*** (0.366)	-0.146 (0.159)	-0.393*** (0.138)	-0.157*** (0.040)
Panel C: low-intensity versus untreated						
Differences	-0.007 (0.007)	0.076 (0.128)	0.093 (0.282)	-0.148 (0.141)	-0.079 (0.116)	-0.013 (0.035)
Panel D: high-intensity versus low-intensity						
Differences	-0.027 (0.018)	0.165 (0.150)	-1.317** (0.514)	0.002 (0.201)	-0.314* (0.179)	-0.144*** (0.049)

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. This table replicates the estimations of table 2 without outliers.

The second robustness test entailed replicating the results obtained in table 3 but eliminating outliers. Table 7 reports the results of the specifications, including all control variables. These results once again show a loss of statistical significance, with some being significant and others not. The comparison of units with high-intensity erosion and untreated units yields a difference of 2.8 percentage points in their average annual growth rates at the 5% level of significance. The difference between all the groups with regard to transparent laws once again becomes non-significant, despite keeping the expected sign. The rest of the differences between groups on the other variables are significant at the 10% level, depending on the panel.

As a final robustness test, we re-estimate the specifications reported in table 4 without outliers. Table 8 shows the results obtained. Some of our dependent variables (economic growth, corruption, democracy and transparent laws) gained potency in the intensity coefficient, greater statistical significance or both. The results of all these robustness tests prove that our assumptions and identification strategy are appropriate and provide reliable conclusions based on our findings.

Table 7
Basic results: effects of the erosion of economic freedom on growth
and institutions, without outliers

	Economic growth (1)	Corruption (2)	Democracy (3)	Transparent laws (4)	Censorship effort (media) (5)	Judicial constraints (6)
Panel A: whole sample						
Differences	-0.015 (0.009)	0.207** (0.085)	-0.615** (0.239)	-0.189 (0.122)	-0.225** (0.099)	-0.083*** (0.030)
F-statistic	3.025	9.990	8.389	2.350	4.344	3.165
R²	0.188	0.441	0.406	0.153	0.250	0.195
Observations	296	261	280	296	296	296
Panel B: high-intensity versus untreated						
Differences	-0.028** (0.013)	0.260** (0.114)	-1.160*** (0.310)	-0.172 (0.162)	-0.354*** (0.130)	-0.170*** (0.040)
F-statistic	2.447	6.876	7.251	1.816	4.274	3.213
R²	0.204	0.422	0.446	0.16	0.310	0.252
Observations	222	199	211	222	222	222
Panel C: low-intensity versus untreated						
Differences	-0.006 (0.006)	0.141 (0.099)	-0.133 (0.222)	-0.160 (0.136)	-0.106 (0.108)	-0.006 (0.032)
F-statistic	3.878	8.866	8.421	2.582	3.392	4.254
R²	0.274	0.477	0.469	0.201	0.248	0.293
Observations	238	205	222	238	238	238
Panel D: high-intensity versus low-intensity						
Differences	-0.018 (0.019)	0.122 (0.119)	-0.779* (0.448)	-0.035 (0.214)	-0.256 (0.171)	-0.146*** (0.050)
F-statistic	1.793	5.929	4.665	1.243	3.099	2.287
R²	0.255	0.535	0.468	0.192	0.372	0.304
Observations	132	118	127	132	132	132

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: Reported β_1 (see equation (3)). * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. All specifications include period fixed effects and control for oil resources, educational attainment and individualism. Estimations including separate figures for the educational attainment and individualism variables are available upon request to the authors. The results in this table were obtained using the same specifications and controls as the results in table 3.

Table 8
Effects of intensity: ordinary least squares (OLS) evidence, without outliers

Coefficient	Dependent variable					
	Economic growth	Corruption	Democracy	Transparent laws	Censorship effort (media)	Judicial constraints
Intensity	0.010*** (0.003)	-0.082** (0.032)	0.371*** (0.092)	0.089* (0.048)	0.138*** (0.039)	0.051*** (0.012)
Educational attainment	0.082 (0.054)	-6.813*** (0.520)	14.827*** (1.452)	4.692*** (0.747)	4.065*** (0.604)	1.382*** (0.182)
Individualism	-0.007 (0.009)	-0.289*** (0.082)	0.274 (0.229)	-0.085 (0.118)	0.169* (0.095)	-0.027 (0.029)
Oil resources	-0.031*** (0.010)	0.340*** (0.094)	-2.551*** (0.261)	-0.199 (0.135)	-0.718*** (0.109)	-0.033 (0.033)
Constant	-0.020 (0.038)	7.948*** (0.378)	-2.389 (2.095)	-1.991*** (0.518)	-0.924** (0.419)	-0.111 (0.126)
F-statistic	3.348	10.023	9.153	2.408	4.803	3.796
R²	0.204	0.441	0.427	0.156	0.269	0.225
Observations	296	261	280	296	296	296

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: All regressions include period fixed effects. * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors in parentheses. Estimations including separate figures for the educational attainment and individualism variables are available upon request to the authors. The results in this table were obtained using the same specifications and controls as the results in table 4.

V.   Conclusions

This paper shows evidence of the causal effects of the erosion of economic freedom in 19 Latin American countries. Its results demonstrate that an erosion of economic freedom results in lower economic growth, a weakening of democracy, an increase in corruption and a potential deterioration of other institutions, with consequences for transparent laws, censorship effort (media) and judicial constraints in the short run.

On average, the estimates indicate that for each percentage point of erosion in a country's economic freedom, its economic growth rate the following year is between 0.3 and 1.6 percentage points lower than that of the countries where it was not eroded. The results also suggest that there is statistically significant evidence that the erosion of economic freedom led to a worsening of institutions. Corruption increased by between 0.031 and 0.043 points (on a scale of 6 points), democracy deteriorated by between 0.0863 and 0.731 points (on a scale of -10 to +10 points), and there is evidence suggesting a potential deterioration in other institutions, with worsening scores for transparent laws (0.04 to 0.29 points) and censorship effort (media) (0.036 to 0.275 points), for which both scales rise to 4 points, and judicial constraints (0.04 to 0.08 points on a scale of 0 to 1).

The results were estimated by combining the differences in the percentage changes in economic freedom scores between countries, differences in economic growth rates and the other institutional variables. Our identification strategy was illustrated with a simple two-by-two table (see table 2), providing evidence that the differences-in-differences methodology and assumption were appropriate. Nevertheless, since these differences could be deemed to be imprecisely estimated given the lack of other covariates and confounding effects, we estimated an ordinary least squares (OLS) linear regression (see section II.1). We used different levels of intensity through the years studied, together with other relevant covariates that have been proven to be determinants of our dependent variables.

The results support our initial findings and suggest causality between the programme and the dependent variables. However, some of the estimates were not statistically significant when units with low-intensity erosion were compared with untreated or high-intensity units. Considering this evidence, we specified a model that allowed us to measure the short-run causal effects of changes in the economic freedom score on our dependent variables (see section II.2), which provided a larger sample size.

The results, which were very similar to the basic results, showed a lower growth rate and a deterioration of institutions the following year compared to countries whose economic freedom was not eroded.

However, we defined our treatment as endogenous and tested our experiment on this basis. We accordingly specified a VAR model, and the results showed that exogenous treatment had a statistically significant causal effect on economic growth, corruption and democracy as well as coefficients qualitatively close to those previously obtained.

In conclusion, these findings show that a freer economic environment would not only benefit Latin American countries in the short run with higher economic growth, lower corruption and a stronger and healthier democracy but could also impact other variables in the region over the long run. Subsequent analysis of the impact of a generalized positive economic freedom shock in the region will be carried out in future research.

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Annex A1

Table A1.1
Description and summary statistics, without outliers

Variable	Source	Summary statistics				
		Observations	Mean	Standard deviation	Minimum	Maximum
Economic growth	Penn World Table 10	312	0.032	0.081	-0.809	0.269
Corruption	PRS Group International Country Risk Guide (ICRG)	279	3.633	0.855	1.5	5
Democracy	Polity5 Project	296	7.851	2.330	-3	10
Transparent laws	V-Dem Project	312	0.607	1.034	-2.524	2.647
Censorship effort (media)	V-Dem Project	312	1.311	0.877	-1.842	3.222
Judicial constraints	V-Dem Project	312	0.617	0.266	0.007	0.969
Intensity	Fraser Institute	312	0.066	1.250	-2.964	2.957
Erosion	Fraser Institute	141	-1.027	0.734	-2.964	-0.128
Economic freedom	Fraser Institute	312	7.041	0.779	2.720	7.970

Source: Prepared by the authors.

Annex A2

Figure A2.1
Latin America: changes in economic freedom scores, without outliers, 2000–2020
(Percentages)

Annex A3

Table A3.1
Robustness test: ordinary least squares (OLS) evidence for the effects of intensity

Coefficient	Dependent variable					
	Economic growth	Corruption	Democracy	Transparent laws	Censorship effort (media)	Judicial constraints
Intensity	0.003*** (0.001)	-0.034*** (0.013)	0.046 (0.034)	0.046** (0.019)	0.031** (0.014)	0.007 (0.004)
Educational attainment	0.044 (0.032)	-5.505*** (0.459)	14.252*** (1.157)	3.887*** (0.620)	3.216*** (0.468)	1.433*** (0.140)
Individualism	-0.011* (0.006)	-0.110 (0.083)	-0.639*** (0.209)	-0.339*** (0.112)	-0.085 (0.085)	-0.098*** (0.025)
Oil rents	-0.001** (0.001)	0.028*** (0.009)	-0.257*** (0.022)	-0.025** (0.012)	-0.087*** (0.009)	-0.026*** (0.003)
Constant	-0.013 (0.025)	7.376*** (0.350)	-0.952 (1.901)	-1.748*** (0.478)	-0.826** (0.361)	-0.283*** (0.108)
F-statistic	5.816	8.473	13.137	2.679	7.083	8.700
R^2	0.279	0.364	0.481	0.152	0.321	0.367
Observations	337	304	324	337	337	337

Source: Prepared by the authors on the basis of estimations drawn from Stata 17.
Note: This table is similar to table 4, the sole difference being that oil rents as a percentage of GDP are taken as a control instead of the dummy variable used in table 4. All regressions include period fixed effects. * Significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are in parentheses. Estimations including separate figures for the educational attainment and individualism variables are available upon request to the authors.

Full dollarization versus monetary union: the case of Ecuador

Andrea Bonilla-Bolaños and Diego Villacreses

Abstract

This study proposes using optimum currency areas (OCA) as a theoretical basis for analysis of the full dollarization of Ecuador, viewing the country and the United States as an informal monetary union. At least two facets of this are of interest: (i) the convergence properties of inflation rates between Ecuador and the United States; and (ii) the degree of vulnerability of the Ecuadorian economy to changes in United States monetary policy. Unit roots and stationarity tests are used to study inflation rate convergence, structural vector autoregressive models are used to examine the Ecuadorian economy's vulnerability to changes in United States economic policy. We find evidence that inflation rates are converging ex-post the full dollarization of Ecuador and that monetary policy changes by the United States do therefore affect Ecuadorian macroeconomic variables. Moreover, we argue that OCA theory is potentially useful for studying fully dollarized economies.

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I. Introduction

Discussion of the pros and cons of regional integration is one of the longest-running multidisciplinary debates. From the field of economics, multiple efforts have been made to develop and improve the theory of economic integration itself, which, among other stages, includes the study of what are known as economic and monetary unions (EMU): economic blocs formed by two or more countries creating a single currency area (Balassa, 1961a). The theory of optimum currency areas (OCAs) (Mundell, 1961) states that one of the main costs of belonging to an EMU is the loss of independent monetary policy. OCA theory also establishes some criteria for economic synchronization among countries that would minimize this impact. In addition, in an EMU, monetary policy decisions must be coordinated, as they are shared across the relevant area. The definition of an EMU provided by OCA theory has several similarities with the current fully dollarized monetary regime of Ecuador. Full dollarization could be said to be an extreme form of a hard peg, whereby the domestic currency is replaced with a foreign currency (Jácome and Lönnberg, 2010). The result is that the dollarized country and the foreign country use the same currency, as in an EMU. Therefore, both dollarization and EMUs can be described as forms of hard pegs.

This study proposes using OCA theory as a theoretical basis for analysis of the full dollarization of Ecuador by viewing the country and the United States as an "informal monetary union". As opposed to a traditional EMU, in which monetary policy is coordinated, formal dollarization of an economy involves sharing a currency without any coordination of monetary policy. In other words, under full dollarization the country issuing the currency —the United States— sets benchmark interest rates and makes use of other monetary policy tools independently. At least two facets of this are of interest: (i) the degree of synchronization of the key macroeconomic variables of Ecuador and the United States; and (ii) the degree of vulnerability of the Ecuadorian economy to changes in United States economic policy. This method allows the costs of full dollarization to be evaluated with an alternative approach.

This article examines full dollarization using the theoretical basis of OCA and the empirical tools adapted to its analysis, focusing on the case of Ecuador. Hence, this paper contributes to the exchange-rate regime debate by linking OCA theory to Ecuador's experience of full dollarization and by performing an econometric exercise to test ex-post fulfilment of a set of OCA criteria in a dollarized economy.

This article has four sections in addition to this introduction. Section II reviews the literature and connects the concept of an EMU with the practice of full dollarization, summarizing OCA theory and contrasting it with full dollarization to explain the econometric exercise. Section III outlines the empirical methodology. Section IV provides the numerical results and compares them with theoretical expectations. Lastly, section V summarizes the arguments and offers some conclusions.

II. Theoretical framework

Discussion of the pros and cons of regional integration is one of the longest-running multidisciplinary debates. In economic theory, the pioneering contribution is the Theory of Economic Integration proposed by Béla Balassa in 1961. Balassa (1961a and 1961b) proposes studying, separately and successively, five stages or degrees of economic integration, each more demanding than the last, in terms of removal of barriers between economic blocs. These stages, as summarized in table 1 below, are: (i) free trade area; (ii) customs union; (iii) common market; (iv) monetary union; and (v) total economic integration.

Table 1
Balassa's stages of economic integration

Integration stage	Features	Examples
1. Free trade area	• No tariffs or quotas against member countries. • Individual quotas against third countries.	• On 1 January 2008, the United States, Canada, and Mexico removed the last remaining tariffs between them, completing the North American Free Trade Agreement (NAFTA). NAFTA had entered into force in 1994. • The ASEAN Free Trade Area (AFTA) was launched in 1992.
2. Customs union	• No tariffs or quotas against member countries. • Common external tariff.	• The European Economic Community (EEC) was created in 1957. EEC formally ceased to exist in 2009 via the Treaty of Lisbon and its institutions were absorbed into the European Union. • The Southern Common Market (MERCOSUR), founded in 1991, and the Andean Community, originating from the Cartagena Agreement of 1969.
3. Common market	• No tariffs or quotas against member countries. • Common external tariff. • Free factor movement, including of labour.	• The European Union was created in 1993 through the Maastricht Treaty.
4. Economic and monetary union	• No tariffs or quotas against member countries. • Common external tariff. • Free factor movement, including of labour. • Harmonization of economic policies and single currency.	• The European Union Economic and Monetary Union (EMU) and the euro were rolled out in January 1999.
5. Total economic integration	• No tariffs or quotas against member countries. • Common external tariff. • Free factor movement, including of labour. • Harmonization of economic policies and single currency. • Unification of monetary, fiscal, social, and counter-cyclical policies. • Requires a binding supranational organization.	• The United States, which has had a federal government system since 1789.

Source: Prepared by the authors, on the basis of B. Balassa, *The Theory of Economic Integration*, Routledge, 1961; E. Dorrucci and others, "The link between institutional and economic integration: insights for Latin America from the European experience", *Open Economies Review*, vol. 15, No. 3, July 2004; and E. B. Essien and M. Dickson, "Economic integration among the less developed countries: myth and the new international realities", *Developing Country Studies*, vol. 4, No. 12, 2014.

Note: The provisional enforcement dates correspond to de jure economic regional integration, or the official dates of signing of the creation treaties. In some cases, the effective implementation of the measures specified by the integration agreements (de facto integration) is not finished. For instance, AFTA, Mercosur, and the Andean Community are de jure agreements because de facto integration has not yet been achieved, and thus, they are incomplete free trade agreements and common markets.

The traditionally recommended recipe for successful economic integration has been to follow these stages in sequence, replicating the European integration model. However, because multiple integration experiences exist that have not followed this order, especially in Latin America, there is a need to review traditional theory, so that these experiences are also evaluated and not automatically dismissed for not following the established scheme (Bonilla-Bolaños, 2021).

Theory behind each of the integration stages proposed by Balassa (1961a and 1961b) is vast. For the purpose of this research, we shall focus on the theory developed around Balassa's fourth stage, the economic and monetary union. The OCA theory formulated by Mundell (1961) and expanded by authors such as Frankel and Rose (1997), Frankel (2004), Issing (2011), therefore forms the theoretical basis of this study (see box A1.1 in annex A1 for a theoretical summary).

While an EMU refers to any geographical area in which countries share a single currency, the OCA concept includes the optimality condition. Thus, for an EMU to be an OCA, sharing a currency must enable maximization of economic efficiency, i.e., the benefits of using a common currency must outweigh the costs for individual economies of giving up their own currencies (Mundell, 1961). Theoretically, because an EMU is a hard fixed exchange-rate regime, the evident cost of such a regime is the loss of independent monetary policy; countries belonging to an EMU must have common monetary policy. So, for countries to constitute an OCA, Mundell argues they need to meet one of two conditions: (i) the countries must experience similar shocks so that having a single monetary policy is not costly; or (ii) if the countries experience different shocks, they must have high factor mobility so that they can adjust to them.

Currently, high factor mobility is just one of several criteria included in OCA theory. Other prerequisites for belonging to an OCA (as detailed in box A1.1) include financial market integration, fiscal integration, inflation rate convergence and economic cycle synchronization (Mongelli, 2002). But what if any of the OCA criteria are met and two or more countries decide to share a single currency? What if a country, in this instance Ecuador, adopts a foreign country's currency? Can they synchronize ex-post?

Full dollarization, or formal dollarization as it is called in Ecuador, occurs when a country abandons its own currency and adopts another country's —which may or may not be the United States dollar— as a means of payment and unit of account. In essence, it is a form of a hard peg (Alesina and Barro, 2001). In fact, EMUs are also a form of hard peg. Therefore, OCA theory may be useful in studying full dollarization dynamics. Given all of this, it is possible to view the Ecuador-United States relationship as an informal monetary union: the formal dollarization of Ecuador can be studied as a special case of an EMU in which the United States and Ecuador share a currency but there is no monetary policy coordination. Viewed this way, it is possible that several of the criteria identified by OCA theory may be fulfilled ex-post, after Ecuadorian full dollarization.

Ex-post fulfilment of OCA criteria is known as the "endogeneity of the OCA criteria", a term coined by Frankel and Rose (1997 and 1998), formulated reflecting on the Lucas (1976) critique: currency union must be understood as a fundamental change of the policy regime; hence, it affects the underlying OCA criteria in such a way that they are more likely to be satisfied ex-post as both monetary and trade integration deepen. Therefore, the United States and Ecuador might be fulfilling some OCA criteria following Ecuadorian full dollarization.

In order to analyse the full dollarization of Ecuador using OCA theory it is necessary to recognize that: (i) if some OCA criteria are fulfilled, they must be attained ex-post (there was not an ordered process of joining together as for the eurozone; (ii) fulfilment of some OCA criteria between Ecuador and the European Union, for example, does not transform them into an OCA or into candidates for one.

At least two facets of this are of interest: (i) the degree of vulnerability of the Ecuadorian economy to changes in United States economic policy; and (ii) the level of synchronization of the main macroeconomic variables of Ecuador and the United States. An understanding of these two elements enables evaluation of the costs of full dollarization using an alternative approach.

The forces that favour and hinder currency unions and full dollarization are similar, because both entail abandoning a national currency. On the cost side of a single currency, monetary autonomy is relinquished, resulting in the loss of a national tool to smooth business cycles (Berg and Borensztein, 2000; Meade, 2009; Vernengo, 2006). This cost is especially important for an economy that is highly vulnerable to external shocks as Ecuador, whose business cycle is vulnerable to fluctuations in oil revenues (García-Albán, González-Astudillo and Vera-Avellán, 2021). On the benefit side, EMUs are said to have a benefit in terms of transaction costs, as using the same money facilitates trade in goods and services as well as financial exchanges. This is important because of globalization (Alesina and Barro, 2001). Moreover, full dollarization may lower the country's cost of foreign credit and enhance the credibility of government policy (Chang, 2000). Indeed, for a country with a track record of higher inflation and a reputation for breaking low inflation promises, a way to immediately gain low inflation credibility is to 'tie its hands' by forsaking national monetary sovereignty (Mongelli, 2008). A fully dollarized economy thus provides a framework of price stability whose benefits have been widely identified (Feldstein, 1997). In the case of Ecuador, stability of prices and exchange rates has reduced price speculation and general macroeconomic uncertainty, providing an economic planning environment that was expected to improve Ecuadorian inhabitants' economic well-being (Anderson, 2016).

Through dollarization Ecuador undoubtedly gained credibility and successfully stabilized its high inflation levels (Onur Tas and Togay, 2015). In short, Ecuador imported credibility from the United States, which is a clear advantage, but it is likely now more vulnerable to United States policy changes. Although

the saying "when America sneezes, the world catches a cold" is well known, this pre-existing sensitivity might increase through dollarization. We therefore chose two OCA criteria to test: (i) inflation rate similarity or synchronization (convergence); and (ii) similarity of shocks and business cycles. Considering that the United States is autonomous in terms of monetary policy, testing ex-post achievement of these OCA criteria will shed light on how vulnerable the Ecuadorian economy is to United States economic policy changes.

III. Methodological approach

Having outlined the theoretical basis of this study, we propose: (i) examining the degree of long-run synchronization between headline inflation rates in Ecuador and the United States using unit root tests and stationarity tests; and (ii) determining how vulnerable the Ecuadorian economy is to United States economic policy changes by estimating impulse-response functions through a structural vector autoregression (SVAR) model.

1.   Long-run inflation rate synchronization

Figure 1 shows a clear post-2000 change in the pattern of Ecuadorian inflation: not only did it stabilize —as has been evidenced in empirical research, such as that by Onur Tas and Togay (2015)— it also seems to have synchronized with United States inflation. We therefore employ the strategy of Busetti and others (2007) to test synchronization between the inflation rates in the United States and Ecuador, using the difference between the two rates (the inflation differential, as shown in figure 2) to perform unit root and stationarity tests.

Figure 1
United States and Ecuador: headline inflation rates, January 1970–December 2021
(Percentages)
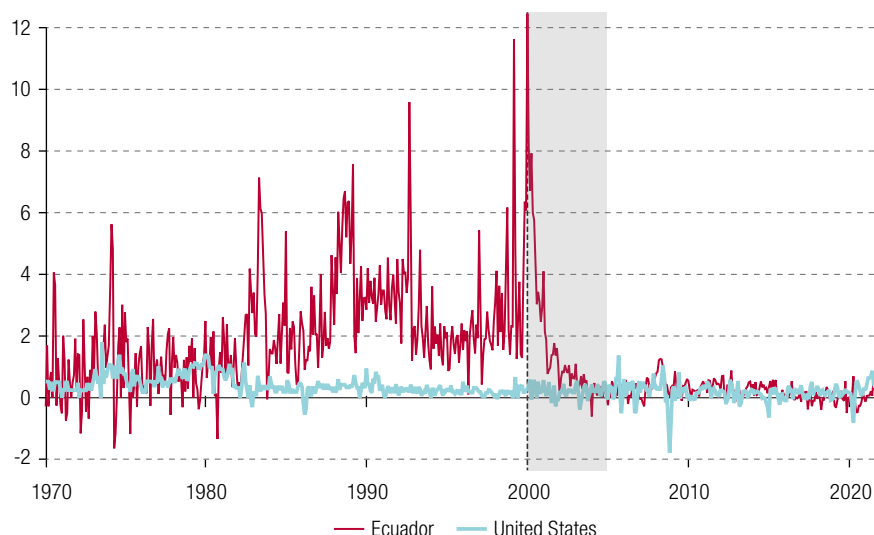
— Ecuador — United States

Source: Prepared by the authors, on the basis of Federal Reserve Bank of St. Louis, "Consumer price index: total all items for the United States (CPALTT01USM657N)", Federal Reserve Economic Data (FRED), 2023 [online] https://fred.stlouisfed.org/series/CPALTT01USM657N and National Institute of Statistics and Census (INEC), "Índice de precios al consumidor", 2023 [online] https://www.ecuadorencifras.gob.ec/indice-de-precios-al-consumidor/.
Note: The grey area indicates January 2000–December 2004, which is considered a period of adjustment (noise).

Figure 2
United States-Ecuador headline inflation differential, January 1970–December 2021

Augmented Dickey-Fuller (ADF) unit root tests (Cheung and Lai, 1995; Dickey and Fuller, 1979) are applied to establish whether the United States-Ecuador inflation series are in the process of converging, and Kwiatkowski–Phillips–Schmidt–Shin (KPSS) stationarity tests (Kwiatkowski and others, 1992) to examine whether the series have converged (whether the inflation rate differential is stable). We have called this convergence process long-run synchronization, because even if the series have not yet converged, they may show synchronization patterns. To test for long-run inflation synchronization we apply ADF tests based on a p'th-order autoregressive process $(AR(p))$:

$$\Delta Y_t = \alpha + \rho Y_{t-1} + \sum_{j=2}^{p} \rho_j \Delta Y_{t-j+1} + \varepsilon_t \qquad (1)$$

where Y_t is the series capturing the inflation differential. If $\pi_{t,US}$ $(\pi_{t,EC})$ denotes the inflation rate series for the United States (Ecuador), properties of convergence between the United States and Ecuador can be studied using time series properties of the inflation differential between them, i.e. by studying $Y_t = \pi_{t,US} - \pi_{t,EC}$. Then, to determine whether convergence is occurring, the null hypothesis of a unit root is tested in (1). The hypotheses are:

$H_0: \rho = 0$; No synchronization is evidenced

$H_a: \rho < 0$; Synchronization is evidenced

The inflation patterns shown in figures 1 and 2, however, suggest convergence, hence we perform KPSS stationarity tests for Y_t to test a level stationarity null hypothesis (H_0). If the null is not rejected, convergence is evidenced: H_0: Convergence is evidenced.

The time series literature on convergence uses both unit root and stationarity tests to detect convergence (Busetti and others, 2007). While unit root tests are useful for identifying a process of convergence between two series, stationarity tests (such as KPSS) are suited for determining

whether the series have converged, which is to say whether the difference between series is stable. In understanding such a process of convergence as long-run synchronization, our methodology is limited to a long-run pattern: we are testing for the existence of a single stochastic trend between the inflation rates series of the United States and Ecuador. As a result, business cycle synchronization patterns are not studied.

Because dollarization of the Ecuadorian economy is a structural change, we test pre- and post-dollarization inflation rate series separately: the pre-dollarization period covers monthly data from January 1970 to December 1999, and the post-dollarization period runs from January 2005 to December 2021. The series from January 2000 to December 2004 is not included as it is considered a period of adjustment (noise). Inflation rate differentials are constructed using the United States and Ecuadorian consumer price indices (CPI) retrieved from the Federal Reserve Economic Data (FRED) (Federal Reserve Bank of St. Louis, 2023a)[1] and the Ecuadorian National Institute of Statistics and Census INEC, 2023)[2] databases. So, Y_t in (1) is $Y_t = \pi_t^i - \pi_t^j$ with i, j = Ecuador, United States. Specifically, the inflation series, π_t, reflects the (monthly) log-differences of the national CPIs and their trends are shown in figures 1 and 2. The results of this exercise are discussed in section IV.1.

2.   Structural vector autoregression modelling

SVAR modelling enables estimation of the response of a time series to an impulse in another time series included in the vector of variables (Sims, 1980 and 1986). Therefore, we employ a SVAR strategy to capture the response of Ecuadorian macroeconomic variables to changes (shocks) in the variables of monetary policy of the United States. Specifically, the econometric strategy is described by the linear simultaneous p'th-order difference-equation model as follows:

$$A_0 X_t = A_1 X_{t-1} + \ldots + A_p X_{t-p} + \varepsilon_t \tag{2}$$

$$A(L)X_t + \varepsilon_t \text{ with } \varepsilon_t | X_s \text{ , } s < t \sim N(0,I)$$

Where X_t is a 3×1 vector of endogenous variables at time t and $X_t^T = (r_{fed}, \Delta y_{ec}, \pi_{ec})$ with r_{fed}: as the nominal interest rate of the United States Federal Reserve (its monetary policy tool), y_{ec}: as Ecuador's real GDP in logarithmic terms, and π_{ec}: as the Ecuadorian inflation rate. L is the lag operator, and p is a finite-order lag length. A_0 is a 3× 3 matrix that summarizes the contemporaneous relationships between the variables and ε_t is the 3×1 vector of structural disturbances. Data on the series included in X_t were obtained from the FRED database and Central Bank of Ecuador databases (Central Bank, 2023). Because dollarization is a structural change, we estimate two SVAR models for each subperiod: pre- and post-dollarization. The pre-dollarization period includes quarterly data from the first quarter of 1980 to the fourth quarter of 1999 and the post-dollarization period runs from the first quarter of 2005 to the fourth quarter of 2021. Again, the period from 2000 to 2004 is omitted as it is considered a period of adjustment (noise). Because for the pre-dollarization model, we were not able to recover quarterly Ecuadorian real GDP[3] data, the pre-dollarization model includes a X_t in (2) that is a 2×1 vector: $X_t^T = (r_{fed}, \Delta \pi_{ec})$ and ε_t in (2) is 2×1. In both the pre- and post-dollarization periods,

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[1] Consumer Price Index: Total All Items for the United States [CPALTT01USM661S], index 2015=100, monthly, seasonally adjusted.

[2] Index 2014=100, monthly. We seasonally adjust the series and scale it to be index 2015=100. We treated seasonality using the seasonal R's package (see [online] https://www.r-project.org/about.html) following the methodology proposed by Sax and Eddelbuettel (2018).

[3] The Central Bank of Ecuador database only includes post-dollarization information. When asked for pre-dollarization data, the central bank responded that no quarterly data exist for Ecuadorian real GDP before 2000, and that only annual data is available for that period.

A_0 is assumed to be non-singular, such that (2) provides a complete description of the conditional distribution of X_t given X_s, and $s < t$ can be solved by multiplying through on the left by A_0^{-1} to produce the reduced form:

$$X_t = B_1 X_{t-1} + ... + B_p X_{t-p} + \mu_t \tag{3}$$

$$B(L)X_t = \mu_t$$

in which $B_0 = I$ and μ_t is white noise that represents the vector of canonical disturbances (3×1) for the post-dollarization period and (2×1) for the pre-dollarization period, whose variance-covariance matrix is not restricted. The canonical (μ_t) and structural disturbances (ε_t) are linked by the relationship $A_0 \mu_t = \varepsilon_t$. The identification strategy relies on a Cholesky decomposition, meaning that some restrictions are imposed on A_0, so that A_0^{-1} is a lower triangular matrix; i.e. the identification strategy relies on short-term restrictions. Thus, for post-dollarization:

$$A_0^1 = \begin{pmatrix} a_{11}^1 & 0 & 0 \\ a_{21}^1 & a_{22}^1 & 0 \\ a_{31}^1 & a_{32}^1 & a_{33}^1 \end{pmatrix}$$

meaning that the Federal Reserve nominal interest rate does not contemporaneously (within a quarter) respond to any Ecuadorian macroeconomic indicator, $\left(a_{12}^1, a_{13}^1\right) = (0,0)$; and that Ecuadorian real GDP growth rate does not instantaneously react to changes in the Ecuadorian inflation rate, $\left(a_{13}^1\right) = 0$. And, for the pre-dollarization period:

$$A_0^2 = \begin{pmatrix} a_{11}^2 & 0 \\ a_{21}^2 & a_{22}^2 \end{pmatrix}$$

meaning that the Federal Reserve nominal interest rate does not contemporaneously respond to changes in the Ecuadorian inflation rate, $\left(a_{12}^2\right) = 0$. The results of this exercise are discussed in section IV.2.

IV. Results

Two aspects of the results of our exercise are discussed separately: (i) the long-run inflation synchronization between Ecuador and the United States in section IV.1; and (ii) Ecuadorian responses to United States economic policy changes in section IV.2.

1. Long-run inflation rate synchronization

Table 2 shows the results of the unit root and stationarity tests of United States-Ecuador inflation rate differentials for the pre- and post-dollarization periods. Sections A and B in table 2 contain the outcome of the ADF test (whether the null hypothesis is rejected at the 1%, 5%, or 10% significance level or not rejected; the retained lags and the test statistics), while section C displays the outcome of the KPSS test.

Table 2
Unit root and stationarity tests on United States-Ecuador inflation differentials

		Pre-dollarization January 1970–December 1999	Post-dollarization January 2005–December 2021
A. H_0: $\rho = 0$; No synchronization is evidenced			
ADF-No intercept	Statistic	-0.727	-3.152
	Reject[a]	Not rejected	10%
	Lags	12	12
B. H_0: $\rho = 0$; No synchronization is evidenced			
ADF-Intercept	Statistic	-1.975	-3.153
	Reject[a]	5%	10%
	Lags	12	12
C. H_0: Convergence is evidenced			
KPSS	Statistic	1.32	0.666
	Reject[a]	1%	Not rejected

Source: Prepared by the authors, on the basis of Federal Reserve Bank of St. Louis, "Consumer price index: total all items for the United States (CPALTT01USM657N)", Federal Reserve Economic Data (FRED), 2023 [online] https://fred.stlouisfed.org/series/CPALTT01USM657N and National Institute of Statistics and Census (INEC), "Índice de precios al consumidor", 2023 [online] https://www.ecuadorencifras.gob.ec/indice-de-precios-al-consumidor/.
[a] Refers to the rejection percentage: whether the null hypothesis is rejected at the 1%, 5%, or 10% significance level or not rejected.

The theoretical belief is that long-run inflation synchronization does exist in the post-dollarization period, i.e. ex-post achievement of OCA criteria (Frankel and Rose, 1998). Long-run synchronization of inflation rates in the pre-dollarization period is not necessarily expected. The evidence of post-dollarization long-run synchronization is strong: the ADF test rejects the null hypothesis at the 10% significance level. Pre-dollarization long-run synchronization is not conclusively demonstrated. Nevertheless, post-dollarization, the inflation rates of the United States and Ecuador inflation rates can be said to be in the process of converging. A stronger hypothesis is that the inflation rates of the United States and Ecuador have already converged. This does indeed appear to be the case. In the KPSS test results, the null of convergence is not rejected for the post-dollarization period. This convergence is immediately apparent in figure 2, and the results in table 2 merely confirm this supposition.

Given our results, not only has Ecuador gained credibility and successfully stabilized its inflation from high pre-dollarization levels (Onur Tas and Togay, 2015), its inflation also appears to have converged to United States levels. Although the KPSS test provides evidence of convergence, there are some non-negligible short-run patterns of divergence. For instance, since 2017, Ecuador has reported periods of negative inflation (see figure 1), while the United States has not. Some clues as to the repercussions of deflation can be found in Lin and Wu (2012) and Oikawa and Ueda (2018), among other studies. Regardless, negative inflation entails challenges in terms of economic stability and growth, the nature of which is still unknown in the case of Ecuador (Calvo, 2002). In fact, a shared long-run pattern in the inflation rates of the United States and Ecuador does not necessarily mean that their short-run trends will match or that severe problems will not arise in the event of deflation. The hypothesis that business cycles are not symmetric, i.e., contractions are shorter and sharper than expansions (Morley and Piger, 2012), adds to the deflation issue, so negative trends can be more harmful than positive ones. Although this issue falls outside the scope of this article, it should nonetheless be considered.

In short, full dollarization allowed Ecuador to import credibility from the United States and stabilize its prices. In addition, the inflation rates of the United States and Ecuador appear to be converging, which would be a clear advantage. One disadvantage of full dollarization is potential high vulnerability to United States policy changes. Section IV.2 sheds some light on this.

2.   Ecuadorian vulnerability to United States monetary policy changes

To compare the pre- and post-dollarization responses of selected Ecuadorian macroeconomic variables to changes in the United States Federal Funds Effective Rate, we perform the preliminary exercise illustrated below. Figure 3A displays the impulse-response functions for the post-dollarization period and figure 3B does the same for pre-dollarization. A response is significant if its confidence interval does not include the zero axis. Table 3 displays the forecast error variance decomposition.

Figure 3
Impulse-response functions of Ecuadorian macroeconomic variables to an increase
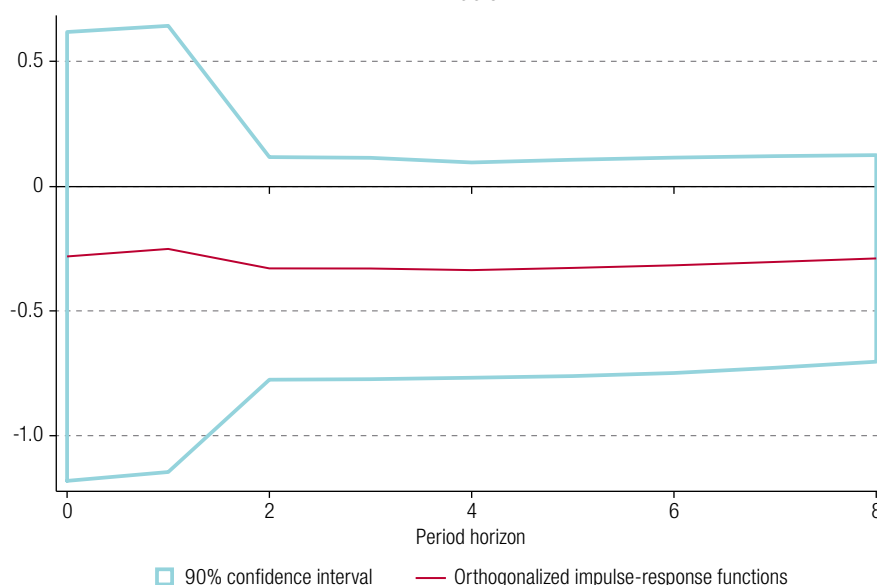of 1 percentage point in the United States Federal Funds Effective Rate

A. Post-dollarization

$$X_t^T = (r_{fed}, \Delta y_{ec}, \pi_{ec})$$

$r_{fed}, \Delta y_{ec}$
Real GDP

r_{fed}, π_{ec}
Inflation

☐ 90% confidence interval   —— Orthogonalized impulse-response functions
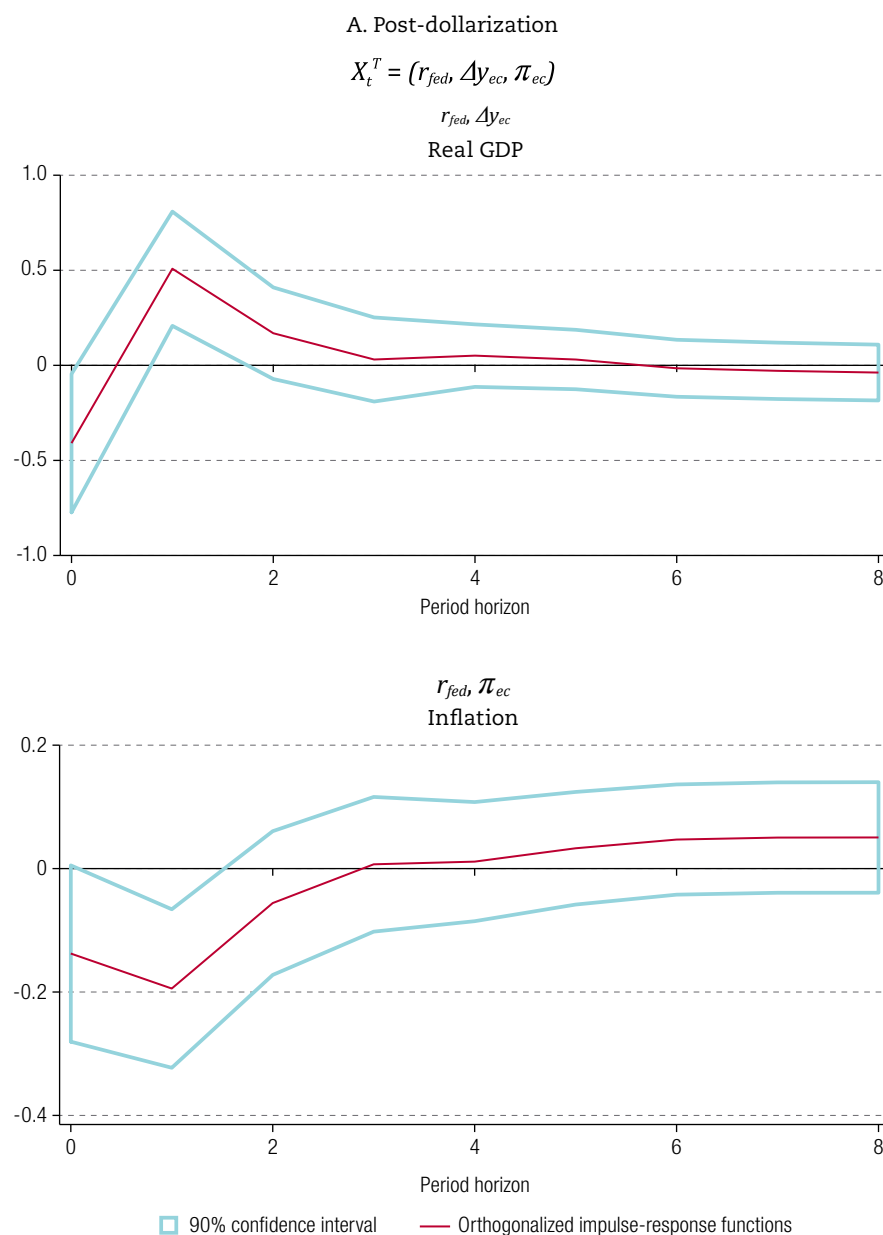
B. Pre-dollarization

$$X_t^T = (r_{fed}, \pi_{ec})$$

$$r_{fed}, \pi_{ec}$$
Inflation

Period horizon

☐ 90% confidence interval   —— Orthogonalized impulse-response functions

Source: Prepared by the authors, on the basis of Federal Reserve Bank of St. Louis, "Consumer price index: total all items for the United States (CPALTT01USM657N)", Federal Reserve Economic Data (FRED), 2023 [online] https://fred.stlouisfed.org/series/CPALTT01USM657N. National Institute of Statistics and Census (INEC), "Índice de precios al consumidor", 2023 [online] https://www.ecuadorencifras.gob.ec/indice-de-precios-al-consumidor/ and Ecuadorian Central Bank, "Boletín de Cuentas Nacionales Trimestrales", 2023 [online] https://contenido.bce.fin.ec/documentos/PublicacionesNotas/Catalogo/CuentasNacionales/Anuales/Dolares/IndiceCtasNac.htm.
Note: Graphs are by impulse variable and response variable.

Table 3
Forecast error variance decomposition after an increase in the United States
Federal Funds Effective Rate

Horizon	Pre-dollarization January 1970–December 1999	Post-dollarization January 2005–December 2021	
	Ecuadorian inflation rate π_{ec}	Ecuadorian real GDP Δy_{ec}	Ecuadorian inflation rate π_{ec}
1	0.003402	0.049005	0.036289
2	0.005795	0.115473	0.089977
3	0.009481	0.112185	0.088817
4	0.013376	0.111568	0.086639

Source: Prepared by the authors, on the basis of Federal Reserve Bank of St. Louis, "Consumer price index: total all items for the United States (CPALTT01USM657N)", Federal Reserve Economic Data (FRED), 2023 [online] https://fred.stlouisfed.org/series/CPALTT01USM657N. National Institute of Statistics and Census (INEC), "Índice de precios al consumidor", 2023 [online] https://www.ecuadorencifras.gob.ec/indice-de-precios-al-consumidor/ and Ecuadorian Central Bank, "Boletín de cuentas nacionales trimestrales", 2023 [online] https://contenido.bce.fin.ec/documentos/PublicacionesNotas/Catalogo/CuentasNacionales/Anuales/Dolares/IndiceCtasNac.htm.
Note: Only bold results are statistically different from zero. The reported values refer to the fraction of the total forecast-error variance of each Ecuadorian series that is attributable to a 1 percentage point increase (shock) in the Federal Funds Effective Rate.

The r_{fed}, Δy_{ec}, π_{ec} series are stationary and Akaike information criterion (AIC) and Bayesian information criterion (BIC) suggest that L should be set to 2 in (2) and (3). The estimated SVAR stability tests and impulse-response functions graphs are included in annexes A2 and A3.

There is a clear difference between pre- and post-dollarization results. Pre-dollarization, the Ecuadorian inflation rate does not react to changes in the Federal Funds Effective Rate. However, post-dollarization, the Ecuadorian inflation rate does significantly decrease when the Federal Funds Effective Rate increases (see figure 3A). Moreover, post-dollarization, there is evidence that Ecuador's real GDP growth rate immediately lightly decreases one period after an increase in the Federal Funds rate. This a short-duration impact, because it becomes zero in period 2 (see figure 3A). Thus, there is preliminary evidence of inflation synchronization ex-post adoption of the informal monetary union. Consequently, monetary policy changes by the United States do affect patterns in Ecuadorian macroeconomic variables. However, when examining the extent to which forecast-error variance of Ecuadorian series are attributed to the error in the United States Federal Funds Effective Rate equation, we found weak impacts. As shown in table 3, post-dollarization, 11.54% of the Ecuadorian real GDP growth rate variation and around 9% of the change in the Ecuadorian inflation rate are explained by the Federal Funds Effective Rate increase. Therefore, the dollarized Ecuadorian economy does appear to be vulnerable to United States policy changes, but this must be confirmed with further research.

V. Conclusions

The findings of this study clearly show that full dollarization of Ecuador did change its monetary relation with the United States. Post-dollarization, not only did the inflation rates of the United States and Ecuador start to synchronize, they also converged. The Ecuadorian economy also appears to have become vulnerable to United States monetary policy changes.

The finding of convergence of the inflation rates of the United States and Ecuador is crucial for Ecuadorian monetary policy. Even though full dollarization entails a limitation of monetary autonomy, non-conventional monetary tools exist that can be implemented, because of money endogeneity (Missaglia, 2021). In fact, full dollarization of Ecuador works as a fractional reserve scheme: only a portion of the total liquidity of the Ecuadorian economy is in United States dollars, the other part is in currencies that are convertible to dollars or records denominated in dollars (secondary money) (Villalba, 2019). Consequently, monetary expansion is possible by increasing secondary money through the money multiplier. Some Ecuadorian monetary policymakers would like to use such non-conventional monetary tools, but, if United States monetary policy does succeed in stabilizing inflation, what is the incentive for Ecuador to change monetary policy? This is an ongoing debate. Some argue that trying to intervene is futile, because, for instance, Ecuador is not a disciplined country, so, not having a monetary tool is better than using it badly (Krugman, 2000) and that its fiscal policy is sustainable and might be enough (Marí Del Cristo and Gómez-Puig, 2016). There are also those who call for some degree of monetary autonomy for Ecuador, one reason being vulnerability to United States shocks. In any case, a monetary policy tool is useful beyond stabilizing prices. Macroeconomic policy is needed to smooth the business cycle, making it an important tool for labour market and welfare policies.

This study did find some evidence of Ecuadorian vulnerability to United States monetary policy changes. However, the transmission channels permitting Ecuador to import United States monetary policy credibility are the same ones that make the Ecuadorian economy vulnerable to United States shocks, or are similar to them. In essence, it is the price to pay for a benefit. This is also an ongoing debate on these channels to which we shall not contribute here (see, for instance, Calvo (2002), Vernengo and Bradbury (2011) or Anderson (2016)). Our aim in this article has been to demonstrate that OCA theory is useful for analysing fully dollarized economies. We argue that full dollarization can be studied as an informal monetary union and shed some light on how by performing two econometrical exercises, the results of which are in line with those in Castillo, Truong and Rodríguez (2021). There is, of course, a great deal more to investigate on this subject.

In sum, we present preliminary evidence that inflation synchronization occurred ex-post adoption of full dollarization by Ecuador (what we have called an informal monetary union). Consequently, monetary policy changes by the United States do affect patterns in Ecuadorian macroeconomic variables. Our analysis suggests vulnerability of the dollarized country in this regard, which needs to be confirmed with future research. Irrespective, OCA theory may be a useful framework to study fully dollarized economies. Lastly, our results suggest that macro-econometric modelling applied to Ecuador should include the United States interest rate to better capture time series patterns.

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Annex A1

An OCA is defined as "the optimal geographic domain of a single currency, or of several currencies, whose exchange rates are irrevocably pegged and might be unified" (Mongelli, 2002, p. 7).[a] This common or pegged currency can fluctuate only with those of the rest of the world. The optimal character of an OCA is determined based on a number of properties or "criteria", including mobility of factors of production, price and wage flexibility, economic openness, diversification of production and consumption, similarity of inflation rates, fiscal integration and political integration. These properties reduce the effectiveness of nominal exchange rate adjustments within the currency area by promoting internal and external balance, thus reducing the impact of certain shocks.

The traditional OCA criteria, developed during the "pioneer phase" of OCA theory (Mongelli, 2002), are as follows:[b]

- The existence of nominal prices and wage flexibility within countries sharing a currency reduces the need for exchange-rate adjustments after a disturbance, because it is unlikely to be associated with sustained unemployment in one country and inflation in another (Friedman, 1966; Kawai, 1987).

- High mobility of factors of production can reduce the need to alter real factor prices and nominal exchange rates between countries in response to disturbances, owing to the reallocation created by factor market integration (Mundell, 1961). Although labour mobility is usually low in the short run, because of migration and retraining costs, it could be higher in the medium and long run, facilitating adjustment after permanent disturbances (Corden, 1972).

- Financial market integration allows temporary adverse disturbances to be softened by capital inflows, thereby reducing the need for exchange-rate adjustments (Ingram, 1962).

- The higher the degree of economic openness, the less useful the nominal exchange rate is as an adjustment instrument, because the higher openness is: (i) the more changes in international prices impact domestic prices directly and indirectly; and (ii) devaluation would be transmitted more rapidly to the price of tradable goods and the cost of living, negating its intended effects (McKinnon, 1963).

- Greater diversification of production and consumption (i.e., in the jobs portfolio, and in imports and exports) decreases the possible impacts of shocks specific to an individual sector, thus reducing the need for changes in the terms of trade (Kenen, 1969).

- When countries have similar (and low) inflation rates, the terms of trade would remain relatively stable, in turn, fostering more balanced current account transactions and trade, and thus reducing the need for nominal exchange-rate adjustments (Fleming, 1971).

- Political integration. Willingness within a group of countries contemplating adoption of a single currency, among other effects, fosters compliance with joint commitments, sustains cooperation on various economic policies, and encourages more institutional linkages (Mintz, 1970). A currency area needs a reasonable degree of policy and preference compatibility to succeed (Haberler, 1970; Tower and Willett, 1976).

- The similarity of supply and demand shocks and business cycles is the "metaproperty" because it captures the interaction between several properties. In fact, membership of a monetary union entails forgoing national exchange-rate and monetary policy. In this case, adjustment costs depend directly on the asymmetry of the shocks each economy faces: if all member countries of a monetary union face the same shocks, there are no costs of having a common policy. Thus, the above conditions (e.g. fiscal integration, wage and price flexibility) are not necessary (Wyplosz and Cohen, 1989; Corden, 1972; Ishiyama, 1975; Mundell, 1973; Tower and Willett, 1976).

Source: A. Bonilla-Bolaños, "A step further in the theory of regional integration: a look at the Unasur's integration strategy", *Working Paper*, No. 1617, Groupe d'Analyse et de Théorie Economique Lyon St-Étienne (GATE Lyon St-Étienne), University of Lyon, May 2016, on the basis of F. P. Mongelli, "'New' views on the optimum currency area theory: what is EMU telling us?", *Working Paper*, No. 138, European Central Bank, 2002; M. Friedman, "The methodology of positive economics", *Essays in Positive Economics*, Chicago, University of Chicago Press, 1966; M. Kawai, "Optimum currency areas", *The New Palgrave: A Dictionary of Economics*, New York, Stockton Press, 1987; R. A. Mundell, "A theory of optimum currency areas", *The American Economic Review*, vol. 51, No. 4, September 1961; W. M. Corden, "Monetary integration", *Essays in International Finance*, No. 93, Princeton University, 1972; J. C. Ingram, *Regional Payments Mechanisms: The Case of Puerto Rico*, University of North Carolina Press, 1962; R. I. McKinnon, "Optimum currency areas", *The American Economic Review,* vol. 53, No. 4, September 1963; P. Kenen, "The theory of optimum currency areas: an eclectic view", *Monetary Problems of the International Economy*, R. Mundell and A. Swoboda (eds.), Chicago, University of Chicago Press, 1969; J. M. Fleming, "On exchange rate unification", *The Economic Journal*, 81, No. 323, September 1971; N. Mintz, *Monetary Union and Economic Integration*, C. J. Devine Institute of Finance, New York University Press, 1970; G. Haberler, "The international monetary system: some recent developments and discussions", *Approaches to Greater Flexibility of Exchange Rates*, C. F. Bergsten and others, Princeton University Press, 1970; E. Tower and T. Willett, *The Theory of Optimum Currency Areas and Exchange-rate Flexibility*, Princeton University, 1976; C. Wyplosz and D. Cohen (eds.), "The European Monetary Union: an agnostic evaluation", *Discussion Papers*, No. 306, Centre for Economic Performance, 1989; W. M. Corden, "Monetary integration", *Essays in International Finance*, No. 93, Princeton University, 1972; Y. Ishiyama, "The theory of optimum currency areas: a survey", *Staff Papers*, vol. 22, No. 2, International Monetary Fund (IMF), 1975; R. A. Mundell, "Uncommon arguments for common currencies", *The Economics of Common Currencies*, H. G. Johnson and A. K. Swoboda (eds.), London, George Allen & Unwin, 1973; A. Alesina and others, "Fiscal policy, profits, and investment", *American Economic Review*, vol. 92, No. 3, June 2002; G. A. Calvo and C. M. Reinhart, "Fear of floating", *The Quarterly Journal of Economics*, vol. 117, No. 2, May 2002; F. Kydland and E. Prescott, "Rules rather than discretion: the inconsistency of optimal plans", *Journal of Political Economy*, vol. 85, No. 3, June 1977; R. J. Barro and D. B. Gordon, "A positive theory of monetary policy in a natural rate model", *Journal of Political Economy*, vol. 91, No. 4, August 1983; J. A. Frankel and A. K. Rose, "Is EMU more justifiable ex post than ex ante?", *European Economic Review*, vol. 41, No. 3–5, April 1997; J. A. Frankel, "No single currency regime is right for all countries or at all times", *Working Paper*, No. 7338, National Bureau of Economic Research (NBER), 1999; P. De Grauwe and F. Mongelli, "Endogeneities of optimum currency areas", *Working Paper Series*, No. 468, European Central Bank, April 2005; W. Buiter, "Macroeconomic policy during a transition to monetary union, *Discussion Paper*, No. 261, Centre for Economic Performance, August 1995; S. M. Collins, "On becoming more flexible: exchange rate regimes in Latin America and the Caribbean", *Journal of Development Economics*, vol. 51, No. 1, October 1996; S. Edwards, "Exchange rates and the political economy of macroeconomic discipline", *The American Economic Review*, vol. 86, No. 2, January 1996.

[a]   The domain of an OCA is given by the sovereign countries choosing to adopt a single currency or to peg their exchange rates irrevocably.
[b]   The "new" OCA theory deals with, among others, the effectiveness of monetary policy (Alesina, and others, 2002; Calvo and Reinhart, 2002), credibility of monetary policy (Kydland and Prescott, 1977; Barro and Gordon, 1983), endogeneity versus specialization hypothesis of OCAs (Frankel and Rose, 1997; Frankel, 1999; De Grauwe and Mongelli, 2005), the character of shocks (Buiter, 1995), synchronization of business cycles and political factors (Collins, 1996; Edwards, 1996).

Annex A2

Structural vector autoregression (SVAR) stability tests

Table A2.1
Pre-dollarization SVAR model: lag order selection criteria

Lag	Log-likelihood (LL)	Likelihood ratio (LR)	Degrees of freedom (df)	p-value (p)	Akaike information criterion (AIC)	Bayesian information criterion (BIC)
0	-323.680				10.46	10.53
1	-258.360	190.66	4	0.000	7.78	7.97
2	-248.880	18.96	4	0.001	7.61[a]	7.94[a]
3	-246.650	4.45	4	0.348	7.66	8.12
4	-245.690	1.94	4	0.747	7.75	8.34
5	-241.697	7.98	4	0.092	7.75	8.47

Source: Prepared by the authors.
[a] Optimal lag, 68 observations.

Table A2.2
Pre-dollarization SVAR model: SVAR eigenvalue stability condition and autocorrelation

Stability condition		Lagrange-multiplier test			
Eigenvalue	Modulus	Lag	chi^2	Degrees of freedom (df)	Prob > chi^2
0.9453	0.9453	1	56.7387	4	0.00000
0.5953	0.5953	2	2.6592	4	0.61637
-0.3715	0.3715				
0.0344	0.0344	Ho: no autocorrelation at lag order			

Source: Prepared by the authors.
Note: All eigenvalues lie inside the unit circle: stability condition is satisfied.

Table A2.3
Post-dollarization SVAR model: lag order selection criteria

Lag	Log-likelihood (LL)	Likelihood ratio (LR)	Degrees of freedom (df)	p-value (p)	Akaike information criterion (AIC)	Bayesian information criterion (BIC)
0	-358.97				10.65	10.68
1	-242.50	232.93	9	0.000	7.49	7.64
2	-214.07	56.86	9	0.000	6.91	7.19[a]
3	-205.83	16.49	9	0.057	6.94	7.32
4	-189.82	32.02	9	0.000	6.73[a]	7.23
5	-184.98	9.67	9	0.378	6.85	7.47

Source: Prepared by the authors.
[a] Optimal lag, 68 observations.

Table A2.4
Post-dollarization SVAR model: SVAR Eigenvalue stability condition and autocorrelation

Stability condition		Lagrange-multiplier test			
Eigenvalue	Modulus	Lag	chi^2	Degrees of freedom (df)	Prob > chi^2
0.81633 + 0.9282i	0.81633	1	14.8878	9	0.09406
0.81633 - 0.9282i	0.81633	2	26.1740	9	0.00191
0.68988	0.68988				
-0.12759 + 0.4476i	0.46541				
-0.12759 - 0.4476i	0.46541	Ho: no autocorrelation at lag order			
-0.43680	0.43680				

Source: Prepared by the authors.
Note: All eigenvalues lie inside the unit circle: stability condition is satisfied.

Annex A3

Figure A3.1
Impulse response functions

A. Post-dollarization
$$X_t^T = (r_{fed}, \Delta y_{ec}, \pi_{ec})$$

Real GDP growth rate Ecuador-
Real GDP growth rate Ecuador

Real GDP growth rate Ecuador-
Federal Reserve interest rate

Real GDP growth rate-
Inflation Ecuador

Federal Reserve interest rate-
Real GDP growth rate

Federal Reserve interest rate-
Federal Reserve interest rate

Federal Reserve interest rate-
Inflation Ecuador

Inflation rate Ecuador-
Ecuador real GDP in log first difference

Inflation Ecuador-
Federal Reserve interest rate

Inflation rate Ecuador-
Inflation rate Ecuador

Period horizon

☐ 90% confidence interval   —— Orthogonalized impulse-response functions

B. Pre-dollarization
$$X_t^T = (r_{fed}, \Delta\pi_{ec})$$

Federal Reserve interest rate-
Federal Reserve interest rate

Federal Reserve interest rate-
Inflation rate Ecuador

Inflation Ecuador-
Federal Reserve interest rate

Inflation rate Ecuador-
Inflation rate Ecuador

Period horizon

□ 90% confidence interval   —— Orthogonalized impulse-response functions

Source: Prepared by the authors.
Note: Graphs are by impulse variable and response variable.

State aid and competition in the Dominican economy[1]

Rolando M. Guzmán, Mercedes Magdalena Lizardo, Daniel de La Rosa and Lisselotte S. Gálvez

Abstract

This paper analyses the economic and social impact of a State aid programme designed to incentivize the development of the border provinces of the Dominican Republic. The intervention method chosen was based on tax exemptions, creating a possible tension between the objective of territorial cohesion and that of upholding market competition. In the competition sphere, the study analyses whether the law had the effect of increasing the market power of beneficiary companies. In the social sphere, it establishes a criterion of regional similarity and compares the evolution of the border provinces with that of other similar provinces. These procedures yield an overall measure of the impact of the initiative. In addition to assessing this particular case, the article contributes to the design of a methodological approach for the economic and social analysis of regional interventions.

Keywords

JEL classification

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I.   Introduction

On 1 February 2001, the Dominican Republic enacted the law creating the Special Zone for Comprehensive Border Development (Act No. 28-01), which introduced a special tax regime for existing and new companies in seven of the country's provinces near the border with Haiti. The initiative was designed to contribute to better living standards for disadvantaged communities by providing incentives for production activities and job creation in the beneficiary region. However, the method of intervention created a potential tension between the objective of promoting territorial cohesion and that of promoting market competition, so that the law was highly controversial from the outset.

The policy under consideration is a typical example of the risks and opportunities created by State aid policies, defined as transfers of government resources to producers, which can have adverse effects on the conditions of competition between firms and the level of efficiency in the economy. In this context, the present study aims, first, to assess the specific case of the law in question and, second, to provide methodological inputs for the ex post evaluation of other State programmes with a similar orientation.

The analysis is based on a review of a variety of indicators for companies covered by Act No. 28-01, with a view to examining the hypothesis that the initiative acted as a compensatory variable counteracting the unfavourable conditions in the border provinces, as opposed to the conjecture that it increased the market power of companies located in that region to the detriment of competitors operating elsewhere. Furthermore, in order to identify the social impact of the initiative, a pre-established criterion of regional similarity is used to compare the evolution of socioeconomic indicators in the border provinces with that of indicators in other similar provinces. These partial results are then combined into an overall measure of the impact of the policy.

The rest of the paper is organized as follows. Section II describes the Act creating the Special Zone for Comprehensive Border Development. Section III summarizes some controversies and previous studies of the initiative. Section IV presents the concept of State aid and discusses its possible effects, as well as international experience in regulating it. Section V characterizes the profile of the border provinces as an introduction to the main results, which are given in section VI. Section VII closes the paper with some conclusions.

II.   The Act creating the Special Zone
for Comprehensive Border Development:
a brief summary

Act No. 28-01 identifies a need to encourage investment in the so-called "border zone" in order to generate jobs, increase incomes and improve the living standards of the region's inhabitants. In its considerations, it describes the border zone as having strategic value for the country and states that "special incentives must be used to promote and direct a flow of adequate investment that [...] will sustainably produce a higher standard of living in the region".

The Act grants benefits to companies located within the boundaries of the border region, which for its purposes covers seven provinces: Montecristi, Bahoruco, Elías Piña, Pedernales, Dajabón, Independencia and Santiago Rodríguez. Companies were granted a 100% exemption from domestic taxes and customs duties on raw materials, equipment and machinery, as well as exemption from any other type of tax, for a period of 20 years. These benefits were put in place until 2021 but were extended for an additional period of 30 years by new legislation, Act No. 12-21, enacted on 23 February 2021.

Act No. 28-01 did not establish strict conditionalities for a company to receive the benefits designated, although it did state that, to be eligible for these exemptions, companies had to undergo a process that included assessment of compliance with environmental standards and an analysis by an Evaluation Commission to determine that they were capable of carrying out significant processes of industrial transformation. Subsequent studies and reports by official bodies show that the monitoring mechanisms were almost non-existent in practice, so there is no guarantee that beneficiary companies actually met the requirements.[2]

III. Background: controversies and analyses

In 2004, Act No. 28-01 was the subject of a direct legal action by a group of companies seeking to have it declared unconstitutional. The grounds for the case were that the Act breached several articles of the Dominican constitution by granting privileges and disregarding acquired rights. In 2005, however, the Supreme Court of Justice, acting as the Constitutional Court, ruled that the Act was constitutional and that it did not lead to the creation of monopolies or situations of privilege, since its benefits were granted to any company setting up in the border area.

Shortly afterwards, however, the country's Congress passed Act No. 236-05, which amended article 2 of Act No. 28-01 to stipulate that companies benefiting from the exemptions provided by the border regime would be subject to the payment of various forms of tax. This prompted a swift reaction from the Dominican Association of Border Enterprises, which filed a direct action for a declaration of unconstitutionality against the new law on the grounds that it breached the principle of non-retroactivity of laws, among others. Responding to this action, the Supreme Court of Justice ruled that by abolishing the tax incentives under which these companies benefiting from Act No. 28-01 had set up their operations, Act No. 236-05 had indeed breached acquired rights.

Consequently, the Special Regime for Border Development was regulated exclusively by the original provisions established under Act No. 28-01 until 2021, when its term of application ended. Its effects were analysed in various studies while it was in force. DASA (2012) pointed out that the benefits provided were highly concentrated, with 62% of the income tax exemptions going to 5 companies and 83% to 10 companies. Furthermore, this source argued that while the aggregate impact of the Act on the public finances was fairly small, it was relatively high when broken down by the number of companies actually operating or when assessed in the light of the large distortions it generated vis-à-vis these companies' peers in the domestic market (DASA, 2012). Roa Chalas (2015) noted a large asymmetry at the provincial level, given the heavy concentration of firms in the province of Montecristi and the very small number of firms in other provinces.

For its part, the Association of Non-Alcoholic Beverage Industries (ASIBENAS) of the Dominican Republic argued that, contrary to the objectives of the Act, the population of the border area had grown by less than that of the rest of the country and had actually shrunk in some provinces between 2000 and 2018 (ASIBENAS, n.d.) Furthermore, four of the beneficiary provinces (Pedernales, Bahoruco, Independencia and Elías Piña) occupied the four lowest rankings in the multidimensional poverty index produced in 2018 and were the only provinces in the country to have a "low" level of human development according to the 2016 *Human Development Report* (UNDP, 2016).

Isa Contreras (2020) estimated the impact of Act No. 28-01 in terms of value added and job creation. His estimation identified three effects: (i) a direct effect on jobs and value added at beneficiary firms, (ii) an indirect effect on suppliers of beneficiary firms and (iii) an induced effect on the value added of suppliers of final consumption goods and purchases by employees of beneficiary firms. These results will be returned to later as part of the estimations in this study.

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[2]   See Mendoza (2019) for information on administrative deficiencies in the implementation of the Act. Furthermore, the Coordination Council of the Special Border Development Zone (CCDF, 2020) admits that until 2017, the institutional basis it operated on was weak and had little institutional support, since it had no budget allocation except for a small payroll of core employees.

IV. The rationale for regional aid and international experience in regulating it

A free competition equilibrium is a situation in which: (i) each firm and each consumer takes prices as given; (ii) given these prices, each firm maximizes its profits and consumers maximize their individual welfare; and (iii) the volume of consumer demand equals the volume supplied by producers. Economic theory states that competitive market equilibrium is efficient in the sense that it is not possible to increase the welfare of any agent without reducing the welfare of some other agent.

These hypothetical conditions are unlikely to be achieved in real circumstances, so that equilibrium in markets can be improved through State intervention. One important form of intervention is the transfer of resources to specific regions, with the aim of preventing production activities from clustering too much in certain locations. The rationale is that such clustering could reflect market failures, insofar as firms, when deciding to locate in a certain region, do not take into account the negative impact this has on agents who remain in the other regions. State aid is thus seen as the right instrument for avoiding a geographical concentration of welfare.

Ultimately, State aid is only justifiable if it can be provided at a reasonable cost, so the choice of instruments is crucial to ensure that the costs do not outweigh the estimated benefits sought. However, there is only limited experience with the supervision of State aid by countries. A benchmark in this regard is the European Union, where the territorial cohesion programmes established by some countries to support their least developed regions have been subjected to intense scrutiny. In this case, the oversight is motivated by the fear that the support provided by individual governments may distort trade between the different countries and that such distortions may generate economic costs that exceed the benefits. This has led to the implementation of regulations governing member States' policies in cases where they: (i) constitute a transfer of State resources; (ii) involve a company or body engaged in an economic activity, be it public or private; (iii) are selective; and (iv) have negative implications for competition, with a potential to affect trade between member States (European Commission, 2006 and 2014).

Many countries have adopted these criteria to identify which State interventions should be regarded as State aid and therefore subjected to special scrutiny with a view to limiting their negative effects on market efficiency. In other regions or countries, such as the United States, there is no system for monitoring State aid to enterprises, and the government quite often provides assistance to individual industries or firms to address specific needs. As noted in OECD (2010), however, the United States government has taken steps to limit the duration and scope of such interventions, and certain provisions in the Constitution stipulate that federal actions may not discriminate between the states or impair commerce between them.

V. Profile of the border provinces

The border provinces had a population of 460,088 inhabitants in 2002 and 496,877 about 20 years later, while the total Dominican population grew from 8,562,541 to 10,358,320 inhabitants. Thus, the border population grew at an average annual rate of 0.45%, while the rest of the country's grew at a rate of 1.10%. As a result, the population in the border area contracted as a share of the country's total population, from 5.40% to 4.80%, and projections are for that share to fall to around 4.60% by 2030.

As regards living conditions, in 2000 the provinces in the border zone had an incidence of moderate poverty of around 32% of households, while the national rate fluctuated around 20% (see figure 1). The gap between poverty levels in the border provinces and the rest of the country narrowed after the 2003

financial crisis, since the poverty rate rose faster in the other provinces than in the border area, leading to equalization with higher poverty rates in the two regions, but it widened in the following years. The Ministry of Economy, Planning and Development (MEPyD, 2021) notes that all the border provinces have a per capita income below the national average, with Elías Piña, Independencia, Bahoruco and Pedernales having the lowest per capita income levels. The human development index (HDI) for all the border provinces has generally been below the national average.

Figure 1
Dominican Republic: moderate monetary poverty rate in the provinces
of the border area and the country as a whole, 2000–2019
(Percentages of households in poverty)
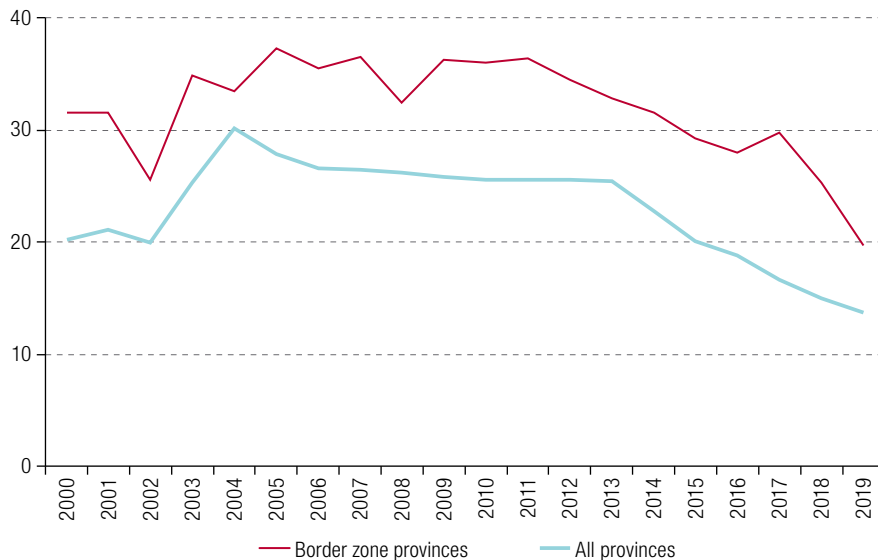
Source: Prepared by the authors, on the basis of the National Labour Force Survey (ENFT) and the National Continuous Labour Force Survey (ENCFT).

The business fabric of the border provinces has traditionally been and still is weak. Physical and legal persons paying taxes in the region represent only about 2.20% of all taxpayers in the country and employ about 1.30% of all employees in formal enterprises. Weak business activity is reflected in a low tax take. Between 2012 and 2018, direct tax receipts in the border provinces ranged between 0.17% and 0.28% of the country's total receipts. In the case of indirect taxes, the border area contributed just 0.44% of the national total in 2012, and this proportion dropped to 0.22% in 2018.

Labour participation rates (i.e. the ratio between the economically active population and the working-age population) in the provinces of the region are lower than the average for the country. This means that, although the unemployment rate in the border area is lower than the national average,[3] the employed population represents a relatively low percentage of the working-age population. Hourly earnings in the border region are below the national average, with a gap of between 20% and 30% (see figure 2). These low wages have not helped to attract a significant volume of firms making intensive use of low-cost labour, such as maquiladoras. In 2020, maquiladoras in the border area employed a miniscule share of all maquila workers nationwide.

According to data from the tax administration, 118 companies are enrolled in the Special Regime for Border Development established by Act No. 28-01, of which 107 had operations in 2019. The number of registered companies enrolled in the regime increased significantly between 2005 and 2006

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[3]   The extended unemployment rate in the border provinces has often been between 1 and 3 percentage points below the national rate, with a similar gap in the open unemployment rate.

and expanded again around 2012, with stable growth thereafter (see figure 3).[4] At present, companies covered by Act No. 28-01 represent a tiny fraction of formal enterprises in the border region and around 5% of companies operating under special regimes in the country, but at the same time they represent a large share of all the companies in the border area that are enrolled in some special tax regime.

Figure 2
Dominican Republic: index of average hourly earnings of the employed
income-earning population, by groups of provinces, 2000–2020
(Index 2016 = 100)
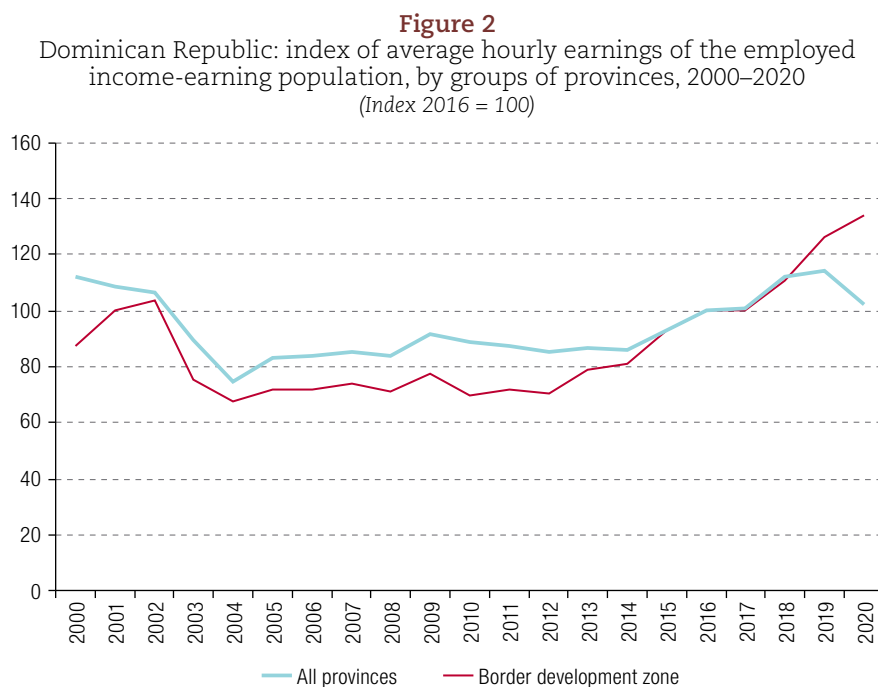
Source: Prepared by the authors, on the basis of the National Labour Force Survey (ENFT) for the period 2000–2015 and the National Continuous Labour Force Survey (ENCFT) for the period 2016–2020.
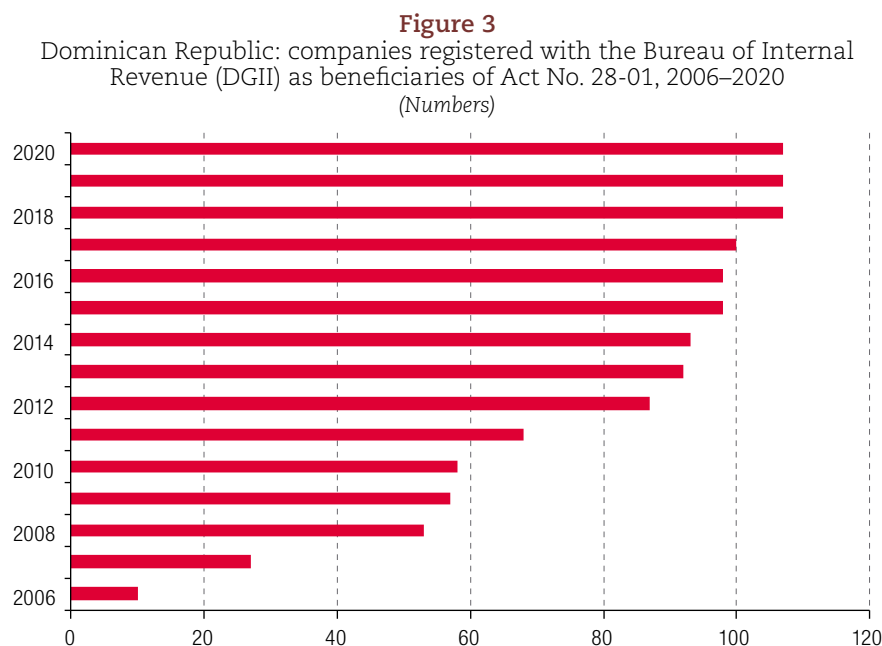
Figure 3
Dominican Republic: companies registered with the Bureau of Internal
Revenue (DGII) as beneficiaries of Act No. 28-01, 2006–2020
(Numbers)

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

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[4]   The analysis generally runs up to 2019, the last year before the special conditions arising from the coronavirus disease (COVID-19) pandemic.

Table 1 shows the number of companies registered with the Bureau of Internal Revenue (DGII) that were operating in 2019 by branch of activity, disaggregated to the second level of the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4, and by tax regime. Most of the companies benefiting from Act No. 28-01 were engaged in industrial activities, specifically manufacturing, while service firms (engaged mainly in commerce) and agricultural ones (engaged mainly in traditional crop growing) accounted for similar percentages of the companies operating under the Special Regime for Border Development. Enterprises operating under the Regime employed some 7,924 people, equivalent to 26.9% of all formal jobs in the border area, which totalled around 29,372.

Table 1
Dominican Republic: companies with operations enrolled
in special tax regimes, by branch of activity, 2019
(Numbers and percentages)

Activity	Border development	Other regime	Border development	Other regime
	(Numbers)		*(Percentages)*	
Agriculture	30	126	28.04	6.21
Cereal growing	7	11	6.54	0.54
Traditional crops	15	76	14.02	3.75
Stockbreeding, forestry and fisheries	3	29	2.80	1.43
Agricultural services	5	10	4.67	0.49
Industry	44	1 084	41.12	53.43
Construction	2	97	1.87	4.78
Mining and quarrying	3	10	2.80	0.49
Manufacturing	39	977	36.45	48.15
Services	33	819	30.84	40.36
Housing rental	2	83	1.87	4.09
Commerce	19	321	17.76	15.82
Communications	1	62	0.93	3.06
Electricity, gas and water	3	85	2.80	4.19
Hotels, bars and restaurants	3	57	2.80	2.81
Financial intermediation, insurance, etc.	1	17	0.93	0.84
Other services	1	192	0.93	9.46
Health services	2	…	1.87	0.00
Transport and storage	1	1	0.93	0.05
Teaching services	…	1	0.00	0.05
Overall total	107	2 029	100.00	100.00

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

VI. Results of the application of Act No. 28-01

To what extent has the application of Act No. 28-01 tilted the playing field in favour of the companies that have availed themselves of it to the detriment of competitors, thus creating adverse conditions for market competition? To what extent has the State aid initiative established under Act No. 28-01 succeeded in inducing, directly or indirectly, favourable changes to social and economic conditions in the border area? These questions present methodological challenges that are addressed below.

1.   Methodology

Two alternative approaches can be used to analyse the impact of Act No. 28-01 on competition conditions in markets. One approach would be to analyse some specific markets in detail, beginning by identifying major markets and estimating market power. Another would be to take an overview,

differentiating between aided and non-aided companies by sector or branch of activity. This paper will follow the second approach, a typical one when a competition authority has to analyse general data before investing significant resources in the investigation of a specific market.

To measure the impact of Act No. 28-01 on social and economic conditions in the border area, it would be wrong to confine ourselves to identifying current differences between the indicators in the provinces of that region and the indicators in the other provinces of the country, since these differences are long-standing and not necessarily linked to the effects of the intervention. Nor, for similar reasons, would it be sufficient to compare conditions in the border provinces at a point in time subsequent to the granting of State aid with conditions in those provinces prior to the intervention, since such differences do not serve to differentiate between the impact actually attributable to Act No. 28-01 and the effect of trends operating independently of that initiative.

Our approach is to identify provinces whose characteristics immediately prior to the implementation of Act No. 28-01 allow them to be considered as fairly similar to the border provinces, and then to contrast the evolution of social and economic indicators in the two groups of provinces after the implementation of the Act. Similar provinces are identified on the basis of various measures of "similarity". In the first method, the (lack of) similarity between province X and province Y is given by the Euclidean distance around 2001 between two vectors, each containing the values of a set of variables for one of these provinces. In other words, given two provinces, X and Y, with socioeconomic characteristics given by a vector of n indicators $(X_1, X_2, \ldots, X_n)$ and $(Y_1, Y_2, \ldots, Y_n)$, respectively, the distance between the provinces is:

$$d_E(X, Y) = \sqrt{\sum_{i=1}^{n}(X_i - Y_i)^2} \tag{1}$$

With the second method, the similarity between province X and province Y is approached in a similar way, but the distance is measured as the sum of the absolute values of the deviations in each variable of the feature vector. In a third method, the variables are subjected to a divisive hierarchical clustering process conducted in this particular case by taking all the provinces and separating them into groups such that the distance between groups is maximized and the intragroup distance is minimized. In all cases, the minimax criterion is first used to normalize each variable so that the province with the highest value scores 1 and the province with the lowest value scores 0.

2. Impact on competition conditions

Firms not covered by any special tax regime (the vast majority of firms in the country) have substantially different characteristics from those that are covered by some special tax regime. For example, firms in the Special Regime for Border Development and firms covered by other special regimes have an average size of 74 and 165 employees, respectively, while other firms average only 6 employees. Thus, the relevant comparison is between firms covered by border incentives and firms covered by other special regimes, since these are the two segments likely to contain competitors with significant market shares and the ability to take strategic decisions vis-à-vis their competitors.

Companies benefiting from Act No. 28-01 absorbed about 2% of sales between 2010 and 2019, although with large sectoral fluctuations. For example, companies operating under the Special Regime for Border Development saw their share of revenues from agricultural service activities progressively increase from 4.20% in 2010 to 18.20% in 2019, while in the case of traditional crops, companies benefiting from Act No. 28-01 saw their market share within the group of companies benefiting from special regimes decrease from 2010 onward, following a rise during an earlier subperiod in which several companies entered the Special Regime for Border Development (see table 2). Overall, following an increase between 2005 and 2010, there has been no marked upward trend in the share of companies benefiting from the border incentive scheme.

Table 2
Dominican Republic: shares of sales revenue, pre-tax profits and income tax exemptions received by companies benefiting from the Special Regime for Border Development, by branch of activity, 2005–2019
(Percentages)

A. Sales revenue

Activity	2005	2010	2014	2019
Agriculture	1.6	12.8	11.9	9.6
Cereal growing	4.7	2.5	12.6	6.0
Traditional crops	5.0	35.4	31.0	21.0
Stockbreeding, forestry and fisheries	0.0	0.4	0.2	0.3
Agricultural services	0.0	4.2	10.0	18.2
Industry	0.3	1.7	2.0	2.1
Construction	3.0	0.2	0.4	1.1
Mining and quarrying	0.4	1.2	0.8	0.2
Manufacturing	0.3	1.7	2.0	2.2
Services	0.7	1.1	1.1	1.2
Housing rental	0.0	0.1	0.1	0.0
Commerce	1.5	1.8	2.3	2.5
Communications	0.0	0.0	0.0	0.0
Electricity, gas and water	0.0	5.6	5.3	4.5
Hotels, bars and restaurants	0.0	0.0	0.0	0.0
Financial intermediation, insurance, etc.	0.0	0.2	0.1	0.4
Other services	2.4	0.7	0.2	0.0
Health services	…	26.4	20.0	13.6
Transport and storage	0.3	0.0	0.0	0.0
Overall total	0.5	2.1	2.3	2.2

B. Pre-tax profits

Activity	2005	2010	2014	2019
Agriculture	-0.4	-19.1	55.9	19.3
Cereal growing	3.7	5.9	2.4	10.2
Traditional crops	6.7	35.8	7.4	37.6
Stockbreeding, forestry and fisheries	0.0	0.0	0.8	5.6
Agricultural services	0.0	76.1	7.1	-4.1
Industry	-0.9	1.7	1.9	2.3
Construction	1.0	0.3	23.4	5.4
Mining and quarrying	0.0	-0.6	0.1	0.3
Manufacturing	-1.2	1.7	1.6	2.2
Services	0.2	0.6	0.8	0.4
Housing rental	-0.5	-1.0	0.0	-0.1
Commerce	1.4	2.4	3.1	1.2
Communications	0.0	0.0	0.0	0.0
Electricity, gas and water	0.0	1.0	0.4	0.2
Hotels, bars and restaurants	-0.1	0.0	0.0	0.5
Financial intermediation, insurance, etc.	0.0	-0.1	-0.3	-0.4
Other services	309.6	-2.8	-0.2	-0.8
Health services	0.0	92.3	51.5	67.4
Transport and storage	0.0	-0.1	0.0	0.0
Overall total	-0.4	1.6	1.5	1.8

C. Income tax exemptions

Activity	2005	2010	2014	2019
Agriculture	6.4	48.8	11.4	42.9
Cereal growing	…	100.0	100.0	100.0
Traditional crops	6.6	9.6	8.0	39.7
Stockbreeding, forestry and fisheries	0.0	100.0	…	100.0
Agricultural services	…	10.1	10.1	34.8
Industry	92.0	52.9	27.7	5.7
Construction	7.8	0.2	0.0	1.5
Mining and quarrying	100.0	0.0	100.0	100.0
Manufacturing	85.8	65.0	59.9	5.9
Services	9.9	0.3	0.0	0.9
Housing rental	0.0	0.0	1.8	0.0
Commerce	96.9	0.4	17.3	1.9
Communications	0.0	0.0	0.0	0.0
Electricity, gas and water	100.0	50.0	32.9	31.8
Hotels, bars and restaurants	0.0	0.3	14.8	0.1
Financial intermediation, insurance, etc.	0.0	0.0	0.0	9.8
Other services	0.0	2.5	0.0	0.0
Health services	0.0	0.0	97.3	100.0
Transport and storage	0.0	0.8	0.0	0.0
Overall total	13.4	40.0	13.5	4.3

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

The trend in the distribution of income tax concessions is less clear. In 2010, companies benefiting from the Special Regime for Border Development absorbed about 40% of the total income tax exemptions granted that year, but the proportion fell sharply in the following years, to just 4.3% in 2019. Again, there are marked differences by branch of activity and significant variations within the different branches, but there is no evidence of any systematic gap in favour of companies benefiting from Act No. 28-01 where income tax is concerned.

The essential justification for the incentives in Act No. 28-01 is that companies in the border area have higher costs because of the adverse conditions there, which take the form of remoteness from the main markets, difficulty in recruiting skilled labour and poor infrastructure, among other factors. It follows from this assumption that costs per unit of sales should be higher for border firms than for other firms in the same industry. The data reveal that costs per unit of sales at the border are higher than the costs of the other two groups of firms in several branches of activity. The difference is particularly marked for service firms but does not obtain to the same extent in the industrial branches (see table 3).

Table 3
Dominican Republic: production costs by tax regime and branch of activity of the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4, at the second level of disaggregation, 2010, 2014 and 2019
(Percentages of sales revenue)

	2010		2014		2019	
	Border development	Other regime	Border development	Other regime	Border development	Other regime
Agriculture	71.3	89.1	87.4	89.9	82.0	84.6
Industry	65.3	67.6	64.1	69.6	64.5	66.8
Services	77.2	44.6	73.3	46.2	76.4	42.8
Total	69.0	62.2	72.5	64.2	70.3	60.7

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

The corollary is that border firms' profits before income tax should be expected to be lower than the profits of similar firms, while profits after tax should be equalized. This also agrees with the data observed for the case under consideration. In particular, the ratio of profits to sales revenue tends to be lower for border firms than for other firms covered by special regimes when profits are measured before income taxes (see table 4) but tends to equalize for the two groups of firms when they are measured after the payment of income taxes (see table 5).

Table 4
Dominican Republic: pre-tax accounting profits by tax regime and branch of activity
of the International Standard Industrial Classification of All Economic Activities (ISIC),
Revision 4, at the second level of disaggregation, 2010, 2014 and 2019
(Percentages of sales revenues)

	2010		2014		2019	
	Border development	Other regime	Border development	Other regime	Border development	Other regime
Agriculture	3.3	-3.1	0.7	-1.7	5.7	2.4
Industry	7.9	9.5	6.9	7.6	12.2	11.1
Services	6.1	12.4	7.7	13.0	4.3	14.7
Total	6.1	9.6	5.1	8.5	9.4	11.7

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

Table 5
Dominican Republic: after-tax accounting profits by tax regime and branch of activity
of the International Standard Industrial Classification of All Economic Activities (ISIC),
Revision 4, at the second level of disaggregation, 2010, 2014 and 2019
*(Percentages of sales revenues)*

	2010		2014		2019	
	Border development	Other regime	Border development	Other regime	Border development	Other regime
Agriculture	3.3	-3.5	0.7	-2.1	5.7	1.7
Industry	7.9	8.4	6.9	6.4	12.2	9.2
Services	5.8	9.8	7.7	10.8	4.3	11.7
Total	6.1	8.2	5.1	7.1	9.4	9.6

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

At the level of aggregation taken, the results are consistent with the premises of Act No. 28-01. In other words, firms located in the border zone often exhibit relatively high costs and, consequently, lower rates of profit before taxation, but profit rates equalize after taxation. Moreover, the application of Act No. 28-01 does not seem to have led to a significant recomposition of market imbalances. It should be noted, however, that the results are also consistent with an alternative hypothesis, namely that firms are inefficient in themselves and not just because they are at the border. If this were so, the application of the Act would be a source of particular inefficiency, insofar as it would enable the survival of firms that should really exit the market in the interests of the proper use of resources.

One way of approaching the issue is to compare firms that are located in the same province but belong to different tax regimes, to find out whether the differences in costs/sales ratios or in staff costs/sales ratios really reflect different conditions in different regions or are rather a reflection of the firms' own characteristics. The data do not indicate that firms benefiting from the Special Regime for Border Development have higher costs. In fact, costs per unit of sales revenue are often lower for these firms than for other firms covered by special regimes (see figure 4).

Figure 4
Dominican Republic: costs per unit of sales revenue for firms located
in border areas, by tax regime, 2014 and 2019
(Percentages)
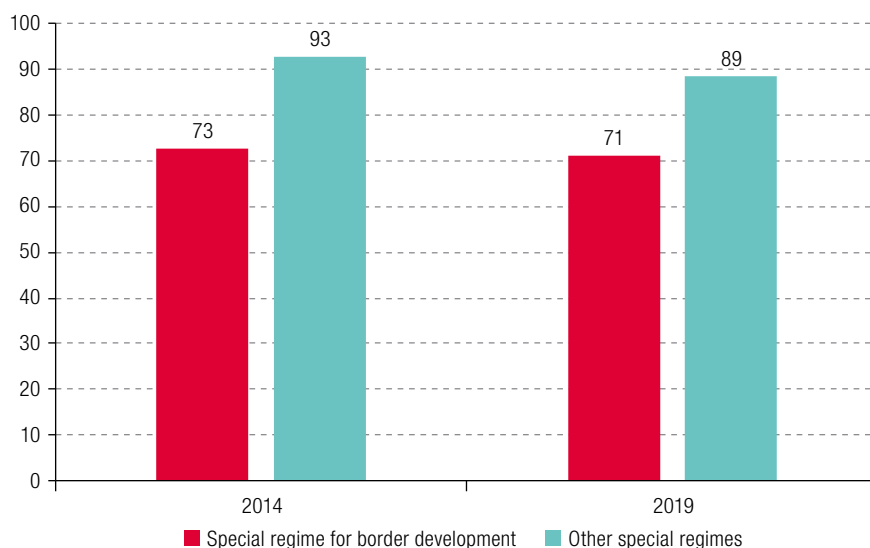
Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

If we assume that the application of the Act has created imbalances leading to an expansion of the market power and share of beneficiary firms, how large might the effect on social welfare be? Suppose that, in a given market, there is a leading firm with a certain number of follower firms that do not adjust their production levels to reflect the decisions of the leader, and let us say that the leading firm has been favoured by the Act in such a way that it succeeds in weakening its rivals, increasing its share of sales and wielding greater market power. Following Posner and Landes (1981, p. 954), we can establish that, on the assumption of linear demand for the industry, constant marginal costs and low fixed costs, the deadweight loss caused by these circumstances may be expressed as:

$$D = \frac{S_l^2}{2} \frac{PQ_{market}}{\eta_{market}}$$

$$= \left(\frac{S_l^2}{2}\right) \frac{I_{market}}{\eta_{market}}$$

(2)

where S_l is the company's market share, I is the size of the market as measured by the volume of sales and η_{market} is the elasticity of demand in the market. An increase in the market share of the company under consideration would then lead to a social loss proportional to the size of the market.

Setting out from this, table 6 presents the estimated differences in the deadweight loss for different market elasticity values and different magnitudes of increase in the dominant firm's market share. Estimation is carried out by adding up losses in the different branches of activity at the fourth level of disaggregation of ISIC, using the sales volume of all firms in each branch as a proxy for I. Only branches of activity in which these firms have a sales share of more than 20% in the market comprised by the group of all firms covered by some special regime are considered, on the assumption that firms with a market share of less than 20% would struggle to exercise considerable market power or to increase it significantly.

Under the assumptions established, the deadweight loss in 2019 is estimated at a minimum of 142.7 million Dominican pesos and a maximum of 570.7 million Dominican pesos, which are very modest

figures both absolutely and in comparison with the volume of sales in the markets participated in by companies benefiting from some special regime, be it the Special Regime for Border Development or another. This does not rule out the possibility of competition effects of a different nature at higher levels of disaggregation or when a more appropriate definition of the relevant markets is used instead of the classification, admittedly a limited one for many purposes, based on branches of industry.

Table 6
Dominican Republic: simulated deadweight loss as the market share
of companies benefiting from the border regime increases
(Millions of Dominican pesos annually)

Assumed increase in market share *(Percentage points)*	Assumed elasticity of demand			
	1.5	2.0	2.5	3.0
5	285.3	214.0	171.2	142.7
10	570.7	428.0	342.4	285.3

Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).

3.   Measuring the impact on social conditions

The competition effects of Act No. 28-01 must be contrasted with its economic and social impacts for the initiative to be fully appreciated. Isa Contreras (2020) provides a concrete estimate for the economic impact of the Act creating the Special Zone for Comprehensive Border Development. As indicated above, the findings in that study deal with three effects: (i) a direct effect in the form of job creation and value added at beneficiary firms, (ii) an indirect effect in the form of value added and jobs created as a result of intermediate domestic purchases by beneficiary firms and (iii) an induced effect in the form of value added and jobs created because of the demand for consumer goods from employees of the firms benefiting from Act No. 28-01.

For 2018, this estimation yields a total value of 16.4197 billion Dominican pesos, with 4.5352 billion pesos of this being the direct effect and the rest dividing between the indirect effect and the induced effect. The total is equivalent to 0.39% of the country's GDP that year. This is a very modest figure, especially if two points are considered: (i) much of the effect represents a relocation of activities that would have taken place elsewhere in the country anyway, although activities in the region are presumed to have a particularly great social value; and (ii) the estimation by Isa Contreras (2020) provides a concrete quantification of the impact on two specific variables (employment and value added), but does not allow us to infer what effects there might have been on the overall social and economic dynamics of the region as a result of the border development initiative. The latter consideration is very important because, although the few companies covered by Act No. 28-01 have clearly not had a very great primary impact, it is possible that more significant impacts of various kinds might have arisen via multiplier effects in the provinces concerned.

This possibility is explored using the method described above, which compares border provinces with "similar" provinces. The results of the different approaches largely match and, after some minor adjustments, all provinces in the cluster with the largest number of border provinces are taken as the comparison group. "Similar" does not mean "identical", and for any individual variable the average value for the border provinces in 2001 could be different from the average for the similar provinces. To control for such differences, the analysis will not simply compare the two groups of provinces but observe whether the gaps that existed when Act No. 28-01 came into force increased or decreased during the period of implementation of the legislation. If a given variable improved faster (or worsened more slowly) in the border provinces than in the similar provinces, this will be interpreted as evidence that the incentives of the Act had a favourable impact, while conversely if it improved more slowly (or worsened faster) in the border provinces than in the similar provinces, this will be interpreted as evidence against the incentives of the border regime having had a favourable impact.

Table 7 presents the results. For each case, it shows the changes that the border provinces and the similar provinces underwent over a given period, the difference between the two groups of provinces at the starting point and the end point, and the difference in differences. A colour code is used: green shading in cases where the border provinces performed significantly better than the similar provinces, such that the difference in differences is greater than 1 percentage point, and red shading in cases where the border provinces performed less well than the similar provinces, with a performance gap greater than 1 percentage point.

Table 7
Dominican Republic: difference in differences between border provinces and similar provinces in social and economic indicators over time
(Absolute values and percentages)

A. Demographic indicators

	2002–2010	2010–2019	Difference in differences
Average population growth rate *(Percentages)*			
Similar provinces	4.30	4.12	
Border provinces	2.77	2.14	
Gap: difference between border provinces and similar provinces	-1.53	-1.99	-0.46

B. Development and human capital indicators

	Around 2002	2020	Difference in differences
Infant mortality per 100,000 live births (2004–2020)			
Similar provinces	9.61	12.69	
Border provinces	11.02	14.57	
Gap: ratio of border provinces to similar provinces *(Percentages)*	114.61	114.81	0.00
Net primary education enrolment rate (2010–2020) *(Percentages)*			
Similar provinces	96.12	94.87	
Border provinces	91.04	94.44	
Gap: difference between border provinces and similar provinces	-5.08	-0.42	4.66
Literacy rate among youth aged 15 to 24 (2002–2020) *(Percentages)*			
Similar provinces	79.26	80.96	
Border provinces	75.41	73.91	
Gap: difference between border provinces and similar provinces	-3.85	-7.05	-3.21
Indigence rate (2000–2020) *(Percentages of households)*			
Similar provinces	14.41	3.34	
Border provinces	20.15	5.28	
Gap: difference between border provinces and similar provinces	5.75	1.94	-3.81
Poverty rate (2000–2020) *(Percentages of households)*			
Similar provinces	31.78	18.72	
Border provinces	32.40	26.22	
Gap: difference between border provinces and similar provinces	0.62	7.50	6.88
Human development index (HDI) (2010–2016)			
Similar provinces	0.36	0.46	
Border provinces	0.30	0.40	
Gap: difference between border provinces and similar provinces	-0.06	-0.06	0.00

C. Labour market indicators

	2000–2005	2010–2016	Difference in differences
Extended unemployment rate *(Percentages)*			
Similar provinces	15.39	14.49	
Border provinces	16.40	13.27	
Gap: difference between border provinces and similar provinces	1.01	-1.21	-2.22
Open unemployment rate *(Percentages)*			
Similar provinces	5.01	4.48	
Border provinces	2.79	2.81	
Gap: difference between border provinces and similar provinces	-2.22	-1.67	0.55

	2000–2005	2010–2016	Difference in differences
Extended labour force participation rate *(Percentages)*			
Similar provinces	62.17	63.21	
Border provinces	57.75	60.33	
Gap: difference between border provinces and similar provinces	-4.42	-2.87	1.55
Open labour force participation rate *(Percentages)*			
Similar provinces	55.35	56.59	
Border provinces	49.59	53.84	
Gap: difference between border provinces and similar provinces	-5.80	-2.80	3.00
Average hourly earnings *(Dominican pesos)*			
Similar provinces	25.44	60.16	
Border provinces	24.30	57.89	
Gap: ratio of border provinces to similar provinces (Percentages)	95.50	96.23	0.73
Average monthly earnings *(Dominican pesos)*			
Similar provinces	4 396.79	10 345.74	
Border provinces	4 237.58	9 990.29	
Gap: ratio of border provinces to similar provinces *(Percentages)*	96.38	96.56	0.18

D. Business activity indicators

	2016	2020	Difference in differences
Profits at formal enterprises *(Millions of Dominican pesos)*			
Similar provinces	2 576.80	4 017.60	
Border provinces	2 162.60	2 670.60	
Gap: ratio of border provinces to similar provinces *(Percentages)*	83.93	66.47	-17.45
Sales revenue at formal enterprises *(Millions of Dominican pesos)*			
Similar provinces	89 712.29	130 025.89	
Border provinces	36 074.33	46 483.41	
Gap: ratio of border provinces to similar provinces *(Percentages)*	40.21	35.75	-4.46
Wages paid by formal enterprises *(Millions of Dominican pesos)*			
Similar provinces	607.50	854.80	
Border provinces	178.60	276.40	
Gap: ratio of border provinces to similar provinces *(Percentages)*	29.40	32.34	2.94
Number of employees at formal enterprises			
Similar provinces	68 408.00	94 388.00	
Border provinces	16 979.00	27 606.00	
Gap: ratio of border provinces to similar provinces *(Percentages)*	24.82	29.25	4.43
Number of corporate taxpayers			
Similar provinces	7 296.00	9 937.00	
Border provinces	2 306.00	3 033.00	
Gap: ratio of border provinces to similar provinces *(Percentages)*	31.61	30.52	-1.08

E. Financial activity indicators

	2012 or 2014	2020	Difference in differences
Financial deposits *(Millions of Dominican pesos)*			
Similar provinces	4 142.45	7 574.69	
Border provinces	784.75	2 565.06	
Gap: ratio of border provinces to similar provinces *(Percentages)*	18.94	33.86	14.92
Financial deposits per capita *(Dominican pesos)*			
Similar provinces	10 307.81	19 980.71	
Border provinces	5 521.50	10 520.73	
Gap: ratio of border provinces to similar provinces *(Percentages)*	53.57	52.65	-0.91
Automated teller machines per 10 000 inhabitants			
Similar provinces	1.30	1.90	
Border provinces	1.10	1.50	
Gap: ratio of border provinces to similar provinces *(Percentages)*	84.46	79.12	-5.34

	2012 or 2014	2020	Difference in differences
Bank offices per 10 000 inhabitants			
Similar provinces	10.70	13.71	
Border provinces	5.90	9.18	
Gap: ratio of border provinces to similar provinces *(Percentages)*	54.93	66.95	12.03

F. Digital inclusion indicators

	2011	2020	Difference in differences
Fixed Internet accounts			
Similar provinces	2 760.30	8 717.10	
Border provinces	664.60	2 174.60	
Gap: ratio of border provinces to similar provinces *(Percentages)*	24.08	24.95	0.87
Fixed telephony accounts			
Similar provinces	7 234.33	8 086.11	
Border provinces	1 955.00	2 220.43	
Gap: ratio of border provinces to similar provinces *(Percentages)*	27.02	27.46	0.44

Source: Prepared by the authors, on the basis of information from the Ministry of Economy, Planning and Development (MEPyD) and the Central Bank of the Dominican Republic.

Demographically, the growth rate of the two groups of provinces followed the same pattern over time: between 2002 and 2010, the border provinces grew at a rate of 2.77% while the similar provinces grew at a rate of 4.30%, with a gap of 1.53 percentage points between the two groups. In the subsequent period, from 2010 to 2019, growth was slower in both regions but the gap in rates held steady at around 1.99 percentage points, so that the difference in differences was not significant on the criterion adopted.[5]

The trends in development and human capital indicators point in different directions. The border provinces performed better than the similar provinces on primary education enrolment and their poverty rate fell by more than theirs, but they fared less well on the youth literacy rate and the moderate poverty rate.

The border region appears to have performed better than the similar provinces in the area of employment, where most indicators show a considerably more favourable evolution. In particular, fairly significant improvements are observed in rates of participation, both extended and open, and unemployment. However, there is no obvious relative improvement in earnings indicators, for which the trends in the two groups of provinces considered maintain a similar relationship over time.

In another area, no pattern of improvement can be observed in the indicators relating to the penetration of information and communications technologies (ICTs), while business activity indicators show divergent results depending on the variable considered. In general, it seems reasonable to conclude that the data suggest a slight relative improvement in the evolution of the border area, with a weak tendency towards a narrowing of gaps vis-à-vis the provinces taken as controls, but there is no evidence that the application of Act No. 28-01 generated or was accompanied by a substantial change in the pattern of regional dynamics obtaining since before the Act was applied.

4. Overall analysis

The findings support the conclusion that, in terms of economic and social impact and the effects on the competition environment alike, Act No. 28-01 has had a limited impact. This assessment of the magnitude of the impact does not change if we add in the additional social cost generated by the tax expenditure involved, i.e. the revenue that the State forgoes by applying Act No. 28-01, since the magnitude of this effect is also limited from an aggregate perspective. In 2019, tax expenditure on the Special Regime

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[5] ASIBENAS (n.d.) points out that the border provinces grew by 10% between 2000 and 2020 while the rest of the country grew by 25.25%. However, it is important to note that the rest of the country's growth was actually concentrated in a few locations, notably Santo Domingo, Samaná and La Romana.

for Border Development was around 1.298 billion Dominican pesos, representing about 0.8% of total tax expenditure (after excluding the share accounted for by individuals, religious organizations, Internet purchases and government agencies) and an average of 12.13 million Dominican pesos per company covered by the Regime (see figure 5).

Figure 5
Dominican Republic: tax expenditure generated by companies
in the Special Regime for Border Development, 2015–2020
(Percentages)
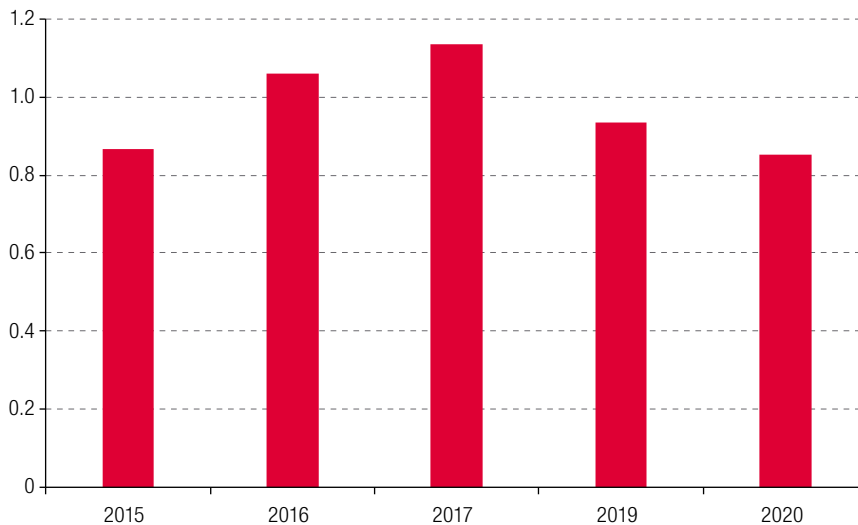
Source: Prepared by the authors, on the basis of information from the Bureau of Internal Revenue (DGII).
Note: Excludes exemptions for individuals, religious organizations, Internet purchases and government agencies.

Taken together, the efficiency cost and the tax cost probably do not exceed 2 billion Dominican pesos per year, which is a modest amount compared to the value added that the activities covered by the initiative generate. Furthermore, the research shows evidence of possible positive impacts of the Act creating the Special Zone for Comprehensive Border Development, given the relative improvements to social and economic variables in the provinces of the region compared to a set of provinces that had somewhat similar conditions around the year 2000. However, this evidence is weak and does not suggest a transformative effect of Act No. 28-01 on the economic and social dynamics of the beneficiary region.

VII. Conclusions

A reasonable conclusion is that the impact of Act 28-01 on competition appears to be low. Judging by the small number of companies covered by the regime and the probably positive but weak effect on the economic and social dynamics of the region, the impact of the initiative has been limited. The objectives of this study do not include an inquiry into the causes of this result, but some reflections are inevitable. What can explain such a poor outcome in the implementation of a policy that seems so relevant?

First, there seem to be two main reasons why so few companies are covered by Act No. 28-01. One is a deliberate policy of limiting the number of beneficiary companies. As discussed in CCDF (2020), the plenary of the agency had not met to assess new companies since 2014, despite a considerable number of applications. Specifically, a list of at least 34 new projects was already available for submission at that time, 15 of them previously screened by the Evaluation Commission over the preceding years, but it was not possible for the body to meet.

The number of companies covered also reflects the limited attractiveness of the initiative for the business sector as a whole, given the absence of complementary actions to create an environment that meets the minimum needs of business. Mendoza (2019) presents different data on failures in the implementation of the Act and highlights the absence of an infrastructure investment programme on a scale that might have complemented it. Public investment in the border provinces has traditionally been low, and although in the last decade it has exceeded investment in the rest of the country on a per capita basis, even in the best years it has not exceeded 12% of total public investment.

In aggregate terms, both the benefits and the costs resulting from the implementation of Act No. 28-01 have been relatively insubstantial so far. Implementation of the new Act No. 12-21 is an opportunity to realize the expectations that gave rise to the earlier law. Among the modest results of Act No. 28-01, perhaps the most important is that it exemplifies the features to be avoided in the design and implementation of a State aid programme that aims to create a favourable impact while avoiding adverse effects on market competition.

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The young Raúl Prebisch and his 1919 translation of Adolph Wagner: clues to a relativist critique[1]

Fágner João Maia Medeiros and Luiz Felipe Bruzzi Curi

Abstract

This article analyses Raúl Prebisch's earliest activities while still a young student at the University of Buenos Aires, between 1918 and 1922. One of these activities was the translation of texts by foreign economists for the university's *Revista de Ciencias Económicas*, contributing to the dissemination of ideas in Argentina. We analyse Prebisch's 1919 translation of Adolph Wagner and find indications that he modified the text, firstly by selecting for translation excerpts critical of the idea that free trade was automatically beneficial to all nations, secondly by omitting Wagner's defence of the neoclassical deductive method. This selectivity of Prebisch's, in our view, makes it necessary to amend the idea of him hitherto enshrined in the literature as a convinced neoclassicist during his early formative years.

Keywords

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I. Introduction

"*Traduttore, traditore*", runs the Italian aphorism. According to this maxim, translations are bound to alter their original text in some way. Its sense is obviously negative: the changes in meaning effected by the translator end up "betraying" the original thought. In the study of the history of ideas, however, it is possible to take a positive view of the tension between original texts and their translations, especially when a more contextualist methodological perspective is applied. This positive sense can be appreciated within the framework of two, if not more, approaches. In the first and perhaps more obvious one, the translated text is seen as a privileged source for documenting and evaluating the processes whereby ideas are disseminated. In this case, translation can be employed as a source for examining both the actual circulation of a text or a thinker's ideas and the intention of assimilating a discourse produced in a particular cultural context within some other context.[2] In other words, translations can help to answer certain questions. How did a particular book circulate internationally in a given period of history? What were the demands and interests that led a publisher or periodical to commission and publish a translation of a specific text?

There is, however, a second approach that can guide the use a translated text is put to as a source for the history of ideas. It involves inverting the meaning of the Italian proverb and considering not how the translator betrays the original thought, but what the translation reveals about the translator's own thinking. Seen from this perspective, the translator is in an equivocal position: not quite the author of a new text, but certainly no passive transmitter of a finished message either. It is within the framework of this methodological approach that we attempt to analyse the translation produced in 1919 by an Argentine student, Raúl Prebisch, of some passages from the textbook authored by a then famous German economist, Adolph Wagner. Prebisch was studying at the Faculty of Economics of the University of Buenos Aires (UBA), a pioneer in the institutionalization of academic teaching of specifically economic subjects in Latin America, and he published his translation in the *Revista de Ciencias Económicas*, a periodical run by the student body of the Faculty of Economics to publicize debates on economic theory and the current economic context.

Prebisch is undoubtedly one of the most studied figures in the history of Latin American economic ideas, especially as one of the originators of the thinking of the Economic Commission for Latin America and the Caribbean (ECLAC). This historiographical output, which is analysed in the second section, relies essentially on what Prebisch himself wrote or said. While this has yielded a solid body of knowledge about his economic ideas, examining a text produced by him as a translator is fascinating because the focus is on what Prebisch "did not say" or at least said without being the author. The Spanish text published in the *Revista de Ciencias Económicas* in 1919 was written by Prebisch, but his name only appeared at the end, and, for the purposes of the publication, Wagner was the author. Thus, the selection of passages and words for translation, and particularly the ways in which Prebisch as the translator altered the original text, become meaningful and interesting when considered from the second analytical perspective, which treats translation as an opportunity to observe the translator's thinking.

This attention to apparently "minor" details in a work is associated with the evidential paradigm, which, according to Ginzburg (2013, pp. 88–92), is an interpretative method based on insignificant details which reveal something about a work or an author. In the case of art history, for example, interpretation of a painting should be based not on the most striking (and easily imitated) features, such as a smile or a look in the eyes, but on details that are less influenced by the general characteristics of an artistic school, such as an earlobe or a fingernail. In these details, the control for which artists are indebted to the cultural and aesthetic tradition they are working within can weaken and give way to their individual, specific traits. From this perspective, some of Prebisch's decisions in translating a German text into

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[2] See Cardoso (2009) for a reflection of this type in the field of the history of economic ideas.

Spanish (from its French edition) come close to what Ginzburg (2013, p. 91) describes as "marginal data", which are potentially revealing because they appear in places where authorial control is loosened. Working in that grey area between authorship and the transmission of someone else's text, the translator may make tiny changes that hardly alter the general meaning but reveal something about the person who made them. Thus, the omission of a specific passage in Prebisch's translation may reveal a particular trait, giving a clue to the development of a personal line of thought.

In his translation of Wagner, Prebisch omitted a passage favourable to the use of the deductive method, which takes "selfish" self-interest as the general basis of human economic action. Although it has little impact on the overall structure of the text translated, Prebisch's intervention in Wagner's text can be taken as a clue, to use Ginzburg's term, hinting at a more relativist stance towards economics. In view of Prebisch's later intellectual trajectory, informed by the effort to adapt economic theory of a universalist bent to a specific historical reality, this hint of a relativist stance as early as 1919 is certainly deserving of consideration. Clearly, such hints are not sufficient for a definitive characterization of the thinking of a figure like Prebisch. The aim of this evidential perspective is, by working from a set of clues and a detailed analysis of context, to draw inferences about relationships that might make sense and contribute something new to our knowledge of the young Prebisch's thinking.

To develop these themes, the text is divided into five sections, in addition to this introduction. The second section attempts to situate the debate within the historiography of the young Prebisch's economic ideas, emphasizing the potential of evidential analysis to address the phenomenon of biographical illusion. The third section analyses Prebisch's social background with a view to establishing the author's qualifications for working as a translator for the *Revista de Ciencias Económicas* at the age of 18. The fourth section presents the historical context of the young Prebisch's education and activities, and in particular the characteristics of the UBA *Revista de Ciencias Económicas* and the circumstances associated with the intellectual labour of translating a foreign author. The fifth section examines the Wagner-Prebisch text itself, discussing its place in the international dissemination of ideas, its general meaning and the specifics of Prebisch's interventions. Lastly, some final considerations are offered.

II. Historiography and biographical illusion

The historiography surrounding the figure of Raúl Prebisch has created the image of an author who moved over the course of his career from orthodoxy (as a student at the UBA Faculty of Economics and as part of the Argentine technocracy) to a diametrically opposed position in the post-war period, when, under the aegis of ECLAC, he came to be remembered as an icon of Latin American structuralism.

This narrative was not built up out of nothing, but derives from the accounts the author left of his own life. As a rule, the use of autobiographical material as a primary source in the history of ideas entails limitations and challenges, given the selective nature of the memories an author might choose to reveal. Bourdieu (1986) cautions that the essential aim of accounts of this type is to give meaning and consistency to an author's career, establishing an order that is both logical and chronological while seeking to justify personal projects or identify the "roots" of certain formulations. For this reason, according to Bourdieu (1986), this type of text can unconsciously give rise to a "biographical illusion".

In Prebisch's specific case, his autobiographical space began to be constructed in the 1970s, when he started to develop his autobiographical narrative.[3] This began with an interview (of a biographical character) granted to Magariños (1991) in 1971, in which Prebisch laid down parameters for the way

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[3] The term "autobiographical space" should be understood here as an architecture of texts (essays, interviews, diaries and personal writings, among others) that have the function of constructing and producing a particular image of their author (Arfuch, 2010).

his intellectual trajectory up to that point was to be read. It was to be the story of a young neoclassicist who sought his own ways of interpreting peripheral development on the basis of his empirical experience and desire to decipher the situation in Argentina.

This narrative about the "young Prebisch" continued in the accounts of the following decade. Biographical interviews with Julio González del Solar in 1983 and David Pollock (Pollock, Kerner and Love, 2002) in 1985, both of which repeat the same narrative, can be cited as examples. Moreover, even in lectures delivered in 1980 and 1981, when expounding his recent theories about "peripheral capitalism", Prebisch never failed to mention his formative years and his "orthodox beliefs" then, in contrast to this more recent thinking.[4] In the author's own words, he was a neoclassicist but that deep faith gradually waned until very few traces of it remained (Prebisch, 1982, p. 68). Lastly, in his famous autobiographical essay (Prebisch, 1983), which although signed by Prebisch was prepared by his technical secretary Adolfo Gurrieri (2022), the author's career is presented as falling into a sequence of five logical stages, in which the advent of the Great Depression in 1930 called into question the beliefs of his "orthodox phase", which he transcended thanks to the theoretical reflections he developed upon leaving the Central Bank of the Argentine Republic in 1943.

In this context, Prebisch became, in Bourdieu's (1986) phrase, the ideologue of his own life by presenting his thinking as a process of linear reasoning and thus inducing a biographical illusion. First, he harmonized the trajectory of the "young Prebisch" as an orthodox neoclassicist, thereby smoothing away the complexity of his development to adapt that initial phase to a narrative of "stages". Second, he committed the anachronism of describing the "young Prebisch" as orthodox from the perspective of the 1970s, adopting a conception of what neoclassical orthodoxy was in that 1970s context rather than in the period when he was at the UBA Faculty of Economics.[5]

According to Bourdieu (1986), the problem arises when biographical illusion is absorbed into the literature. In the specific case of the young Prebisch, historians did not initially pay attention to this period of the author's career. The first important work on the young Prebisch was *Del ortodoxo al conservador ilustrado* by González and Pollock (1991). As the title indicates, the authors present a young orthodox economist who reached the highest spheres of the Argentine State in the 1930s, working for conservative governments. On the whole, this study replicates Prebisch's own biographical account, since its main source is the above-mentioned interview conducted by Pollock himself. The authors' new contribution was to show how Prebisch's work over the 1920s led him to contrast the empirical reality of Argentina with the postulates of neoclassical economics. A crucial episode, in their telling, was the report "Anotaciones sobre la crisis ganadera" (Prebisch, 1991), prepared for the Argentine Rural Society, in which the young Prebisch used a wide range of statistical price data to show how imperfectly markets worked in practice.

The article by Gurrieri (2001) titled "Las ideas del joven Prebisch" can also be included in this line of interpretation. In a similar way, Gurrieri continues the narrative of a young, orthodox Prebisch who saw the underpinnings of his theoretical ideas eroded by the crisis of the 1930s, leading him to seek other interpretations of the economic process that could guide his actions in the Argentine public sector. The figure of Keynes would rise to prominence during the 1930s. Lastly, mention should be made of the biography written by Dosman (2008), showing a young Prebisch who remained an orthodox economist, unswervingly loyal to the theory of comparative advantage, despite all the material he had access to during his formative years.

From this brief analysis of the historiography it can be seen that, while the literature has helped create a more complex picture of the "young Prebisch", it has also reproduced the biographical illusion

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[4] This episode is made more interesting by the fact that Prebisch was then revising his ideas and writing critical essays on peripheral capitalism. See Medeiros (2021) for more details.

[5] See Morgan and Rutherford (1998) for a distinction between neoclassical economics in the inter-war and post-war periods.

constructed by the author himself of an orthodox economist whose underlying ideology was gradually modified by the observation of empirical reality. As will be argued in the following sections of this article, Prebisch's translation of a 1919 text by Adolph Wagner provides evidence that the author was predisposed to theoretical relativism even before engaging with Argentine empirical reality. In other words, this translation suggests that, as a young economics student, Prebisch may not have been altogether beholden to the ideas of the neoclassical economics of his time.

III. The social origins of the young Prebisch

As an economist, Raúl Prebisch had a solid education that enabled him to attain a prominent academic position and to move with some ease between the highest positions in the Argentine State apparatus in the 1920s and 1930s. It is therefore useful to follow Prebisch's first steps, as this paper attempts to do, focusing on what Magariños (1991) described as his "formative period", meaning his family and school life, youth and graduation, i.e., the years preceding his "public life". However, this exercise in regression is not disinterested; the period was selected in consideration of what Bourdieu (1972) called *habitus*, i.e., in an attempt to determine the correspondence between individual practices and the social and existential conditions of the individual.

Prebisch was born in 1901 in the province of Tucumán, where he lived until the age of 17. In that period, the author's social origins were forged within a relationship typical of late nineteenth century Argentina: marriage between a European immigrant man (his father, Albin Prebisch, was German) and an Argentine woman from a family connected with the agrarian oligarchy (his mother, Rosa Linares Uriburu). This combination gave his father access to the leading circles in the high society of a region in the throes of cultural development. After his marriage, Albin Prebisch became prominent in the cultural life of Tucumán, becoming head of the English department at the Colegio Nacional de Tucumán and participating in the founding of clubs and the Banco Comercial de Tucumán. He will also have contributed to Raúl Prebisch's (and his seven other children's) cultural capital by passing on his vast knowledge of languages, as he was fluent in German, English and Spanish and had some knowledge of French and Dutch (Praxedes, 2020).[6]

However, the young Prebisch's cultural acquisitions must mainly be attributed to his mother's side of the family. The Uriburus were part of an old family whose presence in the country went back to the struggles for Argentine independence and were prominent on the local scene because of their political connections and landholdings. On this side, the young Prebisch's grandfather, Segundo Linares, played an important role as a mentor. He was a lawyer who owned *El Norte* newspaper and had had a long political career, including as a senator and regional president of the recently created Radical Civic Union. Founded in 1891, this party stood out on the Argentine political scene for its strong defence of the pillars of liberal democracy. In an interview, Prebisch stated that the whole family had intellectual tendencies that he was sure came from their grandfather (Magariños, 1991, p. 33).

In this context, "the Prebisches" rose to increasing prominence in Argentine politics and culture, very largely because of the importance attached to education and cultural awareness in those years (Terán, 1977). Raúl Prebisch and his siblings grew up, as Barboza (2018) puts it, in a "cultural Tucumán": a province that was becoming a cultural and economic hub in the north of the country. Beginning in the last quarter of the nineteenth century, the creation of a range of institutions in the fields of education (schools and universities) and culture created the conditions for knowledge to circulate and an intellectual life to develop. The young Prebisch is reported to have attended highly prestigious schools, for example

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[6] Albin Prebisch refrained from educating his children in his own traditions and tried to "Argentinize" them, opting to socialize them in Spanish and within the Catholic tradition, so he did not teach them German, let alone Protestant precepts. See Dosman (2008) for more details.

Colegio del Sagrado Corazón, Colegio Nacional de Tucumán and Colegio Nacional de Jujuy, where he obtained the prerequisites for a cultured life, namely the study of foreign languages, literature, inclusion in political circles and scientific knowledge.[7]

This background illuminates a Prebisch different to the one usually depicted in the literature, which persistently portrays him as an author whose social situation on the "periphery of the periphery" made it difficult for him to obtain a legitimate intellectual education. This distorted image is found, for example, in Love (2001). On the contrary, the young Prebisch's formative years provided him, in Bourdieu's phrase, with a stock of cultural capital more than adequate for him to enter the UBA Faculty of Economics in 1918 and to work as a translator for the *Revista de Ciencias Económicas*.

IV. The young Prebisch and his context in the *Revista de Ciencias Económicas*

Prebisch began studying at UBA in April 1918. In an interview, he stated that he had read in the newspapers about a Faculty of Economics that had been set up in Buenos Aires not many years before, and that he asked someone to send him the curricula and got quite interested (Magariños, 1991, p. 38). As mentioned, the Faculty of Economics was a young institution that had been established in October 1913 and started its activities the following year. Until then, academic discussion of economics in Buenos Aires had been almost exclusively confined to the Faculty of Law and Social Sciences. The Faculty of Economics was created by recruiting professors from the law course at the Faculty of Law and Social Sciences and the commerce course at the Centre of Students of Economic Sciences (CECE), created in 1912, while simultaneously UBA took over the Institute of Higher Commercial Studies, which was turned into the Faculty of Economics (Arana, 2022; Scarano, 2022). This development created a framework for the renewal of economics studies in Argentina. Prebisch moved to Buenos Aires to attend the first faculty offering an economics education in Latin America, initially consisting of a public accountancy course and a doctorate in economics. Buenos Aires was also the foremost intellectual hub in the region, especially in the field of economics (Love, 1995).

At the UBA Faculty of Economics, Prebisch was given a theoretical and practical training in economic law, accounting, commerce and economic theory (see annex A1). According to López (2008, p. 180), the idea was that a graduate should be an accountant, economist, financial expert and advisor on economic law all at once. Caravaca and Plotkin (2007) state that the course was created to meet the demand for professionals who could help the country negotiate the process of economic expansion and sophistication it was then going through. In some interviews, Prebisch described the training he received at the Faculty of Economics as neoclassical, saying that when he started his career as a young economist and professor during the 1920s, he was a firm believer in neoclassical theory (Prebisch, 1983, p. 1077). This theory certainly dominated the work of the Faculty of Economics. Notable figures were Hugo Broggi and Luis Roque Gondra, who taught an open course in mathematical economics based on authors favoured by the mainstream of the time, such as William Stanley Jevons, Carl Menger, Léon Walras, Francis Edgeworth, Alfred Marshall, Vilfredo Pareto, Irving Fischer, Antoine A. Cournot and Hermann H. Gossen. Scarano (2022) considers this the first "pure economics" course in South America. Neoclassical dominance became entrenched when Gondra took over the chair of political economy in 1920 and introduced Italian economists such as Vilfredo Pareto, Maffeo Pantaleoni and Enrico Barone into the course.

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[7]   Regarding Prebisch's command of foreign languages, he is quoted as saying that he did his primary schooling and was educated up to the third year of the Colegio Nacional in a school run by French priests belonging to the Missionaries of the Immaculate Conception of Lourdes, who taught him to read and write in Spanish and French in the province of Tucumán (Popescu, 1986, p. 15, quoted in López, 1989, p. 73). López adds that Prebisch would have studied English from the second to the fourth year of secondary school at the Colegio Nacional de Jujuy, as well as Italian in the fifth year.

Although there was a predisposition towards neoclassical economics at the Faculty of Economics, not everything came down to this. López (2001) suggests that the late reception of neoclassical economics in Argentina left room for other schools of thought and ideologies, such as historicism, nationalism, cooperativism and State socialism. Arana (2022) points to a group of professors who had a background in law and were influenced by German economic thought, disseminating the work of authors such as Gustav Schmoller, Friedrich List and Adolph Wagner in their classes. Some of the leading names at the Faculty of Economics were Enrique Ruiz Guiñazú, Félix Martín y Herrera, Marco M. Avellaneda, Juan José Díaz Arana and José Antonio Terry. The coexistence of these different groups in the Faculty led to disputes and debates, both about what the professional profile of the course should be (more scientific or more occupational), and about the essence of economics as a mathematical or social science (Caravaca and Plotkin, 2007).[8] This plurality of ideas, coupled with the disputes that flourished among the professors of the Faculty of Economics, provide a clue to the young Prebisch's reasons for translating Adolph Wagner's writings in the *Revista de Ciencias Económicas*.

Prebisch acknowledged the importance of some professors at the Faculty of Economics for his education, namely Luis Roque Gondra, who gave him reading recommendations, Mauricio Nirenstein, because of his vast culture and interesting reading suggestions, and the director of the Faculty, Eleodoro Lobos, who gave him private lessons every Thursday in his law office (Dosman, 2008; Solar, 2006). On the whole, though, the young Prebisch was dissatisfied with the economics teaching at the UBA Faculty of Economics, considering it limited and his professors uninterested in Argentina's economic situation. These conditions apparently led Prebisch to seek ways of improving his own education by private study. In his diary he states that with the rarest exceptions, the professors at the Faculty were very poor. So much so that after the first year, when the university was reformed and class attendance became optional, he went to the library morning and afternoon instead of going to classes, for eight hours a day, always studying alone (Magariños, 1991, p. 45).

The university reform that did away with compulsory attendance made this kind of flexible study possible. This reform was pressed for by student organizations in different educational institutions around the country with the aim of democratizing Argentina's universities (Donghi, 1962). Meanwhile, Prebisch listed readings that included classical economists (Adam Smith and David Ricardo) and manuals by foreign economists (Italian and English). By his own account, he also kept abreast of current developments by reading scientific journals such as the *Quarterly Journal of Economics* (Pollock, Kerner and Love, 2002). The author's command of foreign languages was thus a crucial factor in his self-education.

Prebisch also cited Marxism as another of his formative sources and said in an interview that the ferment of the Russian Revolution of 1917 had aroused the interest of a group of young university students, himself included, who had read Karl Marx's *Capital* and other authors such as Rosa Luxemburg, Lenin and Trotsky (Magariños, 1991). Mallorquín (2012) points out that Prebisch's academic environment was not yet circumscribed by theoretical hegemonies and that the author also became acquainted with other socialists, such as Filippo Turati and John A. Hobson, and with the cooperativists and guild socialism. In the author's own words, at that age, when he arrived at the University in Buenos Aires, he became a socialist; he went to the other extreme (Pollock, Kerner and Love, 2002, p. 536).

Prebisch states that he followed events in the Soviet Union in his early years as a student, taking an interest in the speeches of the revolutionary leaders. He also maintained strong ties with some members of the Socialist Party in Buenos Aires, establishing a close relationship with socialist thinkers such as Juan Bautista Alberdi, Nicolás Avellaneda, Domingo Sarmiento, Juan Bautista Justo

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[8] Scarano (2022) reconstructs the discussion around the development of the Economics curriculum and shows how three projects were in contention: (i) H. Broggi presented a plan that emphasized mathematical training and marginalist political economy; (ii) J. Bianco prioritized local knowledge over the study of general economic principles, listing numerous courses in law and four in economic geography; and (iii) C. Rodríguez Etchart was concerned to create similarities with the curricula of other countries, but with a greater number of subjects and the addition of optional courses. The resulting curriculum was constructed from these three proposals (see annex A1).

and Alejandro Bunge (Iñíguez, 2003; Souza, 2015). These authors were intellectuals at the forefront of the "Argentine urbanizing project", i.e., proponents of the country's industrialization and urbanization. Justo, who translated Karl Marx's work into Spanish and was one of the founders of the Socialist Party of Argentina, was someone whose activities Prebisch particularly followed during his university period.[9] However, it was the "Bunge brothers" (Alejandro and Augusto) whom Prebisch in fact became involved with during his studies, beginning with Alejandro, who in 1920 invited Prebisch to work under his supervision at the University of La Plata, giving a series of seminars. Augusto, for his part, dominated the political scene by his work in Congress and as the editor of two newspapers (*La Hora* and *Crítica*). The two brothers were advocates of German thought and upheld the German model of social insurance and protectionism as a tool for achieving Argentina's "economic independence".

Lastly, Prebisch took a strong interest towards the end of his studies in the "other Pareto", a reference to the Italian's sociological contributions. Prebisch's socialist ethos was gradually replaced by support, following Pareto (1916), for the idea of a "technocratic elite" capable of guiding the State by prioritizing rational tools over personal interests. Prebisch said in an interview that every morning he sat on board digesting Pareto's *General Sociology* and that Pareto was another author who had a great influence on his education (Magariños, 1991, p. 56). In October 1923, Prebisch organized a conference in the Italian's memory at the Faculty of Economics. His presentation was subsequently published in the *Revista de Ciencias Económicas* under the title "La sociología de Vilfredo Pareto" (Prebisch, 1923).[10]

On the subject of Prebisch's activities at the university, mention should be made of his important political role as a student leader between 1920 and 1921 (Dosman, 2008) and his active participation in the *Revista de Ciencias Económicas*, of which he became an editor and, jointly with Alfredo L. Palacios and J. Waisman, editor-in-chief in 1921. The *Revista de Ciencias Económicas* had been created along with the Faculty of Economics (the first issue dates from July 1913, actually predating the start of the Faculty's activities). It was run almost exclusively by CECE students and functioned as an organ with ample editorial leeway in which they could publish scientific papers and opinion pieces and disseminate the ideas of renowned economists from Argentina and the rest of the world (Arana, 2015). As regards the organization and content of the journal, it was published monthly to begin with, maintaining a strong flow of different types of articles that included: (i) analysis of the Argentine and international situation; (ii) discussions of economic theory; (iii) reflections on economic problems; (iv) analysis of professional standards and legislation; and (v) translations. According to Arana (2022), the journal quickly became an important source of information on practical and theoretical aspects of economics.[11]

In the course of his studies, the young Prebisch published a wide range of texts in the *Revista de Ciencias Económicas*. With the university reform, moreover, he was able to join the journal's editorial committee. Prebisch's interest in topical international issues is evident in his earliest texts. They include "Investigaciones sobre el standard de vida en China" (1919a), "El costo de la vida en Italia" (1919b), "La guerra y la población de Francia" (1919c), "La riqueza y renta del mundo antes de la guerra" (1919d), "La situación financiera de Francia" (1919e), "El medio circulante y los precios en Italia" (1920a) and "La Conferencia de Bruselas" (1921a).[12] Only later, in 1921, did he show a greater leaning towards more theoretical issues, especially in relation to business cycles. Sember (2010) points

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[9] Justo vetoed the publication of an opinion piece by Prebisch titled "¿Salarios a oro?" (Prebisch, 1920b) in *La Hora* newspaper because it went against his own writings, and this apparently led the young Prebisch to cancel his membership of the Socialist Party and distance himself from its activities (Magariños, 1991).

[10] Prebisch features in the literature as one of those who received Pareto's ideas in Argentina (López, 2002).

[11] Until then, the only journal specializing in economics was *El Economista Argentino*, created in 1891 and published for the last time in 1916. The *Revista de Ciencias Económicas* was created in 1913, followed by the *Anales de la Academia Nacional de Ciencias Económicas* in 1915 and the *Revista de Economía Argentina*, edited by Alejandro Bunge, in 1918 (López, 2007; Caravaca and Plotkin, 2007).

[12] Some of the texts were only signed "R. P.". It later emerged that they were by Prebisch.

to the article "Anotaciones sobre nuestro medio circulante. A propósito del último libro del doctor Norberto Piñera" (Prebisch, 1921b, 1921c, 1922a and 1922b), a publication divided between four issues of the *Revista de Ciencias Económicas*, as Prebisch's first major work on the subject of cycles and monetary economics.

Lastly, the young Prebisch also worked diligently as a translator. At that time, students were required to have a good knowledge of languages, since the courses at the Faculty of Economics were dominated by French and Italian literature (López, 1989). It was therefore not unusual for some professors to translate basic texts to be used in their classes. In an interview, Prebisch related that Gondra, for example, had published a translation of Maffeo Pantaleoni's *Principi di economia pura* for use on his course (Pantaleoni, 1918). Having a vast knowledge of languages, Prebisch quickly took to this activity and recounts that when Nirenstein started to translate Enrico Barone's book, he said to Prebisch that it was a first-rate book and suggested he go on with the translation. So Prebisch did (Solar, 2006, p. 20, quoted in Mallorquín, 2006). In 1926, UBA published his translation of *Principi di Economia Politica* (Barone, 1926). Prebisch had previously done other translations for the *Revista de Ciencias Económicas*, producing Spanish versions of excerpts from Adolph Wagner (1919a and 1919b), which will be discussed in the fifth section, and the American John H. Williams's book *Argentine International Trade under Inconvertible Paper Money 1880–1890*. This latter translation, carried out as part of his work as an assistant for the Economics and Finance Seminar of the Faculty of Economics, was published in five issues of the *Revista de Ciencias Económicas* under the title "El comercio internacional argentino en un régimen de papel moneda inconvertible" (Williams, 1921a, 1921b, 1921c, 1921d and 1921e).

V. Adolph Wagner's text and Raúl Prebisch's translation

Adolph Wagner (1835–1917) died shortly before Prebisch published his translation of some paragraphs of *Grundlegung der politischen Ökonomie* or "Fundamentals of Political Economy", one of the volumes making up his capacious textbook *Lehr- und Handbuch der politischen Ökonomie*, which was widely published internationally, being translated into French and (partially) into Italian and adapted in countries as far apart as the United States, Spain, Brazil and Japan, in addition, of course, to Prebisch's case in Argentina. In the United States, Wagner's ideas were disseminated by disciples such as Henry Carter Adams and Richard Ely as part of a broader movement of United States economists who carried out their doctoral studies at German universities in the late nineteenth and early twentieth centuries (Carlson, 1999). In Spain, Wagner influenced the thinking of public men who advocated the modernization of Spanish public finances in the early twentieth century, such as Flores de Lemus and Francisco Bernis (Astigarraga and Zabalza, 2014). Brazilian thinkers of that period, such as Rui Barbosa, also used Wagner as a touchstone when addressing issues such as currency and public finance (Bruzzi Curi, 2019; Bruzzi Curi and Cunha, 2022). In Japan, Wagner's ideas on social policy were part of the wider process of reception of economic ideas in the second phase of the Meiji Restoration (Nishizawa, 2001).

Wagner was a quite influential professor of economics in the Germany of his time, as evidenced by the wide international circulation of his ideas, who belonged to an intellectual and political movement known as State socialism. The distinctive feature of this branch of socialism was its emphasis on public budgetary management as a regulator of income distribution in society. Intellectually, this was reflected in the development of the science of public finance (*Finanzwissenschaft*), which merited a separate volume in Wagner's textbook. The subjects of this science were taxation, public expenditure, public debt and other aspects of the economic administration of the State. In this field, Wagner produced a manual whose distinctive feature was its positive view of the role of expanded public expenditure as a

factor of civilization. This kind of perspective made Wagner an important international reference point for those considering and seeking to reform public finances in a way favourable to the expansion of the scale and scope of State activities (Schulz, 2013; Bruzzi Curi and Cunha, 2022).

Wagner's specific perspective on public finance and his reputation as a scholar of the subject were undoubtedly part of the reason for Prebisch's awareness of him. The availability of the French translation of his volume on public finance, *Traité de la science des finances* (1913), in the library of the University of Buenos Aires and the inclusion of the French translation of his manual *Les fondements de l'économie politique* (1904) on the reading list of the political economy course taught by Nirenstein at the Faculty of Economics support this hypothesis (López, 1989). Likewise, the works of German authors (such as Wagner) provided some of the Faculty's professors with a theoretical and ideological basis for their own thinking.

The translated passage, however, does not deal with the topic of public finance, but is a discussion of the motives of economic action in a register that combines considerations of political economy and psychology. In the general organization of the work, the translated paragraphs (numbered 30 to 41 in both the German and the French versions) are part of the volume titled *Les fondements de l'économie politique*, Book One: The Economic Nature of Man. Object. Tasks. Methods. System of Political Economy, Chapter 1: The Economic Nature of Man. In other words, Prebisch selected the beginning proper of Wagner's theoretical book for translation, dispensing with the long introduction that precedes chapter 1. As was then customary in German textbooks, the introduction included an extensive review of economic doctrines up to that time, i.e., a summary of the history of economic thought up to that point.

The beginning of Wagner's own theoretical exposition set out to examine in detail the nature of human economic action, as indicated in the title of "Book One". In the introduction to the subject, found in the paragraphs immediately preceding the beginning of Prebisch's translation, Wagner drew on a wide range of material in an attempt to get to grips with the problem of human economic nature: in addition to borrowings from political economy, he referred to relatively up-to-date psychological literature, including Höffding and Wundt. Wagner then proceeded from the concepts of need (*Bedürfnis*), satisfaction (*Befriedigung*), the drive for satisfaction (*Befriedigungstrieb*) and labour (*Arbeit*) to arrive at a definition of economics that would enable him to address the economic nature of man.

Wagner linked these concepts in his basic definitions to arrive at a definition of the economy (*Wirtschaft*) by tracing a pathway from human need in its most basic form (people's need to preserve their own lives), via the drive for satisfaction and labour, to the economy. This pathway is summarized in the following definition:

> The economy: (in the broadest sense of the word) is a synthesis of working activities, carried out in accordance with the economic principle, whose purpose is the continuous creation and use of goods for the satisfaction of needs, in a closed (or purportedly closed) human circuit of need and satisfaction (Wagner, 1892, p. 81).

The "economic principle", for Wagner (1892, p. 80), was the psychological principle according to which an action is only initiated if it is inwardly judged that the comfort of meeting the need will outweigh the inconvenience of the effort.

Setting out from this definition of the economy, Wagner moved on to an analysis, not of human nature in general now, but of human economic nature. He considered this economic nature to derive from need, the drive for satisfaction, the instinct for self-preservation and self-interest, mediated by evaluations, comparisons and judgements made predominantly on the basis of the economic principle. Wagner recognized that economic nature was only part of a more general human nature and thus subject to modifications of various kinds. This nature varied between individuals according to their class, social stratum, nation, epoch, country, customs and culture. Thus, human economic nature varied in history. Wagner was clear, however, that in essence this economic nature presented itself in a form common

to everyone, in the motives, thoughts, efforts and actions governed by it. That was because this nature changed very slowly, at least in the time periods relevant to human history. Accordingly, the study of this nature should treat it as an "absolute" category and, as such, an important and sometimes decisive factor for the individual (Wagner, 1892, p. 82).

Such a position on the historicity of the economic nature of man reflects the compromise Wagner sought to establish between the relativism of the historical school, which was quite influential in the German academic milieu of his time, and schools of economic thought with a greater disposition to treat categories in more general terms, such as British political economy. An admirer of Alfred Marshall's work, Wagner (1891) wrote a review of *Principles of Economics* in which he upbraided his German colleagues for paying too little attention to theoretical developments in the United Kingdom. It is not correct, therefore, to link Wagner to the second generation of the German historical school merely because they coincided chronologically and because of his affinities with Schmoller on the social question and his advocacy of a protectionist economic policy (Bruzzi Curi and Almeida, 2022). Wagner's contributions in the field of public finance and his reformist stance on social policy mean that he can be regarded as a State socialist. From the point of view of theory and method, however, he was a thinker of diverse influences who acknowledged the validity of some historicist arguments but did not exchange the deductive method for historical relativism. In general, from his definition of the economy, it is possible to associate Wagner with the common current that, according to Tribe (1995, p. 72), ran through much of nineteenth century German discourse: the centrality of human beings and their needs as a starting point for the consideration of economic life.

It is in this line of reflection on human actions and their motivations based on need that the first passages translated by Prebisch, from chapter 1, section 2, are situated. Prebisch gave the "article" published in the *Revista de Ciencias Económicas* the title of this section: "Diferencia y combinación de móviles en los actos económicos" ("Differences and combinations of motives in economic acts") (Wagner, 1892, p. 83 [original]; Wagner, 1919a, p. 429 [translation]). Wagner emphasized here that human beings acted out of a combination of different motives, but in a unitary way. Human actions did not depend only on economic motives and the pursuit of self-interest. A number of motives generally contributed to an action, even if economic motives predominated. Although differentiation was not always easy, because human behaviour was unitary yet actuated by several motives at the same time, human action was different from action motivated only by self-interest, "by the desire to obtain the greatest possible advantage for the least possible sacrifice" (Wagner, 1892, p. 86 [original]; Wagner, 1919a, p. 432 [translation]).

In his commentary on conceptions in the economic literature regarding this point, Wagner noted that the "old theory", i.e., classical political economy, had paid too little attention to the subject. In his opinion, this school of thought had extrapolated the motivations of modern city dwellers to a quite different set of human beings. Such "equal treatment for all" was the consequence of a "one-dimensional psychology" ("imperfect" is the word Prebisch uses in his translation) that ignored the character of economic action as motivated by a number of determinants. Wagner thus argued for a kind of relativism, a differential treatment of different phenomena and contexts. He criticized the outright abolition of the old law, calling it sometimes coercive, but also protective and the consequent subjection of agriculture and industry to the same economic law. The same error was apparent in the extension of freedom of trade to the most diverse peoples and countries (Wagner, 1892, p. 86 [original]; Wagner, 1919a, p. 432 [translation]).

Prebisch selected for translation a passage of Wagner's on a fairly general theoretical point, the nature of human economic action, in which, however, there is a relativist perspective leading on to a critique of the notion that free trade is beneficial in all circumstances. The argument was not a new one: closely associated with Alexander Hamilton's late eighteenth century defence of American manufacturing, it was given its best-known formulation by Friedrich List in the early nineteenth century. Some thinkers of a historicist bent, such as Schmoller, shared this line of argument, and it was frequently

used in public debate, in Germany and elsewhere, in defence of measures to protect industry as a way of furthering efforts to overcome economic underdevelopment (Tribe, 1988; Boianovsky, 2013). No "endorsement" of Wagner's relativist critique can be extracted from Prebisch's selection of passages. However, the choice and translation of this particular passage are indications of contact, as early as 1919, with a line of economic argument based on the differentiation of countries from the point of view of their development and, consequently, of the applicability of free trade: opening up trade might not be conducive to the commercial prosperity of certain countries, especially those with an underdeveloped industrial structure.

Having established the idea that human action involves different motivations, Wagner distinguished five motives (or driving forces) for economic action. Prebisch translated the analyses of the first three motives into Spanish, ending the translation with "to be continued", although this promise was not to be fulfilled. Wagner's motives were divided into four selfish ones and a fifth, unselfish, one. The first motive was the search for personal economic advantage and the fear of poverty. The second motive was the fear of punishment and the hope of recognition. The third motive was the sense of honour, the desire for consideration and the fear of shame and contempt. These, then, were the three motives included in Prebisch's translation for the *Revista de Ciencias Económicas*. In addition to these, the fourth and fifth motives are described in Wagner's textbook. Still in the "selfish" domain, the fourth related to the drive for activity and the pleasure derived from being active, from work and its results, and the fear of inactivity (passivity). Lastly, the fifth, "unselfish" motive came from the inner compulsion to act morally, the sense of duty and the fear of remorse (Wagner, 1892, p. 87 [original]; Wagner, 1919a, pp. 433–434 [translation]).

In examining the first motive, Wagner associated it with the instinct to meet needs, identifying this as the great underpinning of economic activity. However, he did not view the pursuit of self-interest as prevailing unchecked: "religious and moral ideas" and the "influence of climate" might hinder the development of the first motive, contradict it, or even annihilate it. Moreover, Wagner argued, even in situations where it predominated, this motive would overlap with others, which could increase or reduce its effectiveness. In his view, the "old classical theory" and the "Manchester school" did not give sufficient consideration to these overlaps, instead basing their entire discussion of economic actions and the phenomena derived from them on this first motive. "British classical theory" did not exactly deny the existence of other motives of human action, but classified them as non-economic: they were subjects for morality, psychology, politics, but not for economics (Wagner, 1892, pp. 88–89 [original]; Wagner, 1919a, pp. 435–436 [translation]).

Wagner went on to stress the importance of this self-interested motivation for the methodology of economics by suggesting that:

It was also on this first motive that the old school based the method of political economy especially: *the deduction that proceeds from this motive*, i.e., the deduction that proceeds from self-interest, from selfishness (Wagner, 1892, pp. 89–90 [original]; Wagner, 1919a, p. 436 [translation]).

Later, particularly in the next chapter dealing with method, Wagner showed whether and to what extent this procedure is proper and legitimate. He stated that for the time being, it could only be observed once again that, subject to certain assumptions and precautions, the procedure is not only permissible, but useful and indeed necessary (Wagner, 1892, pp. 89–90 [original]).

Prebisch omitted the second paragraph of the quoted passage in his translation, allowing this subsection to end with the remark, made in a critical tone, that the "old school" had based its method of economics on a deduction from human selfishness. The omission could be attributable to the French edition of Giard & Brière (Wagner, 1904), which Prebisch, according to a footnote, used for his translation. This hypothesis must be discarded, however, because the final paragraph legitimizing the

deductive method of the "old school" does appear in the French version, in a faithful translation of the German original. Thus, there seems no alternative to attributing the omission of this passage to Prebisch himself. Images 1, 2 and 3 help to illustrate this point.
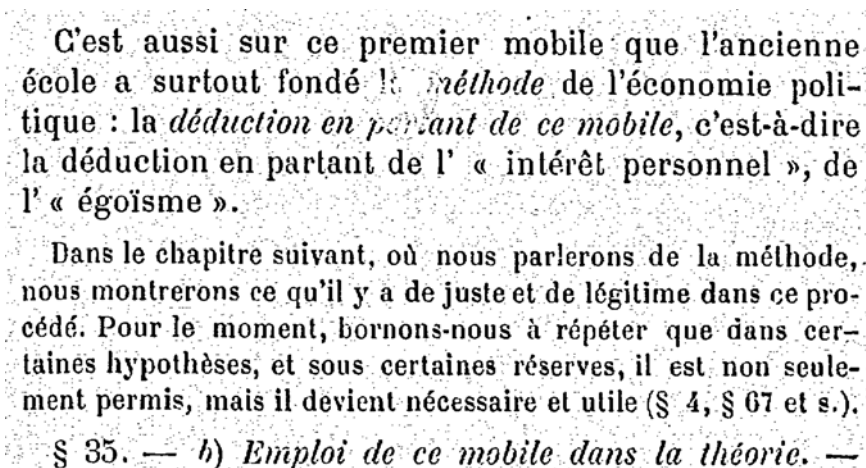
Image 1
Passage in the original German text
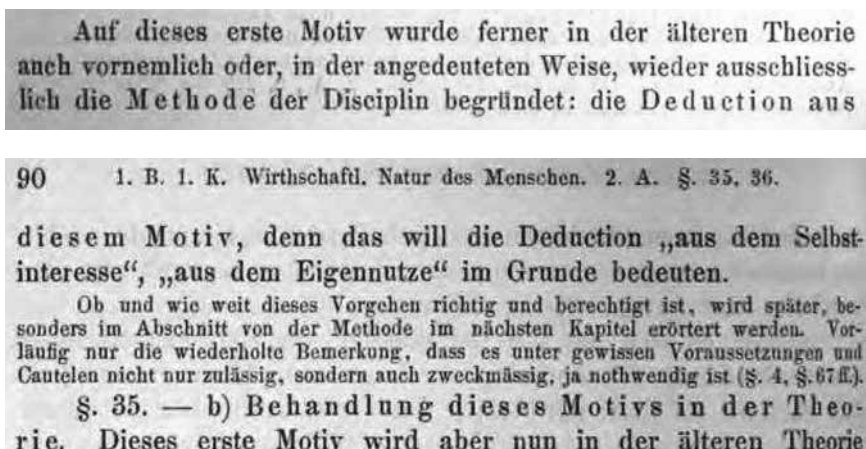
Source: A. Wagner, *Lehr- und Handbuch der politischen* Ökonomie. *Erste Hauptabteilung: Grundlegung der politischen Ökonomie*, Leipzig, 1892, pp. 89–90.

Image 2
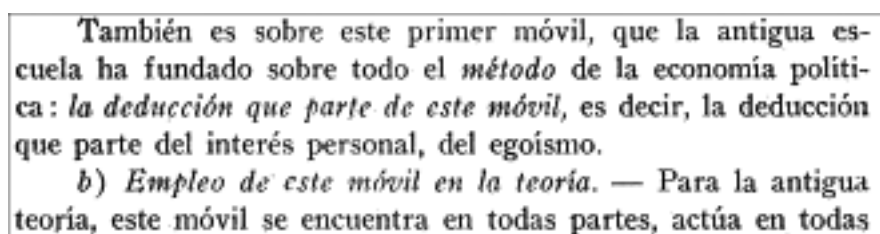Translation of the passage in the French version cited by Prebisch

Source: A. Wagner, *Les fondements de l'économie politique*, Tome I, Paris, Giard & Brière, 1904, p. 129.

Image 3
Translation of the passage in Prebisch's Spanish version

Source: A. Wagner, "Diferencia y combinación de móviles en los actos económicos", *Revista de Ciencias Económicas*, year VIII, No. 77, 1919, p. 436.

It is clear from images 1, 2 and 3 that the passage immediately preceding the paragraph beginning "Empleo de este móvil en la teoría" (numbered §35 in the German and French editions) was omitted in Prebisch's translation. As presented there, the analysis of the first motive of human economic action, namely selfish self-interest, ends on a critical note: the emphasis is on the failure of the "old British school" to take account of motivations other than self-interest, especially in the formulation of its method. Without the comment validating the "deduction that proceeds from self-interest", the tone of this specific passage is undoubtedly more relativistic in the translation provided by Prebisch. While not rejecting the universalist method based on deduction, Wagner acknowledged the value of some historicist criticisms and was concerned to weigh the arguments. As a result, his text lends itself to this kind of intervention which, even if minimal, can change the tone of a passage, making the relativist critique sound stronger to the reader. It is worth noting that this was the only change Prebisch made in his translation: in the passages dealing with the second and third motives of economic action, the translation reproduces the original text in full.

This 1919 translation provides a glimpse of the fact that Prebisch was already in contact with a line of economic reasoning associated with the critique of free trade. Although the motivations of human economic action are the central theme of the text translated, mention is made at one point of the misconception that free trade would be beneficial for economically dissimilar nations. A few paragraphs later, Prebisch intervenes in the text, in an omission whose effect is to change the tone of Wagner's argument about economic method. His acknowledgement of some relativist criticisms is presented, in Prebisch's translation, without the final comment validating the method of the classical "old school". Contact with the relativist critique of free trade in this 1919 translation was, therefore, accompanied by this small but potentially revealing textual alteration.

If an evidential paradigm is applied, this ostensible "slip" of leaving out a passage in the text can be seen as a clue of the kind detectives unearth in trying to elucidate an event. Such clues provide an indirect vantage point from which to question autobiographical narratives about the formation of a line of thought. In other words, it is possible to dispute the idea that Prebisch began to understand the external vulnerability of Latin America and to develop a critique of free trade over the course of the 1920s on the basis of empirical observation of the Argentine economy (especially export cattle farming). These "marginal data" found in the translation of Wagner's text provide a glimpse of an intellectual disposition even in 1919, when Prebisch was a student, towards methodological relativism, linked to suspicion of the benefits of free trade. Thus, the Prebisch who embarked on the empirical study of issues associated with the functioning of peripheral economies had already left "clues" to a relativist line of thinking in which free trade was viewed with misgivings.

VI. Final considerations

The young Raúl Prebisch's intellectual activity in the *Revista de Ciencias Económicas* raises some questions about the author's formative period and provides an opportunity to revisit the historiography surrounding him. Thus, the translations of Adolph Wagner that Prebisch published in 1919 not only shed light on the mechanisms of dissemination and reception of economic ideas in Argentina, but also provide clues about Prebisch's ideas on economics during the years immediately after he graduated from the UBA Faculty of Economics. As has been seen, this provides a response to the "biographical illusion", in Bourdieu's phrase, surrounding the author's career.

First, where the Wagner translation is concerned, although the young Prebisch selected a passage with a broad theme (the nature of human economic action) to translate, he left marks of his own, albeit "marginal" ones, on the text by deciding what should and should not be translated or omitting a passage in the original version. Prebisch, then, was not really a mere transmitter of Wagner's

written message, since his decisions as a translator ultimately altered the tone of part of the text. The omission of the passage on deductive method had the effect of pointing up Wagner's relativist critique of "old school" universalism. This critique involved, among other things, Listian misgivings about the supposedly universal benefits of free trade.

These marks left by the young Prebisch in Wagner's text are clues that can be used to relativize Prebisch's own biographical account (in the various autobiographical texts) from the 1970s onward, according to which he was a fully convinced neoclassicist who only began to question the validity of these theories after the deleterious effects of the 1930s crisis; i.e., it was the author's own empirical experience that led him to categorically reject the use of general economic laws to explain the situation in the periphery. On the whole, this "biographical illusion", as Bourdieu calls it, of the author's own devising was taken up by the literature without much of a struggle, and the inevitable result was the distortion of Prebisch's image as a student at the UBA Faculty of Economics.

Given the contradictions noted above, the Wagner translation helps to reveal a young economist who was not all that dogmatic or all that convinced that neoclassical economics had adequate answers to economic problems. In these terms, even before Prebisch was confronted with the limits of neoclassical economics (through his empirical experience) during the 1920s and, above all, the 1930s, he was already showing signs of resistance to the supposed universality of the methodological foundations of neoclassical thought in his second year as a student at the Faculty of Economics. Moreover, these signs left by Prebisch also prompt a reflection on what it really meant to be a trainee economist in Argentina in the early decades of the twentieth century. For one thing, it needs to be borne in mind that the public debate in Buenos Aires was already characterized by a fierce dispute between free traders and advocates of protectionism. For another, it is also important to understand that Prebisch acquired his training in economics at a time when the academic hierarchies of the discipline had yet to crystallize, so that students were able to come into contact with other theoretical frameworks, as has been seen in Prebisch's case. This was the background to his "creative" reception of Wagner's thought, characterized by a compromise between a more universalist theorization centred on human needs and a recognition of relativist critiques inspired by historicism.

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Annex A1

Table A1.1
Syllabus of the Faculty of Economics of the University of Buenos Aires (UBA), 1914–1924

Year	Syllabus
1	Financial mathematics
	Civil law
	National economic geography (D)
	History of trade (D)
	Commercial law (D)
2	Financial mathematics
	Accounting
	Commercial law
	National economic geography (D)
	Political economy (D)
	Sources of national wealth (D)
3	Banking
	Limited liability companies and insurance
	Statistics (D)
	Political economy (D)
	Industrial and rural technology (D)
	Industrial law (D)
4	Finance (D)
	International trade law (private and public) (D)
	Trade policy and comparative customs regimes (D)
	Consular law (D)
	Economics seminar (D)
5	Agrarian regime (D)
	Economic and administrative regime of the constitution (D)
	Transport and tariffs (D)
	Finance (D)
	Economics seminar (D)
	Thesis (D)

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of M. Arana, "De profesionales y científicos en las Ciencias Económicas, 1913-1945", *Historia de la Universidad de Buenos Aires (1881-1945)*, Tome II, vol. 2, P. Buchbinder (org.), EUDEBA, 2022.

Note: The subjects with no letter afterwards were common to all courses. The letter (D) denotes subjects studied exclusively by actuaries, accountants and PhD students.

Annex A2

Image A2.1
Photograph of the young Raúl Prebisch (undated)

Source: Economic Commission for Latin America and the Caribbean (ECLAC), Hernán Santa Cruz Library, "Archivo de trabajo Raúl Prebisch 1920-1986", Santiago.

Image A2.2
Photograph of the young Raúl Prebisch (undated)

Source: Economic Commission for Latin America and the Caribbean (ECLAC), Hernán Santa Cruz Library, "Archivo de trabajo Raúl Prebisch 1920-1986", Santiago.

Image A2.3
Photograph of the young Raúl Prebisch (undated)

Source: Economic Commission for Latin America and the Caribbean (ECLAC), Hernán Santa Cruz Library, "Archivo de trabajo Raúl Prebisch 1920-1986", Santiago.

Effects of the Continuous Benefit Programme on the nutritional status and food security of older persons in Brazil

Maritza Rosales, Leonardo Bornacki de Mattos
and Cláudia César Batista Julião

Abstract

Addressing the needs of older persons poses public-policy challenges. The obstacles that the poorest older persons face in securing their livelihoods, compounded by physiological and metabolic changes and the presence of chronic diseases, make them more vulnerable. This study evaluates the impact of the Continuous Benefit Programme (BPC) on the nutritional status and food security levels of older persons in Brazil, using a fuzzy regression discontinuity design with microdata drawn from the 2017–2018 Consumer Expenditure Survey (POF). On average, participation in the programme is found to increase the probability that an older person will be food-secure, and to reduce his/her chances of suffering mild food insecurity. Although the objective of the programme is to reduce poverty, these findings can support the formulation of public policies that promote the quality of life of older persons, by acting on purchasing power, health and nutrition.

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I.   Introduction

Food insecurity and its most serious manifestation —hunger and the various forms of malnutrition— are on the rise In Latin America and the Caribbean and are impeding progress towards the Sustainable Development Goals (SDGs). The persistent effects of the coronavirus disease (COVID-19) pandemic, compounded by climate crises and the conflict in Ukraine are identified as the main phenomena hindering this progress (FAO and others, 2022). This is particularly the case with respect to Goal 2, which overlaps with the other goals of the 2030 Agenda for Sustainable Development (Pérez-Escamilla, 2017).[1]

In this context, the problems of food insecurity and malnutrition (including both obesity and undernutrition) and have regained importance on the public policy agenda, since they affect millions of people worldwide. According to the World Health Organization (WHO, 2021), the global prevalence of obesity increased from 8.7% of the population in 2000 to 13.1% in 2016. The phenomenon of increasing obesity is not exclusive to high-income countries (Cawley, 2010). According to WHO (2021), middle-income countries also display high rates of obesity, including Mexico (28.9%), Argentina (28.3%) and Chile (28%). In Brazil, where the same global trend is observed, the percentage of people who are obese increased from 14.5% in 2000 to 22.1% in 2016 —the latter being above the world average of 13.1% in that year.

According to the Brazilian Institute of Geography and Statistics (IBGE, 2010), the obesity rate was 17.9% among 65–74 year-olds in 2008–2009 and slightly lower among those aged 75 years and older (15.8%). In 2018, the obesity rate among persons over 65 years of age reached 20.3%, being higher among women (23.4%) than among men (15.3%) (Ministry of Health, 2018).

In the case of undernutrition, WHO (2021) reports a drop in prevalence from 11.3% of the world's population in 2000 to 9% in 2016. While the rise in obesity rates is the most alarming nutritional problem, undernutrition remains a serious issue. In Brazil, undernutrition decreased from 4.4% in 2000 to 2.7% in 2016. In the same period, the undernutrition rate among 65–74 year-olds group was 3.2%, while among persons aged 75 years and older it stood at 4.4%. These values are above the average rate of undernutrition in the Brazilian population at large (2.7%) (IBGE, 2010).

The spread of obesity is worrying because of its potential to foster chronic noncommunicable diseases and, consequently, loss of quality of life, risk of premature death and increased health costs, among other problems (WHO, 2015; Carvalho and others, 2021; Chooi, Ding and Magkos, 2019). In contrast, undernutrition is of concern because of its relationship with infectious diseases that interfere with nutrient absorption (Keusch, 2003). The metabolic and physiological changes inherent to the ageing process diminish the functionality of the human body; and, in addition, they increase the vulnerability of older persons, owing to the existence of clinical conditions with diseases that can cause changes in eating behaviours (Ipuchima and Costa, 2021).

Nutritional status is defined as the result of the balance between the body's nutrient intake and its energy expenditure. Nutritional disorder is one of its organic manifestations, including both obesity caused by an excess of nutrients and undernutrition caused by their scarcity (Ministry of Health, 2011). Malnutrition problems are persistent in the population, especially among the socioeconomically vulnerable, such as older persons, who are more at risk. In the case of Brazil, Travassos (2018) notes that older persons are vulnerable to income shocks, owing both to low productivity and conditions for remaining in the labour market. This situation increases the chance of suffering from a nutritional disorder (such as obesity or undernutrition) and accentuates poverty and food insecurity.

Huenchuan (2018) argues that socioeconomic inequality is very closely related to higher rates of hunger, obesity and undernutrition among the most vulnerable population groups. The reason is that the high costs of nutritious foods and the budgetary constraints faced by older persons lead them to choose

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[1] The 2030 Agenda for Sustainable Development contains 17 goals and establishes a transformative vision towards the economic, social and environmental sustainability of the countries that adopted it in 2015 (ECLAC, 2023).

cheap foods and diets that are hypercaloric, lacking in variety and nutrient-poor (FAO/IFAD/WFP, 2015). In Brazil, several studies have noted the influence of socioeconomic factors on obesity, particularly income and education (Silva and others, 2015). Triaca, dos Santos and Tejada (2020) found that income is the factor that contributes most to the spread of obesity in the country. However, while a larger income might enable access to more nutritious food, there is no certainty about the allocation of household resources in terms of the quantity and quality of food, because other factors such as price, preferences and socioeconomic levels influence this decision (Simões and others, 2018). Obesity continues to spread in Brazil; and income is a decisive risk factor for this disease, along with dietary diversity, education, occupation and organic factors, among others. Lima and others (2015) and Malta and others (2019) also analysed the problem of obesity in Brazil; but there are few analyses of the prevalence of obesity and undernutrition and their relationship with income among older persons in the country.

According to the Food and Agriculture Organization of the United Nations (FAO and others, 2018), 821 million people suffered from hunger in 2017, while the prevalence of food insecurity increased from 7.6% in 2016 to 9.8% a year later. Food and nutrition security is defined as when all people, at all times, have physical and economic access to food, in sufficient quantity and quality to meet their nutrient needs (FAO and others, 2018). The status of food and nutritional security can be determined using the Brazilian Food Insecurity Scale (EBIA), which distinguishes four levels: (i) food security, when access to both household and individual food is regular, permanent, of quality, sufficient and does not compromise the attainment of other essential needs; (ii) mild food insecurity, which defines a situation of uncertainty about food in the future; (iii) moderate food insecurity, which occurs when there is a quantitative reduction of food among adults; and (iv) severe food insecurity, when the reduction of food in the household also affects children (IBGE, 2020a).

In Brazil, data from the latest (2017–2018) Consumer Expenditure Survey (*Pesquisa de Orçamentos Familiares* – POF) show that the prevalence of food insecurity increased to 36.1% from 22.9% in 2013 (IBGE, 2020a). Drawing on EBIA, Silva and Bento (2019) noted that the food security of an older population group was 8%, while the prevalence rates of mild, moderate and severe food insecurity were 24%, 40% and 28%, respectively.

Older persons are projected to represent 25.5% of the Brazilian population in 2060 (IBGE, 2020a), which poses major budgetary challenges for health care in this age group. In this context, social protection and, in particular, non-contributory pensions are being used increasingly to reduce the vulnerability of older persons to income shocks (Brugh and others, 2018).

One such initiative implemented in Brazil is the Continuous Benefit Programme (*Benefício de Prestação Continuada* – BPC), which aims to reduce poverty among older adults and persons with physical disabilities. The programme involves the transfer of one current minimum wage per month, as a social right guaranteed by the Federal Constitution of 1988 and regulated by the Organic Act on Social Assistance, No. 8742, of 1993 (Denes, Komatsu and Menezes-Filho, 2018). Persons aged 65 years or older with a per capita family income of no more than one-quarter of the current minimum wage are eligible to receive the benefit. According to the Economic Commission for Latin America and the Caribbean (ECLAC, 2019), when the programme was created in 1996, it only served 41,992 older persons and had a budget of R$ 24 million, which represented 0.02% of gross domestic product (GDP). In 2018, the programme served approximately 2 million older persons, with a budget of R$ 23 billion equivalent to 0.77% of GDP.

Social pensions have proven effective at enhancing food and nutrition security, since income transfers influence allocation of household resources (Brugh and others, 2018), with significant effects on the dimensions of food security (Bottan, Hoffmann, and Vera-Cossio, 2021; Bhalla and others, 2018; Tiwari and others, 2016).

In Brazil, it has been found that BPC increased food consumption and health expenditures (Ferrario, 2013; Oliveira, Kassouf and Aquino, 2017). According to Tapajós and Quiroga (2010), 51% of the older persons receiving BPC were food-insecure. Similarly, a study by the Ministry of Social Development

and Fight against Hunger (2010) found that 61% of BPC beneficiary families were food-insecure. It should be noted that the studies in question do not assess the impact of the BPC programme on food and nutritional security. While the first study was of municipal scope (it was conducted in 543 Brazilian municipalities), the second drew on BPC administrative records for all beneficiaries (both older persons and persons with disabilities). Accordingly, there is a lack of studies on BPC relating to older persons specifically, both throughout national territory and in terms of evaluating the impact on the different levels of food and nutritional security. The present research uses EBIA to determine the impact of BPC on food security and on mild, moderate and severe food insecurity.

In this context, it is recognized that there may be errors in public policy actions, especially in addressing the prevalence of obesity and undernutrition and the persistence of food insecurity among older persons. These errors should be rectified to enhance the efficiency of the programme in reducing poverty and its cross-cutting axes, such as those analysed in this research.

This study investigates the impact of the BPC programme on changes in nutritional status and food security levels among older persons, using the fuzzy regression discontinuity design method to evaluate the effects of BPC on the aforementioned outcome variables. The research aims to enhance understanding of the nutritional status and food security levels of Brazil's older persons. The results provide evidence to enrich the debate and improve public policy action to achieve the programme's explicit objective of reducing poverty. By using the 2017–2018 POF for impact evaluation estimations, the research covers older persons nationwide. The 2017–2018 edition of the POF presents EBIA data for the first time, which contains records of food security and mild, moderate, and severe food insecurity. This helps to reinforce the originality of the research and to analyse how BPC affects these outcome variables among older persons.

The article is divided into six sections, including this introduction. While section II describes the characteristics of BPC, section III presents the fuzzy regression discontinuity design as an empirical strategy for the estimations. Section IV describes the variables and data source, and section V presents the research findings. Lastly, the section VI draws conclusions.

II. Characteristics of the Continuous Benefit Programme (BPC)

According to Dodlova, Giolbas and Lay (2018) and Cecchini, Villatoro and Mancero (2021), social assistance mainly comprises two types of programme: conditional cash transfers and social pensions or unconditional cash transfers. The main objective of these programmes is to reduce poverty among the target population. Conditional cash transfers provide cash grants along with services such as education and health to children and adolescents. The beneficiaries are required to comply with certain rules or types of behaviour (conditionalities) to be able to participate and remain in the programme. In contrast, social pensions are cash transfers to older persons and persons with disabilities. Apart from fulfilling the eligibility criteria, there are no other conditions for receiving the benefit. Nonetheless, remaining in the programme will depend on the criteria chosen in each context. As social assistance programmes, they do not depend on a person's current or previous participation in the formal labour market; and their importance for social policy depends on the coverage of the target population, the share of GDP and welfare effects (Dodlova, Giolbas and Lay, 2018; Cecchini, Villatoro and Mancero, 2021).

The Continuous Benefit Programme forms part of a social pension and is a right provided for in the Federal Constitution of 1988. It was regulated by the Organic Act on Social Assistance, No. 8742, of 1993 and pays an amount equivalent to one minimum monthly wage to persons with disabilities and older persons who demonstrate that they lack the means to support themselves (Brazil, 1993).

The benefit is granted to older persons following the verification of eligibility criteria, such as age and per capita family income. Recently, Act No. 14.176 of 2021 amended the per capita family income criterion for accessing the benefit, by stipulating additional parameters characterizing a situation of social vulnerability, such as health expenses (Brazil, 2021).

To give an idea of the size of BPC, figure 1 shows how the number of older person beneficiaries has grown since the programme's inception in 1996. In that year, when the benefit was first implemented, it covered 41,992 older persons, representing 12.13% of total programme beneficiaries. In 2003, following the change in the age eligibility criterion to 65 years, the programme benefited 664,875 older persons. As of 2005, more than 1 million older persons were receiving BPC and, as of 2017, the number surpassed 2 million. There was also a significant increase in 2021, owing to measures adopted to address the COVID-19 pandemic. The new strategies implemented by the Government in relation to BPC, to help combat the pandemic and prevent poverty among older persons, include the following three: the diversity of care channels already promoted earlier by the National Social Security Institute (INSS); the advance payment of BPC for the same amount as Emergency Assistance (*Auxílio Emergencial*) to older persons who were waiting for their INSS application to be processed; and temporary suspension of the deadlines for enrolment in the Single Register (*Cadastro Único*) (Ministry of Citizenship, 2021).

Figure 1
Brazil: older person beneficiaries of the Continuous Benefit Programme
and growth rate of the older adult population, 1996–2021
(Percentages of total beneficiaries and of the older adult population)

Source: Prepared by the authors, on the basis of Ministry of Social Development and Hunger Alleviation, Economic Commission for Latin America and the Caribbean (ECLAC), Non-contributory Social Protection Programmes Database in Latin America and the Caribbean [online] https://dds.cepal.org/bpsnc/home; Brazilian Institute of Geography and Statistics (IBGE), *Pesquisa de orçamentos familiares 2017–2018: análise da segurança alimentar no Brasil*, Rio de Janeiro, 2020.

A key factor in the expansion of the programme's coverage during the period under review have been the successive changes made to the age-based eligibility criteria. When the programme was created, the minimum age for receiving the benefit was 70 years. In 1998, this was lowered to 67 years, by Act No. 9720 of 1998 (Brazil, 1998); and in 2003 it was reduced to 65, under Act No. 10741 of 2003 (the Older Person's Charter) (Brazil, 2003). The minimum 65 year-old threshold for applying for the benefit still remains in force, pursuant to Act No. 13982 of 2020 (Brazil, 2020).

Another key feature of BPC coverage is the ageing process itself among Brazil's older population, as a result of increased life expectancy (currently 77 years) and improved health conditions (IBGE, 2022a). According to IBGE estimations (2020a), the older population (aged 65 and over) has been growing by more than 3.0% per year since 2002 and expanded by 3.8% in 2021. The 2010 census revealed that the total number of older persons in Brazil was 19.6 million, representing approximately 10.2% of the national population (Silva, 2010; IBGE, 2022b). In the next 40 years the older population is set to increase by 3.2% per year, to reach 64 million persons and 29.7% of the total population in 2050 (IBGE, 2022b). The increasing share of older persons in Brazil's total population is explained by a declining fertility rate, which has modified the demographic profile since 1960 and is changing the population growth rate and age structure. In other words, the number of children and adolescents is not keeping pace with the adult and older person population (Simões, 2016).

III. Fuzzy regression discontinuity design

When evaluating a public policy, various methods can be used to judge whether the policy affects the beneficiaries as intended (Khandker, Koolwal and Samad, 2010). Angrist and Pischke (2009) argue that the causal relationship of interest will determine the impact of a policy on a given characteristic (such as poverty or nutritional status, among others); and it will make it possible to predict what would happen if the underlying conditions were changed. In a randomized experiment, the treatment and control groups may consist of very similar units, so a simple difference in means would be sufficient to compare the two groups (Gertler and others, 2016).

There is no evidence that participation in the BPC programme is randomly assigned. All persons aged 65 or older whose per capita family income is no more than one quarter of the current minimum wage are eligible to apply for the benefit. In this situation, measuring the effect of the programme by the difference in means across the entire population would make no sense; and it would produce biased estimates, owing to the non-random nature of assignment to the programme and the fact that older persons would self-select for participation. Accordingly, the effect of BPC must be estimated for those in the treatment group. However, older persons exposed to the treatment cannot be observed at two points in time, so there is no comparison group to represent those that did not receive BPC.

To overcome these problems, this research adopts the regression discontinuity design, in which participation in a treatment is determined by a threshold c, related to a continuous forcing variable, X_i. In this case, the forcing variable is the age of the older person, which determines eligibility for the programme. Specifically, the fuzzy regression discontinuity design case is used to estimate the average local effect of exposure, since in the fuzzy design the probability of participation in the treatment does not necessarily jump from 0 to 1 at the cut-off point c, defined as 65 years of age, because there are other observable and unobservable variables that determine this probability. This is true in the case of BPC, where receipt of the benefit does not depend on age alone, but also on per capita income and other factors, both observable and unobservable. The latter ignorance of the possibilities of the BPC, the work done by municipalities to identify candidates, and the motivation to participate (Oliveira, Kassouf and Aquino, 2017). Thus, being older than the threshold age c increases the probability of receiving treatment if candidates are also motivated to participate in the programme, for example. The assumptions for identifying the local average treatment effect (LATE) in the fuzzy design fulfil the regression discontinuity design's own assumptions (local continuity and ignorance) and those of the instrumental variable estimator: monotonicity, independence, and exclusion restriction (Menezes, 2012).

Given these specifications, LATE can be estimated directly in the fuzzy regression discontinuity design using a regression model that combines the regressions on both sides of point c, as represented by equation (1). Since the treatment condition is only partially determined by the eligibility rule, it is

first necessary to estimate how the probability of participating in the treatment is related to the forcing variable, using two-stage least squares (2SLS). According to Menezes (2012), Lee and Lemieux (2010) and Fonseca (2017), the first stage of the estimation is represented by equation (2), which, in this case, relates the age of the older person and the treatment effect, as presented below:

$$y_i = \alpha_l + \tau * T_i + \beta_l * (X_i - c) + (\beta_r - \beta_l) * T_i * \varphi * (X_i - c) + \sum_{j=1}^{j} \tau_j * W_{i,j} + \varepsilon_i \qquad (1)$$

if
$$c - h < X_i \leq c + h$$

$$T_i = \gamma_l + \theta * D_i + \delta_l * (X_i - c) + \pi * D_i * (X_i - c) + e_i \qquad (2)$$

if
$$c - h < X_i \leq c + h$$

where,
$$D_i = \begin{cases} 1 \ \text{if } X_i \geq 65 \\ 0 \ \text{if } X_i < 65 \end{cases} \qquad (3)$$

In equation (1), T_i is the treatment condition for those who actually receive BPC; $\tau = \alpha_r - \alpha_l$ is the local average treatment effect, represented by the difference between the intercepts of the linear functions on either side of the threshold, c; $\varphi = \beta_r - \beta_l$ is the parameter of the difference between the gradients of the regression lines, where β_l is the gradient of the line on the left side of the cut-off point, c; β_r is the gradient of the straight line on the right side of c. X_i is the treatment assignment variable, in this case the age of the older person; $W_{i,j}$ is the sum of the covariates represented by the characteristics of older persons, households, location and regions.

Equation (2) relates the probability of receiving the treatment with X_i. In this case, T_i is the treatment condition, which takes the value 1 for those who receive BPC and 0 for those who do not; D indicates whether Xi exceeds the value c; D is a dummy variable equal to 1 if X_i is older than 65 years and 0 otherwise, as specified in equation (3). $\theta = \gamma_r - \gamma_l$ is the difference between the intercepts of the linear functions on either side of the threshold c; $\pi = \delta_r - \delta_l$ is the parameter of the difference in the gradients of the regression lines; δ_l is the gradient of the straight line on the left side of c, and δ_r is the gradient of the straight line on the right side of c.

In determining the local average treatment effect for older persons whose participation status changed at age 65, LATE compares only older persons within the bandwidth (h) around the threshold. However, if the units studied are very different from the other units in the population of interest, the LATE found using the fuzzy regression discontinuity method should not be extrapolated to the rest of the population, as indicated by Menezes (2012).

IV. Description of variables and data source

This study uses microdata sourced from the 2017–2018 Consumer Expenditure Survey (POF), which compiles socioeconomic data on individuals and households drawn from a sample of the Brazilian population. The sample consists of older persons aged 65 years or more living in households in which the BPC cash transfer forms part of the family income. The control group consists of older persons who are below the cut-off point, c; in other words those who are not eligible for the programme because they are under 65 years of age.

To measure nutritional status, the body mass index (BMI) is calculated as weight divided by height squared (kg/m^2) using the anthropometric indicators of weight and height available in the 2017–2018 POF. In this research, undernutrition is analysed and diagnosed on the basis of a BMI$\leq$18.5 kg/m^2,

whereas obesity is identified by a BMI≥30, following WHO (1995). Specifically, the dependent variable Y_i will be evaluated from two perspectives, as specified by Pinho Neto and Berriel (2017):

Y_i =1 if BMI≤18.5, and Y_i=0 otherwise: this evaluates the impact of BPC on undernutrition.

Y_i =1 if BMI≥30, and Y_i =0 otherwise: this evaluates the impact of BPC on obesity.

Food security is measured on the basis of the Brazilian Food Insecurity Scale (EBIA). According to IBGE (2020a), EBIA is an adaptation of the scale developed by the United States Department of Agriculture and has been validated by research teams from universities in the five regions of Brazil. The validation process was coordinated by the Department of Public Health of the State University of Campinas (UNICAMP). In Brazil, the EBIA-based method, which uses psychometric scales of household access to food, has the advantage of measuring the phenomenon of food insecurity directly, as perceived by individuals. Thus, relative access to food and the psychosocial dimension of food insecurity are detected. The scale comprises different levels of food insecurity, as summarized in table 1.

Table 1
Brazil: definition of food security and food insecurity levels

Food security status	Description
Food secure	The household has regular and permanent access to quality food, in sufficient quantity, without compromising access to other essential goods and services.
Mild food insecurity	Worry or uncertainty about future access to food; inadequate quality of food resulting from strategies to avoid compromising food quantity.
Moderate food insecurity	Quantitative reduction of food among adults or a break in eating patterns owing to insufficient food among adults.
Severe food insecurity	Quantitative reduction of food also among children; in other words a break in eating patterns owing to insufficient among all household members, including children. In this situation, hunger becomes a lived experience in the household.

Source: Brazilian Institute of Geography and Statistics (IBGE), *Pesquisa de orçamentos familiares 2017–2018: análise da segurança alimentar no Brasi*l, Rio de Janeiro, 2020.

The questions that make up EBIA (see table A1.1 in annex A1) and correspond to household self-declarations were included for the first time in the questionnaire evaluating living conditions (POF 6) of the 2017–2018 POF. The EBIA questions are analysed on the basis of a final score gradient, which represents the sum of affirmative responses to the 14 questions. This score establishes cut-off points that are equivalent to the concepts of food and nutrition security and are presented in table 2.

Table 2
Brazil: cut-off points for households without children under 18 years of age, according to food security status

Food security status	Cut-off points
Food-secure	0
Mild food insecurity	1-3
Moderate food insecurity	4-5
Severe food insecurity	6-8

Source: Prepared by the authors, on the basis of Brazilian Institute of Geography and Statistics (IBGE), *Pesquisa de orçamentos familiares 2017–2018: análise da segurança alimentar no Brasil*, Rio de Janeiro, 2020.
Note: Household cut-off points are the scores used to classify households as being food-secure, or subject to mild, moderate or severe or food insecurity.

Nonetheless, as Barret (2002) notes, although the concept of food security is measured at the family or household level, it actually refers to individuals. Therefore, the food and nutrition security indicators of the 2017–2018 POF are used as proxy variables for each level of food security among older persons. Table 3 describes the outcome variables and the observable variables used in the estimations. All variables are recorded in the 2017–2018 POF.

Table 3
Description of the variables used in the model

Outcome variables	Definition
Obesity	Dummy variable indicating whether the older person is obese. Categories: (1) Yes; (0) No.
Undernutrition	Dummy variable indicating whether the older person is malnourished. Categories: (1) Yes; (0) No.
Food safety	Dummy variable indicating whether the older person enjoys food security. Categories: (1) Yes; (0) No.
Mild food insecurity	Dummy variable indicating whether the older person suffers from mild food insecurity. Categories: (1) Yes; (0) No.
Moderate food insecurity	Dummy variable indicating whether the older person suffers from moderate food insecurity. Categories: (1) Yes; (0) No.
Severe food insecurity	Dummy variable indicating whether the older person suffers from severe food insecurity. Categories: (1) Yes; (0) No.
Explanatory variables	
Characteristics of the older person	
Race	Dummy variable indicating whether the older person is white. Categories: (1) Yes; (0) No.
Genre	Dummy variable indicating whether the older person is male. Categories: (1) Yes; (0) No.
Age	Indicates the older person's age in years.
Education	Indicates the older person's years of schooling.
Household characteristics	
Total members	Indicates the total number of household members.
Bath	Dummy variable indicating whether the household has a bathroom. Categories: (1) Yes; (0) No.
Sewerage	Dummy variable indicating whether the household is located near an open sewer or ditch. Categories: (1) Yes; (0) No.
Electric power	Dummy variable indicating whether the electricity used in the household is obtained from the general grid. Categories: (1) Yes; (0) No.
Water	Indicates whether the water used in the household is piped to at least one room. Categories: (1) Yes; (0) No.
Location of home	
Urban area	Dummy variable indicating whether the household is located in an urban area. Categories: (1) Yes; (0) No.
Region[a]	
North Region	Dummy variable indicating whether the household is located in the North Region. Categories: (1) Yes; (0) No.
Southeast Region	Dummy variable indicating whether the household is located in the Southeast Region. Categories: (1) Yes; (0) No.
Midwest Region	Dummy variable indicating whether the household is located in the Centre-west region. Categories: (1) Yes; (0) No.
Southern Region	Dummy variable indicating whether the household is located in the South Region. Categories: (1) Yes; (0) No.

Source: Prepared by the authors, on the basis of M. Ferrario, "Análise do impacto dos programas de transferência de renda sobre as despesas familiares com o consumo", doctoral thesis in science, São Paulo, University of São Paulo, 2013.
[a] The Northeast region is the base category.

V. Local average effect of BPC on persons in the treatment group

To determine the causal effect, the identification assumptions, such as non-manipulation of the forcing variable, X_i and balanced observable characteristics of the older person, are validated as described in section 1 below. Section 2 describes the results of the local average effect of BPC on the nutritional status and food security levels of older persons in Brazil.

1. Validity of the fuzzy regression discontinuity design

The validity of a regression discontinuity design project requires that units cannot perfectly manipulate the treatment attribution variable (assumption of no manipulation of the forcing variable X_i). According to Cattaneo, Jansson and Ma (2020), the manipulation test is used as a falsification test in empirical regression discontinuity studies.

In the present study, the age of the older person is used as an assignment variable to verify empirically whether or not units are able to change their BPC status around the cut-off point, c. As shown in figure 2, the number of observations above the cutoff point is not disproportionate to the number below this threshold. Therefore, according to Cattaneo, Jansson, and Ma (2020), there is no evidence of discontinuous changes around the cut-off point. This means that older persons do not have precise control over the variable, so they cannot manipulate it in order to self-select for treatment.

Figure 2
Manipulation test
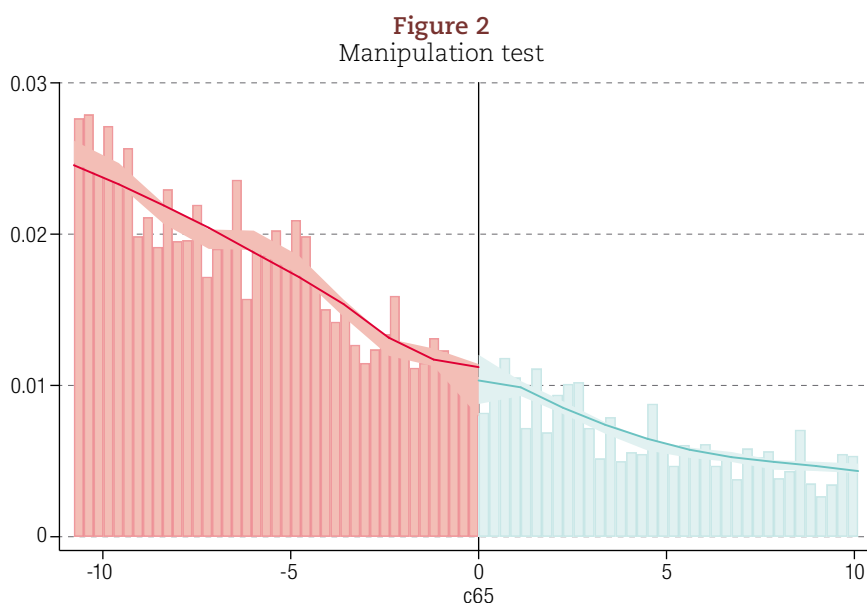
Source: Prepared by the authors.

In addition to the assumptions used to identify the causal effect, it must be shown that eligibility for treatment is associated with treatment status. Given the eligibility criterion based on the minimum age of 65, which defines receipt of the benefit, older persons who have not reached that age do not receive the treatment, and all older persons who have passed that age should receive it. However, several observable and unobservable factors mean that the change in the older person's probability of treatment is not determined solely by the treatment assignment variable; consequently the probability does not "jump" from 0 to 1 at point c, as seen in figure 3.

Figure 3
Probability of treatment

● Sample average within bin   —— Polynomial fit of order 4
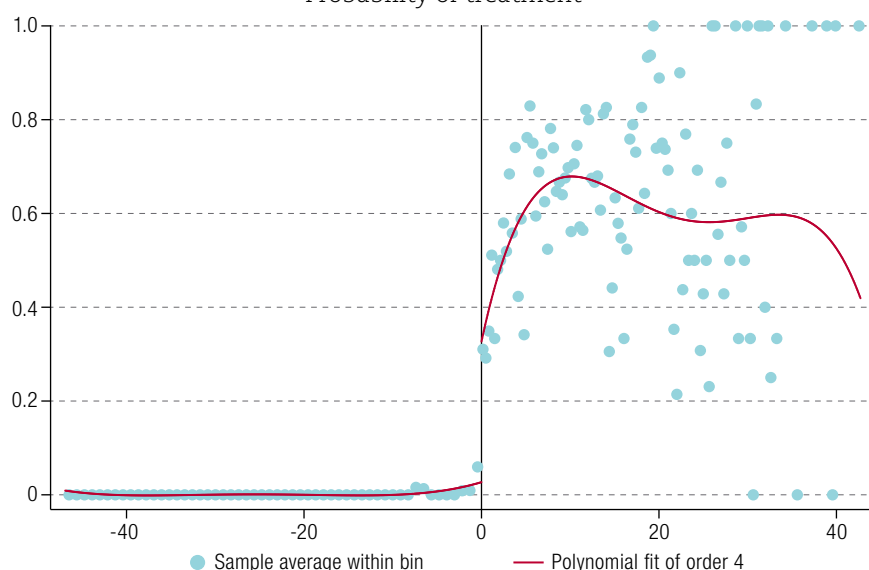
Source: Prepared by the authors.

Balancing is another identification hypothesis that examines whether or not there are systematic differences between groups —in this case whether older persons just below the cut-off point have observable characteristics that are similar to those of older persons just above the threshold. To verify this hypothesis, tests are performed to gauge whether the means of the characteristics are the same in both groups. Table 4 presents the means of the observable characteristics. The first column reports the means of the observations of untreated persons (without BPC), and the second column shows the observations of those who received the treatment (with BPC). For this test, intervals of +/-5 and +/-8 were used for the age of the older person.

Table 4
Equilibrium of the predetermined characteristics of the older person

Variables	Older persons aged 60–69 years		Older persons aged 57–72 years	
	Without PBC	With BPC	Without BPC	With BPC
Variables of the reference person				
White	0.238	0.291	0.210	0.290***
Man	0.466	0.384	0.455	0.404**
Years of schooling	2.600	3.600	3.350	3.470
Household characteristics				
Bath	0.828	0.963***	0.849	0.959***
Sewerage	0.961	0.989***	0.282	0.452***
Total members	4.600	3.200***	4.673	3.143
Electric power	0.961	0.989	0.970	0.991***
Water	0.609	0.791	0.907	0.956***
Location of home				
Urban area	0.685	0.813***	0.681	0.794***
Region				
North Region	0.304	0.108***	0.228	0.116***
Northeast Region	0.504	0.471	0.553	0.461***
Southeast Region	0.095	0.219***	0.129	0.221***
Centre-west Region	0.057	0.073	0.043	0.066
South Region	0.038	0.126***	0.044	0.133***

Source: Prepared by the authors.
Notes: H_0: difference between means equals 0; *** and ** indicate 1% and 5% significance levels, respectively.

As shown in table 4, older persons without BPC are statistically different from those with BPC in several characteristics for the sample of older persons aged 57 to 72 years. However, the differences diminish and become non-significant for some of the variables in the age range 60–69 years. In general, as the width of the interval narrows, individuals display similar observable characteristics. However, because some variables show significant differences at the 1% level in the younger age interval, these are included in the regression in order to reduce estimation bias.

2. Impact of BCP on nutritional status and food security levels using the fuzzy regression discontinuity design

The results reported in table 5 show the first and second stages of the estimations. The first stage presents the effect of age on the probability of participating in the programme; and the second stage shows the results of the local average effect of BPC on rates of obesity, undernutrition and food security. The results are estimated using the triangular kernel function and the **cerrd** method to choose the optimal interval, equal on both sides of the cut-off point, as suggested by Calonico, Cattaneo and Farrell (2020).

Table 5
Local average effect of the Continuous Benefit Programme on obesity and undernutrition – fuzzy regression discontinuity design

Specifications	First stage	Second stage
	Obesity	
Triangular *Bwmethod = cerrd*; *h* = 5.9	0.18874*** (0.07349)	0.02647 (0.34908)
N(*h*)	582	
	Undernutrition	
Triangular *Bwmethod = cerrd*; *h* = 4.9	0.19327*** (0.08347)	0.04976 (0.20363)
N(*h*)	457	

Source: Prepared by the authors.
Notes: ***, ** and * indicate 1%, 5%, and 10% significance levels, respectively. Standard errors in parentheses. Estimates include controls in respect of older person and household characteristics, and regional dummy variables. N(*h*): number of observations used for the estimations in each interval.

In the first stage, age is statistically significant at 1%, which means that the age criterion for programme selection is a valid element of impact evaluation. The results of the second stage presented in table 5 show that BPC has no statistically significant effect on obesity or undernutrition.

The results shown in table 6, for the first stage, also reveal that being age-eligible increases the probability of participating in BPC by 25%. This implies that age is an effective eligibility criterion for participation in the programme. The second stage suggests that BPC increased the probability of being food secure by 63% relative to the control group.

Table 6
Local average effect of the Continuous Cash Benefit on food security

Specifications	First stage	Second stage
Triangular *Bwmethod = cerrd*; *h* = 7.0	0.25639*** (0.03701)	0.63563*** (0.18418)
N(*h*)	1 871	

Source: Prepared by the authors.
Notes: ***, ** and * indicate 1%, 5%, and 10% significance levels, respectively. Standard errors in parentheses. Estimates include controls in respect of older person and household characteristics, and regional dummy variables. N(*h*): number of observations used for the estimations in each interval.

The results are similar to those obtained by Bottan, Hoffmann and Vera-Cossio (2021) for households receiving the *Renta Dignidad* pension in the Plurinational State of Bolivia. These authors found that receiving the pension increased the probability that an older person enjoyed food and nutrition security by an average of 0.38 percentage points. Since BPC only affects individual and household incomes, the only transmission channel is through raising of the budget constraint. Thus, families in lower income brackets and with larger reductions in income —even in the event of shocks, such as the COVID-19 pandemic— may respond more strongly to income variations by increasing consumption expenditures, particularly on food (Baker and others, 2020). This finding is supported by Ferrario (2013), in the case of Brazil; and by Case and Deaton (1998), for South Africa; and by Kang, Park and Ahn (2022), who study the case of the Republic of Korea. The pension benefit increases amounts spent on food, improving access to it and, at the same time, increasing its availability and use in the household (Hidrobo and others, 2014; Tiwari and others, 2016).

Table 7 reports the results for mild, moderate and severe food insecurity. The first stage presents the coefficients of the effect of age on levels of food insecurity, which are significant at 1% across all interval specifications. The second stage estimates the coefficients of the local average effect of BPC for all levels of food insecurity. Mild food insecurity shows results that are statistically significant at 1%. In the case of the second stage, the coefficients for moderate and severe food insecurity are not significant.

Table 7
Local average effect of the Continuous Cash Benefit on food insecurity

Specifications	First stage	Second stage
Mild food insecurity		
Triangular *Bwmethod = cerrd*, $h = 6.4$	0.25243*** (0.03895)	-0.68249*** (0.21272)
N(h)	1 679	
Moderate food insecurity		
Triangular *Bwmethod = cerrd*, $h = 5.1$	0.24299*** (0.04532)	0.15184 ns (0.21328)
N(h)	1 329	
Severe food insecurity		
Triangular *Bwmethod = cerrd*, $h = 8.7$	0.27187*** (0.03313)	-0.02241 ns (0.09923)
N(h)	2 294	

Source: Prepared by the authors.
Notes: ***, ** and * indicate 1%, 5%, and 10% significance levels, respectively. Standard errors in parentheses. Estimates include controls in respect of older person and household characteristics, and regional dummy variables. N(h): number of observations used for the estimations in each interval.

In poor families, older persons are more likely to have regular, secure and higher incomes than other family members; and BPC may even represent a large proportion of the family income (Bottan, Hoffmann and Vera-Cossio, 2021). The legal and constitutional status of BPC establishes a predictable and regular monthly payment, in accordance with the Organic Act on Social Assistance. Since the benefit is equivalent to one minimum wage, it is adjusted in line with the federal minimum wage, which is estimated to cover the basic needs of Brazilians, such as food and health, among other items. These characteristics make BPC a useful tool for mitigating the socioeconomic effects of the COVID-19 pandemic.

During the pandemic, the federal government used the BPC structure and other social programmes to address the emergency situation. In addition to affecting health, the pandemic had an impact on the economy and, consequently, increased the risk of food insecurity. The necessary physical distancing and quarantine measures had the effect of reducing family income. The Continuous Benefit Programme was used as a tool to address this crisis situation, and several measures were implemented through Act No. 13982 of 2020. These included the relaxation of the family income ceiling for receiving the

benefit —which was raised from a quarter to a half of the per capita minimum wage, taking into account the evaluation of certain vulnerability criteria— and the advance payment of BPC of R$ 600 to persons who were still in the process of applying to INSS (Paiva and Pinheiro, 2021).

This research supported the analysis of food security levels in the pre-pandemic period 2017–2018. The findings indicate that the BPC income transfer provided protection against food insecurity, especially mild food insecurity (Palmeira and others, 2021). It was particularly important in poor households where the income received by the older person might be the family's only source of sustenance for coping with adverse labour market shocks and rising food prices.

However, it should be noted that ensuring food and nutritional security has become more challenging. Food insecurity is not a recent phenomenon in Brazil (IBGE, 2020a; Pinheiro and others, 2022), but the COVID-19 pandemic increased its levels, as household food security declined and the mild, moderate and severe levels of food insecurity all increased (PENSSAN Network, 2021 and 2022). A number of studies have confirmed that socioeconomic inequalities intensified food and nutrition insecurity during the pandemic, with more severe levels of food insecurity being attained (Pinheiro and others, 2022). According to Boschetti and Rossetti (2021) and Alpino and others (2020), the amounts of income transfers established during the pandemic were well below social needs, which exacerbated social inequalities and probably also worsened the food and nutrition insecurity situation in Brazil.

However, it is also possible that the measures adopted under BPC have had potential for mitigating the effects of the pandemic, by averting poverty among families waiting for the benefit. In addition, the integration of BPC with other social programmes, such as *Auxílio Brasil*, reinforces the anti-poverty strategy, since families can receive both benefits. It has been shown that the *Auxílio Brasil* programme is more effective than BPC in reducing poverty because it costs less, is more precisely targeted to the poor and produces changes in the lives of beneficiaries through the education and health conditionalities. However, BPC targets a population with different needs; for example, older persons and persons with disabilities generate higher costs through their greater demand for health services (Neri and Osorio, 2020). Therefore, in the post-pandemic period, the discussion on BPC should focus on further strengthening of the programme.

VI. Conclusions

Non-contributory pension programmes are being used increasingly to address poverty among older persons in countries such as Brazil. In the non-contributory pension system, the Continuous Benefit Programme (BPC) has proven effective in reducing poverty and inequality, and also influences other poverty-related variables. This research has provided additional information on the impact of BPC on the well-being of older persons, by assessing its effects on obesity, undernutrition, and levels of food and nutrition security, based on microdata sourced from the 2017–2018 POF.

The consideration of unobservable factors showed robust results for the estimations using the fuzzy regression discontinuity method. The main findings are that BPC did not have a statistically significant effect on undernutrition and obesity rates among older persons. However, the programme did have a statistically significant effect on rates of food security and mild food insecurity.

The fact that BPC has not had a statistically significant impact on obesity and undernutrition may indicate that the benefit alone does not improve nutritional status directly. Accordingly, this research suggests promoting policies to improve the monitoring of the nutritional status and health of older persons within the public health system. For example, the programme could play a role similar to that of conditionalities, requiring some economic resources to be channelled into the priority care of older persons. The growth of the older person population poses a challenge to programme coverage, the type of health care and the budgetary resources available. On the supply side, investments, and the upgrading of infrastructure and services needed to meet the demands of the older person, pose challenges for policy makers.

The significant effects of BPC on food security showed that the income transfer enables access to food by easing the budget constraint and thus increasing the availability of food in the household. These results were to be expected, as the benefit affects food consumption directly. However, the findings do not provide information on the nutritional value of the food, in question which requires another type of study. Moreover, the results on food insecurity suggest that it might not be possible to overcome moderate and severe food insecurity with a specific income such as BPC. This has public policy implications that can be carefully integrated into the programme, since the benefit alone is not sufficient to eradicate food insecurity in a specific group of older persons. Nonetheless, it can reduce mild food insecurity, in other words uncertainty about future food consumption among older persons.

This research has a number of shortcomings. The variables used to measure nutritional status are the result of two different measurements in the two most recent POF surveys. This made it impossible to combine the last two surveys to consolidate a larger number of observations for the estimations of nutritional status (obesity and undernutrition).

In addition to the results obtained, suggestions are made for future research that could contribute to the analysis and deepen understanding of the topics studied here: in particular, aspects related to permanency in the programme and heterogeneous effects —according to gender or regions in Brazil, for example.

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Annex A1

Table A1.1
Questions used in the Brazilian Food Insecurity Scale

Number	Question
1	In the last three months, did members of this household have concerns that food would run out before they could buy or receive more?
2	In the last three months, did food run out before the members of this household had money to buy more?
3	In the last three months, did the members of this household run out of money for a healthy and varied diet?
4	In the last three months, did the members of this household eat only a few types of food that they still had because money ran out?
5	In the last three months, did any household member aged 18 years or older miss any meals because there was no money to buy food?
6	In the last three months, did any household member aged 18 years or older ever eat less than he/she felt he/she should because there was no money to buy food?
7	In the last three months, did any household member aged 18 years or older ever feel hungry but did not eat because there was no money to buy food?
8	In the last three months, did any household member aged 18 years or older ever eat once only during the day or go a whole day without eating because there was no money to buy food?
9	In the last three months, did any household member under 18 years of age ever ceased to have a healthy and varied diet because there was no money to buy food?
10	In the last three months, did any household member under 18 years of age ever eat less than he/she should have because there was no money to buy food?
11	In the last three months, was the amount of food in the meals of any household member under 18 years of age ever reduced because there was no money to buy food?
12	In the last three months, did any household member under 18 years of age ever forgo any meals because there was no money to buy food?
13	In the last three months, did any household member under 18 years of age ever feel hungry but did not eat because there was no money to buy food?
14	In the last three months, did any household member under 18 years of age ever eat once only during the day or go a whole day without eating because there was no money to buy food?

Source: Brazilian Institute of Geography and Statistics (IBGE), *Pesquisa de orçamentos familiares 2017–2018: análise da segurança alimentar no Brasil*, Rio de Janeiro, 2020.

Annex A2

Robustness exercise: change of interval and kernel function

Tables A2.1, A2.2, A2.3 and A2.4 present the results with similar intervals on either side of the cut-off, following Imbens and Lemieux (2008). These authors use a uniform kernel function, which gives the same weight to all observations that fall within similar intervals on either side of the threshold, specified as five and eight years.

Table A2.1
Local average effect of the Continuous Benefit Programme on obesity

Specifications	First stage	Second stage
(I) Uniform $h = 5$	0.26771*** (0.0635)	0.04088 ns (0.27397)
N(h)	461	
(II) Uniform $h = 8$	0.29066*** (0.04762)	-0.08384 ns (0.19422)
N(h)	724	

Source: Prepared by the authors.
Notes: ***, **and * indicate 1%, 5%, and 10% significance levels, respectively; ns: not significant. Standard errors in parentheses. Estimations I and II include controls in respect of older person and household characteristics, and regional dummy variables.

Table A2.2
Local average effect of the Continuous Benefit Programme on undernutrition

Specifications	First stage	Second stage
(I) Uniform $h = 5$	0.26771*** (0.0635)	0.12626 ns (0.13279)
N(h)	461	
(II) Uniform $h = 8$	0.29066*** (0.04762)	0.0688 ns (0.09428)
N(h)	724	

Source: Prepared by the authors.
Notes: ***, **and * indicate 1%, 5% and 10% significance levels, respectively; ns: not significant. Standard errors in parentheses. Estimations I and II include controls in respect of older person and household characteristics, and regional dummy variables.

Table A2.3
Local average effect of the Continuous Benefit Programme
on food security, fuzzy regression discontinuity design

Specifications	First stage	Second stage
(I) Uniform $h = 5$	0.30713*** (0.03703)	0.54008 *** (0.16916)
N(h)	1 310	
(II) Uniform $h = 8$	0.30994*** (0.02788)	0.42161 *** (0.12924)
N(h)	2 101	

Source: Prepared by the authors.
Notes: ***, **and * indicate 1%, 5% and 10% significance levels, respectively; ns: not significant. Standard errors in parentheses. Estimations I and II include controls in respect of older person and household characteristics, and regional dummy variables.

Table A2.4
Local average effect of the Continuous Benefit Programme on food insecurity

Specifications	First stage	Second stage
Mild food insecurity		
(I) Uniform _h_ = 5	0.30713*** (0.03703)	-0.51976*** (0.17713)
N(_h_)	1 310	
(II) Uniform _h_ = 8	0.30994*** (0.02788)	-0.33205** (0.13315)
N(_h_)	2 101	
Moderate food insecurity		
(I) Uniform _h_ = 5	0.30713*** (0.03703)	-0.0147 ns (0.14173)
N(_h_)	1 310	
(II) Uniform _h_ = 8	0.30994*** (0.02788)	0.01866 ns (0.10939)
N(_h_)	2 101	
Severe food insecurity		
(I) Uniform _h_ = 5	0.30713*** (0.03703)	-0.00562 ns (0.11047)
N(_h_)	1 310	
(II) Uniform _h_ = 8	0.30994*** (0.02788)	-0.10822 ns (0.08551)
N(_h_)	2 101	

Source: Prepared by the authors.
Notes: ***, **and * indicate 1%, 5%, and 10% significance levels, respectively; ns: not significant. Standard errors in parentheses. Estimations I and II include controls in respect of older person and household characteristics, and regional dummy variables.

Gross fixed capital formation in the Brazilian health sector: methodology and results for 2010–2019[1]

Tassia Gazé Holguin, Thiago Miguez, Lia Hasenclever and Fabio Freitas

Abstract

Health satellite accounts provide information to elucidate the interaction between the health sector and the rest of the economy. However, in Brazil these accounts have gaps, such as a lack of data on gross fixed capital formation. The aim of this article is to present a methodology to measure gross fixed capital formation in the health sector in 2010–2019 and to analyse the data thus obtained. The results show that gross fixed capital formation in the health sector is biased towards machinery and equipment rather than construction. The share of private investment increased throughout the period whereas public investment declined.

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I. Introduction

The ageing of Brazil's population has progressively increased the demand for health-care goods and services and accentuated the need to improve public policy planning. As a result, the health sector is gaining momentum increasingly as a major economic activity, and it now accounts for a significant share of job creation and income generation in Brazil (IBGE, 2019).

Population aging has its own epidemiological, economic and technological characteristics. In epidemiological terms, the demand for health care often occurs in atypical circumstances, such as illnesses and accidents (Barr, 1998). At the same time, the pressure on demand can intensify in times of economic crisis, since falling incomes and rising unemployment may increase the demand for health services from the public network (Vieira, 2016).

The publication *Conta Satélite de Saúde,* which has been produced by the Brazilian Institute of Geography and Statistics (IBGE) since 2009, provides macroeconomic data that elucidates the interaction between the health sector and the rest of the economy. It includes information on the generation, distribution and use of income in the country, and also on the consumption of health-care goods and services by the government and households (IBGE, 2019). Nonetheless, it has several gaps. For example, it does not contain information on gross fixed capital formation (GFCF) in the health sector, which ultimately hinders analysis on this subject in Brazil.

The investment process is an important indicator for monitoring the trend of an economy or sector. It should be noted that investment has a dual nature: it is one of the components of aggregate demand with the greatest multiplier effect, and it also influences the rate of technological change. The purchase of capital goods affects the production chain by increasing the demand for labour and inputs. Subsequently, the deployment of the corresponding fixed assets expands the supply capacity of the economy, with the result that such investment ultimately affects both the cycle and the trend of both the health sector and the economy as a whole. Moreover, innovations in the production process are partly incorporated as new fixed capital assets, so that the increase in investment also influences the pace of technological change and the advance of productivity (Miguez, 2016).

In health systems, investment in fixed assets has a positive impact on the sector's infrastructure, by contributing to its sustainability and equity. Moreover, as investment is also channelled into technological development and activities of research, development and innovation, its effects also improve diagnoses, treatments and health care in general (Teja and others, 2020).

Thus, in view of the importance of the investment process for the health sector and the economy as a whole, and given the gap that exists in this data category in the current satellite account for health, this article aims to present a methodology for measuring GFCF in the health sector, both public and private, and to analyse the robustness of the data obtained for 2010–2019. The methodology consists of mapping and analysing databases from IBGE, the Foreign Trade Secretariat (SECEX) of the Ministry of Economy, and the Public Health Budget Information System (SIOPS). This methodology can be adapted and used in other countries since it draws on databases that are usually published by national statistical bodies or compiled by international agencies. These include databases on industrial production, civil construction, foreign trade and public health expenditure.

With this objective, the article is divided into four sections in addition to this Introduction. Section II focuses on the *Conta Satélite de Saúde* publication, on the main data it contains and on its importance for the planning and execution of public policies. Section III describes the methodology proposed for estimating GFCF data in the health sector. It also explains the databases used and their manipulation, and how investments were disaggregated between the public and private system. Section IV reports and analyses the results of the data obtained; and, lastly, section V sets forth conclusions.

II. The health sector satellite account

Several countries have adopted the methodologies of international organizations to generate data on their health sector. Currently, the two main methodologies are: (i) the System of Health Accounts (SHA), developed by the Organisation for Economic Co-operation and Development (OECD) and (ii) Health Satellite Accounts (HSA), based on the manual of the System of National Accounts (SNA).[2] Brazil uses the latter to develop its satellite account for the health sector.

This topic has become increasingly important since it was recognized that continuously producing economic data on the health sector provides managers and decision-makers with a more accurate analytical overview of health systems. The potential for allocating resources more efficiently improves the planning, monitoring and evaluation of public policies, and provides extra inputs for these purposes. The use of international methodologies to produce health accounts —even if additional agreements are needed to produce more harmonious statistics— facilitates comparison between countries and enables greater standardization when measuring health data (Nakhimovsky and others, 2014).

In addition, by preparing macroeconomic aggregates, measuring the health system as an economic activity enables a better understanding of its role as a job creator and income generator, and reveals the impact it can have on a country's development. According to Vieira and Piola (2016), the objective of the health satellite account is to provide information to support public policies and decision-making in programmes and projects related to the health sector; and they link it to the growth and development of the economy as a whole. It is a macroeconomic analysis that makes it possible to understand the interaction between the health sector and the rest of the national economy.

While countries such as France, Germany, the Kingdom of the Netherlands and the United States started to publish health sector data in the 1950s and 1960s, health expenditure in Brazil was estimated from lines of research (Holguin, 2021). In the 1980s, the Institute of Applied Economic Research (IPEA) used social expenditures consolidated at the federal level, while also estimating private expenditures from the Household Budget Survey. The Brazilian Institute of Geography and Statistics did not start its statistical series on health data until 2008, with the publication *Economia da saúde: uma perspectiva macroeconômica 2000–2005* (IBGE, 2008), which provides data on the health-sector share in the aggregate value of the economy. This study could not yet be considered a satellite account for the health sector, because it did not include data on the production of system-wide health services, such as hospitals linked to the ministries of defence and education. Nonetheless, the study was a milestone, as it included the first collection of data on the country's health economy.

The first health satellite account, as such, was published the following year and covered 2005–2007 (IBGE, 2009). Since then, six editions of the health satellite account have been published, encompassing the period from 2005 to 2019.[3] Brazilian health data adhere to the international standard provided by the *System of National Accounts 2008* (European Commission and others, 2016), which implies that they are linked to the IBGE's system of national accounts and replicate its structure, concepts and methodological framework.[4]

Accordingly, like the system of national accounts (SNA), HSA consists of supply and use tables and summary tables.[5] The supply tables describe the production process carried out in the local units of the producer firms or families, plus imports. The use tables, by contrast, report the types of demand

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[2] The SNA manual is the same as that used by most countries to produce their official economic statistics, such as GDP.
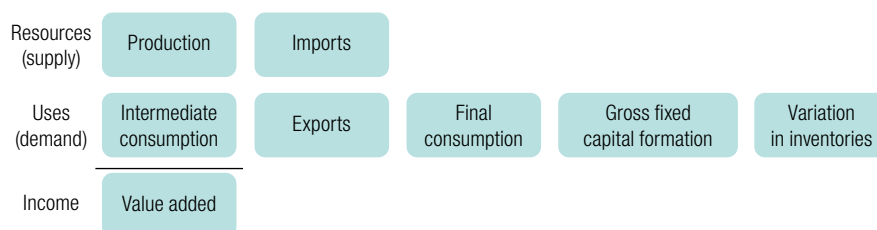
[3] However, as discussed below, the series is not fully comparable through time.

[4] The term "satellite account" derives precisely from this link, as if health data were "orbiting"; that is, as if they were linked to data from the system of national accounts.

[5] The Integrated Economic Accounts (IEA) were also published until the 2007–2009 edition.

for products and services: intermediate consumption, final consumption, exports or GFCF. Thus, the supply and use tables make it possible to analyse economic activities in terms of the production, expenditure and income generated (see diagram 1).

Diagram 1
Structure of supply and use tables

Resources (supply)	Production	Imports			
Uses (demand)	Intermediate consumption	Exports	Final consumption	Gross fixed capital formation	Variation in inventories
Income	Value added				

Source: Prepared by the authors.

The relationship between the health satellite account and the system of national accounts underwent a methodological change, when Reference series 2000 (SNA Ref. 2000) on which the system of national accounts covering 2000–2009 was based, was replaced by Reference series 2010 (SNA Ref. 2010), which covers the period from 2010 onwards. This framework change entails a revision of the classifications of products and economic activities, as well as the updating of some concepts in accordance with the most recent version of the *2008 System of National Accounts*. The major impact of this change for the health satellite account was the interruption of the historical data series, since the 2005–2009 data are not comparable with the data series that started in 2010.

In the case of SNA, a retropolation version was launched with more aggregated supply and use tables for 2000–2009. Thus, despite not having the same number of products and activities, the concepts are aligned, so it is possible to use the data to analyse the period starting in 2000 and the data after 2010. However, the health satellite account was not updated to the same extent: only the final consumption data in the health sector were made compatible. Unfortunately, the supply and use tables were not updated, so the 2005–2009 series remains methodologically outdated and is not compatible with the series that started in 2010.

From a methodological point of view, the current status of the health satellite account is aligned with the 2008 System of National Accounts (2008 SNA). It defines total health expenditure as the sum of two components: (i) the consumption of health goods and services in a country; and (ii) the GFCF in the facilities of health service providers. According to the 2008 SNA definition, the consumption of health goods and services corresponds to personal health care services, medical products provided to patients in outpatient facilities, total personal health expenditures, preventive measures, public health services and health insurance expenditures. Gross fixed capital formation, meanwhile, corresponds mainly to the purchase of machinery and equipment, along with civil construction. An important detail is that Brazil's health satellite account includes expenditures on heath care provided in university and military hospitals, while in SNA these are included as part of the education and public administration sectors, respectively.

Lastly, despite constant progress, Brazil's health satellite account still has a number of major shortcomings. The first is that it does not provide enough information to analyse health financing flows, which makes it difficult to compare Brazil's public spending on health with that of OECD countries. This is partly because, unlike the other countries, the Brazilian case has a complex financing system in which public and private financing and co-payment regimes coexist (Luiza and others, 2018).[6]

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[6]   The Brazilian health system is segmented into three subsystems: (i) the Unified Health System (SUS), which is universal and free at the point of use; (ii) the Supplementary Health System (SSS), which comprises health insurance; and (iii) the Direct Disbursement System (SDD), in which private health goods and services are purchased directly by families.

A second major shortcoming, which is the focus of this article, is the gap in information that exists in health investment expenditure in Brazil. This point became clear in the field research conducted by Holguin (2021) with health economics specialists: interviewees were unanimous in their opinion that data on GFCF in the health satellite account needed improvement, especially in terms of the separation between public and private investment. Thus, with the aim of improving the availability of statistical data and helping to gain a better understanding of the dynamics of this activity in the country, this article proposes a methodology for estimating health sector GFCF. The data will be disaggregated by type of asset acquired, namely machinery and equipment or construction, and by sector —public or private.

III. Methodology for estimating GFCF in the health sector

1. Gross fixed capital formation: conceptualization and existing data

In the national accounts, investment is defined by the concept of GFCF. According to IBGE (2016), GFCF records the expansion of an economy's productive capacity through expenditure on new fixed assets —that is, goods that are used continuously in a productive process for more than one year. Thus, the European Commission and others (2016) and IBGE (2016) note that GFCF is composed of: (i) machinery and equipment; (ii) civil construction; (iii) intangible assets; and (iv) other assets. Furthermore, machinery and equipment is usually subdivided into two categories: machinery and equipment not intended for transportation; and machinery and equipment intended for transportation.[7] Gross fixed capital formation therefore does not include financial assets or the transfer of used assets.

In the SNA Ref. 2010 series, GFCF data are compiled and disseminated through supply and use tables and integrated economic accounts. The supply and use tables provide data on the supply side, in other words how much of each product went to GFCF.[8] By contrast, the integrated economic accounts provide data on the demand side, but only on total expenditure on GFCF by institutional sectors[9] (there is no information on the acquisition profile by type of product).

Even in the specific case of the health satellite account, the information is still scarce, due in part to the methodological link with SNA Ref. 2010. The supply and use tables of the health satellite account show only the value of the product "Apparatus and instruments for medical and dental use" as destined for GFCF. However, the manufacture of electromedical, electrotherapeutic devices and radiation equipment, produced by firms included in the code of the National Classification of Economic Activities (CNAE 2660),[10] is not included, which results in the share of the Health Industrial Economic Complex (CEIS) in GFCF being underestimated. Following the example of SNA, the health satellite account also lacks data on the demand side —that is, on the purchase of civil construction by the health sector— and on GFCF separated between public and private health care. For this reason, the current IBGE data, both in SNA and in HSA, do not provide sufficiently satisfactory GFCF data on the demand side to perform sectoral studies and plan public policies in the health sector.

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[7] For further details on what each category includes, see European Commission and others (2016), IBGE (2016) and Miguez and Freitas (2021).

[8] In the resource and use tables, this information does not distinguish between domestically produced and imported supply. This segregation is only performed in the years in which the input-output matrices are published.

[9] Institutional sectors are divided into five categories: non-financial corporations, financial corporations, government, households, and non-profit institutions serving households (Classification of the purpose of non-profit institutions serving households (COPNI)). For further information on their role in the national accounts and the characteristics of each category, see IBGE (2016).

[10] This class includes firms that manufacture radiation apparatus and tubes, electrodental apparatus, electrodiagnostic apparatus, X-ray apparatus, magnetic resonance apparatus, and other items.

To fill this gap, the work of Miguez and Freitas (2021) provides estimations of GFCF broken down by economic activity, and by type and origin of product. However, despite having data on GFCF in the health sector, these display a few shortcomings. The first is that the data on public health are not separated because the authors estimate the GFCF of the entire public sector in aggregate, without a breakdown by activity (education, health and public administration). Another shortcoming is that the data on the private health sector, which is referred to as "*saúde mercantil*" (market-oriented health care) do not contain estimates of demand for civil construction, but only for machinery and equipment. Accordingly, these data also have shortcomings for working with the health sector.

Given these limitations and the importance of having data on GFCF in the health sector, this study proposes a methodology for obtaining the necessary data series. The following section presents the databases used.

2.   Databases used

As noted in IBGE (2016), information on GFCF comes from different sources, depending also on whether it is used for supply-side or demand-side estimations. In general, to estimate GFCF data, IBGE uses its full range of structural surveys, such as the annual industrial survey (PIA), the annual construction industry survey (PAIC), the annual services survey (PAS) and the annual trade survey (PAC). Additional information is sought from other agencies, such as SECEX, the central bank and the Brazilian Revenue Service (Receita Federal).

In this study the authors decided to use only public data sources for the estimations, to enable other researchers to apply the methodology more easily. The databases used gather information both on the supply side —as in the case of PIA-Product and PAIC— and on the demand side —such as the Public Health Budget Information System (SIOPS) and the "Siga Brasil" information system.

The PIA-Product survey, published annually by IBGE, contains detailed information on the country's industrial production. It lists the quantities and values produced and sold of more than 3,000 products from the Prodlist (list of industrial products) classification. This level of detail makes it possible to identify the machinery and equipment used in the provision of health services. The same is true for foreign trade data obtained from SECEX, which publishes monthly export and import data according to the MERCOSUR Common Nomenclature (NCM), containing more than 10,000 products, which also allows for the separation of health machinery and equipment.[11] As foreign trade data are available in United States dollars, they were converted to Brazilian reais using the average monthly exchange rate between the two currencies. Lastly, although the Prodlist and NCM classifications are not fully compatible, it was possible to finesse the data to obtain annual series of production, imports and exports of health machinery and equipment.

The PAIC survey is also published annually and reports information on firms and products related to civil construction. However, it is relatively less detailed than PIA-Product, especially as regards the aims of this study. The information is divided into three categories of the National Classification of Economic Activities (CNAE): (i) 41 – Construction of buildings; (ii) 42 – Infrastructure works; and (iii) 43 – Specialized construction services. Information on hospitals constructed in a given period, for example, is included in section 41.2 – Construction of buildings, with the Prodlist product code 4120.2030 – Non-residential buildings not previously specified (hospitals, schools, hotels, garages, stadiums, etc.). Thus, it is impossible to directly disaggregate amounts relating to the construction of hospitals, laboratories and clinics, or to separate them into the public and private domains. These data have to be inferred using other variables, as explained below.

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[11] The list of machines and equipment is too long to be included in this article, but can be requested from the authors or consulted in Holguin (2021).

Data from SIOPS and Siga Brasil were used to obtain an estimation of public health expenditure. The Ministry of Health SIOPS system provides information on public health spending and financing in Brazil and is one of the data sources used in SNA (public health activity). This system aims to monitor compliance with the constitutional provision that establishes a minimum allocation of resources to public health projects and services. It records health investment expenditures divided by administrative spheres, that is Union, States and municipalities. The data used refer to the two latter spheres and to the categories considered as part of GFCF: "Works and facilities" and "Equipment and permanent material". One limitation of the SIOPS data is that the data is reported by the accountant responsible for the State or municipality in question and, although the SIOPS team reviews the data sent by the managers, it is not always consistent.

The data on federal expenditures were extracted from Siga Brasil, which is a data repository containing information from the Integrated Financial Administration System of the Federal Government (SIAFI), the Integrated Planning and Budget System (SIOP), the Information System of State Enterprises (SIEST) and the Management System of Agreements and Transfer Contracts (SICONV) of the Federal Government. Following the example of SIOPS, it is also possible to separate GFCF products into "Works and installations" and "Equipment and permanent material".

In the private sector, information on the demand side is scarce, but some options were analysed, especially the databases derived from the Statement of Economic and Tax Information of Legal Entities (DIPJ) made available by the Ministry of Finance.

The objective was to study the structure of the information available on income tax, in particular the balance sheets consolidated by CNAE, and to propose an algorithm to obtain data on private investment in health. However, these data are only available up to 2013, after which DIJP was replaced by Fiscal Accounting, which has not yet published the consolidated balance sheet data. In addition, in the case of the health sector, many philanthropic hospitals are included in the classification of non-tax paying and exempt firms, which were not required to declare this information until 2016. Lastly, information was also sought in the annual services survey (EAS), but it was noted that this survey does not include companies included in CNAE 86 (human health-care activities), so it could not be used for this study.

3.   Estimation methodology

The first step in the methodology consisted of obtaining a series on GFCF in the health sector, regardless of whether the demand came from the public or the private sphere. Next, information was sought on the demand side and, as noted in the previous section, it turned out that there was insufficient information for the private sector. Therefore, after obtaining an estimate for the public sector, the private sector estimate was determined by the difference between the total and the public sector estimate.

(a)   Total GFCF in health care

Detailed supply-side databases, namely PIA-Product, SECEX foreign trade data and PAIC, were used to estimate health-sector GFCF data. Data were then estimated for two groups of assets: machinery and equipment, using data from PIA-Product and SECEX, and civil construction, using data from PAIC.

The machinery and equipment share was calculated using the concept of apparent consumption, which serves as an indirect indicator of the national absorption of a given product. The apparent consumption of a good was calculated as the value of its domestic production, minus the value of exports plus the value of imports. The rationale for this approach is that the value of domestic production minus exports represents the domestic demand for domestically produced goods; while imports represent the demand for goods produced in other countries.

Estimations of the demand for machinery and equipment in the health sector were based on the products identified as capital goods most likely to be destined (almost) exclusively for the sector. In the case of PIA-Product, these products are some of those listed in the Prodlist codes beginning with CNAE 2660 – Manufacture of electromedical, electrotherapeutic and irradiation equipment, and CNAE 3250 – Manufacture of instruments and materials for medical, dental and optical uses.

The same rationale was applied to the SECEX export and import data; in other words, the MERCOSUR common nomenclature codes containing products classified as capital goods for the health sector were selected. Data in dollars were converted to Brazilian reais, using the monthly average exchange rate calculated from the rates published by the Central Bank.

The classification and organization of these data enabled the authors to obtain annual series of production, exports and imports of machinery and equipment for the health sector. Thus, apparent consumption was used to estimate the portion of total health sector GFCF that corresponded to machinery and equipment. The results are shown in table 1.

Table 1
Gross fixed capital formation in health-care machinery and equipment, 2010–2019
(Millions of Brazilian reais, current prices)

Year	Domestic production	Exports	Imports	Gross fixed capital formation in health machinery and equipment
2010	1 821.3	211.0	2 283.1	3 893.4
2011	1 904.6	226.1	2 212.5	3 891.1
2012	2 187.6	237.6	2 701.4	4 651.4
2013	2 362.0	255.2	3 351.5	5 458.4
2014	3 039.9	261.9	3 559.4	6 337.4
2015	2 670.9	357.1	4 264.7	6 578.5
2016	2 791.6	325.1	3 606.7	6 073.2
2017	2 746.9	357.4	3 593.7	5 983.2
2018	3 408.5	395.6	5 067.4	8 080.4
2019	3 578.1	468.6	5 250.3	8 359.9

Source: Prepared by the authors on the basis of Brazilian Institute of Statistics and Geography (IBGE) and the Foreign Trade Secretariat (SECEX).

In addition to machinery and equipment for use in the health sector, a portion of the supply of general-purpose capital goods —such as computers, motor vehicles (especially ambulances), furniture, and other machinery and equipment— is also part of GFCF in the health sector. However, since the demand for these products is secondary, and the data classifications used do not allow for a more detailed separation focused on health, it was decided not to apportion these products.[12]

The second part of the estimation relates to construction. For this, PAIC survey data by construction product were used, which are only available on the IBGE Automatic Retrieval System (SIDRA) portal. As in the case of PIA-Product, the PAIC data by product is classified according to Prodlist.

The product that responds best to the need to measure health-sector GFCF, related to the construction and building of hospitals, is Prodlist code "4120.2030 – Non-residential buildings not previously specified (hospitals, schools, hotels, garages, stadiums, etc.)". As the name suggests, however, this is a product that encompasses several types of building, not just hospitals. It was therefore decided to

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[12] Miguez and Freitas (2021) do include these products in their estimations, since they estimate the demand for GFCF of all products for all SNA activities. However, the classification used in the authors' data and the failure to segregate between public and private health, as noted above, make it impossible to use these data in the present study.

pro-rate the value of this code based on the production value of the SNA activities that might require the types of construction included in Prodlist. Some potentially small or sporadic construction types were not included because the production value could affect the pro-rating disproportionately. Table 2 shows the correspondences between the products included in Prodlist 4120.2030 and the SNA economic activities.

Table 2
Types of construction included in Prodlist 4120.2030
and economic activities that may require them

Types of construction included in PAIC Prodlist 4120.2030 product	Activities that may require them (SNA 68)
Service stations	4680 – Wholesale and retail trade, except of motor vehicles
Gatehouse	8000 – Surveillance, security and investigation activities
Arts and culture (cinemas, theaters, clubs, circuses, theaters, amusement parks, buildings for cultural or recreational purposes)	9080 – Artistic, creative and entertainment activities
Garage (garage building and underground garage)	5280 – Warehousing, transportation support activities and courier services
Stadiums (sports stadiums, sports halls, indoor courts, gymnasiums)	9080 – Artistic, creative and entertainment activities
Forts and fortresses	8400 – Public administration, defence and social security
Churches (churches, temples, cathedrals, synagogues, mosques and other types of buildings for religious purposes)	7880 – Other administrative activities and complementary services
Prisons (jails, prisons, police stations, battalions, forts and fortresses)	8400 – Public administration, defence and social security
Incineration plants	3680 – Water, sewerage and waste management
Restaurants (restaurants, bars, snack bars, cafeterias and bakeries, canteens, refectories and other establishments that serve food)	5600 – Food services
Stables and other buildings for agricultural and livestock use	0192 – Animal husbandry, including support for animal husbandry
Health (clinics, health centres and hospitals, doctors' consulting rooms and medical offices)	8691 – Public health and 8692 – Private health
Education (schools, faculties, universities, colleges, crèches and other buildings used for educational purposes)	8591 – Public and private education 8592 – Private education

Source: Prepared by the authors.
Note: Only the activities of the construction types in the shaded rows have been taken into account.

In short, to obtain the estimation for construction in the health sector, the first step was to deduct from SIDRA the values of construction works and services relating to Prodlist 4120.2030. Next, these values were distributed according to the weighting of the production value obtained with the activities selected in table 2. In other words, the total value of construction works and services was multiplied by the share of health services in the total production value of these activities. The result is shown in table 3, which reports the estimated value of construction expenditures in the health sector.

Table 3
Gross fixed capital formation in health construction, 2010–2019
(Millions of Brazilian reais, current prices)

Year	Public health care *(Percentage of total production value)*	Private health care *(Percentage of total production value)*	PAIC Prodlist 4120.2030	Public health care	Private health care	Total GFCF in health sector construction
2010	13	14	7 364.5	963.4	1 066.5	2 029.9
2011	13	14	7 307.7	917.6	1 002.1	1 919.6
2012	12	14	10 770.0	1 302.8	1 542.2	2 845.1
2013	12	14	10 152.0	1 260.2	1 451.8	2 712.0
2014	12	15	10 304.2	1 283.1	1 552.9	2 836.0
2015	13	16	7 260.8	911.4	1 132.8	2 044.2
2016	12	16	6 440.2	800.9	1 031.5	1 832.4
2017	12	16	6 394.0	762.5	1 045.5	1 808.0
2018	12	17	6 269.1	728.0	1 087.6	1 815.6
2019	12	17	5 745.5	663.4	990.6	1 654.1

Source: Prepared by the authors.

Lastly, to obtain the estimation of total investment by the health sector, the estimates for GFCF in machinery and equipment (table 1) are added to GFCF related to construction (table 3). The result is shown in table 4.

Table 4
Total GFCF in the health sector, 2010–2019
(Millions of Brazilian reais, current prices)

Year	Gross fixed capital formation in machinery and equipment	Gross fixed capital formation in construction	Total gross fixed capital formation in the health sector
2010	3 893.4	2 029.9	5 923.34
2011	3 891.1	1 919.6	5 810.70
2012	4 651.4	2 845.1	7 496.44
2013	5 458.4	2 712.0	8 170.45
2014	6 337.4	2 836.0	9 173.42
2015	6 578.5	2 044.2	8 622.68
2016	6 073.2	1 832.4	7 905.58
2017	5 983.2	1 808.0	7 791.23
2018	8 080.4	1 815.6	9 895.96
2019	8 359.9	1 654.1	10 013.91

Source: Prepared by the authors.

(b) Gross fixed capital formation in the public and private health sector

In the previous section, estimations of GFCF in the health sector were presented without distinguishing between the public and private sectors. In this section, a methodology is presented for estimating the investments made by the public health sector. Unfortunately, as noted in section III.2, there is a major lack of data on private sector demand. Thus, since there is one estimate for total health and another for the public domain, it was decided to obtain the GFCF of the private sector by calculating the difference between the two.

Federal expenditures were extracted from Siga Brasil, and State and municipal expenditures come from SIOPS. To explain how to extract these data, it is important to understand the accounting procedures of the National Treasury Secretariat (STN), the classification of budgetary expenditures, the phases of expenditure and the concept of expenditure from the public administration standpoint. It should also be noted that health expenditure by the federal government is defined as any health-related expenditure that is incurred by any public administration body, not only by the Ministry of Health but also by university and military hospitals, for example.[13]

In terms of the phases of expenditure, Act No. 4.320/1964 states that from the public administration standpoint, every expenditure consists of three stages: commitment, settlement and payment. Commitment entails reserving the funds needed to purchase the good or contract the service in question. In other words, it is a guarantee by the manager to the creditor that the public administration has the budgetary resources needed to pay the future obligations arising from the acquisition of the good or service. Settlement is the acknowledgment that the good was delivered or the service was rendered, and payment is the realization of the payment to the creditor (payment order).

Another important point is that committed budget expenditures that have not been paid as of December 31, the fiscal year-end date, are classified as "payables", which in turn can be divided into "processed payables" and "unprocessed payables". The former refer to settled goods or services that

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[13] Vieira and Piola (2016) discuss the various definitions of health expenditure, including that used in international manuals for the production of health accounts.

have not yet been paid; in other words, the good or service was delivered but payment has not yet been made. "Unprocessed payables" are committed expenses that have not yet been settled or paid. Thus, committed expenses that become "unprocessed payables" may or may not actually materialize. For this reason, measuring investment in terms of the commitment phase leads to an overestimation of the amounts in question.

From an economic point of view, investment should be measured on the basis of the settled expenditures of the fiscal year, including expenditures relating to previous years even if they refer to previous years' budgets (Gobetti, 2006, p. 22). International health accounts manuals also suggest that expenditures should be measured from the settlement phase. According to the 2008 SNA manual, "The general principle for the time of recording of acquisitions less disposals of fixed assets is when the ownership of the fixed assets is transferred to the institutional unit that intends to use them in production. Except in two special cases, this time is not generally the same as the time at which the fixed assets are produced. Nor is it necessarily the time at which they are put to use in the production of other goods or services" (European Commission and others, 2016; 10.53, p. 201). Therefore, the best expenditure phase in which to measure GFCF in public health is that of settled expenditure.

Thus, considering these conceptual aspects and the shortcomings of the databases, the best way to calculate public sector investment in health is through the settled expenditure of the States and municipalities and of the Union (Vieira and Piola, 2016). The latter can also include the values of "Unprocessed remainders payable" (*restos por pagar no procesados* – RPNP) that have been paid. Thus, the formula used to calculate GFCF in public health was as follows:

$$GFCF_{Public\ health} = (\text{Settled expenditures} + \text{RPNP}_{paid})_{Union} + \tag{1}$$
$$\text{Settled expenditures}_{States} + \text{Settled expenditures}_{Municipalities}$$

In terms of expenditure modalities, only direct investments were considered, as was also adopted by SNA.[14] Lastly, the items considered were only those allocated as investment within the capital expenditure category, and more specifically the categories medical, dental, laboratory and hospital apparatus, equipment, utensils and other equipment and permanent material; that is items that are equivalent to the machinery and equipment portion.

During the critical analysis of the SIOPS data, it was found that many municipalities do not correctly complete the data on equipment specific to the health sector and on equipment for general use. Some municipalities underestimate the data in category 4.4.90.52.08.00 – Medical, dental, laboratory and hospital apparatus, equipment, utensils. Others responded in error in subcategory 4.4.90.52.99.00 – Other permanent equipment and supplies. This inconsistency was also detected in certain States (in this case, data from the States' transparency portals were checked). For this reason, the items in category 4.4.90.52.00.00 – Permanent equipment and supplies were prorated to correctly estimate the value of category 4.4.90.52.00.08 – Medical, dental, laboratory and hospital apparatus, equipment and utensils. To perform the prorating, States and municipalities of significant size that had completed the data in full were selected. The prorating was calculated by dividing the total of category 4.4.90.52.08.00 by category 4.4.90.52.00.00.

Initially, the aim was to use data from Siga Brasil and SIOPS to estimate construction, but it was impossible to separate the value of construction in Prodlist 4120.2030 between the public and private sectors. This made it difficult to check the consistency of the preliminary estimate for construction in

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[14] The other possible modality is transfers. However, a transfer implies direct investment by third parties, so using the direct investment modality exclusively avoids double counting (Santos and others, 2014).

the public and private sectors. Thus, as seen in section III.3.a, it was decided to use the production value of activities 8691 Public Health and 8692 Private Health contained in SNA to disaggregate the total value of the construction portion of health sector GFCF the calculated with the PAIC data.

Once the share relating to public health demand was calculated, the private health share was estimated by the difference between the total and the public health estimate. The result is shown in table 5.

Table 5
Gross fixed capital formation in health by type of public and private investment, 2010–2019
(Millions of Brazilian reais, current prices)

| Year	Public health			Private health			Total health		
	Machinery and equipment	Construction	Total	Machinery and equipment	Construction	Total	Machinery and equipment	Construction	Total
2010	1 541.5	963.4	2 504.9	2 351.9	1 066.5	3 418.5	3 893.4	2 029.9	5 923.3
2011	1 171.7	917.6	2 089.3	2 719.4	1 002.1	3 721.4	3 891.1	1 919.6	5 810.7
2012	1 169.1	1 302.8	2 472.0	3 482.3	1 542.2	5 024.5	4 651.4	2 845.1	7 496.4
2013	1 331.6	1 260.2	2 591.8	4 126.8	1 451.8	5 578.6	5 458.4	2 712.0	8 170.4
2014	1 247.0	1 283.1	2 530.1	5 090.4	1 552.9	6 643.3	6 337.4	2 836.0	9 173.4
2015	1 000.0	911.4	1 911.4	5 578.5	1 132.8	6 711.3	6 578.5	2 044.2	8 622.7
2016	1 135.4	800.9	1 936.3	4 937.8	1 031.5	5 969.3	6 073.2	1 832.4	7 905.6
2017	948.2	762.5	1 710.7	5 035.0	1 045.5	6 080.5	5 983.2	1 808.0	7 791.2
2018	1 792.6	728.0	2 520.6	6 287.8	1 087.6	7 375.4	8 080.4	1 815.6	9 896.0
2019	1 499.2	663.4	2 162.6	6 860.6	990.6	7 851.3	8 359.9	1 654.1	10 013.9

Source: Prepared by the authors.

IV. Gross fixed capital formation in the health sector in 2010–2019

The recent COVID-19 pandemic and the resulting disruption of global supply chains revealed the strategic nature of the production of health-related goods and services. As noted above, investment in fixed assets has a positive impact on health sector infrastructure, contributing to the sustainability of the system and equity of care. In terms of technological development, the sector is intensive in both incremental and radical research, development and innovation investments;[15] and the purchase of new machinery and equipment, which incorporate many of these technological advances, has positive effects on the evolution of treatments and health care generally (Teja and others, 2020). Moreover, the improvement of primary care is closely related to the incorporation of new equipment and technologies that have optimized population monitoring and diagnoses.

The estimation of health-sector GFCF presented in this article makes it possible to analyse the trajectory of investments in the health sector relative to the Brazilian economy at large. This, in turn, enables a more complete analysis of the dynamics of the sector and provides information that is relevant for decision making when formulating public policies. In fact, the separation of investments by type —machinery and equipment, and construction— and by domains —public and private— is an important element for public health decision-making. Figure 1 displays analytical summaries of these data.

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[15] Pullen and others (2009) discuss some of the concepts related to types of innovation.

Figure 1
Distribution of GFCF by type of investment and by public and private sector, 2010–2019
(Percentage of total)

A. Investment type

■ Construction   ■ Machinery and equipment

B. Public and private sector

■ Private health care   ■ Public health care
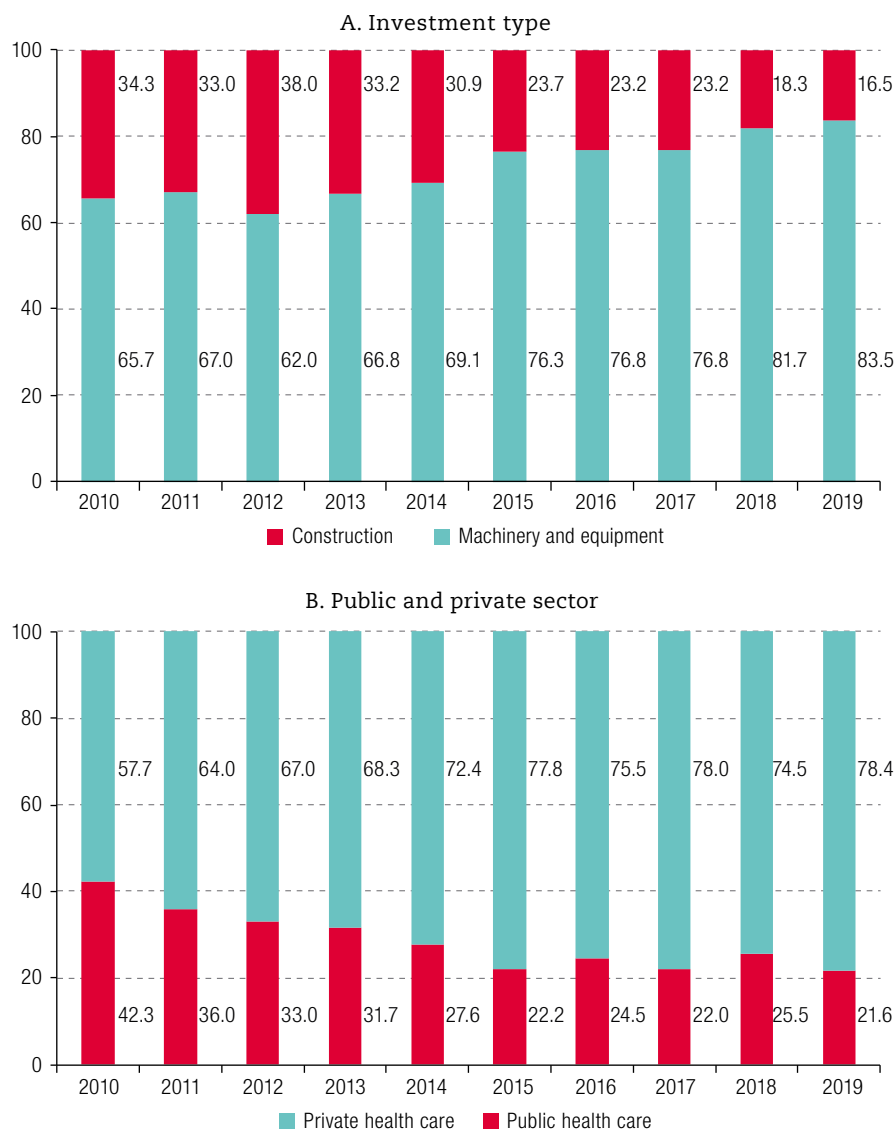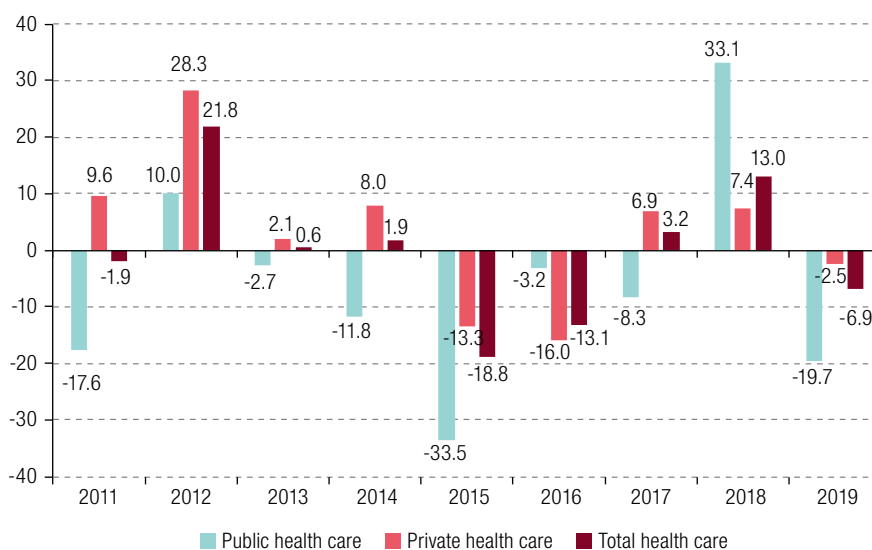
Source: Prepared by the authors.

Table 5 and figure 1 highlight two key features. The first is that, in both the public and private sectors, investments in the machinery and equipment category accounting for between 60% and 80% of the total amount invested, and are always greater than investments in construction. One of the reasons for this is the speed of the technological updating cycle of health equipment, which outpaces advances in information and communication technologies and materials. Thus, even well-established health-care facilities are constantly faced with the need to acquire new equipment to replace old processes. In addition, industry pressure is seen in the eagerness to incorporate new medical technologies (Andreazzi and Affonso, 2016).

The second striking feature is the share of investment in both domains. The share of private investments is not only greater throughout the period, but the share of public investment declines progressively: it decreases from 42.3% in 2010 to just 21.6% in 2019, the lowest value in the series.

The slight uptick in the values and share of public investment in 2018 reflects the effect of the Ministry of Health Ordinance No. 3,992/2017. This was approved with the aim of giving greater autonomy to health sector managers, under which the rules on the financing and transfer of federal resources to health initiatives and services of the Unified Health System (SUS) were modified. Under the previous Ordinance No. 204/2007, resources were transferred to six funding blocks; but after the change, financial resources were henceforth allocated to just two blocks: financing and investment. Thus, while the municipal manager previously received the resources in different accounts, after the change all resources earmarked for investment went to a single account (CNM, 2018).

The data on health sector GFCF are obtained from sources that report amounts only in current prices. In order to correctly identify the dynamics of investment growth, they need to be converted to constant prices, to thus discount the effects of price variation. Owing to the diversity of data sources, it was decided to calculate deflators from the work of Passoni (2019) which, by calculating annual input-output matrices at constant prices, also made it possible to calculate deflators by product and by components of final supply and demand. The following data deflators from Passoni (2019) were used: (i) for GFCF in construction, the product 41801 – Buildings, from the vector of domestic GFCF; and (ii) for GFCF in machinery and equipment, the product 26004 – Measuring, testing and control, optical and electromedical equipment, from the vectors of domestic GFCF, imported GFCF and exports. Figure 2 presents the results of the growth rates of total GFCF in the health sector and in the public and private domains.

Figure 2
Change in real terms in health GFCF, 2011–2019
(Percentages)

Source: Prepared by the authors.

As shown in figure 2, while in 2011 total health investment declined by 1.9%, the following three years saw growth, albeit significant only in 2012. In 2015 and 2016, health sector GFCF declined once more, dragged down first by public investment, but then with a greater influence of private investment. In 2017, private health investment staged a recovery. Public investment only recovered in 2018, largely as a result of the aforementioned changes in the financing blocks, which in accounting terms made more resources available specifically for investment. However, in 2019, on the eve of the COVID-19 pandemic, investment again retreated across the board. This context is likely to have an

impact on the 2020 data, as the pandemic is very likely to have boosted investment in the sector. Considering the entire period covered, the average growth rate of total GFCF in health was minus 0.7% per year: the private sector grew by 2.6% per year on average while the public sector shrank by 7.6%.

The trajectory of public health investment in Brazil depends, partly, on the allocation of funding for the Unified Public Health System. The story of how these resources are allocated and the poor results obtained in the period analysed in this article dates back to before 2010. Health services are financed from the income of the Social Security Budget.[16] By law, 30% of the budget, excluding unemployment benefits, was supposed to be allocated to the health sector until the budget guidelines law was passed (Vieira, 2016). As this never actually happened, Constitutional Amendment 29 (EC 29) was created to define rules for the use of resources at the federal, State and municipal levels. The Union had to invest a minimum amount in 2000, which could not be less than that committed in 1999, adjusted upwards by 5%. Until 2004, the value committed in the previous year would be corrected according to nominal GDP growth. States and municipalities were required to allocate 12% and 15% of tax revenues and constitutional transfers, respectively, to public health initiatives and services. In 2015, EC 86 changed the method used to calculate minimum expenditure on public health initiatives and services by the Union by linking the minimum allocation to a percentage of net current revenues (Vieira and Benevides, 2016).

In 2016, health-care funding suffered another setback with the passage of EC 95 (known as the expenditure cap) which effectively froze government spending for 20 years. Primary expenditure (federal spending minus interest expense) was capped at a ceiling defined as the amount spent in the previous year adjusted for cumulative inflation (based on the National Broad Consumer Price Index (IPCA)). That is, this ceiling means that public spending will no longer track population and income growth (Vieira and Benevides, 2016).

The decrease in public expenditure leads to a fall in economic growth, a reduction in public revenue collection and, consequently, more expenditure cuts; in other words, it entails a vicious circle (Rossi, Dweck and Arantes, 2018). In a context of fiscal austerity, declining public health funding and economic crisis, health investment expenditure will also likely be affected while the ceiling is in place. This will further undermine the supply of health goods and services for the Brazilian population, while also causing a negative impact on development and on innovation and technology policies in the health sector.

Although articles on health investment in Brazil are few, authors such as Orair and Siqueira (2018) analyse the trajectory of public investment in the country in recent decades. They conclude that budgetary constraints on public investment intensified after 2011 (p. 956), even though public spending expanded in that period. The authors emphasize that the relationship between public investment and business cycles is less deterministic than some economists suggest; and that, in this period, the fiscal regime and changes in the orientation of economic policy influenced the course of public investment. In other words, the rate of growth of the economy is not the only determinant of the level of public investment, but the fiscal regimes and economic policies adopted by the government also play a role. Since investment expenditures are not mandatory, greater fluctuation is to be expected in these categories, unlike spending on wages, for example.

Public investment in Brazil grew between 2006 and 2010 but, from 2011 onwards, the data estimated here show that investments, including in the health sector, flatlined despite an increase in social spending. In this period, the fiscal space available for public investments shrank (Orair and Siqueira, 2018, p. 961).

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[16] Resources obtained from the budgets of the Union, the States, the federal district and the municipalities, as well as from social contributions. In principle, these resources are distributed among social security, social assistance and the health sector (Piola and others, 2012).

Thus, the results presented in figure 2 seem to corroborate the hypothesis that, in a context of fiscal constraint, public investment tends to retreat sharply, even in essential areas such as health. This is because discretionary spending —in this case, investment— is the first to be cut despite rules to guarantee a minimum allocation of resources.

This context of limited investment in the health sector is of major concern considering the economic crisis and the increase in unemployment in recent years. The number of families covered by private health insurance can be expected to decrease,[17] and the demand for SUS services is likely to increase. This ultimately generates pressure to increase investment in supply capacity, either by hiring labour or by purchasing equipment. In short, the current public health financing policy seems to be moving in the opposite direction to the needs of the population.

In 2020, the onset of the COVID-19 pandemic made the weaknesses of the health sector in Brazil even more evident, not only in terms of the pharmaceutical sector and reliance on imported active pharmaceutical ingredients (APIs) (Hasenclever and others, 2020), but also in terms of the need to invest in the sector's infrastructure.

The methodology proposed in this article to measure health investments, therefore, is just another tool to draw attention to the actual needs of the health sector. It is important to continue analysing health investment expenditures in the coming years, given the possible effects of EC 95, 2016 and the COVID-19 pandemic itself.

V.   Conclusion

The health satellite account provides health managers with a macroeconomic view of the sector, in addition to serving as a source of data for the formulation of public policies. Nonetheless, it suffers from a few gaps, such as the absence of information on GFCF in the health sector. The only GFCF data included in the health satellite account is the contribution made by the sectors linked to the health industrial complex from the supply side. Accordingly, the aim of this article is to present a proposal to estimate health sector GFCF from the demand side. This proposal can be adapted and replicated by other countries, since it uses databases of industrial production, civil construction, foreign trade and public expenditure on health.

The data sources used in the proposed methodology were PIA-Product, PAIC and SNA —official IBGE surveys— to estimate initially the total GFCF of the sector, as a first version of the data, divided into the categories of machinery and equipment and construction. In a second stage, data from Siga Brasil and SIOPS were used to estimate the demand for GFCF in health by the public sector. Unfortunately, the data sources used to make the private sector estimate were insufficient, so it was decided to calculate this as the difference between the total and the public sector estimations.

While filling some gaps, this approach also has its shortcomings. First, it was decided not to estimate the demand for general-purpose capital goods (which arises not only from the health sector but also from several other sectors), such as automobiles (where ambulances are included), computers and furniture. In addition, having to calculate the GFCF of the private health sector exclusively by elimination imposed a constraint on the estimations, since there is no parameter for comparing dynamics and adjusting the methodology.

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[17]   Although it is an expense that can be considered relatively income-inelastic, a combination of high unemployment and the rising cost of health insurance can leave families with insufficient income to purchase it.

The data showed that the sector's GFCF is more intensive in machinery and equipment than in construction, in both the public and the private domains. This can be considered a "technical" characteristic of the sector, owing to the constant need to update equipment technology. It was also noted that public investments have been declining consistently in recent years. However, it is important to note that SUS health services are partly supplied by the private network through agreements or contracts (Santos, Santos and Borges, 2013). Thus, although total investment spending is less in the public sector, the services of the Unified Public Health System are produced partly in the private network through the outsourcing of beds and examinations. Nonetheless, public investments in health are expected to decrease further with the implementation of EC 95 (expenditure ceiling), a worrisome situation resulting from the duration and prolonged consequences of the COVID-19 pandemic.

Lastly, despite recent progress in health statistics and the methodology proposed here, it would be important for IBGE to take steps to publish data on GFCF on the demand side. Also, the current data on the supply side suffer from a limitation: they do not take into account highly complex equipment such as tomographs, ultrasound scanners and X-ray equipment, which are part of CNAE 2660 and are assigned in SNA under product 26004 – Optical and electromedical measuring, testing and control equipment. The official data thus end up underestimating the CEIS contribution to the total GFCF of the Brazilian economy. Since this is a set of products with a significant weight in health sector investment, it should be disaggregated in a future change in the SNA base.

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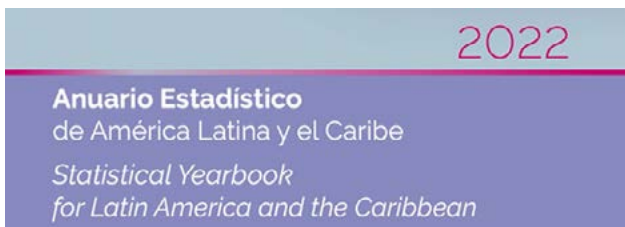
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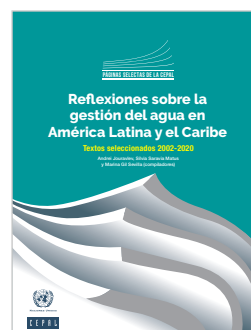
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