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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.

Tribute to Maria da Conceição Tavares

Virginia Laura Fernández

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Abstract

This article is a brief tribute to the life and work of Maria da Conceição Tavares, a leading heterodox economist and central figure in Latin American economic thought. Through a chronological narrative, it analyses her theoretical contribution from her time at the Economic Commission for Latin America and the Caribbean (ECLAC) to her period as a professor at the University of Campinas (UNICAMP) and the Federal University of Rio de Janeiro (UFRJ), as well as her involvement in Brazilian politics. The article highlights her role as a pioneer of Latin American structuralism, her critical analysis of the import substitution model and her ability to link quantitative approaches with historical and social perspectives. Tavares is remembered not only for her academic contributions, but also for her political activism and her commitment to social justice. She is considered a key figure in improving understanding of the region's current challenges in inclusive development.

Keywords

Women, economists, biography, tributes, thinking, ECLAC, economic history, economic development, development models, Brazil, Latin America

JEL classification

A11, A13, B19, B50, O10, O54

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I. Introduction

Maria da Conceição Tavares at a debate event held in the early 1990s.
Source: Universidad Estatal de Campinas (UNICAMP), historical archives.

The biggest problem in Latin America is not stagnation, but income distribution, which is very bad. That's the problem. That gives way to structural heterogeneity. This poor income distribution creates a structural heterogeneity based on the point of view of consumption and production. That is our problem, the problem of heterogeneity, not the problem of stagnation. (Tavares, cited in Fernández, 2021)[1]

Maria da Conceição de Almeida Tavares, a Portuguese citizen and nationalized Brazilian, was born in Anadia on 24 April 1930 and died on 8 June 2024 in her adopted homeland, in Nova Friburgo, Brazil, at the age of 94. Her academic career led her to be considered one of the great heterodox economists of the twentieth century and the most important woman economist in Brazil and all of Latin America (Arestis and Sawyer, 2000; Pereira de Melo, 2019). Her eloquent theoretical contributions to critical Latin American and global economic thought are rooted in the work of the Economic Commission for Latin America and the Caribbean (ECLAC).

Tavares arrived in Brazil in 1954 with the clear goal of contributing to the development of a "tropical" country.[2] After training in mathematics and graduating from the University of Lisbon in 1953, the economics programme at the University of Brazil —now the Federal University of Rio de Janeiro (UFRJ)— allowed her to expand her academic training and to learn new tools that would lead her to develop the first studies and assessments of the economic and social reality of Brazil, focusing on the country's extreme income and wealth inequality.

Tavares joined the Brazilian public service as a statistical analyst in 1955, after passing the competitive exam of the National Institute for Immigration and Colonization. Between 1958 and 1960, she worked as a mathematical and statistical analyst at the National Economic Development Bank (BNDE). During that period, she also helped to develop Juscelino Kubitschek's Targets Plan, as a member of the Executive Group of the Heavy Mechanical Industry. In 1960, she obtained a bachelor's degree in Economic Sciences, graduating summa cum laude and receiving the University of Brazil's Viscount of Cairu Award. In 1961, she resigned from the Institute to begin her teaching career as an assistant professor at the Faculty of Economic Sciences of the University of Brazil, working under her professor, Otávio Gouveia de Bulhões, one of the leading figures of orthodox economic thought in Brazil.

[1] Part of this interview, which was conducted on 25 May 2019, was published in Fernández (2021).

[2] Her own words, as conveyed in the documentary by José Mariani (2018).

During that period, she became interested in what she perceived to be the main problem of the Brazilian economy, since in 1958 she conducted her first analysis on income distribution in Brazil for BNDE and was shocked by the country's extreme income inequality. That experience drove her to try to understand the root of the problem and seek solutions. The proximity to Bulhões also enriched her training, as it provided her with comprehensive knowledge of quantitative theory and the models of the marginalist school (known as the neoclassical tradition), which she would later counter with solid arguments using both quantitative methods and theoretical frameworks incorporating history, sociology, politics and social sciences in general.

Between 1961 and 1974, Tavares was employed at the Economic Commission for Latin America (ECLA)[3] of the United Nations, which was dedicated to reflecting on economic issues and preparing assessments and public policy proposals to foster development in the region. She joined the ECLAC office in Rio de Janeiro in 1961, where she worked with Osvaldo Sunkel and Aníbal Pinto before being transferred to the Santiago headquarters in September 1968. During her time in Rio de Janeiro, she worked on the first studies on Brazil and Latin American structuralism with Antonio Barros de Castro and Carlos Lessa, her closest Brazilian colleagues. Tavares assumed the role of Deputy Director of the ECLAC-BNDE Economic Development Centre when Pinto returned to Santiago (Pereira de Melo and Moraes da Costa, 2019, p. 47).

Her contact and intellectual proximity with Raúl Prebisch, Celso Furtado and Aníbal Pinto at ECLAC were central to her career. However, that influence was reciprocal. From her early years as an economist, these men, who were at the forefront of the ECLAC theoretical approach, had a notable influence on her professional training. At the same time, Tavares' analytical creativity, her vast knowledge of mathematics, political economy and economic theory, as well as her great sensitivity and commitment to income distribution issues, quickly led her to become the first woman to participate in the development of ECLAC structuralist thought and, subsequently, to carry out a critical theoretical review, whose results served to develop economic theory at the international level.

During her time in Chile, in addition to her intellectual contact with structuralism at ECLAC, between 1968 and 1972 she was a member of the faculty of the Graduate School of Latin American Economic Studies —a postgraduate programme of the Faculty of Economic Sciences of the University of Chile— and of the Latin American School of Sociology of the Latin American Faculty of Social Sciences. Both schools promoted robust critical training on Latin American affairs and became forums for dialogue among a wide range of social science professionals (including economists, sociologists, political scientists and historians), as well as spaces of political resistance for Latin American exiles in Chile. They formed a community of intellectuals whose ideological and political commitments had kept them in exile from their home countries for many years, but somehow, they were welcomed in Salvador Allende's Chile. Against that background, in 1971–1972, Tavares contributed to the public sector as an economic advisor to the Government of Chile (Pereira de Melo, 2019).

Upon her return to Brazil in 1972, she resumed her teaching activities at UFRJ (formerly the University of Brazil). She was immediately licensed to coordinate the Postgraduate Programme in Economics at the University of Campinas (UNICAMP), and remained in that role until 1974. During that period, she played a fundamental role in the establishment and consolidation of the postgraduate centre, which was founded with the clear intention of becoming an academic centre of excellence, with theoretical rigour and critical, heterodox training on issues related to Brazil and Latin America as a whole. She was also a visiting professor at the University of Paris VII in France, the National Autonomous University of Mexico and the Economic Research and Teaching Centre in Mexico. In 1974, she moved definitively to Brazil, where she worked as a professor at both UFRJ and UNICAMP, undertaking various coordination, management and representative positions. She was central to defining the training profile for economists in both higher education establishments and, more specifically, in their respective Institutes of Economics.

[3] At that time, the Commission did not yet include the countries of the Caribbean.

Tavares also contributed to the development of institutions representing economists, serving, for example, as president of the Institute of Economists of Rio de Janeiro in 1981–1982 and 1992–1994. She received countless awards and decorations from various institutions —such as the University of Buenos Aires, UFRJ, Ministry of Foreign Affairs of Brazil, Ministry of Labour of Brazil, National Council for Scientific and Technological Development of Brazil, National Bank for Economic and Social Development, and the Jabuti Award for Economics, Management, Business and Law— and government agencies —including the Pedro Ernesto Medal of the Municipal Chamber of Rio de Janeiro, the Medal of Honor of the Inconfidência Mineira[4] of the Government of Minas Gerais, Order of Merit (Commander) of the Government of Portugal, and the Order of Bernardo O'Higgins of the Government of Chile.

Through her political activism, she answered her calling to help transform reality. She was initially affiliated to the Brazilian Democratic Movement party, serving as a member of its national executive body between 1980 and 1988, and played a fundamental role in advocating for the democratization of Brazil. She later joined the Workers' Party and was elected federal congresswoman for the State of Rio de Janeiro from 1995 to 1999. Regarding her time as a congresswoman, she said that even in that environment, her most important role was that of teacher, critic and questioner of the status quo.[5] It was a complex time, with liberal ideas gaining strength in the country and worldwide. Democratization had arrived, along with neoliberal policies that sought to shrink the size of the State, which to Tavares was the most appropriate mechanism to steer the country towards a new development model following the abandonment of developmentalism; that is, one that was more suited to the characteristics of global capitalism in the late twentieth century.

At the risk of being overly simplistic in attempting to briefly summarize Tavares' career, it makes sense to highlight her intellectual contribution on three main fronts: (i) theoretical, through the development of an economic theory in the context of ECLAC; (ii) educational, through her role as a professor and mentor of great Brazilian intellectuals and politicians at the Institutes of Economics of UFRJ and UNICAMP, which she founded; and (iii) legislative, for her engagement in Brazilian politics as a federal congresswoman for the State of Rio de Janeiro.

However, these three areas were simply a means of building a convincing, robust and contemporary narrative through which to present proposals for State action —i.e. public policies— aimed at transforming the reality of dependent developing countries and, in particular, improving the conditions of extreme income and wealth inequality among the Brazilian and Latin American working class, through the structural reforms needed to change the heterogeneity of consumption and production. The challenge of overcoming the structural heterogeneity of the countries of the region stemmed from Brazilian capitalism's subjection to the interests of national and international financial capital. In addition to capital accumulation, that form of dependent capitalism included other political, social and historical elements that increased its dependence endogenously.

II. Tavares' stages of thought

Tavares' vast body of written work has well-defined moments linked to the academic and institutional spaces in which she was active throughout her life: ECLAC, UNICAMP and UFRJ. Bielschowsky (2010) defines a historical (structural) periodization that divides her intellectual output into two stages: developmentalist (until approximately 1980), which aimed to understand the logic of Brazilian growth; and post-developmentalist (with the rise in neoliberal ideas), which focused on studying the causes of stagflation and lack of economic growth.

[4] Awarded annually in honour of Joaquim José da Silva Xavier, martyr of the eighteenth-century independence movement known as Inconfidência Mineira (Minas Gerais Conspiracy).

[5] See Mariani (2018).

Using these two major stages as a basis, her theoretical contributions can be classified according to her place of work, without losing sight of the common thread running through her work, which was to understand, explain and attempt to change the peripheral underdevelopment of Brazil and Latin America; the inner workings of the process of industrialization through import substitution; linkages with the endogenous elements of capital accumulation, consumption and income distribution; and the capitalist dynamics of a dependent and peripheral country like Brazil. Building on these themes, her later work addressed changes in global capitalist dynamics stemming from the international economic (dis)order, the return of North American hegemony[6] and the dominance of the financial economy over the real economy.

With reference to the developmentalist stage, the publications produced during her time[7] at ECLAC and, subsequently, at UNICAMP stand out. The first work that positioned her in the Latin American structuralist debate was "The growth and decline of import substitution in Brazil" (Tavares, 1964), in which she characterized and criticized industrialization as a process of import substitution in Brazil and Latin America, and described the model's operation, expansion, rise and fall. She argued that industrialization would not necessarily solve the problem of foreign currency shortages in peripheral countries and, particularly, in Brazil. While the process of import substitution would transform the production structure of some of the more qualified sectors, it would be limited by bottlenecks in the balance of payments, since production for the domestic market (inward) implied a demand for foreign capital assets, which ended up maintaining the disparity in the balance of payments, a structural characteristic of the countries of the region. That revealed a structural dependence that perpetuated underdevelopment.[8] Thus, industrial growth in peripheral countries would reflect a particular trend, in which the absorption of labour and consumption accompanying the import substitution process would eventually change the composition of imports, without reducing them (Bielschowsky, 2016, p. 15).

The second work that placed her at the centre of discussions at ECLAC was "Beyond stagnation: a discussion on the nature of recent development in Brazil", co-authored with José Serra during her time at ECLAC in Santiago and published in Spanish in 1971 (see Tavares and Serra, 1973). That work was pivotal, as it helped to formulate arguments for interpreting the possible development "models" of the countries of the region, which was the analytical focus of ECLAC in the 1970s. It also provided solid arguments against the stagnation thesis, prevalent throughout the 1960s, on the attrition of the substitutive model in the region; in particular, the thesis of Celso Furtado, one of her great teachers, who published "Development and stagnation in Latin America: a structuralist approach" in 1965. In "Beyond stagnation: a discussion on the nature of recent development in Brazil", Tavares analysed and interpreted the Brazilian economic crisis and recovery of the mid-1960s and, on that basis, highlighted particular aspects of the Brazilian economic development model that have given rise to a capitalist economy whose growth and development are extremely unequal. There are processes of expansion, diffusion and incorporation of technical progress and, at the same time, income concentration and a widening gap in consumption and productivity which, paradoxically, function as internal stimuli for the growth of the system. That publication launched a debate between concentration-oriented growth and the stagnation thesis, which remains active today.[9]

During that period, Tavares also dedicated herself to studying development financing. Influenced by the work of Ignácio Rangel, who saw the need to incorporate financial variables in the analysis

[6] In her essay "The resumption of North American hegemony" (1985), Tavares refers to the strong dollar policy implemented by the United States, which enabled the country to regain its economic and political hegemony.

[7] Regarding the periodization of Tavares' work, Andrade and Silva (2009) define three phases (ECLAC, UNICAMP and UFRJ) and delimit them according to different theoretical reviews and contexts. Possas (2001) and Robilloti (2016) also present three phases (ECLAC, theoretical review and international political economy) and relate them to her most prominent publications.

[8] Prebisch (1950 and 1963) had already expressed his concern regarding the sustainability of imbalances in his foundational written work at ECLAC, but he considered that that situation would end once the import substitution process was completed.

[9] This debate was also taken up by Aníbal Pinto in 1976, when, in "Styles of development in Latin America", he made clear that industrialization through import substitution could occur without any improvement to the structural heterogeneity of the region's economies.

of Latin American structuralism, in 1967 she presented the paper "Notas sobre el problema del financiamiento de una economía en desarrollo: el caso de Brasil" at the Seminar on Short-term Monetary and Financial Programming (see Tavares, 1967); in 1972, she published "Natureza e contradições do desenvolvimento financeiro recente" (Tavares, 1972); and in 1978, as part of the selection process to become a tenured professor at UFRJ, she presented her thesis *Ciclo e crise: o movimento recente da industrialização brasileira*, whose fourth chapter was entitled "O sistema financeiro brasileiro e o ciclo de expansão recente" (see Tavares, 1998b). That research represented a novel effort at ECLAC to connect the analysis of the movement of the real economy, the movement of financial capital and peripheral capitalist dynamics.

With respect to the works published during her time at UNICAMP, her interests centre around capitalist dynamics, capital accumulation and income distribution. That period was marked by her theoretical revision of Latin American structuralism and of her own work, as well as a critical dialogue with political economists, especially Marx, Kalecki, Keynes, Schumpeter, as well as Steindl, Bain and Labini. She used Marx's reproduction schemes divided into departments (producers of capital goods, capitalist consumption goods and mass consumption goods) to study the capitalist dynamics of the Brazilian economy. That phase of her intellectual career produced the idea of an "endogenous cycle" for the Brazilian economy (an early version of which was presented in "The growth and decline of import substitution in Brazil" and in "Beyond stagnation: a discussion on the nature of recent development in Brazil"), which was now supported by the theoretical use of Kalecki's three-department scheme, inspired by Marx.

That represented an important turning point in Tavares' work. As Nogueira da Costa (2019, p. 17) points out, Tavares' publications of the 1970s and 1980s break with the ECLAC view of external determinants and turn to the sectoral analysis schemes developed by Kalecki to understand the developing capitalist economies. That rift was significant, as it sparked a critical discussion of the main theoretical foundations of ECLAC. It also led Tavares to a theoretical discussion that enabled a broader analysis of capitalism, through abstraction, while also gathering historical structural elements to understand a particular case. That is the type of analysis she applied to Brazil.

Her first work under that new approach was a theoretical article, published as part of a series analysing the debate on income distribution and development in Brazil, at a time when data from the 1970 national census in Brazil were being disseminated and the perception was that, after decades of rapid economic and industrial growth in the developmentalist stage, the concentration of income had worsened in Brazil. While the book was published in 1975,[10] Tavares' theoretical article was presented at the first annual meeting of the National Association of Postgraduate Programs in Economics of Brazil in 1973. The original essay, entitled "Distribuição da renda, acumulação e padrões de industrialização: um ensaio preliminar" (1973), served as the basis for her teaching dissertation *Acumulação de capital e industrialização no Brasil* and her full professorship thesis *Ciclo e crise: o movimento recente da industrialização brasileira*, presented in 1974 and 1978, respectively (see Tavares, 1975, 1998a and 1998b). Therefore, although the texts were written and discussed with her colleagues at Campinas —Luiz Gonzaga de Mello Belluzzo, João Manuel Cardoso de Mello, Luciano Coutinho and Carlos Lessa (also a professor at UFRJ)—, they were presented at UFRJ and at a time when her connection with ECLAC was still active.[11]

[10] In the book *A controvérsia sobre distribuição de renda e desenvolvimento*, coordinated by Ricardo Tolipan and Arthur Carlos Tinelli, the first two papers are theoretical with a Marx-based methodology, the first written by Luiz Gonzaga Belluzzo and the second by Maria da Conceição Tavares. A review of both articles suggests that they were developed out of a joint effort or discussion. Belluzzo and Tavares undertake a high level of theoretical abstraction to intertwine the distributive variables with those of the production structure and the dynamics of accumulation in Brazil. In the remaining chapters, authors with critical perspectives and diverse political leanings present and discuss the 1970 census data. Fernando Henrique Cardoso wrote the preface of the book.

[11] In fact, in her 1974 thesis, Tavares thanks Fernando Fajnzylber, who was at the Economic Research and Teaching Centre in Mexico, for his contributions on oligopolistic accumulation in large companies, particularly international companies (see Tavares, 1998a, p. 19).

Regarding that period, Bielschowsky argues that Tavares' ingenious way of applying Kalecki's cyclical analysis to the Brazilian economy has two components. First, in the context of Brazil's "late capitalism", cyclical booms are intense, but short, and doomed to rapid decline because the size of the sectors producing capital goods and capitalist consumption goods is small compared to the economy as a whole. Second, the industrial sector and, in particular, the sectors producing capital goods and capitalist consumption goods, are both the fastest-growing sectors of the economy and those with the highest profit margins. That implies an increase in the share of profits in income and, consequently, the requirement that investments accelerate continually in order for profits to "materialize", which cannot continue indefinitely (Bielschowsky, 2010, pp. 198–199).

The post-developmentalist stage (rise of neoliberal ideas) occurred primarily during her time at UFRJ, from 1985 onward. That new stage of thought, which began with the publication of "The resumption of North American hegemony" (Tavares, 1985), lasted from her time at the Institute of Industrial Economics at UFRJ and continued up to her final written works. While it was characterized by discussions on the international political economy and transformations of the world economic order (or disorder), presenting a geopolitical vision to better understand how hegemonic centres are formed (Nogueira da Costa, 2019, p. 17), it also analysed the corresponding impacts on national economies and the macroeconomic adjustments or maladjustments in key variables such as inflation, interest rates, exchange rates and the relationship between those variables and wages and income distribution (Bielschowsky, 2010). Lastly, the 1986 publication "Problemas de industrialización avanzada en capitalismos tardíos y periféricos",[12] which was published by the Institute of Industrial Economics of UFRJ but belongs to the body of theory developed at UNICAMP, completed her discussion of the endogenous cycle.

III. Continued relevance of Tavares' work

Tavares' thinking, her theoretical development and her invitation to reflect on the path of inclusive development in Brazil and in other Latin American countries remain fully valid today. The reflections drawn from a close and active reading of her written works, which became classics while she was still alive, point to the ongoing challenges of Latin America's dependent and peripheral development, as well as their potential solutions. Her work remains relevant to current challenges in at least three areas: the barriers to sustained improvements in distribution, subjugated to structural heterogeneity; the debate regarding concentration-oriented growth as a development model for the region, as opposed to the stagnation thesis; and the new multipolar global environment, which questions but does not delegitimize North American hegemony.

The first theme relates to the long-standing discussion on Tavares' original concern regarding distribution, in particular the concentration of income, wealth and property, and its link to structural heterogeneity in terms of consumption and production and as a constraint to the region's development. Latin American structuralist thought, as per ECLAC, offered various structural reform proposals to overcome such problems as early the 1960s and, more recently, the publications developed for the ECLAC sessions of the 2010s underscored their continued relevance. The issue of distribution moved to the centre of the debate to guide policy through a rights-based approach, given its effects on productivity, environmental sustainability, the development of the knowledge society and the strengthening of democracy and full citizenship (Curado and Fernandez, 2019).

The second topic, concerning concentration-oriented growth as a development model and the critique of the stagnation thesis, is related to the first and is presented as a debate rather than as a counterargument, since today both phenomena are occurring simultaneously: lower growth rates (without reaching stagnation)

[12] This article was written for the seminar on policies for Latin American development, organized by the Development Training Centre of the Secretariat of Programming and the Budget of the Government of Mexico and held between September 1980 and June 1981 (see Tavares, 1986).

together with a greater concentration of income, wealth and property. The expansion of the financial economy to the detriment of the real economy and the concentration of global production could further reinforce this situation, and Tavares' complex and robust body of theory serves as a basis for their analysis.

The last topic refers to the discussion on North American hegemony and the unfolding of a multipolar world, where the presence of China and remaining BRICS countries (Brazil, the Russian Federation, India and South Africa) as well as of the developing economies of Asia, is becoming increasingly important for the international engagement of the countries of the region. Strong currencies, the ability to make international investments in strategic sectors and infrastructure, new demand for natural and technological resources, and the expansion of accumulation in the financial economy to the detriment of the real economy characterize this new era and restore the countries of the region to their former positions in the international division of labour. The above-mentioned points raise fundamental questions about the nature of the region's dependency and its effects on development.

IV. Final reflections

Maria da Conceição Tavares was a pioneer of Latin American structuralist thought and played a prominent role in the foundational discussions of Latin American structuralist development theory, which emerged at ECLAC under Raúl Prebisch and her teachers Celso Furtado and Aníbal Pinto, among others. She carried out a critical review of that body of theory and consolidated the Institutes of Economics of UNICAMP and UFRJ. Tavares was a source of inspiration through her energetic, combative and dissenting voice. She was a female leader in the male-dominated field of economics; accustomed to going beyond established thought, her forceful statements were imbued with a reasoning that sought to provide a better version of the reality under analysis, both intellectually —as an economist and professor— and politically.

Tavares was not only a brilliant economist, but also a tireless teacher, a fierce critic and a visionary who never lost sight of the struggle to transform reality. Her ability to combine complex mathematics and political economy, to challenge established dogmas and to inspire generations of critical thinkers is an unmatched legacy. From her years at ECLAC to the consolidation of the economics programmes at UNICAMP and UFRJ and her courageous foray into politics, each stage of her life was marked by her passion, intellectual rigour and social commitment. Tavares not only thought of a "tropical development model"; she lived it and taught it with patience and audacity.

In addition, she not only theorized about inequalities, but also fought to reduce them, from both the academic and political spheres. As she herself said:

> A formação analítica de um economista, sobretudo a de um professor e pesquisador, deve passar por todas as tradições e guardar delas a distância necessária, para não ser aprisionada, pelo seu método. Cada um deve refazer por si mesmo, com paciência e audácia, o estilo de análise que lhe parecer mais conveniente na luta pelo conhecimento, na luta por "conhecer o mundo" e "tentar mudá-lo", na medida que lhe permitirem as suas próprias forças e as forças sociais ante as quais se situa[13] (Tavares, 1998b, p. 12).

Today, her work lives on, reminding us that it is possible to combine theory with action, critique with hope, and economics with humanity. Maria da Conceição Tavares was, and will continue to be, an essential teacher for understanding and transforming Latin America.

[13] The analytical training of economists, especially that of professors and researchers, should pass through all traditions while keeping a necessary distance to avoid being imprisoned by their methods. With patience and audacity, they should develop the analytical style they find most convenient in the struggle for knowledge, in the struggle to "know the world" and "try to change it", to the extent that their own strengths and the social forces before them permit.

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The centre-periphery model and the political economy of the Economic Commission for Latin America and the Caribbean: past and present

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Abstract

This article is focused on the hypotheses of Raúl Prebisch and Hans Singer regarding the centre-periphery model, which is the cornerstone of development theory for peripheral countries. The article emphasizes aspects of theory and policy related to the political economy of the Economic Commission for Latin America and the Caribbean (ECLAC) from the early 1950s to the present. It shows how, since the 1980s, ECLAC economists —influenced by evolving neo-Schumpeterian models and equipped with sophisticated microeconomic instruments— have undertaken a critical appraisal of the import substitution model in Latin America while retaining Raúl Prebisch's original hypotheses on the external forces restricting the economic development of peripheral countries.

Key words

Economic dependence; economic development; import substitution; Prebisch, Raul; ECLAC; economists; thinking; development models; economic structure; macroeconomics; Latin America.

JEL classification

B15; B20; B25.

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I. Introduction

Less developed countries, especially in Latin America and Asia, have not necessarily followed the same development process as today's capitalist developed countries, in particular those in mainland Europe. While Latin American structuralist development theories, like their European counterparts, advocate industrialization as the only means of overcoming underdevelopment —on the basis of the same arguments as classical developmentalism—,[2] they are more progressive in two aspects: (i) they take into account the historical, social and institutional particularities of each country or region and the model that underdeveloped or developing (i.e. peripheral) countries adopt for global economic participation; and (ii) they emphasize development-focused economic policy (i.e. development and economic planning measures), without which peripheral economies cannot approach or maintain higher levels of per capita income and well-being. As Celso Furtado (1954) argues in one of his classic studies, without input from historians, anthropologists, sociologists and other social scientists, economists cannot say why any society develops or identify the social agents responsible for this process. Although economic analysis "can describe the mechanism of economic development" (Furtado, 1954, p. 129), the distinctive historical factors of a given country or region must be taken into account.

This article is focused on the hypotheses of Raúl Prebisch and Hans Singer regarding the centre-periphery model, which is the cornerstone of development theory for peripheral countries. Following this introduction, the article contains an additional four sections. The second section presents an examination of the centre-periphery model, which constitutes the analytical underpinnings of structuralist and neo-structuralist development theory in Latin America. The third section examines the analytical mechanism of the political economy of the Economic Commission for Latin America and the Caribbean (ECLAC) as the guiding force behind the Latin American nationalist-developmentalist policies adopted between 1950 and 1980. The fourth section looks at the development of the centre-periphery model from the 1980s to the present. The author will show that, since the 1980s, ECLAC economists —influenced by evolving neo-Schumpeterian models and equipped with sophisticated microeconomic instruments— have undertaken a critical appraisal of the import substitution model in Latin America while retaining Raúl Prebisch's original hypotheses on the external forces restricting the economic development of peripheral countries. The final section presents a brief conclusion.

II. The centre-periphery model, theoretical foundation of structuralist development policy in Latin America

The centre-periphery model traces its origins back to the hypotheses of Raúl Prebisch, second Executive Secretary of ECLAC, and Hans Singer, economist in the Department of Economic Affairs (later renamed the Department of Economic and Social Affairs) of the United Nations. The two men developed these theories —independently but almost simultaneously— in the early 1950s.[3] Prebisch (1950) conceived of the global economy as comprising two blocs: the centre, made up of developed countries, where innovation is concentrated and there is a near-total global monopoly on technical progress; and the periphery, composed of underdeveloped or developing countries which seek to emulate and absorb technical progress from central countries.

[2] Latin American structuralist theories of development, like classic development theory, are based on the hypothesis that the manufacturing sector drives the accumulation of capital and the generation and dissemination of technical progress, and on the idea that economic development is a process of structural change in which productive resources are reallocated from low-productivity sectors to high-productivity sectors.

[3] Prebisch's seminal article was published in Spanish in 1949, but not in English until 1950, the same year that Singer (1950) was published in *The American Economic Review*.

An examination of goods and services trade flows between central countries and peripheral countries led Prebisch (1950) and Singer (1950) to conclude that the benefits of the international division of labour did not transfer to peripheral countries, contradicting the theory of comparative advantage espoused by free trade proponents.

The theory of comparative advantage holds that laissez-faire economic policy and free world trade will lead each country to specialize in the goods and services that are comparatively cheapest to produce (i.e. those with the highest relative productivity or largest comparative advantage),[4] and that peripheral countries can maximize their efficiency only by using their economic resources mainly to produce goods and services with the lowest comparative cost (i.e. opportunity cost). The logical conclusion of this theory, which remains foundational to pro-free trade arguments, is that peripheral countries should specialize in commodities and central countries should specialize in manufactured goods.

In the view of David Ricardo (1817), the determining factor for each country's comparative advantages is its relative mastery of the technology used to produce each good, which translates into greater or lesser relative labour content incorporated into production when compared to other global competitors. However, this theory approaches technology as an exogenous factor, mysteriously inherited through laissez-faire and free trade practices, that distinguishes the centre from the periphery. It fails to consider that technology is generated and disseminated as a result of the simultaneous interaction between government stimulus measures and the private sector's innovation in response to those measures, which govern production in a market economy. The theory of comparative advantage does not account for the fact that this dynamic interaction determines the faster or slower pace of capital accumulation and technological development.

A different but complementary iteration of Ricardian theory was later developed by Swiss neoclassical economists Eli Heckscher (1919) and Bertil Ohlin (1924 and 1933). In their iteration, the different relative costs and prices of goods and services produced by each country are attributable not to technological differences but to the relative distribution of factors of production throughout the global economy.

In this neoclassical version, peripheral countries specialize in commodities, which they produce at lower costs relative to central countries owing to their greater relative wealth in the factors used intensively in the production of such goods (i.e. natural resources or unskilled labour). Central countries, meanwhile, specialize in manufactured goods, which they produce at lower relative costs thanks to their greater access to the factors used intensively in manufacturing (i.e. capital or skilled labour). Thus, the Heckscher-Ohlin version of Ricardian theory postulates that engaging in reciprocal free trade practices allows each bloc to import the goods that, for them, present a comparative disadvantage —commodities for central countries and manufactured goods for peripheral countries— more cheaply than they could produce them domestically.

In contrast to Ricardo's theory, the free trade arguments put forward by Adam Smith are eminently dynamic and based on the hypothesis that the free trade of goods in global markets would allow each country to expand its exports beyond the natural limits imposed by the size of its domestic market. Free trade would also provide greater access to imported goods at cheaper prices than domestically produced goods. Thus, Smith's conception suggests that the main benefit of international trade comes from the expansion of each country's net exports, and the primary impact of that expansion is, ultimately, increased long-term economic growth.

The formal sophistication of the Ricardian principle of comparative advantages allowed traditional neoclassical theory to anchor its defence of free trade in predominantly static arguments. Neoclassical theory has built an analytical framework to show that, under a highly restrictive set of hypothetical

[4] In the strictest sense, among the multiple productive sectors of an economy, comparative advantages are determined by differences in each sector's relative productivity and wages as compared to the corresponding sectors of the trading partner's economy. For a detailed analysis of this theory, see Krugman, Obstfeld and Melitz (2015), in particular chapter 3.

circumstances (e.g. constant returns to scale, perfect competition and laissez-faire), free trade achieves the optimal allocation of productive resources in the global economy, without regard for the possible positive or negative effects on each country's economic growth. Unlike Smith, neoclassical theory traces the provenance of global trade's primary benefit to the expansion of each country's net imports, which ultimately improves well-being by increasing total consumption.

The neoclassical version of the theory of comparative advantage gained enormous policy influence with the development of the factor price equalization theorem by Paul Samuelson (1948 and 1949), which provided the ideological heft to finally persuade periphery governments of the benefits, including dynamic benefits, of unconditionally embracing multilateral free trade. According to this theorem, if all markets (of goods and factors of production) operated under conditions of laissez-faire and perfect competition, free trade would lead to the equalization of the relative prices of goods and factors of production in the global economy.[5]

The mechanics of this theorem are simple: reciprocal pressure created by inter-industrial competition between countries causes the relative price of a given good to fall in the countries that are at a comparative disadvantage to produce that good.[6] The theorem predicts that free trade will drive down the relative price of imported manufactured products for Latin American peripheral countries and of imported commodities for central countries. At the same time, the falling relative price of these goods, for periphery and central countries, respectively, brings down the relative price of factors used intensively in the production of each (capital and skilled labour in peripheral countries and natural resources and unskilled labour in central countries). The theorem also states that free trade encourages movement in the opposite direction (i.e. upward) in the relative price of goods for which each bloc of countries has a comparative advantage, in addition to increasing the relative price of the factors used intensively in their production. In other words, the factor price equalization theorem holds that, in a utopia of perfect competition, real wages and earnings will be equal throughout the world.

However, if, as the theory of comparative advantage and the factor price equalization theorem suggest, peripheral countries will enjoy permanent benefits as exporters of commodities and importers of manufactured goods, what is the source of their economic development? Although the neoclassical theory of international trade does not explicitly answer this question, it does imply that accelerated capital accumulation and technical progress in the manufacturing sector tend, in the long term, to bring down manufactured goods prices relative to commodities prices. In other words, peripheral countries, by engaging in free trade, can accumulate capital and absorb the technological progress embodied in the capital goods that they import from central countries, which would allow them to incorporate such technology in their local production activities (including in emerging industrial sectors) and thereby accelerate their economic development.

Indeed, there has never been a prosperous nation that developed thanks to an extreme dependence on the importation of manufactured goods.[7] However, the criticisms of Prebisch (1950) and Singer (1950) are largely theoretical, based on the hypothesis that the factor price equalization theorem does not apply to the real world or the observed dynamics of international trade.

This discrepancy between theory and reality is explained by structural heterogeneity in the supply and demand behaviour of commodities as compared to manufactured goods. Regarding supply, the manufacturing sector has two distinctive characteristics: it generates and disseminates technological

[5] It is worth pointing out, however, that this theorem only applies in the framework of the comparative advantage model as envisaged by Heckscher, Ohlin and Samuelson. In the original Ricardian model, with production costs depending on a single factor (labour), there is no mechanism through which international trade can equalize wages.

[6] Neoclassical theories of international trade assume the absence of financial capital flows among countries, which limits international economic transactions to trade flows of tradable goods and services. They also assume the free movement of physical factors of production (e.g. capital, labour and natural resources) domestically (i.e. from one part of the country to another) but not internationally. Thus, the real exchange rate is directly dictated by the terms of trade (that is, the relationship between price indices for exports and for imports). For technical details in this regard, see Feenstra (2004).

[7] For reference, see the classic works of Amsden (2001) and Chang (2002).

innovations at a higher rate, and it uses technologies that are subject to both static and dynamic economies of scale. As a result, the sector dictates the strength of capital accumulation, technical progress, economic growth and support for long-term productivity. A higher degree of oligopolization tends to hinder price competition in the sector, giving leading enterprises enormous power to fix market prices and control profit margins.

As Prebisch stated (1950, p. 10), if this theory were correct, the terms of trade (i.e. peripheral countries' export prices relative to their import prices) would have shifted in favour of primary products given the higher productivity of this sector. However, this scenario has not materialized because, on the supply side, increased productivity gains —which correspond to sharp declines in the cost of manufactured goods produced by central countries— are not transferred to prices in a proportional manner; and on the demand side, there is significant structural heterogeneity between the goods exported by central countries and those exported by peripheral countries. In this regard, for the price factor equalization theorem to bear up under real-world conditions, the following prerequisite must be met: the income elasticity of demand for goods in which the central and peripheral countries specialize (manufactured goods and commodities, respectively) must be equal to unity, meaning that the average growth rates of global demand for commodities and manufactured goods must equal the average growth rates of global income.

However, international trade is also governed by Engel's law: the income elasticity of demand for luxury goods (i.e. most manufactured goods) —which are subject to product differentiation and the manipulation of consumer preferences via marketing, advertising and propaganda— is greater than unity. By contrast, the income elasticity of demand for essential goods (i.e. commodities) —which are generally homogeneous and easily replaceable in the marketplace— is lower than unity.

An analysis of the prevailing historical and economic conditions of the period 1870–1930, during which the peripheral countries of Latin America followed a development strategy with a primarily external focus, led Prebisch (1950) and Singer (1950) to conclude that this model tended to perpetuate perverse and unsustainable growth in the long term. Even during cycles of global economic expansion, demand for peripheral countries' commodities exports tended to grow at a slower pace than demand for central countries' manufactured goods exports, leading to a general deterioration in the terms of trade. As Prebisch observed (1951, p. 30), commodity imports by central countries expand at a lower rate than real income. Thus, the income elasticity of commodity imports by these countries tends to be lower than unity.

Therefore, it is impossible for peripheral economies to develop following a model of international participation guided by static comparative advantages, because the secular deterioration of terms of trade tends to reduce their import capacity. Specifically, the foreign exchange flows needed to finance the importation of manufactured goods, in particular machinery and equipment used for capital accumulation, are reduced in relative terms. In practical terms, assuming the equilibrium of the real exchange rate (meaning that the currency of peripheral countries was neither undervalued nor overvalued against the basket of currencies of central countries), this perverse process of "outward-oriented" development caused the value of commodities exports to fall relative to the value of manufactured goods exports. Thus, peripheral countries, facing diminished import capacity, transferred part of their income to central countries and grappled with recurring balance-of-payments crises.

As Furtado (1962) showed in his classic text *The Economic Growth of Brazil*, in the periods following frequent exchange-rate crises, periphery governments heavily devalued their currencies with the aim of reducing the price in foreign currency of exportable commodities while increasing the price of importable manufactured goods. However, as demand for commodities is price-inelastic (i.e. not very affected by prices) and demand for manufactured goods is price-elastic (i.e. very affected), currency devaluations did little to boost peripheral countries' exports and sharply reduced their imports, such that the resulting balance-of-payments adjustment was highly recessive.

How should we understand these short-term or medium-term periods in which peripheral countries benefited from rising international prices of agricultural and other commodities? Would not the facts of the periods 1820–1830, 1840–1860[8] and, more recently, the 2000s, negate Prebisch's and Singer's hypotheses, the corroboration of which hinges on the hypothesis of deteriorating terms of trade?

The answer is no. These transitory periods did not see peripheral countries parlay their "commodity lottery" prize (to use the apt expression coined by Díaz-Alejandro (1984)) into permanent gains. Rather, they were passing phases in which spikes in relative commodity prices resulted from an aberrant increase in demand from key international actors, as in the case of the United Kingdom at the height of the Industrial Revolution (1850–1860) and China during its transition to a middle-income economy (early 2000s). The hypotheses of Prebisch and Singer, however, are based on the hypothesis of secular deterioration of terms of trade, which empirical data have supported time and again.[9]

Is there any alternative, then, to the free-market approach to participating in external trade, which condemns peripheral countries to long-term economic stagnation? As Prebisch showed (1950, p. 29), the exchange-rate controls adopted from the 1930s on and import substitution's eruption onto the Latin American scene as a new development model for peripheral countries were "not the result of a theory" but rather "imposed by circumstances". This is because Latin American countries were induced to spontaneously reorient their development model inward, through the import substitution process.

Nevertheless, both in his 1950 manifesto and his 1951 study, with greater theoretical precision, Prebisch presents arguments for the adoption of deliberate State-coordinated development policies. To paraphrase Marx, for Prebisch and the ECLAC economists, it was not enough to interpret the periphery; the point was to change it. The 1950s ushered in a wave of long-term public policies adopted as part of the national development programmes of Latin American periphery governments, under the influence of the political economy of ECLAC.

III. ECLAC political economy and the nationalist-developmental State

There is no question that the nationalist-developmentalist public policies implemented between 1950 and 1980 in many Latin American countries, including Brazil, were markedly influenced by the ideas of Prebisch and the fruitful theoretical debate under way at ECLAC. Curiously, in the past three decades, critical analysis of the basic theoretical aspects and policy implications of nationalist-developmentalism, including in Brazil, has been biased, disparaging and ideologically prejudiced. As will be discussed in the following section, the national development plans adopted by periphery governments in Latin America, including Brazil, were not without their faults —both in design and implementation—, but then, they were never faithful reproductions of the public policy strategies recommended by ECLAC to begin with.[10]

There is scarcely a single example of a country which developed after the Industrial Revolution in the United Kingdom or is still developing that allowed its economic development to be guided by the classical liberal model in which free-market forces determine its specialization according to its

[8] To consult these data, see Coatsworth and Williamson (2002).

[9] Coatsworth and Williamson (2002) observed a near constant deterioration of the terms of trade of peripheral countries between 1870 and the early 1940s. The International Monetary Fund (IMF, 1994, p. 92) noted a downward trend in commodities prices throughout the post-war period and, furthermore, recalled that the weakening of these prices was secular, rather than temporary. Ocampo and Parra (2003), analysing the behaviour of relative prices of a statistically significant sample of commodities and price indices, observed an overall, albeit intermittent, trend of deteriorating terms of trade between 1900 and 2000. More recently, Silva, Prado and Torracca (2016) concluded that, between 1977 and 2011, terms of trade tended to be unfavourable to peripheral countries.

[10] Nothing could be further from the truth than the claim (Sachs and Warner, 1995, pp. 4 and 5) that the great historical mistake of Prebisch's hypothesis was to recommend import substitution —via protection through tariff and quota barriers— rather than export promotion, as the path to industrialization.

natural comparative advantages (i.e. laissez-faire, laissez-passer).[11] On the contrary, Germany and the United States, in the late nineteenth century, and China, India, Japan, the Republic of Korea and Taiwan Province of China, in the wake of the Second World War,[12] either were or continue to be guided by firmly nationalist-developmentalist strategies based on the well-known infant industry argument.

ECLAC economists' favourable opinion of protectionist policies geared towards the industrialization of the Latin American periphery was also grounded in the infant industry argument —the same argument that had been used to justify protectionist policies in less industrialized countries (as measured against the development of the British economy). In both cases, the argument was based on the fact that the slow uptake of free trade practices by industrializing nations had perpetuated the absolute technological gaps between them and countries that had developed earlier. However, free trade with central countries (which at the time included the United States and several countries of mainland Europe) had observably blocked economic development in Latin America owing to terms of trade that were unfavourable to peripheral countries —a fact which strengthened the argument advanced by ECLAC.

ECLAC-recommended policies went beyond the adoption of industrial policy programmes, defined as a set of public incentives for the economic activities, sectors and production chains that had the greatest potential to accelerate capital accumulation, spread technological progress and, consequently, foster long-term economic development.[13] ECLAC proposed more broadly —and in the author's view, correctly— that the governments of Latin American peripheral countries should follow an economic planning model, based on the adoption of national development plans.

ECLAC economists were aware that the challenge facing Latin American countries from the second half of the twentieth century onward was much greater than the challenge that had faced less developed countries, in particular Germany and the United States, at the end of the nineteenth century. The task for these two countries had been to incentivize, through public policy, the development of industries and the adoption of radical innovations that they themselves would conceive and create (e.g. machinery and mechanical equipment, electricity and the automotive and chemical industries).[14] For Latin American peripheral countries, however, government support was geared towards import substitution industrialization, led by domestic or external private investors or State investors, in sectors where the relevant technology had already or nearly reached maturity in central countries.

Prebisch, in particular, recognized the magnitude of the challenge. He predicted the possible emergence of several microeconomic problems that policymakers would have to confront and resolve in the implementation of development programmes in Brazil and, more broadly, Latin America. How would one reconcile, for example, the industrial technologies that central countries had already invented and put to use —characterized by massive technical scales of production and high capital intensity relative to labour— with peripheral countries' smaller markets and abundance of idle labour?

It is not always possible to adapt the size of manufacturing plants, which incorporate indivisible technologies, to peripheral economies' relatively small market size.[15] Moreover, Prebisch already recognized that, as industrialization in peripheral countries accelerates economic development and

[11] Interestingly, as shown by British economic historian Leonard Gomes (1987) —in opposition to Smith and Mill, the free trade proponents in classical political economy—, the scope of Ricardian liberal activism at the global level was limited to the elimination of tariffs on wheat imports in the United Kingdom. Ricardo believed that tariff barriers for wheat harmed workers' basket of goods and, by extension, the real cost of local labour, which harmed the rate of profit of British manufacturing. Thus, while for Ricardo, the principle of comparative advantage had been developed to demonstrate that trade in any form is better than no trade at all, for Mill and, later, the neoclassical economists, the same principle would provide the theoretical foundation for the unconditional defence of global free trade.

[12] See Johnson (1982), Amsden (1989 and 2001), Wade (2003), Chang (2002) and Devlin, Estevadeordal and Rodríguez-Clare (2006).

[13] The term "industrial policy" has many definitions, but the author considers the concept, as adapted by Chang (1994, p. 60), to be the best suited to the strategic objectives of a poor or developing country.

[14] For further details on the second industrial revolution, see Landes (1969, chapters 4 and 5).

[15] In the manufacturing sector, it is unusual to use equipment with a 1:1 ratio of capital to labour (unlike with personal-use sewing machines or harvesters). Modern manufacturing facilities overwhelmingly use continuous, large-scale production systems, employing technologically indivisible machinery and equipment. This is the case, for example, with steel, oil drilling and refining, paper and pulp, chips and automobiles, among other industries. For further details, see Scherer and Ross (1990, chapters 3 and 4).

lessens balance-of-payments pressures, rising per capita income produces structural changes in demand. By increasing demand for goods with high income elasticity, these changes tend to act as endogenous accelerators of import growth which, in turn, exposes peripheral countries to the possibility of new external constraints. Prebisch (1951) diagnosed this problem and suggested reducing superfluous imports and implementing an export stimulus programme to overcome it.

Another problem arises from the intrinsically closed nature of the import substitution model. No matter how substantial the effort to shift export composition and flows towards manufactured goods, which enjoy stronger demand in international markets, progress in the substitution process has a tendency to reduce the import coefficient (i.e. the ratio of total imports to domestic availability (apparent consumption) of goods and services).[16] As noted by Tavares (1964, p. 4), the substitution process is not intended to reduce the overall import quantum; the reduction, when it occurs, is the outcome of restrictions in the external sector rather than an aim in itself. Thus, as the substitution of certain imported goods advances, others take their place. Sooner or later, the process leads to exhaustion.[17]

In the specific case of Brazil, Tavares (1964), backed by ample empirical evidence, called attention to the saturation apparent in the import substitution process by the early 1960s. To avoid any tendency towards long-term structural stagnation, she suggested moving towards "a new and truly autonomous [model], receiving its vital force from the system itself", in which the structural questions that had been pointed out would have to be dealt with (Tavares, 1964, p.56).

ECLAC assisted some Latin American countries in the preparation of national development plans in the 1950s, including the Brazilian Targets Plan under the government of Juscelino Kubitschek (1956–1961). For the reasons previously indicated, it was only natural that ECLAC economists would include conventional mechanisms to protect infant industries, such as import tariffs, production subsidies and investment financing, in the range of industrial stimulus measures. However, this does not mean that the political economy of ECLAC advocated the perpetuation of draconian protectionist regimes or the full-scale reorientation of Latin American economies towards their domestic markets, isolating themselves from international trade. In his most academically prominent and politically influential articles, Prebisch (1950, 1951 and 1959) expressed profound reservations regarding the practical application of these stimulus measures, which are presented below.

1. Prebisch's reservations concerning the practical application of stimulus measures

(a) The role of the State

Prebisch (1951, p. 22) recommended that the State formulate "a well-rounded programme, including the various branches of economic activity, in which State intervention would be limited to creating favourable economic conditions for private enterprise and exercising the indispensable incentives which will enable it to fulfil the planned goals". It follows that the State's entrepreneurial activity (i.e. the creation of State enterprises) should be strictly limited to cases of strategic necessity (Prebisch, 1951).

[16] Apparent consumption refers to the domestic availability of goods and services and is calculated as production + imports – exports. The import coefficient, then, is measured as $\left[\frac{Imports}{GDP + Imports - Exports}\right] \times 100$. It can also be calculated as the ratio of imports to GDP.

[17] See the analysis of Albert Hirschman (1968) regarding the process of import substitution in Latin America. Hirschman discusses the relatively early disillusionment with this model of industrialization in the region that structuralist economists (including Raúl Prebisch and Celso Furtado) were already voicing in the 1960s. Hirschman (1968, p. 31) recognized that the sequential character of the process presented inherent difficulties such as lack of training in technological innovation, resistance to accelerating backward linkage investments (for example in intermediate goods sectors) and barriers to access to international markets through manufactured goods exports. Nevertheless, he concluded that import substitution was the best model for accelerating Latin American development.

(b) The role of foreign capital

According to Prebisch (1951, p. 13), the economic development of Latin American peripheral countries must be led by national investment, with international investment playing only a secondary role. Indeed, this scenario, which has played out in China and India in recent decades, never materialized in post-war Latin America, causing a variety of problems that persist to this day. This topic is addressed in section IV.

(c) The relationship between agriculture and industry

ECLAC analysis underscores the enormous structural heterogeneity that exists not only between the centre and the periphery but within the periphery, which combines a primary export sector characterized by modern technology and high productivity with an infant industry characterized by traditional practices and low productivity. Even within the primary sector, there has been and continues to be a significant productivity gap between export-oriented agriculture and traditional agriculture (which employs typical subsistence production technologies).

To address low levels of productivity and real wage stagnation in this furthest-behind sector, Prebisch (1951) recommended the provision of incentives for its capitalization and technological modernization. Nonetheless, he warned, mechanization, when extended beyond the industrial and other sectors' capacity to absorb the surplus labour that it creates, can result in technological unemployment (Prebisch, 1951, p. 61) and migration flows, ultimately causing the population to balloon and social conditions to deteriorate in urban centres.

Furtado (1964), in particular, but also Rangel (1957 and 1963), identified the dualism of agriculture and industry as an obstacle to the development of domestic markets in Latin American peripheral countries, exacerbated in the case of Brazil by the system of *latifundios* (large landed estates) after nearly four centuries of slavery.

(d) Selectiveness and productivity level of local industry

Prebisch argued —and this holds true today— that the local market should not be protected indiscriminately but, rather, selectively. Nor should protection be insufficient or excessive; it should be applied to the precise degree required for increased productivity.[18] According to Prebisch (1959, pp. 259, 260 and 265),

> …protection by itself does not increase productivity. On the contrary, if excessive, it tends to weaken the incentive to produce. Therefore, in order to maintain at the periphery the major fruits of technical progress in primary activities and especially in exports, similar progress has to be made in industrial activities in order to improve their productivity and increase the level of wages in foreign currency. This will allow a parallel increase in wages for export activities; thus preventing a corresponding transfer of real income. The need for technical progress in industrial activities has been duly emphasized in the infant industries argument. As productivity improves, protection may decrease until it is completely eliminated. [...]. And in some cases indiscriminate or massive protection has gone far beyond the optimum point, to the serious detriment of exports and world trade.

[18] In a competitive market, the calculation of the import tariff should equalize the external price to the domestic price. This is because, by definition, the domestic price is higher than the external price, from the industry's nascent phase until its achievement of sufficient scale and competitiveness for the domestic price to converge with the international price, which is lower. For further details, see Krugman, Obstfeld and Melitz (2015, chapters 9–11).

(e) Protection through import tariffs (or subsidies)[19] versus protection through currency depreciation

As Prebisch (1959, p. 257) stated (correctly, in my view),

> …a policy of depreciation or devaluation should be used only to correct an externally overvalued currency and not as an instrument for effecting structural changes in the economy. A selective protection policy is a preferable instrument, notwithstanding the obstacles that have to be overcome in practice; and if it is applied gradually, higher import prices, affecting a relatively small proportion of imports each time, could be absorbed by general increments of productivity without affecting the price level of the entire economy, provided that protection has not been exaggerated to shelter inefficiency.

(f) Expansion, diversification and competitiveness of exports

The claim that the political economy of ECLAC encourages peripheral countries to adopt a model of development that is primarily focused on the domestic market is false. Prebisch emphasized that export flows from peripheral countries are critical to fund their imports and avoid driving up their external debt.

The main reason is obvious: contrary to the neoclassical conception, in which savings (the portion of national income that is not spent) are viewed as a social sacrifice, the achievement of a favourable trade balance (which was the objective, mutatis mutandis, of none other than the mercantilists)[20] makes it possible to generate sufficient domestic savings to alleviate external constraints on economic growth. This is because the increase in net exports comes with a simultaneous increase in aggregate income and, if all else remains constant, an expansion of net foreign exchange flows in convertible currencies.[21] Exports, according to Prebisch (1951, p. 60), "may procure a wider margin of savings and better means of transferring such savings in order to facilitate imports of capital goods". These measures, in that regard, "should be designed to increase exports and effect through domestic production the required alterations in the structure of imports both as regards industrial and agricultural imports" (Prebisch, 1951, p. 81).

Nonetheless, Prebisch recognized that strengthening and restructuring exports in favour of manufactured goods was no small feat for periphery economies, where markets in the early phases of industrialization were too small to compete in industries subject to large economies of scale. Even without the proper analytical tools at the time, Prebisch suggested two strategies to change the export profile, both of which are supported to this day by modern international trade theory.

The first strategy is to ensure that, as the framework protecting local industry against imports changes the productive structure, it also functions as a mechanism for the creation of strong comparative

[19] In the short term, direct subsidies to production are less harmful to consumers than import tariffs. Whereas the latter increases the price paid by the consumer by transferring demand for imported products to the local market, the former provides an identical boost to national enterprises without changing domestic consumer prices. The burden associated with the subsidies falls squarely on government (or more precisely, on society, which pays the taxes). See, in that regard, Krugman, Obstfeld and Melitz (2015, chapter 9).

[20] Between the mid-eighteenth century and the mid-nineteenth century, mercantilists came under systematic criticism from David Hume, Adam Smith and David Ricardo. However, as Thirwall (2011) notes, mercantilist policies were not unsophisticated. In fact, they were strategically important to the national interests of the major European Powers of the time.

[21] The faithful implementation of this strategy by the Chinese State in the 1980s and 1990s kick-started a process of development and has enabled that process to be sustained ever since. However, until the late 1990s, China's largest sources of net foreign exchange flows were activities located in special economic zones, where multinational and Chinese subsidiaries can only produce goods exclusively for export. As activities located outside these special economic zones have always been subject to the government's regulatory mechanisms, China's external trade policy is governed by a model that Feenstra (1998) called "one country, two systems". Also see Devlin, Estevadeordal and Rodríguez-Clare (2006).

advantages and for broadening the proportion of the export basket dedicated to more technologically sophisticated manufactured goods with higher income elasticity of demand in global markets. Prebisch (1959, p. 269) wrote:

> Industrialization needs a dynamic policy of protection, which should be continually adapted so as to introduce new changes in import composition as the economy develops and disparities in the income elasticity of demand play their role. Trade treaties should not try to crystallize existing situations but should be flexible enough to promote these changes in import composition in an orderly, selective, and rational way.

This strategy of local protection as export promotion was described mathematically by Krugman (1984), according to whom, in the presence of oligopolies and large economies of scale, protection instruments (e.g. government procurement policy) can shift import demand to local enterprises, reducing their marginal costs to the detriment of foreign enterprises.[22] [23] Economies of scale offer local enterprises a pathway to increased sales at the expense of foreign enterprises, reinforcing subsequent reductions in marginal and average costs and changing the competitive profile of protected industries until they can compete in the international market.

The second strategy suggested by Prebisch (1959) is to give preference to regional integration agreements with trading partners of a similar per capital income level. Even if the agreement includes both small and large countries, integration raises the bloc's average per capita income closer to that of larger countries. Looking to the example of the European integration strategy to form a common market beginning in the 1950s, Prebisch strongly recommended that governments strive to establish a Latin American common market. According to Prebisch (1959, p. 268),

> … an unfavorable fluctuation in exports tends to have critical effects on economic development far more so than when, as in former times, vulnerability was more on the demand side. The common market by diversifying trade within the area can gradually correct this situation. This is without detriment to the possibilities of developing industrial exports to countries outside the region that the common market may foster through the reduction of industrial costs.

More recent international trade literature is conclusive: the larger the domestic market, the greater the potential to achieve a competitive level of industrial exports. Efficiency in that regard depends on optimizing the massive economies of scale required. The establishment of a common market (as in the European Union) has no other objective than to maximize income through economies of scale among the member countries, by increasing reciprocal demand (to use John Stuart Mill's expression) between large and small economies.

In two seminal articles, which contributed to his being awarded the Nobel Prize, Krugman (1980 and 1981) formally showed the following to be true when economies of scale, product differentiation and competitive oligopoly (or "monopolistic competition", in his words) are present: (i) the possibility of becoming a large-scale exporter of manufactured goods depends on the size of the domestic market (Krugman, 1980, p. 958);[24] (ii) much of global trade is between countries endowed with similar factor endowments (Krugman, 1981, p. 959), meaning that countries rich in physical and human capital

[22] Marginal costs refer to the cost change (at the margin) that comes from the use of variable factors of production (e.g. labour) to make additional units of a product. According to traditional microeconomic theory, in the short term, potential productive capacity is considered a given, such that, above a certain level of enterprises' current production, the increase in production (at the margin) entails an increase in (marginal) costs due to the use of variable factors of production (e.g. labour). This theory states that, when production flows are below the optimal level, an enterprise can increase current production at decreasing marginal costs, but when production is above the optimal level, marginal costs increase. For that reason, under conditions of perfect competition, enterprises can only produce above the optimal level by raising their prices. This is not a viable strategy in the long term, given the existence of competitors capable of producing at lower prices. For further details, see Pindyck and Rubinfeld (2009, chapters 7 and 8).

[23] Krugman (1984) assumes that, without protection, and even under oligopolistic conditions (i.e. possessing the market power to set prices), local enterprises would produce below the optimal level. Therefore, in the absence of protection (where the import tariff equals zero), local enterprises cannot compete with imported goods.

[24] The author recognizes Burenstam Linder (1961) as a pioneer of this work, although his effort showed less formal precision.

dominate exports of the industrial goods that are intensive in these two forms of capital; and (iii) among countries with similar levels of per capita income and demand profiles (on average), a large part of trade is intra-industrial, meaning that the manufactured goods being traded are similar, though not identical, as they are subject to product differentiation by model, brand and quality standards, for example.[25]

Newer thinking around international trade suggests that, to maximize competitiveness in manufactured goods exports, which are subject to economies of scale and product differentiation, the best strategy for developing countries to participate in the global economy is to strengthen regional integration[26] with countries that have similar per capita income levels while remaining engaged in multilateralism. This approach is consistent with Prebisch's argument that the best strategy for Latin American countries to engage in global trade was and remains to prioritize regional integration agreements while continuing to pursue multilateralism. Agreements with rich countries, by contrast, should include exception clauses to keep open the possibility of accelerating industrial development.[27]

An examination of the post-war economic history of Latin America shows that the governments responsible for implementing development programmes in the region did not, strictly speaking, follow any of Prebisch's recommendations to the letter. To be fair, implementing these recommendations in practice is more art than science, and the process leaves room for course corrections along the way; still, the fact is that little was done to correct errors in time.[28]

For example, in contrast to successful endeavours in East Asia, in particular the Republic of Korea and Taiwan Province of China, Brazil's major development plans —from the Targets Plan (1956–1960) to the end of the 1970s— were not selective. Instead, they relied on excessive protection mechanisms for the domestic market and reinforced the country's dependency on foreign investment, technology and financing, among other aspects.[29] This shows that, while the arguments for adopting State-coordinated development plans to achieve a sustained recovery from underdevelopment are theoretically sound, the biggest challenge lies in their real-world implementation, where success hinges on the historical, political and cultural idiosyncrasies of each country. The State's primary challenge, in any capitalist model, is to resist pressure from rent-seeking private interests to maintain an unproductive appropriation of public funds beneficial to them.[30]

In spite of massive static inefficiency in the microeconomic allocation of resources, which created a national industrial production system characterized by high prices and low quality relative to international standards, Brazil managed to catch up between 1950 and 1980. However, a period of stagnation began in the early 1980s and continues to this day.

[25] Intra-industrial trade in automobiles between France, Germany, Spain and Sweden within the European Union is one example. Similar examples of such trade in differentiated manufactured goods can be found in other regional integration mechanisms (be they free trade areas or customs unions), such as the United States-Mexico-Canada Agreement (USMCA), the Association of Southeast Asian Nations (ASEAN) and the South American Common Market (MERCOSUR).

[26] The literature on international trade distinguishes phases of regional integration, from the simplest to the most ambitious. The simplest is the free trade area, in which member countries eliminate barriers (tariff and non-tariff) to trade with other member countries but continue to impose differentiated import tariffs on countries outside the bloc. The next phase is the customs union, where, in addition to the removal of trade barriers, a common external tariff is imposed on countries outside the bloc. The common market is achieved when, in addition to the elimination of trade barriers, factors of production (capital and labour) can move freely among countries within the bloc. In the economic union, in addition to the removal of trade barriers, member countries share a common currency, adopt monetary policies regulated by a unified central bank and establish shared legislation regarding the management of fiscal policy. Looking at recent regional integration experiences, USMCA is an example of a free trade area; MERCOSUR, despite its name, remains a partial customs union; the European Union is a common market; and the euro area is an example of an economic union in the midst of consolidation. For further details, see Hoekman and Kostecki (2009, chapter 10).

[27] This means that, for Brazil, even today, strengthening regional integration agreements with other Latin American countries is a more strategic pursuit than strengthening agreements with the United States. In the case of the European Union, the benefits of integration could be more promising, as there is enormous potential for intra-industrial trade, both with higher income countries and with member countries that have a per capita income comparable to Brazil's.

[28] See Fernando Fajnzylber's masterly works *La industrialización trunca de América Latina* (1983) and *Industrialización en América Latina: de la "caja negra" al "casillero vacío"* (1990).

[29] For a comparative analysis of the development plans of the Republic of Korea and Brazil, see Moreira (1995). For further information on the case of Brazil, see Suzigan and Furtado (2006).

[30] Similar arguments are found in a study by Peter Evans (1992).

Beginning in the 1980s, with neoliberalism on the rise and import substitution under heavy criticism in Latin America, the leading economists at ECLAC, equipped with the tools of neo-Schumpeterian microeconomic theory, undertook a critical appraisal of the region's development policies, comparing what had been proposed with what had been done in order to recommend adjustments. As neoliberalism took on hegemonic proportions, ECLAC paved the way for the development of neostructuralist theoretical models. This modified approach, while not enough to restore the Commission's policy influence in Latin America, would ultimately preserve its academic prestige.

IV. ECLAC neo-structuralism and the centre-periphery model today

At the beginning of the 1980s, most Latin American countries were already having trouble accessing international liquidity and ensuring sufficient foreign exchange availability to cover the external debt service costs that had been piling up since the previous decade. Argentina and Chile had adopted radical (albeit unsuccessful) liberalization reforms in the 1970s, but the rest of the Latin American countries had yet to follow.

Even before the Washington Consensus —the term coined by John Williamson (1990) to describe a set of 10 free-market policies prescribed by the multilateral institutions headquartered in the United States capital —became a mainstream tool for multilateral institutional pressure, the most prominent ECLAC economists (such as Jorge Katz, Osvaldo Sunkel, Fernando Fajnzylber and Ricardo Ffrench-Davis), using the more refined microeconomic and macroeconomic instruments at their disposal, were re-evaluating the import substitution model in Latin America, identifying the main errors in the policies adopted and proposing course corrections.[31]

The purpose of this critical review by ECLAC was to address the adverse international context and offer recommendations for definitively resolving the problems relating to the external debt crisis and high inflation. It was also intended to propose public policy adjustments to overcome stagnation and allow the continent to continue, as soon as possible, the process of catching up. However, let me be clear: policy adjustment did not mean unconditional adherence to neoliberalism; the suggestions were not to throw the sick baby out with the bathwater, but to remove it from the water, treat it and recreate the conditions for its healthy growth.

Fajnzylber (1983), in *La industrialización trunca de América Latina*, offers one of the most comprehensive studies on the policies and results of the import substitution process in Latin America. In Fajnzylber's view, most of the problems identified in Latin America were closely related to the weakness of policies adopted since the 1950s. Although those policies had accelerated economic growth through the late 1970s, they ultimately produced a "truncated industrialization" —a stunted and incomplete industrial system—, in particular in larger economies, such as Brazil, Mexico and Colombia.

The main problems studied by Fajnzylber, all of which resulted from the policies selected, are the following: (i) the perpetuation of indiscriminate and unselective protectionist practices ("frivolous protectionism"); (ii) the non-existence of an endogenous core capable of generating and disseminating technical progress in the economic system; (iii) multinational subsidiaries' grip on the industries with the greatest potential for technological development, which created a lack of independence in terms of investment, innovation and financing decisions and built a local business community whose capacity for making copies, reproductions and superficial alterations was greater than its capacity for genuine innovation; and (iv) the precarious relationship between agriculture and industry. Having addressed this fourth point in a previous section, we will briefly analyse the first three problems.

[31] For an outstanding book on the history of Latin American structuralist thought, see Di Filippo (2021).

Fajnzylber used the expression "frivolous protectionism" to refer to the perspective that, contrary to liberal objections, classical infant industry protection mechanisms are necessary to strengthen industrialization. The successful industrialization of the "Asian tigers" (in particular the Republic of Korea and Taiwan Province of China) shows that government stimulus measures, such as discriminatory import tariffs and other mechanisms to protect local industry, should be implemented temporarily and only to the degree needed to acquire technological knowledge and achieve domestically and internationally competitive scales of production. This was not the approach taken by the Latin American countries with the greatest market potential.

In Brazil, the use and abuse of excessive protection measures and the indiscriminate granting of government assistance —without imposing economic performance requirements linked to productivity, reduced unit costs and compliance with international quality standards— produced a relatively diversified industrial structure that nevertheless fell short of the level of competitiveness needed for global market penetration (with some notable exceptions).

The combination of intense local protection and overindulgence in foreign direct investment made it impossible for the domestic industries with the potential to drive technical progress to gain technological autonomy and perpetuated the prevalence of manufactured goods with high income elasticity of demand in the import profile. Fajnzylber (1983) correctly understood that, as a result of this dialectical interaction, the import substitution process remained stuck in its 1970s intermediate phase instead of advancing towards an economy driven by metalworking (which encompasses the capital goods and automotive industries) and electronics industries. Such industries, which at the time formed the vanguard of technological innovation and dissemination, would have had the transformative potential to generate such a rate of investment, capital accumulation and technological progress as to become endogenous to long-term economic growth. Thus, industrialization in Latin America was cut short by a failure to develop an endogenous nucleus for the dissemination of technical progress.

Fajnzylber noted that, even in Brazil —the most advanced economy in terms of industrial growth and diversification between the 1950s and 1970s—, this group of key industries was controlled by multinational enterprises.[32] In their countries of origin, would-be competitors faced enormous structural barriers to entry due to the required mastery of production techniques and significant minimum efficient scales of production. This created an environment of oligopolistic rivalry between established companies, where self-reinforcing technical progress drove a Schumpeterian process of creative destruction.

In Latin America, high levels of protection brought an influx of foreign subsidiaries to key industries, in particular durable consumer goods sectors (e.g. automotive and electronics), where enterprises compete on the basis of product differentiation rather than prices. In Brazil, for example, the overprotection of these sectors allowed an excess of foreign enterprises to crowd in and kept prices too high for international competition. According to Fajnzylber (1983, p. 192), despite operating at high unit costs owing to an exceedingly fragmented market and diminished scales of production, entrepreneurs in the highly protected countries of Latin America were in a position to transfer the costs associated with the partial use of their facilities to the consumer in the form of increased prices.

Fajnzylber (1983, pp. 176 and 177) correctly pointed out that the considerable permissiveness of the various social stakeholders in Latin American peripheral countries ultimately allows the supremacy of multinational enterprises in the major hubs of technological progress to restrict domestic entrepreneurs' capacity to adapt, innovate and compete internationally in a broad range of strategic sectors.

However, ECLAC economists' critical analysis of Latin American development policy, in particular policies implemented during the 1970s heyday of import substitution, emphatically rejects the unconditional adoption of the neoliberal precepts that would eventually come to pervade economic

[32] According to Fajnzylber (1983, p. 151), between 1950 and 1978, Brazil's industrial sector had the highest average annual growth rate in Latin America (8.5% compared to an average of 6.5% for 19 countries).

policy in the region, beginning in the 1990s. While ECLAC has since proposed public policy reforms to get the region's economies back on the path to sustainable development, its recommendations have never included a rapid transition to free trade ("shock therapy"), an open door to short-term foreign capital flows, a minimal State or even the limiting of public policies to correcting market failures.[33] Thus, its public policy proposals have never been aligned with the neoliberal agenda.[34]

Three key points can be distilled from the theoretical and empirical productive development literature produced by ECLAC since 1990: (i) the recognition that the region's considerable economic growth from 1950 to 1980 failed to reduce social inequality and eliminate poverty; (ii) the renewed endorsement of the centre-periphery model —sometimes called the North-South model— as an analytical framework for understanding the factors contributing to the persistence of large gaps in productivity and per capita income between Latin America and more advanced economies; (iii) the conclusion that the process of development in Latin American peripheral countries was interrupted by premature deindustrialization more than four decades ago; and (iv) the rehabilitation of the centre-periphery model, emphasized in more recent documents (ECLAC, 2010, 2012 and 2018), and more specifically, the observation that the globalization of Latin American countries (in particular their financial globalization) has further entrenched their position on the periphery by increasing social inequality and labour market insecurity.

In ECLAC (2018, p. 13), the Commission identified poor diversification of production, dependence on natural resources, specialization in low-value added activities and vulnerability to external shocks as harmful to equality, citing their tendency to stifle the labour market and restrict the dissemination of skills. It also recommended that governments in the region adopt a macroeconomic policy focused on development and take advantage of the myriad opportunities to incorporate low-emissions technologies. According to ECLAC, overcoming the region's protracted economic stagnation, which persists to this day, depends on leveraging the still-untapped potential of industrial diversification through structural change, while increasing the rate of investment, incorporating technological progress, reducing social inequality, and safeguarding environmental sustainability.

In an article on centre-periphery relations in the twenty-first century, Torres and Ahumada (2022) argue that the subordination of the periphery in Latin America under global capitalism has intensified in recent decades as neoliberal political hegemony increased the political and economic power of financial rent-seekers.

This situation is not irremediable. The main focus of ECLAC, during the period in which the external debt crisis and chronic inflation were weighing down most Latin American economies, was to restore macroeconomic stability and direct efforts towards generating and disseminating technological progress rather than merely imitating imported technologies, such that the resulting increase in productivity would boost the share of real wages in national income. ECLAC maintained the view that such results could not be achieved through the indiscriminate assimilation of neoliberal precepts but rather through a combination of restructured trade protections and an industrial policy in which innovation is approached systemically, in coordination with all other areas of public policy (e.g. science and technology, education and training, and those relating to fiscal, social and macroeconomic issues).

In a recent document, ECLAC (2020) justifiably emphasized the concern that, once the world emerged from the coronavirus disease (COVID-19) pandemic, the cavernous gap between Latin American peripheral countries and the global technological frontier could represent a structural barrier to the

[33] Neoclassical liberalism only allows for State intervention when imperfections in market functioning prevent free competition from achieving the optimal allocation of productive resources and national income distribution. In such cases, public policies may be adopted to correct market failures.

[34] The only document in which ECLAC dabbles in neoliberalism —and even then, it stops short of endorsing the full package of reforms proposed by that ideology— is *Open regionalism in Latin America and the Caribbean: economic integration as a contribution to changing production patterns with social equity* (1994), which was prepared under then-Executive Secretary Gert Rosenthal. Some proposals rooted in the neoclassical approach to market failures are examined in that document. See ECLAC (1994).

region's sustained economic growth. Moreover, the Latin American periphery would have to reconcile economic growth with two additional gaps: social inequality and the physical limitations imposed by environmental constraints.

With regard to the technology gap, according to Thirlwall's law, in the long term, the growth rate of peripheral countries *(GDP Periphery)* relative to central countries *(GDP Centre)* depends on their ratio of income elasticity of demand for exports to income elasticity of demand for imports. The equation that expresses Thirlwall's law can be further refined by the addition of a policy factor, represented by the term "development policies" inside the parentheses in equation (1):

$$\frac{GDP\ Periphery_{BP}}{GDP\ Centre} = \frac{Income\ elasticity\ of\ periphery\ exports}{Income\ elasticity\ of\ periphery\ imports}\ (Development\ policies) \quad (1)$$

To illustrate, let us apply this equation to the case of Brazil. In the long term, the economic growth rate compatible with the country's balance of payments (left side of the equation) is limited by the ratio of income elasticity of demand for exports to income elasticity of demand for imports (right side of the equation, except for the term in parentheses), which in turn reflects the current productive structure. A recent empirical study (Nassif, Feijó and Araújo, 2016) estimated the income elasticity of Brazilian exports and imports for the period 1995–2013 at 1.74 and 2.01, respectively.[35] Thus, more robust economic growth rates would tend to be short-lived in Brazil, as they lead to a faster increase in imports than in exports, thereby exposing the country to unsustainable current account deficits in its balance of payments.

Note also that, as the incorporation of the term inside the parentheses in equation (1) suggests, the current ratio of income elasticity of demand for exports to income elasticity of demand for imports in Brazil is lower than unity, as it is the result of short-term and long-term economic policies adopted in the preceding period (1995–2013). In economics as in life, you reap what you sow: a country's economic performance, as measured by the growth rates of its per capita income and the living conditions of its population, is the product of the selection and combination of public policies adopted in the past. From this perspective, Brazil's economic growth faces severe structural constraints.

But all is not lost: the term inside the parentheses in equation (1) also suggests that if the right development policies are implemented immediately, the ratio of income elasticity of demand for exports to income elasticity of demand for imports in Brazil could change, bringing its coefficient above unity at some point in the future. Consequently, more robust growth rates that would allow Brazil to steadily catch up, in this and the coming decades, would be possible.[36] By extrapolation, ECLAC could apply this conclusion to Latin America and the Caribbean as a whole, the focus of its research efforts.

V. Conclusion

The centre-periphery model is not a repudiation of the canonical theses of classical developmentalism, which postulate that industrialization drives economic development, bringing with it structural changes that reallocate productive resources from low-productivity sectors to high-productivity sectors. Rather, the two models are complementary. As far as remedies for underdevelopment go, the centre-periphery model represents progress, as it places greater emphasis not only on the economic, historical and social particularities of the peripheral countries of Latin America but also on the role of planning and public policy, compared to classical developmentalism.

[35] In view of the economic slowdown, crisis and stagnation that have played out in Brazil since 2014, there is no reason to expect significant changes in these estimates.

[36] See ECLAC (2020) and Porcile (2021).

ECLAC, as a centre of structuralist thought in Latin America, has formulated (and continues to formulate) theoretical development models and public policy recommendations aimed at supporting and sustaining the region's economic development. These policies do support protectionist measures for local industry based on the infant industry argument, leading critics to suggest that the political economy of ECLAC supports closed development models focused entirely on domestic markets; however, the academic publications of leading ECLAC economists (Prebisch, in particular) suggest otherwise. Indeed, the Commission's repertoire of policy recommendations has long included selective and moderate protectionism, measures to minimize technological dependence on multinational enterprises and support for manufactured goods exports.

The fact that Latin American governments did not scrupulously follow these recommendations just goes to show that some things are easier said than done: in practice, development policies are influenced by a variety of factors, including pressure from lobbies, the power of political oligarchies, changes of government, cultural factors and the prevalence of ideas or dogmas.[37] The region's fast-paced economic growth from 1950 to 1980 came at a cost: with few exceptions, this period ultimately created a heterogeneous, stunted and microeconomically inefficient industrial system.

Nevertheless, the low growth rates and secular stagnation in labour productivity that have plagued most Latin American countries since the early 1980s do not justify the region's long-term neglect of development policy and economic planning. In any country, developed or not, some development policies will succeed and others will fail, because their implementation occurs within a complex system of economically and socially interrelated stakeholders. For this exact reason, ECLAC economists have suggested to governments that past errors may provide a practical guide to correcting future development policies.

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[37] The author is grateful to André Lara Resende for recalling this factor.

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The failure of shock therapy during the Chilean military dictatorship (1974–1979)[1]

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Abstract

This article analyses Chile's monetary policy following the 1973 military coup and the failed attempt at nominal stabilization during the dictatorship. Two causes of persistent inflation are identified: (i) the narrowing of the fiscal deficit in 1974 was insufficient to curb high monetary issuance and inflation, thus perpetuating the inflation needed to finance the fiscal deficits; and (ii) the perception by economic agents that fiscal needs, financed through seigniorage, would not slow the growth of the monetary base and inflation. This perception kept inflation levels high following the coup. For the shock therapy to succeed, a greater reduction of the fiscal deficit and a perception that these lower deficits would be permanent would have been necessary. In the absence of a credible deficit reduction policy, inflation did not stabilize until the late 1970s.

Keywords

Monetary policy, fiscal policy, tax administration, inflation, money, budget deficit, economic stabilization, mathematical models, Chile.

JEL classification

E31, E52, H62.

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The key economic problems of Chile are clearly twofold: inflation, and the promotion of a healthy social market economy. [...] There is only one way to end the inflation: by reducing drastically the rate of increase in the quantity of money. In Chile's situation the only way to reduce the rate of increase in the quantity of money is to reduce the fiscal deficit. [...] Such a shock program could end inflation in months […].

Milton Friedman
Letter to General Pinochet, 21 April 1975[2]

I. Introduction

On 11 September 1973, a military coup in Chile, led by Augusto Pinochet, overthrew the elected president, Salvador Allende Gossens. After taking office in November 1970, Allende had introduced a series of unprecedented economic and social reforms, which generated, among other things, a considerable increase in public spending. In macroeconomic terms, one of the characteristics of the Allende government was the significant widening of fiscal deficits. In the absence of external and internal sources of financing, these deficits were financed through monetary issuance (i.e. money printed by the central bank). This monetary expansion accelerated inflation, which rose from 22% in December 1971 to 163% in 1972 and 286% in 1973 (see Caputo and Saravia, 2022). Rising inflation, which soared to unprecedented levels, became one of the major macroeconomic problems of the Allende government.

Yet, the military coup of September 1973 triggered a drastic change in the country's economic management.[3] The armed forces appointed military officers to several key positions, who, together with civilian supporters of the military dictatorship, took control of the regime's economic policies. Army General Eduardo Cano Quijada was appointed Governor of the Central Bank of Chile, while Lorenzo Gotuzzo Borlando, former Rear Admiral of the Chilean Navy, was named Minister of Finance. The Allende government's economic authorities were not only immediately dismissed from their posts but, in many cases, suffered the direct consequences of the dictatorship's systematic repression of the civilian population.[4]

In theory, a drastic change in the conduct of fiscal and monetary policy by the Ministry of Finance and the Central Bank, respectively, could have created the conditions needed to reduce fiscal deficits, issuance and inflation. Such policies are what Milton Friedman referred to as a "shock program", which he recommended during his visit to Chile and in the letter written to Pinochet in 1975 (see Friedman and Friedman, 1998). Had they been successful, such shock therapy measures would have lowered in inflation within months, according to Friedman himself. Monetarist models such as those of Cagan (1956) and Sargent (2013) that aim to explain hyperinflationary processes and their dependence on fiscal deficits and monetary issuance point to similar conclusions. Specifically, under these models, unanticipated, drastic and credible changes in the conduct of fiscal and monetary policy can prompt immediate changes in hyperinflationary processes.[5]

[2] See Friedman and Friedman (1998).

[3] See Carrasco (2009) for an in-depth analysis of the monetary policy since the founding of the Central Bank of Chile.

[4] Following the military coup in September 1973, Carlos Tulio Matus Romo, Minister of Economy in the Allende government, was arrested and imprisoned, initially on Dawson Island, a concentration camp established by the dictatorship in southern Chile, and later in Ritoque, in the region of Valparaiso. Matus was released in 1975 and went into exile in the Bolivarian Republic of Venezuela, where he lived until his death in 1998. Jaime Barrios Meza, an economic adviser to Allende and former General Manager of the Central Bank of Chile, was arrested on the day of the coup. He was transferred to Artillery Regiment No. 1 "Tacna", where he remained until 13 September, when he was transported by military truck to an undisclosed destination and remains missing to this day.

[5] Sargent (2013) provides an example of this when referring to the way in which inflation was reduced in France at the start of the twentieth century. This process was the result of a credible change in economic policy. Specifically, the government of Raymond Poincaré faced major economic challenges in the period following World War I, including massive war debt and reparations owed to other countries. To stabilize the French economy, Poincaré implemented stringent fiscal measures, which included the introduction of a new currency —the Poincaré franc— and a strict inflation reduction policy.

Sargent, Williams and Zha (2009) study the hyperinflations of the 1970s and 1980s in several countries of Latin America, including Chile, through the lens of monetarist models in which the main element is a demand for money that hinges on inflation expectations. This also assumes the existence of a fiscal deficit that is financed wholly or in part by monetary issuance. Sargent, Williams and Zha (2009) posit that hyperinflation is explained both by changes in fundamentals in the form of government deficits financed by money creation and destabilizing expectation dynamics that can occasionally divorce inflation from fundamentals. They conclude that the levels and conditional volatilities of monetized deficits drove most of the region's hyperinflations and stabilizations, with the exception of Peru.

Phylaktis and Taylor (1993) studied the use of monetarist models based on demand for money in Chile and other economies of Latin America. The study's empirical results confirm that Cagan's model can be applied to Latin American economies with high inflation, particularly Chile. A significant and negative relationship can be found between the demand for money and expected inflation, which coincides with the model's theoretical predictions. This relationship is stable, which aligns with Caputo (2022), who, applying Cagan's model to the Chilean economy of the 1970s, identifies the level of inflation and the period in which it would have maximized the collection of the inflation tax.

The first five years of Chile's military dictatorship, from 1974 to 1979, were marked by high inflation that only began to stabilize in 1979.[6] In this sense, this study sets out to understand why —despite the radical political and economic changes following the 1973 military coup— Chile was unable to successfully implement an economic shock therapy that would have reduced fiscal deficits, monetary issuance and inflation.

To answer this question, we develop a theoretical model based on Cagan (1956) to understand the determinants of inflation expectations. In keeping with the literature, we identify a demand for money that is contingent on the expectation of future inflation. We also incorporate several new elements. First, the demand for money is allowed to respond to product levels, which is unusual for this type of model. Second, the relationship between fiscal deficits and monetary issuance is determined based on general government (which includes the central bank) budget constraints. Third, the relationship between inflation expectations and expected issuance in future periods is determined, in a context of rational expectations. Lastly, we find a closed-form solution that links monetary issuance to fiscal deficits and the liquidity in the economy. In this way, we find an analytical, or closed-form, expression that relates inflation expectations to fiscal deficits and liquidity.

The following key results were obtained from the theoretical model: first, expected inflation is a function of the expected issuance growth rate and, second, the growth of issuance depends, in a non-linear way, on the fiscal deficits to be financed and, inversely, on the liquidity in the economy. On the basis of this model, we conclude that the fall in the fiscal deficit in 1974 was unable to curb the high monetary issuance rate or to dampen actual (and expected) inflation observed up to 1973. This can be attributed not only to the insufficient narrowing of the fiscal deficit, but also to the reduced liquidity in the economy —understood as a smaller monetary base relative to GDP— as of 1974. The latter amounts to a reduction in the inflation tax base, perpetuating the high levels of issuance and inflation needed to finance a given fiscal deficit. The second cause, which is linked to the first, is that economic agents perceived that monetary and fiscal policy from 1974 onwards would not be able to slow the growth of the monetary base and inflation.

In light of the data and the model developed in this paper, we conclude that for shock therapy to have been successful, it would have required a greater reduction in the fiscal deficit after 1973, coupled with the perception that these lower deficits would be sustained over time. In the absence of a credible

[6] In 1979, Chile adopted a fixed exchange rate regime. This implies delegating monetary policy to another country, in this case the United States, and adopting that country's inflation levels.

deficit reduction policy, inflation only stabilized in the late 1970s, which according to monetarist models amounts to a nominal adjustment that is not perceived as immediate and is postponed pre-emptively into the future.

This paper is organized as follows. Section II presents a discussion of the historical context framing the economic policies of the Allende government (1970–1973) and the first years of the military dictatorship (1974–1979). In section III, we construct a monetarist model with rational expectations that explicitly incorporates the budgetary constraints of the treasury and the Central Bank. This model follows in the tradition of Cagan (1956), Phylaktis and Taylor (1993), Sargent, Williams and Zha (2009), Sargent (2013) and Caputo (2022). In section IV, the model is used to quantify the impact that fiscal deficits and liquidity would have had on expectations linked to inflation and the conduct of fiscal and monetary policy from 1974 onwards. Lastly, section V presents the conclusions.

II. Historical context: monetary policy and fiscal dominance

The government of Salvador Allende (November 1970–September 1973) is widely recognized as having brought about extensive economic and social transformation. Salvador Allende's rise to power in 1970 marked an important milestone in Chilean history.[7] Allende, leader of the left-wing Popular Unity coalition, campaigned on a programme that differed radically from that of his predecessors and won the presidential election with 37% of the vote. His government was committed to implementing socialist reforms and during this time, Chile underwent a series of reforms that sought a more equitable redistribution of wealth and economic power, with a focus on nationalizing major industries and expanding the public sector. Some of the main economic achievements of the Allende government are detailed below:

(i) Nationalization of key industries: one of the main measures taken by the Allende government was to nationalize major economic sectors, including copper, iron and saltpetre mining. These industries came under State control with the aim of directing their profits towards social and development programmes. This policy raised concerns about the State's efficiency and management capacity in strategic economic sectors and a significant expansion of fiscal spending.

(ii) Land reform: the Allende government implemented or followed through on ambitious land reform efforts that sought to redistribute land held by large landowners among farmers and agricultural communities. Such measures aimed to increase agricultural production and improve the living standards of rural workers.

(iii) Price and wage controls: to combat inflation, the Allende government implemented price and wage controls. While these measures sought to protect purchasing power and control inflation, they also led to market distortions and the scarcity of certain goods.

(iv) Public sector expansion: the State played an increasingly important role in the economy during the Allende government, with the creation of State-owned enterprises in various sectors, including mining, manufacturing and public services. At the same time, social spending rose sharply.

[7] There is extensive academic literature examining the main events that occurred during the Allende government, as well as the consequences of the military coup. Notable articles include: Ffrench-Davis (1979, 1983 and 2003); Corbo (1985); Edwards and Edwards (1987); Larraín and Meller (1991); Bosworth, Dornbusch and Labán (1994); Corbo and Fischer (1994); Velasco (1994); Larraín and Vergara (2000); Aldunate and others (2020); González, Prem and Urzúa (2020); González and Vial (2021); and, more recently, Caputo and Saravia (2022), González and Prem (2023), Edwards (2023) and Caputo (2024).

As mentioned by Caputo (2025), a fundamental premise of the economic programme was that the manufacturing sector had considerably underutilized capital capacity in 1970. Against this background, it was expected that the increased aggregate demand could be met without creating short-term inflationary pressures (Edwards and Edwards, 1987). As a result, an aggressive expansionary fiscal policy was implemented in 1971. The fiscal deficit widened from 0.5% of GDP in 1970 to 7.3% in 1971, while the nominal growth of high-powered money went from 66% in 1970 to 136% in 1971. Not surprisingly, aggregate demand grew at double-digit rates (10.5% in 1971), while real GDP expanded by 9.4% and unemployment fell sharply to 3.9%.

The Popular Front government recognized that it was troubled by fundamental problems, such as stagnant production and high inflation. In 1971, Pedro Vuskovic, then Minister of Economy, pointed out that other imbalances and problems unresolved by the system translated into persistently steep inflation: the average annual increase in the domestic prices for the previous decade was almost 28%. In less than 15 years, the country had experienced three anti-inflation programmes[8] that turned out to be equally ineffective in the short term, with most of the working population suffering their consequences (Vuskovic, 1971).

Prices did not rise substantially in the first year of the Allende government, owing to the presence of price controls together with rationing in goods and factor markets. While the 1970 agreement between the Amalgamated Worker's Union and the government established a substantial readjustment of public and private sector wages (for example, minimum wages would increase at a rate equivalent to 66.7%), the 1971–1972 agreement between the same parties established active price controls. Vuskovic (1971) posited that beyond its primary objective, price control policy effectively curtailed inflation expectations, which have historically contributed to strong inflationary pressures. As highlighted by Edwards (2023) and noted by Vuskovic (1971), this followed the assumption that businesses were capable of absorbing the adjustment through their profits.

The expansion of production achieved in 1971 was not sustained in the following years. On the external front, the government declared a moratorium on its existing external debt in 1971. This resulted in a default on external obligations in 1972, according to Reinhart and Rogoff (2009). The moratorium meant that Chile faced a lack of external financing. In the absence of sufficient domestic and foreign funding to cover the fiscal deficit and interest payments on debt, the government came to rely on the inflation tax (monetary issuance) as a source of financing. Between 1971 and 1974, the fiscal deficit and seigniorage showed similar trends.

In 1972, the fiscal deficit widened further, rising to 11.4% of GDP. The monetary expansion rate was 178% and, despite official controls, prices could not be contained: annual inflation climbed almost 255%. The Allende government's expropriation of manufacturing companies gave rise to a particularly serious problem in terms of real activity. Government interventions were often preceded by lengthy labour strikes and workers' occupations of company facilities, which led to significant production losses. In October 1972, a national strike led to a further decline in activity. That year, real production fell by 1.2% and the trade deficit rose to 3.5% of GDP (see Edwards and Edwards, 1987).

In 1973, the economic and social crisis deepened. Various factors exacerbated the conflict, including worsening economic conditions (for example, exchange rate devaluation and a deterioration in the balance of payments and real wages), nationalization programmes, political conflicts within the governing coalition and foreign intervention (González and Prem, 2023; Edwards, 2023). That year, the fiscal deficit almost doubled to reach 23% of GDP, the highest level recorded in 40 years. At the same time, inflation was tipping towards hyperinflation. Average inflation rose to 433% in 1973, while the monetary expansion rate stood at 365%.

[8] These anti-inflation programmes refer to those developed in the context of the Klein-Saks mission and those of the Alessandri and Frei Montalva governments (Nazer, 2021).

The polarization within Salvador Allende's government may have influenced price dynamics as it exacerbated the monetary factors affecting prices. Rowthorn (1977) models how conflict influences price dynamics through income distribution. More recently, Lorenzoni and Werning (2023) revisited this topic, arguing that disagreement or conflict owing to different aspirations for relative prices has general inflationary effects on all prices.

The information presented thus far indicates that fiscal deficits, which increased substantially between 1971 and 1973, could not be fully financed through additional public debt (domestic and external). Consequently, monetary issuance (inflation tax) became the most important source of revenue for tax authorities. The result of this strategy was that inflation ultimately became a fiscal issue.

How different was the relationship between fiscal deficits, monetary issuance and inflation in the Allende government? As shown in table 1, under the pre-Allende governments, particularly those of Alessandri (1958–1964) and Frei Montalva (1964–1970), inflation was close to 25%, while fiscal deficits were around 2% of GDP.

Table 1
Chile: macroeconomic indicators, 1960–1990

Period	Average annual GDP growth *(Percentages)*	Fiscal deficit *(Percentages of GDP)*	Price of copper *(United States cents per pound)*	Annual average inflation *(Percentages)*	Unemployment rate *(Percentages of unemployed persons in the labour force)*	Annual average growth of monetary issuance *(Percentages)*
1958–1964 (Alessandri)	4.5	2.9	32.5	25.3	7.5	39.1
1964–1970 (Frei Montalva)	4.2	0.6	56.7	26.1	5.6	45.1
1970–1973 (Allende)	1.0	13.7	58.9	231.2	4.1	226.4
1973–1980 (Pinochet I)	4.0	-0.3	73.9	150.7	12.6	159.4
1980–1990 (Pinochet II)	3.1	-1.0	79.7	19.5	11.8	16.1

Source: R. Caputo, "Política monetaria en Chile desde 1970: persistente inflación y dominancia fiscal", *Historia económica de Chile: más allá del crecimiento*, M. Llorca-Jaña and R. Miller (eds.), 2025.

As noted by Caputo (2025), the close relationship between fiscal deficits, issuance and inflation was not unique to the Allende government. Chile had experienced high levels of inflation since the 1940s, but it became a pressing concern in the 1950s. In an effort to address this problem, in July 1955, the government contracted the Klein-Saks mission to provide technical assistance on anti-inflation policy. According to Edwards (2007), the mission's assessment of inflationary pressures in Chile focused on four main areas: (i) fiscal deficit, (ii) monetary expansion, (iii) exchange-rate policy and (iv) wage policy.

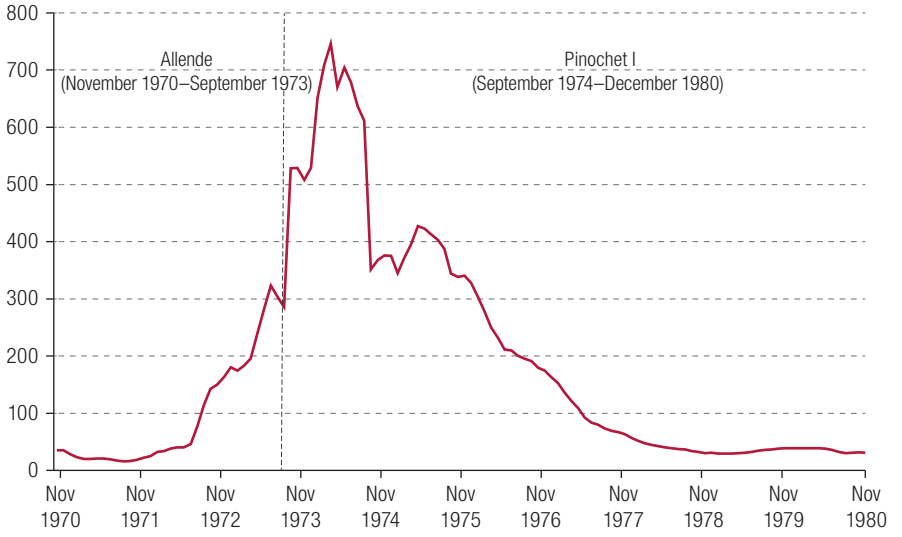
The Klein-Saks mission argued that the state of government finances, particularly the extremely high fiscal deficit, was at the root of the inflationary process. In the period preceding the Allende government, monetary issuance helped to finance fiscal deficits, while also giving rise to high levels of inflation, which became an endemic problem for the Chilean economy. This was the case from the establishment of the Central Bank of Chile in 1925 to the return to democracy in 1990. Perhaps one of the main characteristics of the Allende government is that this interdependence between inflation and fiscal deficits intensified to unprecedented levels.

As shown in table 1, average annual inflation during the Allende government was 231%, while the growth in monetary issuance stood at 226%. At the same time, fiscal deficits averaged 14% of GDP. These figures are much higher than in previous periods and represent a constant in Chile's monetary history since 1925: an example of fiscal dominance.[9] Fiscal dominance is understood as the process through which fiscal deficits are financed by issuance. In this sense, fiscal policy (financing deficits) "dominates" monetary policy, which is passive.

[9] See Caputo (2025) for a more in-depth discussion.

The above analysis leads to the conclusion that inflation increased significantly under the Allende government, and this is related to the financing of fiscal deficits through monetary issuance. A recurring question is how the dictatorship addressed this situation following the military coup. In this regard, two stylized facts should be mentioned. First, annual inflation, which was close to 300%, accelerated even more after the coup, climbing to 500% in late 1973 and around 800% in mid-1974 (see figure 1). In 1977, almost three years after the coup, annual inflation remained above 100%. Inflation did not stabilize until 1979, when it was decided to fix the exchange rate against the dollar. The second stylized fact is that fiscal deficits narrowed considerably during the first seven years of the military dictatorship, as shown in table 1. Specifically, in the period 1973–1980, referred to as "Pinochet I", fiscal accounts remained practically balanced, with a deficit around 0% of GDP.

Figure 1
Annual inflation: comparison between Allende and Pinochet I, November 1970–November 1980
(Percentages)



Source: Prepared by the authors, on the basis of data from the Central Bank of Chile.

The persistent inflation following the military coup, coupled with the fall in fiscal deficits, raises the question of how inflation could have remained high despite the elimination of fiscal deficits. To answer this question, a simple monetarist model will be used to shed light on why unyielding inflationary pressures have coexisted with fiscal balance.

As explained in section III, successfully reducing inflation is not merely a question of eliminating its root (or structural) causes: fiscal deficits. These changes need to be perceived by agents as permanent; in other words, agents should expect that these fiscal deficits will decrease in the future.

III. Inflation, issuance and fiscal deficit: a generalized Cagan model

Cagan's (1956) inflation model is based on a general function for the demand for real cash balances, which is expressed as:

$$m_t - p_t = \alpha E_t(\pi_{t+1}) + \beta y_t, \alpha, \beta > 0 \quad (1)$$

where m is the logarithm of the money supply; p is the logarithm of the price level; π^e is expected inflation, i.e. the expectation of $(p_{t+1} - p_t)$.[10] The variable u_t represents the importance of output levels, in logarithms, for the demand for money. Using equation (1), and assuming that future inflation is $x_{t+1} = p_{t+1} - p_t$, with rational expectations, we can express expected inflation, $E_t(\pi_{t+1})$, as:

$$E_t(\pi_{t+1}) = E_t x_{t+1} \tag{2}$$

where $E_t x_{t+1}$ is the mathematical expectation of x_{t+1}, conditional on the information at time t. Using (1) and (2), we can demonstrate that inflation expectations depend on two elements: (i) expected money supply growth, $\mu_{t+j} = m_{t+j} - m_t$, for all $j > 1$; and (ii) expected future real GDP growth, $E_t(y_{t+j} - y_{t+j-1})$, for all $j > 1$. In this way, expected inflation, π^e_t, is expressed as:

$$\begin{aligned} E_t(\pi_{t+1}) &= \frac{1}{1+\alpha}\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1} E_t \mu_{t+j} \\ &- \frac{\beta}{1+\alpha}\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1} E_t\left(y_{t+j} - y_{t+j-1}\right) \end{aligned} \tag{3}$$

Monthly GDP data for Chile (monthly index of economic activity) from 1996 to April 2024 indicate that this variable is stationary, with an expected value that is not statistically different from zero.[11] The model in (3) can thus be expressed as:[12]

$$E_t(\pi_{t+1}) = \frac{1}{1+\alpha}\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1} E_t \mu_{t+j} \tag{4}$$

Equation (4) characterizes the systematic component of expected inflation, $E_t(\pi_{t+1})$, as a function of expected money growth in future periods, $E_t\mu_{t+j}$.[13] There is thus a causal relationship between expected money creation by the monetary authority and expected inflation. One important aspect of equation (4) is that expected inflation for the following period, $E_t(\pi_{t+1})$, depends on expected money creation for the following month, $E_t\mu_{t+1}$, as well as on the entire trajectory of future expected money growth.

On the basis of (4), two simple theoretical exercises are considered to illustrate which mechanisms can perpetuate hyperinflationary processes, or drastically reduce them.

1. Unanticipated and credible change in the issuance rate

The first exercise assumes that the rate of monetary expansion, μ_t, is constant up to a certain period, $t = t_0$. In particular, $\mu_t = \mu > 0$ for all $t < t_0$. Let us assume that the monetary authority in period t_0 announces that monetary issuance will fall to 0 from that date forward. Specifically, it announces that

[10] The model in (1) can be estimated with cointegration techniques and using error correction methods that assume that cash balances are not always at equilibrium. In such models, the long-term relation between real balances and inflation expectations and the level of output holds, but cash balances gradually converge in the long run (see Phylaktis and Taylor (1993) for an in-depth discussion of this topic). In monthly terms, the difference between actual and long-term balances can be significant. However, in annual terms, this difference tends to diminish. Section IV provides an empirical analysis of such models with annual data.

[11] The data for the monthly index of economic activity for the period January 1996–April 2024 can be accessed through the Central Bank of Chile website [online]: https://bcentral.cl/areas/estadisticas/imacec.

[12] Where expected GDP growth is a non-zero constant, equation (4) remains valid and the relationship between expected inflation and future issuance remains proportional. The only difference is that a non-zero constant would be added to this relationship, which, nevertheless, would not affect the joint dynamics of expected inflation and issuance.

[13] This does not require that the demand for cash in (1) exclude the element of real GDP as an argument. It requires GDP growth to be stationary and expected growth to be constant. In the case of Chile, expected monthly GDP growth is not statistically different from zero, such that equation (4) becomes a valid model for expected inflation, without requiring the coefficient β in (1) to be zero.

$\mu_t = 0$ for all $t > t_0$. On the basis of equation (4), it can be determined that, for all $t < t_0$, economic agents do not anticipate any changes in the central bank's behaviour concerning the rate of monetary expansion. That is, the following is true for all $t < t_0$:

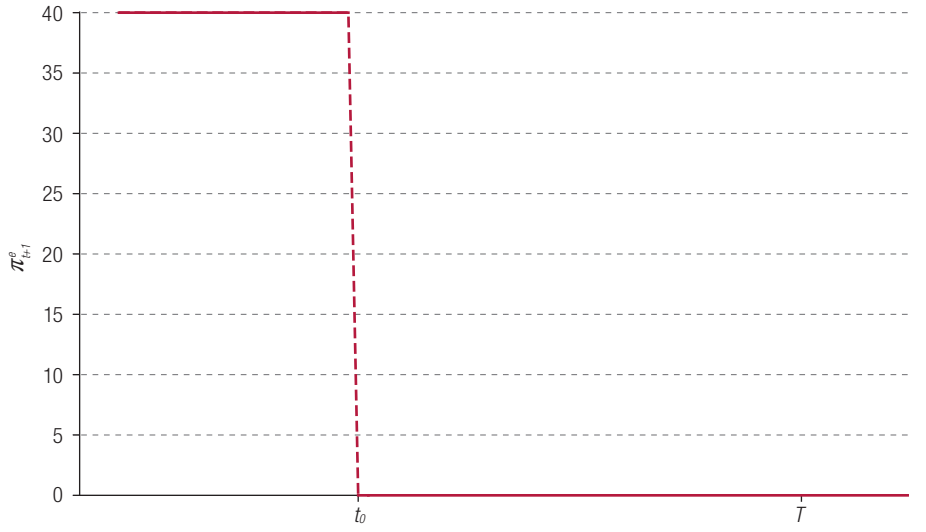
$$E_t(\pi_{t+1}) = \frac{1}{1+\alpha}\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1}E_t\mu = \mu \tag{5}$$

where we have used the property that $\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1} = 1+\alpha$ and $E_t\mu = \mu$. The monetary authority then announces unexpectedly in $t = t_0$ that the issuance rate will be $\mu = 0$ from t_0 onwards. If this announcement is credible, equation (5) for all $t > t_0$ becomes:

$$E_t(\pi_{t+1}) = \frac{1}{1+\alpha}\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1}E_t\mu = 0 \tag{6}$$

To illustrate the previous point, we have plotted equations (5) and (6) under the assumption that $\mu_t = 40\%$ for all $t < t_0$, while $\mu_t = 0$ for all $t > t_0$. This exercise does not require that a value be determined for the coefficient α, thus it is a general result that only requires determining the levels of growth of the monetary base before and after $t = t_0$. Figure 2 presents the dynamics of expected inflation, which is equivalent to 40% up to $t = t_0$.

Figure 2
Inflation and issuance rate (μ_t): unanticipated and credible change in t_0
(Percentages)



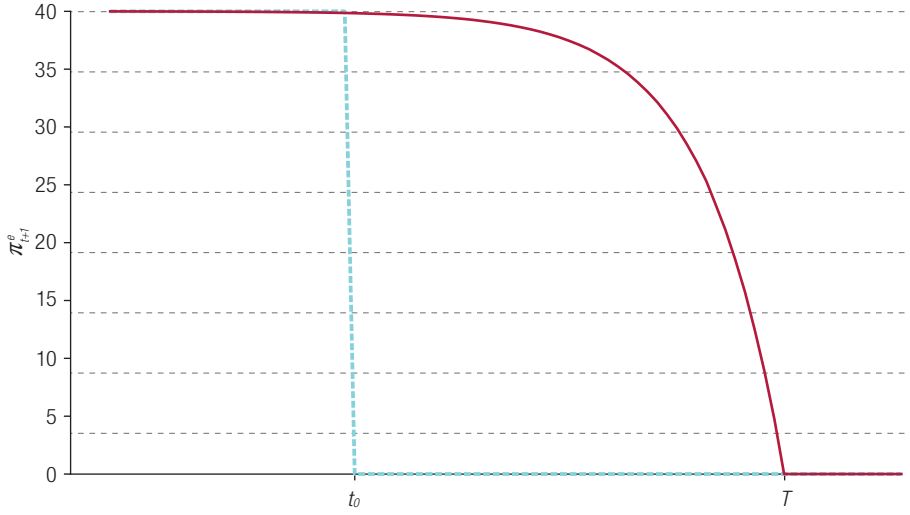
Source: Prepared by the authors, on the basis of equation (6).

2. Announced change in the issuance rate

Using Cagan's model in equation (4), an alternative exercise consists in the monetary authority announcing at t_0 that it will reduce monetary issuance to 0 in the future; in particular, it will bring issuance to $\mu_T = 0$ starting from $t = T$. Since this change is expected by economic agents, expected inflation will be equal to 0 from $t > T$ onwards. One important result is that, from the time of the announcement, i.e. from $t = t_0$, expected inflation, generated from (4), will incorporate future money growth, $\mu_T = 0$, from $t = T$

onwards and contemporaneous money growth, $\mu_t = 40\%$, for all $t < T$. Thus, credible announcements regarding future reductions in monetary issuance drive down inflation. This can be seen in figure 3, which shows how inflation gradually falls to 0 from $t = T$ onwards.[14]

Figure 3
Inflation and issuance rate (μ_t): anticipated change in T
(Percentages)



Source: Prepared by the authors, on the basis of equation 4.

If the government were to announce today, at $t = t_0$, that monetary issuance will be reduced immediately to $\mu = 0$, but economic agents expect this change to come into effect only from $t = T$, inflation will remain at levels consistent with $\mu = 0$. In this case, expected inflation will approach zero much more slowly owing to the lack of credibility in monetary policy announcements and will follow the trends presented in figure 3.

3. Monetary issuance and fiscal deficits

What elements explain the lack of credibility of a given announcement on future growth in the money supply? Equations (4), (5) and (6) relate inflation expectations to expected monetary issuance, but they do not specify the factors that may underlie the latter. To determine the factors that may lead to anticipating a given growth rate for issuance, we analyse the link between the monetary expansion rate and fiscal deficits. To this end, we specify the budget constraint of the central government, including the central bank. This constraint is expressed as:

$$\left(G_t - T_t\right) + \left(1 + r_{t-1}\right)B_{t-1} = \frac{M_t - M_{t-1}}{P_t} + B_t \qquad (7)$$

The right hand side of (7) represents the financing needs of the treasury. The first component is the fiscal deficit, $(G_t - T_t)$, which is the difference between expenditures (G) and tax revenues (T). The second component is the interest (and principal) payments associated with the fiscal debt (B) acquired

[14] To conduct this exercise, we use the estimate for coefficient , which is derived from the estimation of equation (1) in Caputo (2022). This study, like those of Phylaktis and Taylor (1993) and Sargent, Williams and Zha (2009), shows that the demand for money in Chile from 1970 to 1980 can be represented by a relationship similar to (1).

in the previous period, $(1 + r_{t-1})B_{t-1}$. These financing needs are covered by two sources: monetary issuance in real terms, $\frac{M_t - M_{t-1}}{P_t}$, and the issuance of new debt, B_t. If we assume that new debt issuance can cover the payment of the previous debt, together with the interest payment —that is, if we assume that $(1 + r_{t-1})B_{t-1} = B_t$—, then equation (7) can be expressed as follows:

$$(G_t - T_t)P_t = \frac{M_t - M_{t-1}}{M_{t-1}} M_{t-1} = \mu_t M_{t-1} \tag{8}$$

Dividing both sides of equation (8) by the nominal GDP, $P_t Y_t$, and multiplying the right hand side of (8) by M_t, we obtain the following expression for the issuance rate, μ_t:

$$\mu_t = \frac{d_t}{l_t - d_t} \tag{9}$$

Equation (9) is an expression for the monetary issuance rate that can sustain a given fiscal deficit (as a percentage of GDP). This issuance rate also depends on the liquidity in an economy, understood as nominal balances as a share of GDP, d_t. Taking partial derivatives in (9), with respect to the deficit, d_t, and liquidity, l_t, we obtain the following expressions:

$$\frac{\partial \mu_t}{\partial d_t} = \frac{l_t}{(l_t - d_t)^2} > 0 \tag{10}$$

$$\frac{\partial \mu_t}{\partial l_t} = \frac{-d_t}{(l_t - d_t)^2} < 0 \tag{11}$$

Equation (10) shows that as fiscal deficits as a share of GDP grow, the issuance rate needs to increase. This increase is greater as fiscal deficits, d_t, widen. In other words, the relationship between the issuance rate and fiscal deficits is non-linear.[15] Meanwhile, equation (11) shows that as liquidity in the economy, understood as $\frac{M_t}{P_t Y_t}$, falls, larger increases in the rate of issuance, μ_t, are needed to sustain a given level of fiscal deficit via issuance. In other words, the less money people keep as a percentage of GDP, the higher the inflation tax needed to achieve a given level of tax revenue. Conversely, if people are willing to increase cash balances as a percentage of GDP, the inflation tax that sustains a given fiscal deficit is lower.

Replacing equation (9) in equation (4), we obtain a relationship linking expected inflation with future fiscal deficits and expected liquidity in the economy:

$$E_t(\pi_{t+1}) = E_t x_{t+1} = \frac{1}{1+\alpha} \sum_{j=1}^{\infty} \left(\frac{\alpha}{1+\alpha}\right)^{j-1} E_t \left(\frac{d_{t+j}}{l_{t+j} - d_{t+j}}\right) \tag{12}$$

Equation (12) is fundamental to understanding how expectations regarding the future conduct of fiscal policy affect the rate of monetary issuance and, as a result, inflation expectations. Thus, if fiscal deficits are expected to increase steadily and, for example, balance holdings as a percentage of GDP, l_{t+j}, decrease, the expected issuance rate will rise, together with expected inflation. Section IV uses this model to understand inflation dynamics following the military coup.

[15] The non-linearity is clear if equation (10) differs, again, with respect to d_t. In particular, $\frac{\partial^2 \mu_t}{\partial d_t^2} = \frac{2l_t}{(l_t - d_t)^3} > 0$ when $l_t > d_t$. This inequality has always been the case in Chile, according to issuance and fiscal deficit data.

IV. Inflation and fiscal deficits: chronicle of a failed stabilization process

In this section, we will use the model in (12), together with properties of the issuance rate in (10) and (11), to understand the failed attempt at nominal stabilization following the 1973 military coup. To this end, we will first characterize the main macroeconomic variables during the Allende government and the military dictatorship. These variables are presented by year in table 2, which shows how GDP growth slowed considerably from 1972 to 1975, following a period of relatively high growth in the first two years of the Allende government. The growth of aggregate demand followed a similar pattern to GDP growth, although it contracted much more sharply during the first years of the military dictatorship.

Table 2
Macroeconomic indicators, 1970–1989

	GDP growth *(Percentages)*	Demand growth *(Percentages)*	Current account deficit *(Percentages of GDP)*	Fiscal deficit *(Percentages of GDP)*	Copper prices *(United States cents per pound)*	Inflation *(Percentages)*	Monetary issuance *(Percentages of GDP)*	Growth in currency issue *(Percentages)*
1970	1.9	1.8	1.2	1.4	61.3	34.9	7.9	66.1
1971	9.4	10.5	2.1	8.1	49.1	22.1	14.5	135.9
1972	-1.2	0.8	3.9	11.7	49.1	163.4	19.8	178.2
1973	-5.0	-5.8	2.8	22.5	78.4	508.1	22.7	365.0
1974	2.6	-3.1	1.9	10.5	90.2	375.9	10.8	319.6
1975	-13.0	-21.1	6.6	2.6	55.5	340.7	10.7	282.8
1976	3.7	-1.1	-1.5	2.3	64.1	174.3	11.0	271.6
1977	10.3	15.4	4.0	1.9	60.3	63.5	9.5	92.5
1978	7.8	9.2	6.9	0.9	62.2	30.3	9.0	59.2
1979	8.6	10.8	5.6	-1.7	88.5	38.9	8.6	52.7
1980	8.2	9.5	6.9	-1.7	96.8	31.2	8.4	37.3
1981	6.7	12.3	13.9	0.0	78.7	9.5	6.6	-6.9
1982	-11.1	-19.1	9.2	-0.3	65.8	20.7	4.8	-29.3
1983	-5.4	-9.1	5.6	-0.4	71.9	23.1	4.4	13.6
1984	4.0	6.4	10.9	0.7	61.3	23.0	4.3	17.6
1985	4.3	-1.0	8.1	0.6	61.0	26.4	3.9	34.1
1986	5.4	4.8	6.4	0.4	61.6	17.4	4.2	37.3
1987	6.5	9.5	3.4	-2.3	77.8	21.5	3.9	23.7
1988	7.3	7.6	0.9	-4.5	114.6	12.7	4.0	32.0
1989	10.0	12.1	2.3	-6.1	124.9	21.4	3.9	22.6

Source: Prepared by the authors, on the basis of J. Díaz, R. Lüders and G. Wagner, *Chile 1810-2010: la república en cifras. Historical statistics*, Santiago, Ediciones UC, 2016, and data from the Central Bank of Chile, the National Institute of Statistics (INE) and the Budgetary Affairs Bureau.

Regarding fiscal variables, table 2 shows how the public deficit climbed from 1.4% of GDP in 1970 to 22.5% of GDP in 1973. Although this deficit fell sharply after the military coup, it remained high (10.5% of GDP), approaching the averages of the first years of the Allende government (1971–1972). By 1975 and 1976, these deficits began to fall, though they hovered at around 2.5% of GDP. Inflation rose to 508.1% in 1973 and remained very high in 1974–1976, with an annual average above 200%. The growth in currency issue, which stood at 178.2% in 1972, jumped to 365% in 1973 and remained high, at close to 300%, from 1974 to 1976.

The information in table 2 allows us to identify four stylized facts during the Allende government that carry over into the first years of the dictatorship. The first is that, although fiscal deficits narrowed after the military coup, they continue to be very high in 1974, only falling notably after 1975. The second

stylized fact is that, during the first three years of the dictatorship, growth in currency issue remains close to 300%, a rate not dissimilar to the average issuance growth during the Popular Unity government. The third stylized fact is that, although inflation moderates after the military coup, it averages close to 300% during the first three years of the dictatorship. Lastly, the fourth stylized fact is that issuance as a percentage of GDP, which measures liquidity l_t mentioned in section III, increases from 7.9% of GDP in 1970 to values close to 20% in 1972 and 1973 and decreases considerably during the first three years of the dictatorship, dropping to around to 10%.

How can the above set of stylized facts account for the persistent inflation and rising issuance rate following the military coup, particularly considering that the fiscal deficit undergoes such a major adjustment from 1974 to 1976? In what follows, we will use the analysis framework developed in section III to explain an apparent paradox: during the dictatorship, inflation remained high despite a significant fiscal adjustment (narrowing of the deficit).

Below, we express equation (12), which links the expected inflation, issuance rate and fiscal deficits that we derived from Cagan's generalized model. Assuming, for illustrative purposes, that issuance and fiscal deficits remain at a given level during a given economic regime, equation (12) can be expressed as:

$$E_t\left(\pi_{t+1}\right) = E_t\left(\mu_T\right) = E_t\left(\frac{d_T}{l_T - d_T}\right) \tag{13}$$

Where μ_t is the annual issuance rate in a particular economic regime and d_T and l_T represent fiscal deficits and liquidity in the economy, respectively, with both variables expressed as a percentage of GDP. Period T can be interpreted as the last period of a given economic policy regime. On the basis of equation (13), it is possible to evaluate the impact of changes in the fiscal deficit and in the economy's liquidity on the issuance rate.

Recalling that $\mu_T = \frac{d_T}{l_T - d_T}$, we can express the change in μ_T over time as:

$$\begin{aligned}\frac{\partial \mu_T}{\partial t} &= \frac{\partial \mu_T}{\partial d_T}\frac{\partial d_T}{\partial t} + \frac{\partial \mu_T}{\partial l_T}\frac{\partial l_T}{\partial t} \\ &= \frac{l_T}{\left(l_T - d_T\right)^2}\frac{\partial d_T}{\partial t} - \frac{d_T}{\left(l_T - d_T\right)^2}\frac{\partial l_T}{\partial t}\end{aligned} \tag{14}$$

Equation (14) is critical to understanding the dynamics of issuance as a function of changes in fiscal deficits and liquidity in the economy. Specifically, as fiscal deficits narrow over time, that is, to the extent that $\frac{\partial d_t}{\partial t}$ is negative, the issuance rate, μ_t, should fall, which would decrease expected inflation. If liquidity in the economy falls as a result of the behaviour of economic agents seeking to safeguard against high inflation, for example, then $\frac{\partial l_t}{\partial t}$ is negative. In equation (14), this implies that the issuance rate, which is needed to finance a given fiscal deficit, increases. Thus, equation (14) shows that the narrowing of fiscal deficits is a necessary condition to reduce the issuance rate, but it is not sufficient. Liquidity in the economy also needs to be maintained, or at least not decrease, in order to offset the impact of lower fiscal deficits on issuance. The intuition behind this result is that as the quantity of money in the economy decreases, a higher inflation tax is needed to sustain a given fiscal deficit.

How does the model in (14) explain the persistence of inflation and issuance growth after the military coup, in a context where the fiscal deficit falls sharply in 1974? To quantify the determinants of issuance and inflation following the coup, we estimate (14) for the immediate post-coup period. As shown in table 2, the fiscal deficit narrowed by 12% of GDP between 1973 and 1974. Specifically, $\frac{\partial d_t}{\partial t} = -12\%$. During the same period, liquidity in the economy also fell from 22.7% to 10.8% of GDP. In other words, $\frac{\partial l_t}{\partial t} = -12\%$. Incorporating these values into (14), and noting that the deficit and liquidity in the economy are almost identical in 1973, we obtain the following:

$$\frac{\partial \mu_T}{\partial t} = \frac{l_T}{(l_T - d_T)^2}\frac{\partial d_T}{\partial t} - \frac{d_T}{(l_T - d_T)^2}\frac{\partial l_T}{\partial t}$$
$$= \frac{l_T}{(l_T - d_T)^2}(-12\%) - \frac{d_T}{(l_T - d_T)^2}(-12) = 0 \quad (15)$$

That is, the sharp fall in the fiscal deficit during the first year of the dictatorship was not enough to reduce the monetary issuance rate in accordance with that deficit. According to the model, and assuming that liquidity in the economy had effectively materialized, a greater reduction in the fiscal deficit would have been needed. The shock therapy proposed by Friedman was not actually applied. The implication of zero change in the issuance rate is transferred directly to inflation expectations. Specifically:

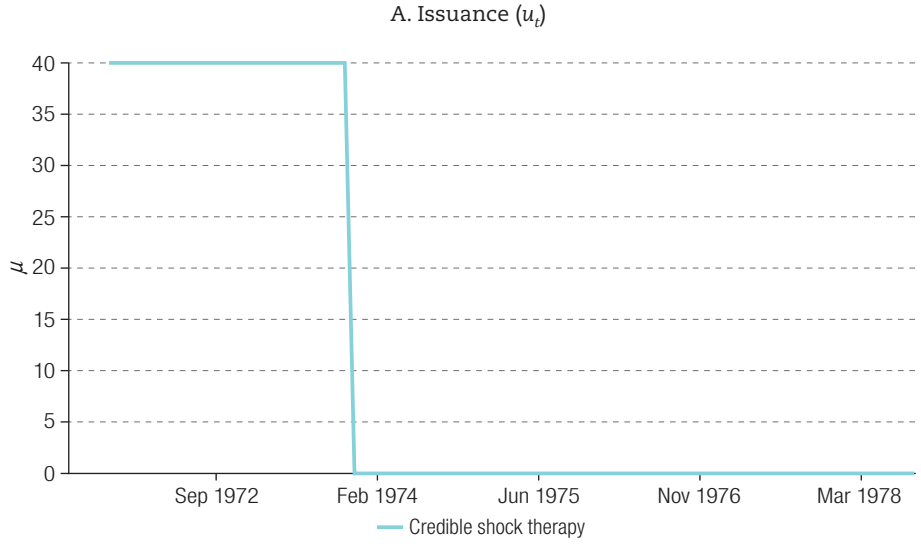
$$\frac{\partial E_t(\pi_{T+1})}{\partial t} = \frac{\partial E_T(\mu_T)}{\partial t} = 0 \quad (16)$$

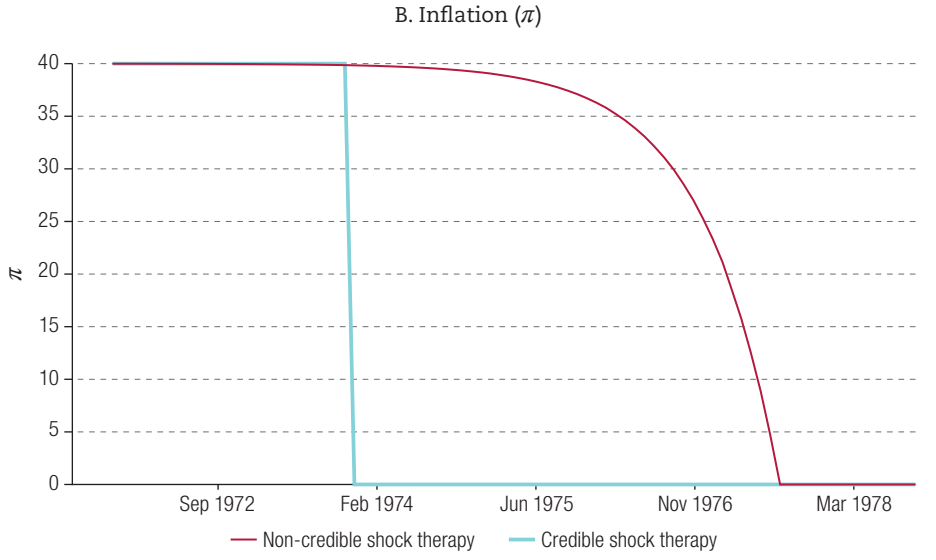
What are the consequences of the failed shock therapy in 1974? One conjecture is that persistent inflation, resulting from an insufficient adjustment of the fiscal deficit, created an expectation of gradual adjustments coupled with future adjustments to the issuance rate. To see the inflation trends that would have occurred in this scenario, we simulate the model in (4), expressed as:

$$E_t(\pi_{t+1}) = \frac{1}{1+\alpha}\sum_{j=1}^{\infty}\left(\frac{\alpha}{1+\alpha}\right)^{j-1} E_t \mu_{t+j} \quad (17)$$

The above model is simulated, over time and by month, for the two scenarios of the Chilean economy. The first assumes that the treasury is capable of making the fiscal adjustment necessary to bring the monetary issuance rate from 400% (average of the last two years of the Allende government) to 100% just after the military coup. The second scenario assumes that this is only possible around the beginning of 1978, for two reasons. The first is that the military government had announced that it would undertake a fiscal and monetary adjustment in the future. The second reason, which we deem more plausible, is that economic agents anticipated (correctly) that it would occur several years later in early 1978, after having seen the failed attempt at adjustment in 1974. Figure 4 shows inflation trends under each scenario.

Figure 4
Monetary model: issuance (μ_t) and inflation (π), 1972–1978
(Percentages)



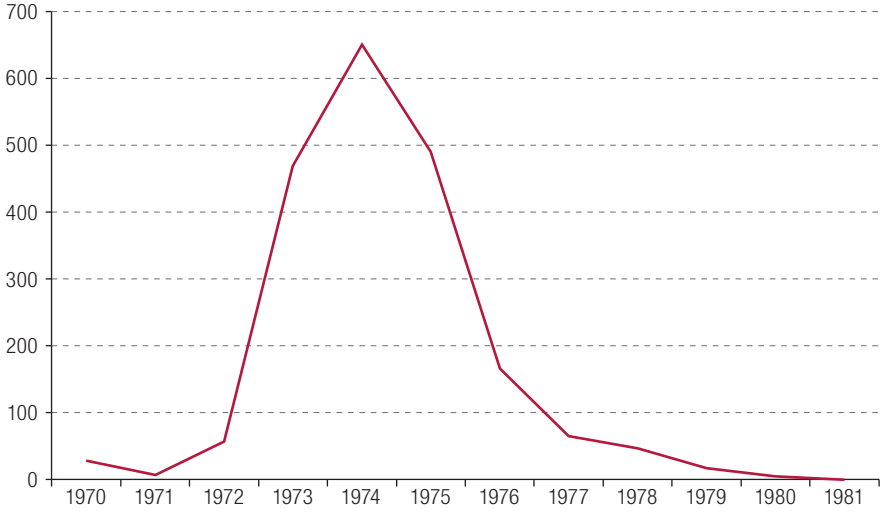


Source: Prepared by the authors.
Note: It is assumed that the semi-elasticity coefficient of cash demand to expected inflation is . In the credible shock therapy scenario, the issuance rate falls from 400% to 100%, while in the non-credible shock therapy scenario, the issuance rate is expected to fall to 100% only in early 1978.

Figure 4 shows that the inflation in Chile after the military coup is consistent with the scenario of non-credible shock therapy, in which agents do not expect the issuance rate or inflation to fall. In this context, an anticipated future adjustment to the issuance rate results from the lack of credibility of an immediate adjustment.

Before concluding, we briefly analyse an important variable in an open economy: the exchange rate. As shown in figure 5, the depreciation of the exchange rate closely follows rising inflation and issuance. Our interpretation is that exchange rate fluctuations stem from movements in the quantity of money in the economy and induce inflationary effects consistent with higher issuance.

Figure 5
Nominal exchange-rate depreciation, 1970–1981
(Annual percentage variation)



Source: Central Bank of Chile.

V. Conclusions

The first years of the military dictatorship in Chile were marked by high inflation, which only stabilized in the late 1970s. This is paradoxical, since the characteristics of the economic policies adopted by the dictatorship were, by and large, completely opposed to those implemented during the Popular Unity government. This study set out to understand why —despite the radical political and economic changes following the 1973 military coup, in line with the economic shock programme recommended by Milton Friedman— inflation was not brought under control until 1979.

The failed nominal stabilization during the dictatorship, understood as the reduction of inflation, is analysed using a monetarist model with rational expectations. We conclude that two causes explain the persistent inflation in those years. First, the fall in the fiscal deficit in 1974 was unable to curb the high rate of monetary issuance or to dampen actual (and expected) inflation. This is the result not only of the insufficient narrowing of the deficit, but also of the lower liquidity in the economy, understood as a smaller monetary base as a share of GDP, which has been the case since 1974. The latter corresponds to a reduction in the inflation tax base, which perpetuates the high levels of inflation needed to finance a given fiscal deficit. The second cause, linked to the first, is that economic agents perceived that monetary and fiscal policy from 1974 onwards would not be able to slow the growth rate of the monetary base and inflation. In light of the data and the model developed in this paper, we conclude that a successful shock therapy would have required a greater narrowing of the fiscal deficit following the 1973 military coup, together with the perception that these lower deficits would be sustained over time. In the absence of a credible deficit reduction policy, inflation only stabilizes in the late 1970s, which according to monetarist models amounts to a nominal adjustment that is not perceived as immediate.

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What drives non-financial private sector capital outflows in Latin America?

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Abstract

We analyse gross non-financial private sector capital outflows from six large Latin American economies over the past three decades. While considerable attention has recently been devoted to corporate capital inflows into emerging markets, the accumulation of foreign assets by the non-financial private sector in these countries has been overlooked. The omission is surprising, given that residents' outflows contribute considerably to the financial account balance and thus to the external financial vulnerability of the region. Moreover, although there are considerable differences between countries, we find that, in general, these outflows are (i) highly correlated with the global financial cycle; (ii) positively related to capital inflows and the current account balance, implying that they grow with higher foreign exchange availability; and (iii) seemingly unaffected by changes in domestic asset risk.

Keywords

Capital, capital movements, financial resources, financial flows, business cycles, corporations, private sector, macroeconomics, Latin America

JEL classification

F30, F36, F40, F44

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I. Introduction

Macroeconomic stability and economic development in Latin America have been increasingly jeopardized by the volatility of foreign capital. This heightened vulnerability is a direct consequence of the region's increasing integration into global financial markets (ECLAC, 2019) and has been presented as a source of external financial constraints affecting the economies of Latin America and emerging markets more generally (Abeles and Valdecantos, 2016; Pérez Caldentey, 2023).

While external financial vulnerability has been on the rise since the mid-1970s, changes to the global financial architecture in the wake of the global financial crisis of 2008–2009 introduced specific sources of vulnerability. More particularly, non-financial corporations became a key channel of global liquidity (Shin, 2014), especially through bond issuances. This increased the prominence of the non-financial corporate sector as a source of external financial vulnerability for emerging market economies vis-à-vis the banking sector and spurred a more detailed scrutiny of the sector's financial flows in these economies (Abraham, Cortina and Schmukler, 2021).

Although few studies have specifically analysed non-financial corporate indebtedness in Latin America, significant stylized facts emerge. First, the indebtedness of the non-financial corporate sector seems paradoxical in Latin America, where it has been characterized by a continuous financial surplus and weak capital expenditure (Abeles and Pérez Caldentey, 2022; Pérez Artica, Delbianco and Brufman, 2017). Again, Pérez Caldentey, Favreau Negront and Méndez Lobos (2019) show that the cycle of intense bond issuance activity that began in 2009 led to an increase in the fragility of Latin American firms, with potentially negative effects on their capital expenditure. Lastly, De Camino, Pérez Caldentey and Vera (2023) highlight the importance of intracompany loans recorded as part of direct investment flows in the balance-of-payments data and reveal their short-term nature by showing that they are highly correlated with the cyclical component of gross domestic product (GDP). They thus conclude that, despite being recorded as direct investment, these inflows entail serious financial fragility risks.

Simultaneously, academic interest has increasingly turned towards gross rather than net capital flows. This shift has been motivated by several factors. Primarily, the growing size of gross inflows and outflows relative to net flows became apparent, particularly with the sudden and significant changes that followed the crisis. Furthermore, a deeper analysis of the roots of the crisis revealed the need to focus more on gross positions than on current account imbalances (Borio and Disyatat, 2015).

In line with the sixth edition of the International Monetary Fund (IMF) *Balance of Payments and International Investment Position Manual* (BPM6) (IMF, 2009), the literature usually defines gross inflows as the net foreign liabilities incurred, and gross outflows as the net foreign assets accumulated by residents in the economic territory of a given country. An institutional unit is considered a resident of a country when its centre of economic interest lies within the economic territory of that country. This has several implications. First, outflows exclude financial remittances abroad by non-residents (such as firms whose centre of economic interest lies abroad). Second, when a resident firm or individual repatriates assets previously accumulated abroad, this is reflected as a negative gross outflow. Net capital flows are reported as the financial account balance in the BPM6 statistics and obtained as the difference between gross inflows and outflows.

There have been incipient attempts to understand the gross financial flows of different institutional sectors within each country. The first distinction made was between the net flows of the private and public sectors (Alfaro, Kalemli-Ozcan and Volosovych, 2014). Another study dissects gross flows generated by different private agents, such as corporations and banks (Avdjiev and others, 2022). Interestingly, the evidence gathered by these studies shows that the cyclical dynamics of foreign financial flows systematically differ according to whether the domestic sector is acting as borrower or lender in the financial relationship.

In this context, the aim of the present article is to provide an empirical characterization of gross capital outflows originating from the household and non-financial corporate (HNFC) sector over the past three decades in six large Latin American economies, namely Argentina, Brazil, Chile, Colombia, Mexico and Peru.

Several important considerations motivated our engagement with HNFC outflows in Latin America. First, we focus on the HNFC sector because, of all those reported in the BPM6 data, it is the institutional sector that most closely corresponds to the non-financial corporate sector. Although significant efforts have been made to understand the extent and implications of the sector's inflows, a systematic characterization of gross outflows in the region has yet to be accomplished, despite their importance as a source of foreign currency demand and currency crises (Calderón and Kubota, 2013). Moreover, considering the non-financial corporate sector's financial surplus and weak capital expenditures in the region, a study of its gross outflows may prove informative about the alternative uses being made of bond proceeds.

In addition, recent research has highlighted the need to examine the interplay between gross outflows and other key balance-of-payments variables. To illustrate this, we follow ECLAC (2019) and use the following identity:

$$Current\ account\ balance\text{-}financial\ account = \Delta international\ reserves \quad (1)$$

Decomposing the financial account balance as the difference between gross financial outflows (net accumulation of foreign assets) and inflows (net accumulation of foreign liabilities), the identity is as follows:

$$Gross\ outflows = current\ account\ balance + gross\ inflows - \Delta international\ reserves \quad (2)$$

Among other implications, equation 2 shows the role of outflows during a sudden stop in gross inflows. An important discussion in the literature focuses on this point. Some studies have shown that a sudden decline in capital inflows might be offset by a reduction in residents' capital outflows without necessarily evolving into a sudden stop in net capital flows that forces a costly adjustment of the current account balance (Cavallo, Izquierdo and Leon-Diaz, 2017). By contrast, other researchers have found this offsetting to be weak (ECLAC, 2019), strengthening the case for capital controls. Our study contributes to the ongoing discussion in the literature by highlighting this relationship specifically for the HNFC sector in the region.

Local investors may themselves trigger a balance-of-payments crisis by suddenly switching to larger positions in foreign assets (Calderón and Kubota, 2013), a phenomenon that Forbes and Warnock (2021) dub "sudden flight".

We provide novel results with significant implications. First, we build a conceptual framework to explain gross outflows by organizing theoretical arguments from the literature. Regarding our empirical results, the first descriptive analysis shows that HNFC outflows are quantitatively large and clearly eclipse bank outflows. They are also negatively correlated with official outflows (mostly of central bank reserve assets), which reinforces the case for a sectoral breakdown of financial flow analysis. Moreover, while gross national inflows clearly outpace gross national outflows (excluding central bank reserves), HNFC inflows and outflows are quantitatively similar. The sources of these differences are explained below.

Subsequently, we build a parsimonious econometric model that considers four main sets of drivers: (i) the global financial cycle, mainly via global risk; (ii) domestic variables affecting foreign exchange and saving; (iii) foreign capital inflows particularly directed to the non-financial sector; and (iv) variables influencing the relative risk of domestic assets. We also consider the impact of other structural and institutional factors, such as the degree of financial development and different capital control measures.

The main results can be summarized as follows:

(i) Not only total outflows but also HNFC sector outflows are correlated with the global financial cycle, mainly through co-movement with capital market risk and risk aversion;

(ii) HNFC outflows are positively related to the current account balance, which implies that the HNFC sector in the region capitalizes on foreign exchange availability resulting from current account surpluses to finance foreign asset accumulation;

(iii) HNFC outflows are also positively related to gross inflows to the same sector, as well as to foreign direct investment (FDI) (a source of financial inflows to emerging market economies that has gained importance over the past decade) and official sector inflows, and this result is particularly relevant in a phase when gross inflows to the non-financial corporate sector are predominant;

(iv) There is evidence that domestic asset returns have a negative impact on HNFC outflows, but this evidence is insufficient, and domestic asset risk does not seem to affect HNFC outflows; in sum, HNFC outflows do not seem to lend themselves easily to optimal portfolio theory explanations.

The study is organized into five sections after this introduction. Section II presents the conceptual framework used to analyse the determinants of HNFC outflows. Section III introduces the methodology used to construct HNFC outflow series and discusses the behaviour of these outflows. Section IV describes the estimation procedure. Section V presents empirical findings characterizing HNFC outflows. Section VI offers conclusions.

II. A conceptual framework for analysing the determinants of household and non-financial corporate sector outflows in Latin America

There are at least two dimensions in which different sources of outflows in a given sector can be conceptualized.

First, gross outflows or foreign asset accumulation can be seen as resulting from portfolio decisions: residents must decide what share of their portfolio is to be held in foreign assets. Consequently, our conceptual framework allows us to organize the different sources of HNFC outflows as either portfolio growth or portfolio reallocation factors. Portfolio growth factors are those that enlarge total HNFC assets even as portfolio shares are kept constant. This can occur because of an increase in local funding (new domestic savings) or in external sources of finance (financial inflows being a key source). Conversely, portfolio reallocation factors are those that involve changes in domestic returns or risks vis-à-vis foreign assets and thus lead to a shift in portfolio shares. Several previous studies have addressed this (Kraay and Ventura, 2000 and 2003; Tille and Van Wincoop, 2010).

Second, these sources of variation in outflows can be classified following the traditional distinction between push and pull factors (Calvo, Leiderman and Reinhart, 1993; Fernández-Arias, 1996). Push factors are external forces that affect global liquidity, returns, risk, or risk aversion in global financial markets. Conversely, pull factors relate to domestic conditions that allow or prompt the accumulation of assets abroad (e.g. domestic growth, higher foreign currency availability and increasing domestic asset risk).

The sources of HNFC outflows are discussed in detail in the remainder of this section, which organizes factors by whether they belong to the category of pull or international factors or instead result from domestic conditions leading to foreign asset accumulation. We treat gross capital

inflows as a relevant factor on their own, since we cannot classify them as either a pull or a push variable. Within each broad category, we identify the factors that act as sources of portfolio growth or reallocation.

1. Push or global financial cycle factors

(a) Global risk and risk aversion

The bulk of the literature dealing with gross flows, such as Forbes and Warnock (2012), Calderón and Kubota (2013) and Avdjiev and others (2022), finds that capital flow cycles are strongly correlated to the Chicago Board Options Exchange financial market volatility index, a measure used as a proxy for risk and risk aversion in global financial markets. Bearing in mind the growing importance of non-financial corporations as drivers of global liquidity in the aftermath of the global financial crisis of 2008–2009 (Avdjiev, Chui and Shin, 2014; Kim and Shin, 2021), we expect this to be a stronger conditioning factor for HNFC sector flows in that period.

According to our conceptual framework, increasing risk and risk aversion in global financial markets should negatively impact the accumulation of foreign assets by the HNFC sector, owing to the effects of both the portfolio growth and the portfolio reallocation factors. Declining capital inflows from risk-averse foreign investors may deter outflows via a portfolio growth channel. Again, an increase in the risk of foreign vis-à-vis domestic assets might discourage outflows via a portfolio reallocation channel.[1]

The literature provides evidence that outflows are negatively related to global risk. Indeed, using a sample of 99 countries (both developed and emerging market economies), Calderón and Kubota (2013) show that the probability of an "outflow-driven sudden stop" either decreases or shows a non-significant relationship with a rise in the volatility index. Likewise, Forbes and Warnok (2012) study a sample of 59 economies and find that the probability of a "sudden flight" by domestic investors decreases when global risk increases and that global risk leads to a higher probability of domestic investors retrenching their investment positions abroad. Lastly, Adler, Djigbenou and Sosa (2016) analyse a sample of 38 emerging market economies and find that foreign asset accumulation by residents is particularly sensitive to shocks in global financial risk, with asset repatriations offsetting contractions in gross inflows when there is a global financial shock. Thus, we formulate the following hypothesis regarding the impact of a rise in the volatility index on HNFC outflows.

- Hypothesis 1: Global risk is negatively related to HNFC outflows

2. Pull or domestic determinants of capital flows

Our next set of determinants includes country-specific factors. These can be understood as mostly domestically determined, as opposed to being shaped mainly by global forces. They include (i) the current account balance, (ii) domestic growth and (iii) variables characterizing the returns and risk of domestic assets.

(a) The current account balance

We can outline two opposing effects on outflows stemming from the current account balance. First, since the current account balance represents domestic saving in excess of domestic investment, we can interpret it as a source of portfolio growth and thus expect a positive relationship with outflows.

[1] Below we discuss how higher global risk can lead to even higher domestic risk.

Importantly, a positive current account balance also leads to a rise in the availability of foreign exchange to increase the accumulation of foreign assets. Conversely, given that successive negative current account balances will increase the probability of a country being cut off from foreign financing, triggering expectations of an exchange-rate depreciation, we might expect that a negative relationship would prevail in those circumstances.

Thus far, the empirical evidence points to a positive relationship between gross outflows and the current account balance. More specifically, Calderón and Kubota (2013) show that the probability of what they call an outflow-induced sudden stop increases when the current account balance turns positive. Broner and others (2013) also find that the current account balance relates positively to residents' gross capital outflows.

Since the current account balance includes the primary income account, where investment income is recorded, a positive correlation between the current account balance and assets accumulated abroad might seem trivial. In particular, growth in foreign assets leads to a rise in financial income. However, there is evidence that other forces are also at play. First, Broner and others (2013) find a strong positive relationship between outflows and the trade balance by itself. Second, Calderón and Kubota (2013) find that countries with abundant natural resources are more prone to experiencing outflow-driven sudden stops.

Considering both the theoretical and the empirical arguments summarized above, we expect a positive relationship between the current account balance and outflows, which gives us the next hypothesis.

- Hypothesis 2: The current account balance is positively correlated with HNFC outflows

(b) Domestic growth

The empirical literature reviewed by Koepke (2019) shows that domestic growth is also an important driver of capital inflows. This evidence is consistent with domestic growth attracting foreign investors, along the lines of the pull forces proposed by Calvo, Leiderman and Reinhart (1993).

However, the theoretical relationship between growth and gross outflows turns out to be less straightforward, pointing towards two opposite effects. An increase in HNFC saving associated with domestic growth may lead to the accumulation of foreign assets through a portfolio growth effect. Kraay and Ventura (2000) stress this channel.

The empirical evidence thus far seems to support the prevalence of a positive relationship between domestic growth and outflows. Broner and others (2013) find that domestic product is positively related to both inflows and outflows. Second, domestic growth does not seem to lead to any significant reduction in the probability of outflows turning into "sudden flight" or in outflow-driven sudden stop episodes (Calderón and Kubota, 2013; Forbes and Warnock, 2012). In other words, according to the empirical literature focused on country-level gross flows, we should, if anything, expect domestic growth to have a positive impact on outflows.

We thus formulate the following hypothesis regarding the relationship between domestic growth and HNFC outflows:

- Hypothesis 3: The relationship between domestic growth and HNFC outflows is ambiguous, potentially being either positive or negative

(c) Domestic asset returns and risk

As previously discussed, research emphasizing the portfolio decision nature of capital flows shows that changes in returns and risks should prompt changes in foreign asset accumulation. This is also observed in the literature on sudden stops, which frames these episodes as abrupt shifts in portfolio

composition. When discussing the relative importance of domestic (pull) versus external (push) factors, Calvo, Leiderman and Reinhart (1993) consider indicators of domestic returns such as stock market returns and interest rate spreads. Again, many variables used in the gross capital flow literature reflect domestic asset risks, examples being the current account balance, expansionary monetary and fiscal policy, and dollarization of private and public sector liabilities (Calderón and Kubota, 2013).

Empirically, although Meng and Van Wincoop (2020) find evidence that portfolio reallocation dominates short-term variations in outflows from the United States to individual countries, they are less important and persistent than portfolio growth factors.

Thus, we formulate the following hypothesis:

- Hypothesis 4: Domestic asset risk has a positive relationship with HNFC outflows

3. Gross capital inflows to the household and non-financial corporate sector

The study of inflows to the non-financial corporate sector, rather than aggregate inflows, has acquired greater prominence since the global financial crisis of 2008–2009. The surge of dollar-denominated bond issuances by corporations from emerging market economies in this period has led scholars to see corporations as a new driver of global liquidity (Avdjiev, McCauley and Shin, 2016; Shin, 2014), contributing to mounting credit risk and external sector vulnerabilities in these countries (IMF, 2019).

Other research has pointed to the proliferation of domestic financial asset accumulation as a major application of the funds raised by firms in emerging market economies (Bruno and Shin, 2017; Hardy and Saffie, 2019). However, the links between these inflows and the accumulation of foreign assets by firms in emerging market economies are yet to be systematically analysed.

Gross capital inflows may lead to an increase in corporate outflows in several ways.[2] First, there is a simple portfolio growth factor. Inflows represent an increase on the liabilities side of the balance sheet for the HNFC sector that should be matched by an increase on the assets side, leading to a proportional increase in foreign and domestic assets if portfolio shares remain unchanged. Moreover, this positive relationship might be merely the result of larger firms obtaining bank credit abroad and initially leaving the proceeds as deposits in the lending bank.[3]

In addition, portfolio reallocation processes may connect higher inflows to higher outflows. First, new inflows may lead to higher outflows if risk has an asymmetric impact on domestic and foreign investors. To make sense of the positive correlation between gross inflows and outflows, the literature has identified factors that produce asymmetry between domestic and foreign investors' perceptions of risk, such as exchange-rate and sovereign risk, and different hedging strategies (Broner and others, 2013; Milesi-Ferretti and Tille, 2011). These may also be portfolio reallocation forces underlying the positive association between inflows and outflows.

Lastly, the need to hedge currency mismatches arising from dollar-denominated debt might also be a channel leading from foreign inflows to the accumulation of foreign financial assets.

For Latin America, De Camino, Pérez Caldentey and Vera (2023) highlight the importance of intracompany loans registered as part of direct investment flows in the balance-of-payments data and reveal their short-term nature by showing that they are highly correlated with the cyclical component

[2] A number of these have already been touched upon above, given that inflows may act as a channel through which push factors influence outflows.

[3] We are grateful to an anonymous referee for pointing out this possibility.

of GDP. They conclude that, despite being recorded as direct investment, these inflows entail serious financial fragility risks. We therefore carry out robustness exercises for our main results, where we include direct investment inflows as part of HNFC inflows.

Consequently, we propose the following hypothesis for the relationship between HNFC inflows and outflows:

- Hypothesis 5: HNFC inflows should have a positive relationship with HNFC outflows

III. Introducing household and non-financial corporate sector outflows

In this section, we discuss our methodology for constructing the HNFC outflow series using the IMF balance-of-payments database. Subsequently, we highlight several important aspects of the behaviour of HNFC outflows. First, we discuss the importance of this sector as a source of countries' foreign asset accumulation. Second, we analyse how these flows interact with the global financial cycle. Lastly, we assess whether there is a positive correlation between HNFC capital outflows and inflows, given that the literature documents a relationship between country-level capital outflows and inflows.

1. Methodology for constructing the household and non-financial corporate sector outflows series

Since our main purpose is to analyse the evolution of gross capital outflows originating from the HNFC sector in Latin America, we draw on the financial account items of the IMF balance-of-payments database. Our estimate of HNFC gross capital outflows comprises, in principle, three different types of flows originating in this institutional sector: other investment debt, portfolio equity and portfolio debt. When available, we add together all three items to obtain our measure of HNFC outflows:

$$HNFC\ outflows = OID + PE + PD \tag{3}$$

where OID is outflows of other investment debt, PE of portfolio equity and PD of portfolio debt originating in the HNFC sector. Other investment debt represents a large share of total HNFC outflows and includes mostly currency and deposits (as well as loans, trade credit and accounts receivable). Following other studies (Avdjiev and others, 2022), we ignore other flow types, such as financial derivatives[4] and other investment equity.[5] These flows are often negligible and are sparsely reported in the balance-of-payments database (see annex 1[6] and Avdjiev and others, 2022).

In addition, we exclude direct investment flows from our main analysis because these flows are not broken down by institutional sector; thus, we are unable to distinguish between banking and non-banking FDI flows. Lastly, we adopt an admittedly naïve approach and exclude other sources of residents' outflows that may be registered as errors and omissions. The absence of a sectoral breakdown of errors and omissions would prevent their contribution to HNFC outflows from being adequately quantified even if we were to attempt this.

[4] These include derivatives and employee stock options and exclude financial derivatives linked to reserve asset management.

[5] This covers equity investment other than direct investment, reserve assets and securities (this last item is included in the portfolio equity flows category).

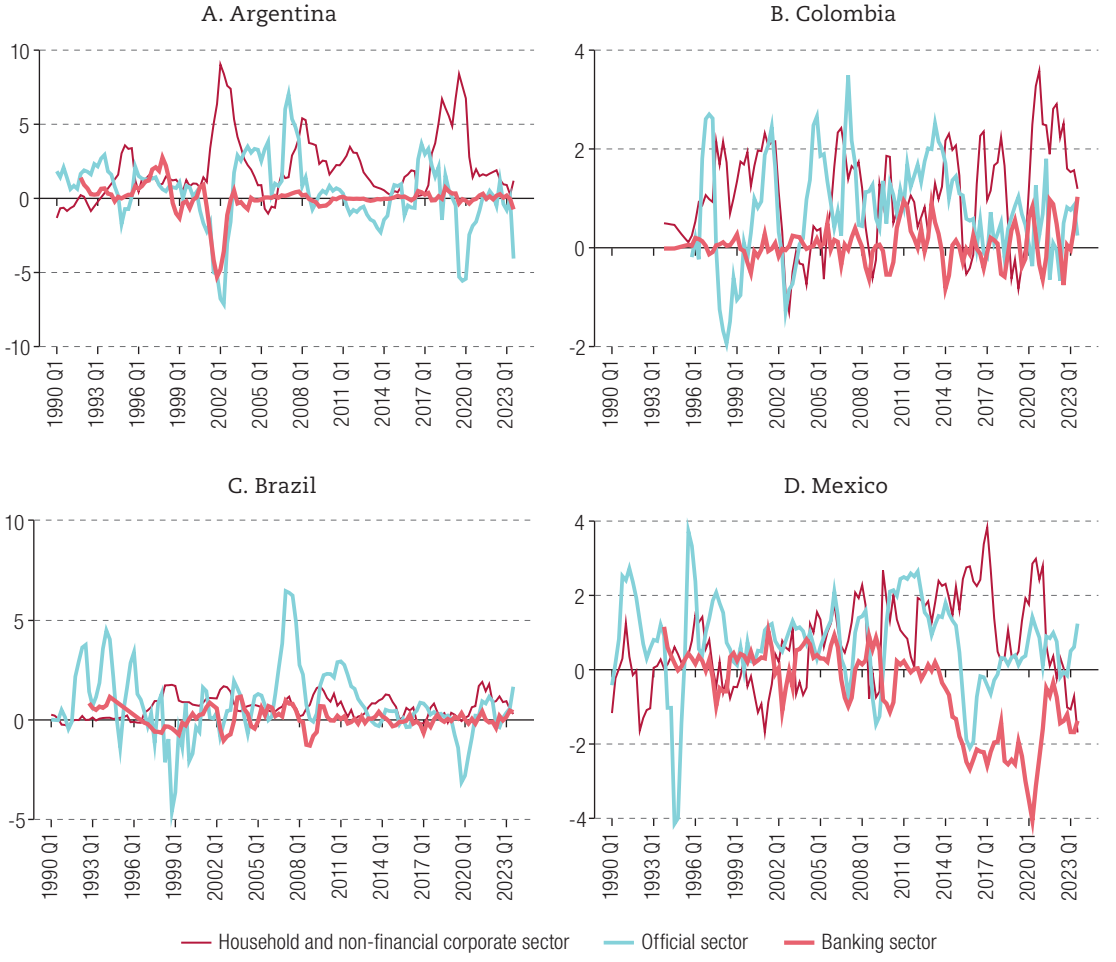
[6] The annexes are available in English at [online] https://www.dropbox.com/scl/fi/1lrufco84l7xicwf64xzb/03_PerezArticaRabinovich_Cepal_Appendix.pdf?rlkey=r977k79r4yfsghlt2ugim2hh8&st=gke17ju7&dl=0.

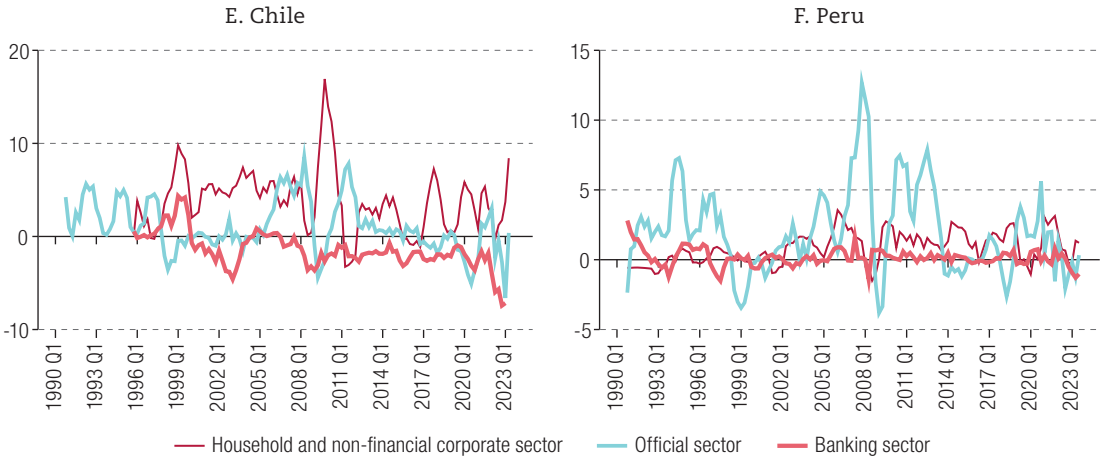
Annex 2 shows the availability of data for the three items composing our estimate of HNFC outflows by country and describes the filling procedure used to replace missing observations. We end up with 757 quarterly observations for the HNFC outflows series, spanning the six countries in our sample for the period from the first quarter of 1990 to the third quarter of 2023.

(a) Capital outflows by institutional sector

Each panel in figure 1 shows the evolution of capital outflows for different institutional sectors in each of the six Latin American countries covered by this study. Following Avdjiev and others (2022), we distinguish three institutional sectors: (i) the HNFC sector, which includes mostly non-financial corporations and households; (ii) the banking sector; and (iii) the official sector, which comprises the central government and the central bank, the bulk of whose foreign assets are composed of central bank reserve assets (see annex 1). We normalize these flows by GDP in current dollars.

Figure 1
Latin America (6 countries): financial outflows originating from the household and non-financial corporate sector, the banking sector and the official sector, four-quarter moving averages, first quarter of 1990 to first quarter of 2023
(Percentages of GDP)





Source: Prepared by the authors.

Figure 1 highlights three significant findings. First, it shows that HNFC outflows are, on average, very large in relation to other sectors and total country-level outflows. This is very striking in Argentina, Chile, Colombia and Mexico, for example, where HNFC outflows eclipse other sectors' outflows, including those of official reserve assets, over considerable periods of time. Second, it reveals the insignificance of banking flows relative to HNFC flows. Third, it suggests that HNFC outflows are predominantly positive for most countries in our sample, despite their fluctuations.

It also suggests that for most countries there is a negative correlation between HNFC and official outflows, reinforcing the case for an analysis that breaks down national flows into sectoral components. Table 1 confirms this negative correlation between HNFC and official outflows and shows that it is statistically substantial for three of the six countries.

Table 1
Latin America (6 countries): correlation of household and non-financial corporate outflows with official outflows

	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Pearson correlation coefficient	-0.3650***	-0.1654	-0.2446**	-0.1393	-0.1935**	-0.0310
P-value	0.0000	0.0620	0.0128	0.1565	0.0286	0.7324

Source: Prepared by the authors.
Note: *** Significant at 1%; ** significant at 5%.

(b) Household and non-financial corporate sector outflows and inflows

We can also gain insight into the scale of HNFC outflows by comparing them with HNFC inflows. We compute HNFC inflows by the same procedure as we used to obtain the HNFC outflows series, considering other investment debt, portfolio equity and portfolio debt inflows to the HNFC sector. Figure 2 shows the time series for gross HNFC inflows and outflows in the six countries considered. Outflows are quantitatively substantial relative to inflows to the sector. It can also be seen that the sector's outflows (excluding central bank reserves) outpace inflows in some periods. This is the opposite of the relationship between total economy-wide inflows and outflows, as shown by ECLAC (2019). In that study, the authors find that total outflows are relatively insignificant compared to total inflows.

Figure 2
Latin America (6 countries): financial inflows and outflows of the household and non-financial corporate sector, four-quarter moving averages, first quarter of 1990 to first quarter of 2023
(Percentages of GDP)

Source: Prepared by the authors.

The divergence between the total inflows to outflows ratio and the HNFC inflows to outflows ratio can be attributed to two main factors. First, direct investment inflows are excluded from HNFC inflows because HNFC and banking flows cannot be disaggregated. Second, although official inflows constitute a substantial portion of gross national inflows, the largest component of official outflows (central bank international reserves) is not included in the national outflows series.

In sum, the recent increase in the salience of non-financial corporate inflows, together with the large size of HNFC outflows in relation to inflows to the sector, make the study of these even more relevant to the assessment of external vulnerability in Latin American countries.

(c) Some differences between countries

Differences between countries emerge when we analyse the time series of HNFC outflows. First, there are substantial differences in the average level of outflows, with Chile leading over the entire period considered, followed by Argentina. Table 2 shows that average HNFC outflows relative to dollar-denominated GDP were between four and five times as large in Chile as in Brazil, Colombia, Mexico or Peru, and almost twice as large as in Argentina. The table also shows that this difference diminished over the decades.

Table 2
Latin America (6 countries): average financial outflows of the household and non-financial corporate sector, by country and decade
(Percentages of GDP)

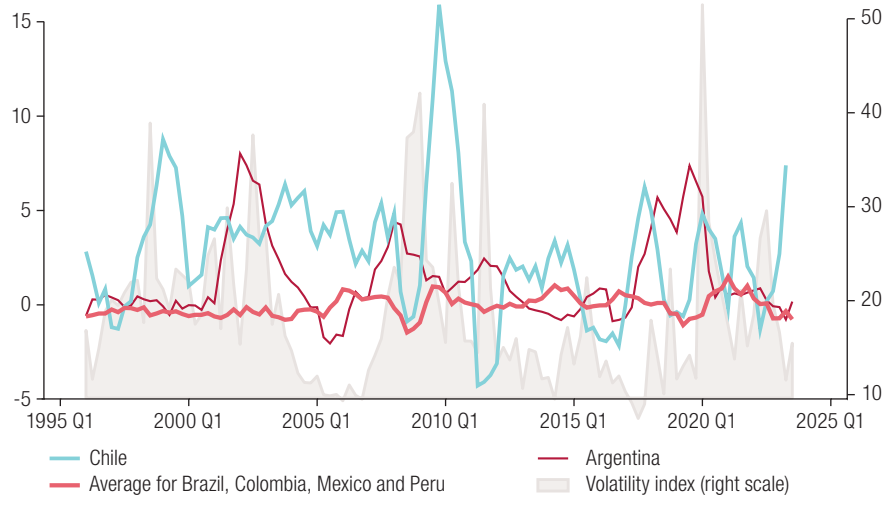
	Argentina	Brazil	Chile	Colombia	Mexico	Peru
1990s	0.9	0.4	3.8	1.0	0.0	0.0
2000s	2.8	0.7	5.9	1.0	0.7	1.2
2010s and 2020s[a]	2.4	0.6	2.6	1.3	1.4	1.3
Overall average	2.1	0.6	3.8	1.1	0.7	0.9

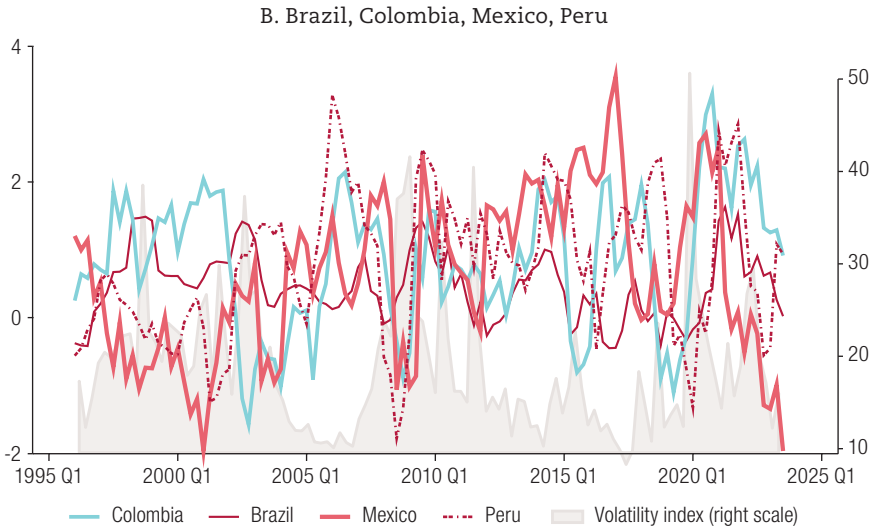
Source: Prepared by the authors.
[a] Up to the third quarter of 2023.

Second, the trend of HNFC outflows seems to have been positive in the four countries with lower average levels. Third, when the time series for outflows is displayed against the volatility index, as in both panels of figure 3, we see that the most extreme movements in HNFC outflows occurred in the vicinity of extreme fluctuations in global risk and risk aversion. On average, HNFC outflows seem to show a negative relationship with the volatility index, something that is confirmed by the econometric results given below.

Figure 3
Latin America (6 countries): financial outflows in the household and non-financial corporate sector and global financial risk as measured by the Chicago Board Options Exchange financial market volatility index, first quarter of 1995 to third quarter of 2024
(Percentages of GDP and index values)

A. Argentina and Chile





Source: Prepared by the authors.
Note: The Chicago Board Options Exchange financial market volatility index measures expected volatility over the next 30 days and is derived from the prices of call and put options on the S&P 500 index.

IV. Estimation procedure

Our data are a panel with a large number of time periods (T) and a small number of cross section individuals (N). When estimating a panel data model, we can usually deal with endogeneity due to unobservable and time-invariant sources of individual heterogeneity by performing a within-transformation of the data. In addition, dynamic panel models are typically used to control for other sources of endogeneity, such as predetermined regressors, which are correlated with the disturbance term.

However, the use of typical dynamic panel models introduces difficulties in a long panel context. As pointed out by Roodman (2009), these estimators are designed for situations with "small T, large N". Consequently, we follow Cameron and Trivedi (2009) and use methods specifically aimed at dealing with long panels.

Whereas in a short panel scenario we could control for serial correlation in the error without specifying a particular model for it, such a model is required when T is large. We use different estimators that were designed for this purpose. Consider the following two-way fixed-effects model:

$$y_{it} = \alpha_i + \gamma_t + X'_{it}\beta + \varepsilon_{it} \tag{4}$$

where α_i represents the individual unobserved effects, γ_t stands for the time effects, X'_{it} is the set of regressors, β are the parameters of interest and ε_{it} is the error term, which we assume to be independent and identically distributed. In our case, given that the panel only has a few individuals, α_i can be included as dummy variables. In addition, the natural ordering of time can be used to include a linear or quadratic time trend, and thus replace γ_t. We therefore obtain the following model:

$$y_{it} = X'_{it}\beta + u_{it} \qquad i = 1, ..., N; t = 1, ..., T \tag{5}$$

where X'_{it} includes indicator variables for each individual and possibly a linear time trend, a quadratic time trend, or both. We allow u_{it} to be heteroskedastic, correlated over i, and use an AR(1) autoregressive process to model the correlation over t. That is, we consider that $u_{it} = \rho_i u_{it-1} + \varepsilon_{it}$, where ε_{it} is serially uncorrelated but is correlated over i.

We can estimate the β parameters by using an ordinary least squares (OLS) or generalized least squares (GLS) procedure. In addition, we can model ρ_i to differ across panels or assume that it is the same for all individuals. We could also allow autocorrelated errors of general form instead of restricting u_{it} to AR(1) (Driscoll and Kraay, 1998).

Alternatively, we could estimate the individual effects model:

$$y_{it} = \alpha_i + X'_{it}\beta + u_{it} \quad (6)$$

Assuming that the error is AR(1), $u_{it} = \rho_i u_{it-1} + \varepsilon_{it}$. Here, the procedure begins by estimating ρ_i and performing a first transformation of the data to remove the effects of the AR(1) process. A second transformation is required to eliminate individual effects.

Our baseline model uses this last approach, although, as we will show, the main results hold when alternative estimators are used. In section V, we discuss further endogeneity issues and the use of instrumental variables in long panels.

We estimate a simple baseline model in which our measure of HNFC outflows relative to dollar-denominated GDP is regressed on variables describing the global financial cycle, pull factors associated with domestic income and foreign exchange availability, and variables describing domestic asset returns and risks. Schematically, we estimate a model described by

$$HNFC\ outflows = f(global\ financial\ cycle,\ domestic\ variables,\ domestic\ risk) \quad (7)$$

We present three subsequent versions, starting from a simple model that considers only push variables: the volatility index, global growth and the global interest rate. The global interest rate is calculated as the average rate of long-term sovereign bonds in the United States, Europe and Japan, following Forbes and Warnock (2012). All variables were obtained from the IMF International Financial Statistics database. Global growth is the yearly global growth rate obtained from the IMF World Economic Outlook database.

In a second step, we include a set of pull factors such as the current account balance as a proportion of GDP, the domestic growth rate, gross foreign capital inflows to domestic HNFC sectors (normalized by dollar-denominated GDP) and the domestic deposit interest rate. Subsequently, we add a set of variables describing domestic asset returns (based on the domestic deposit interest rate) and risk. Following the literature, our baseline model includes domestic inflation, central bank reserve assets as a proportion of GDP (in first difference) and the emerging market bond index for each country. In the robustness checks in section V.2 (c), we consider other sources of risk that are likely to be relevant. Annex 2 summarizes the usual panel unit root tests by showing the p-values corresponding to the statistics of each test. We confirm that the variables included do not follow a unit root process.

V. Empirical characterization of household and non-financial corporate sector outflows

1. Baseline results

Columns 1 to 3 of table 3 present the results of the three steps in our baseline model described above. We observe that the global variables are consistently significant across estimations. In line with our hypothesis 1, the volatility index parameter is always significant and negative. Moreover, its magnitude

is economically substantial, implying that an interquartile increase in the volatility index would lead to a decline in HNFC outflows of approximately 30% relative to the average HNFC outflows for the whole sample.[7]

Table 3
Baseline econometric results

Variable	(1) Push variables only	(2) Push and pull variables	(3) Push, pull and domestic risk variables	(4) Push, pull and domestic risk and financial structure variables	(5) Pull variables only	(6) Pull and domestic risk variables
Volatility index	-0.000314 *	-0.000383 **	-0.000562 ***	-0.000653 ***		
	(0.000168)	(0.000168)	(0.000181)	(0.000192)		
Global interest rates[a]	0.00578	0.00402	0.000927	-0.00214		
	(0.00393)	(0.00420)	(0.00497)	(0.00515)		
Global growth[b]	-0.00229 *	-0.00418 ***	-0.00569 ***	-0.00623 ***		
	(0.00137)	(0.00142)	(0.00161)	(0.00161)		
Domestic growth[b]		-0.0593 *	0.0297	-0.0191	-0.0262	-0.0198
		(0.0357)	(0.0511)	(0.0556)	(0.0244)	(0.0337)
Current account balance[c]		0.321 ***	0.385 ***	0.378 ***	0.292 ***	0.371 ***
		(0.0465)	(0.0550)	(0.0574)	(0.0434)	(0.0545)
Household and non-financial corporate sector inflows[c]		0.300 ***	0.407 ***	0.387 ***	0.331 ***	0.424 ***
		(0.0566)	(0.0658)	(0.0686)	(0.0554)	(0.0653)
Domestic interest rate		-2.92e-06	0.000343	-9.82e-05	-2.06e-06	0.000267
		(1.87e-06)	(0.000274)	(0.000345)	(1.94e-06)	(0.000284)
Reserve assets[a c]			-0.214 ***	-0.217 ***		-0.236 ***
			(0.0373)	(0.0403)		(0.0378)
Emerging market bond index			1.39e-06	1.74e-06		4.00e-07
			(2.10e-06)	(2.10e-06)		(2.16e-06)
Annual inflation			-0.000149	0.000144		-0.000215
			(0.000371)	(0.000380)		(0.000387)
Stock market capitalization[d]				0.000157		
				(0.000133)		
Financial system deposits[d]				-0.000608 *		
				(0.000361)		
Chinn-Ito index				0.0224 **		
				(0.0113)		
Constant	0.0294 ***	0.0445 ***	0.0518 ***	0.0573 ***	0.0200 ***	0.0220 ***
	(0.00475)	(0.00550)	(0.00639)	(0.0136)	(0.00141)	(0.00269)
Observations	655	585	493	457	671	518
Number of countries	6	6	6	6	6	6
R-squared (within)	0.0138	0.122	0.189	0.211	0.0927	0.159
R-squared (between)	0.609	0.342	0.352	0.171	0.420	0.461
R-squared (overall)	0.00748	0.159	0.219	0.208	0.125	0.187

Source: Prepared by the authors.
Note: Standard errors in parentheses. *** Significant at 1%; ** significant at 5%; * significant at 10%.
[a] Expressed in first difference.
[b] Expressed in percentage points.
[c] Normalized by the country's GDP expressed in current dollars.
[d] Normalized by GDP on the basis of Beck, Demirguc-Kunt and Levine (2000).

[7] To compute this, we multiply the point estimates of the parameters reported in column 3 of table 6 by the difference between the twenty-fifth and seventy-fifth percentiles of the distribution for the volatility index (and other regressors subsequently). A summary of the descriptive statistics for HNFC outflows and the regressors is provided in annex 3.

Some interesting results emerge when we consider the relationship with the first set of domestic variables. First, and confirming hypotheses 2 and 5, there is a significant and robust relationship between HNFC outflows, on the one hand, and the current account balance and gross foreign capital inflows received by the HNFC sector, on the other. In effect, these relationships are quantitatively important: interquartile changes in the current account and capital inflows to the HNFC sector are associated with increases of 75% to 80% and 35% to 40% of average HNFC outflows, respectively.[8]

The implications of these findings are significant because they indicate that both sources of foreign currency (the current account balance and capital inflows) were strongly associated with greater accumulation of foreign assets by the HNFC sector in the countries examined. Thus, the portfolio growth factors introduced in our discussion seem to prevail in the relationship between the current account balance and HNFC outflows. Moreover, in annex 3 (table A4, columns 9–11), we perform the same regressions but include the trade balance as a share of GDP instead of the current account balance, and the results are robust to this change.

Regarding the relationship between gross inflows and outflows, these results are consistent with other factors besides portfolio growth leading to a positive relationship, such as risks impacting residents and non-residents asymmetrically and demand for foreign assets for hedging purposes. If the estimated coefficient for HNFC inflows is considered in the light of the debate on offsetting between inflows and outflows, the relationship also seems important, although we still reject the existence of complete offsetting. Nevertheless, further exercises focused on episodes of extreme capital movements are needed.

We do not find any significant relationship between domestic growth and HNFC outflows, which bears out the ambiguous relationship proposed in hypothesis 3. As discussed above, this might imply an offsetting impact of portfolio growth and portfolio reallocation factors, stemming from domestic growth. The robustness exercises presented below show evidence of a positive relationship that might be due to portfolio growth factors.

Among those variables accounting for domestic asset risk, we only find a robust negative relationship with changes in reserve assets. This could be interpreted as the HNFC sector reducing its stock of foreign assets when central banks strengthen their reserve positions, thereby reducing the risk of exchange-rate depreciation. On the other hand, it could merely be the result of the HNFC and official sectors competing for the same supply of foreign exchange, with the former's outflows contributing to a reduction in reserve assets.

Regarding the rest of the variables that account for domestic risk and returns, the relationship between these factors and HNFC outflows is weak at best in the whole sample, as column 3 of table 3 shows. Overall, there is not enough evidence to support hypothesis 4.

Column 4 of table 3 includes a set of controls for the financial development of economies. Besides market capitalization and financial system deposits, both as a share of GDP, these include the Chinn and Ito (2006) financial openness index as a preliminary control for the effect of capital account openness on HNFC outflows.[9] The results show that there is no significant relationship between financial development and aggregate measures of capital account openness, on the one hand, and HNFC outflows, on the other.

Columns 5 and 6 of table 3 contain additional specifications in which global factors are removed as regressors. The results for the domestic variables remain qualitatively the same.

[8] We compute these magnitudes for the relationships between variables on the basis of the descriptive statistics provided in table A3.

[9] Although an in-depth analysis of the impact of capital account controls on HNFC outflows should be conducted in another, more specific study, we go on to further consider the relationship with alternative measures of capital controls in section V.2 (e) below.

In annex 4, we repeat the exercises performed in columns 1–4 of table 3 but use alternative versions of the dependent variable. Columns 1–4 of table A3 evaluate whether the results hold when only the original HNFC outflows series taken directly from the IMF balance-of-payments database are considered (i.e. without performing the internal filling procedure shown in section II). Columns 5–8 are there to ascertain whether the results are robust to the inclusion of FDI outflows in our measure of HNFC outflows.

Overall, the main results summarized above hold when we use these alternative measures for HNFC outflows. It is worth mentioning that when FDI outflows are included, the negative relationship between global risk and HNFC outflows lessens somewhat, and global interest rates begin to show a systematic negative relationship. However, the results for the current account balance and gross inflows to the HNFC sector are the same.

2. Robustness checks and further exercises

This section presents further exercises to evaluate the robustness of the foregoing results and consider in more detail additional relevant factors that are likely to affect HNFC outflows. Five main areas of concern are addressed:

(i) Are the results robust to alternative estimation methods?

(ii) Are the results sensitive to the removal of one country at a time?

(iii) Do the results hold when we consider different subperiods of time?

(iv) Do outflows have any relationship with FDI or official inflows?

(v) Are outflows sensitive to different sets of capital controls?

(a) Alternative methodologies and endogeneity issues

First, we use a number of alternative estimators to evaluate the robustness of our results, as discussed in section IV. A detailed discussion of the alternative methods and the findings is provided in annex 5. Overall, the results presented in section V.1 are confirmed. In addition, a positive relationship with domestic growth appears.

(b) Alternative country subsamples

The results could be biased by the inclusion of one or other of the individual economies in our sample. We therefore repeat the exercise performed in table 3 but remove one country at a time from the sample. Table A6 in annex 6 presents the results of these robustness checks. We observe that the main results for the domestic variables hold. However, contrary to the findings for the entire sample, we detect a departure from the general results for the global financial cycle variables when Chile is excluded from the sample. This implies that the importance of global risk in accounting for HNFC outflows might be weaker if we focus only on the remaining five countries. Thus, foreign assets held by Chilean residents are much more likely to be repatriated in response to heightened global risk than those held by residents of any other country in our sample.

(c) Different subperiods

Several studies have shown that heightened international bond issuance activity by non-financial corporations leads to more widespread use of carry trade strategies and the accumulation of domestic financial assets (Bruno and Shin, 2017; Caballero, Panizza and Powell, 2016). However, to the best of

our knowledge, no study has shown how foreign inflows to non-financial firms during the most recent period are related to the accumulation of foreign assets. We therefore attempt to throw a spotlight on these dynamics by splitting the full period analysed above into different subperiods.

More specifically, we consider four phases: (i) the years up to 2002, which cover a different timespan depending on the country (the beginning of the sample period varies by country); (ii) 2002–2010; (iii) 2010–2019; and (iv) 2002–2019. The results are shown in table A7 of annex 7.

For the period 2010–2019, we do not find any substantial qualitative changes relative to our baseline results.

Interestingly, our main findings regarding the positive relationship linking the global financial cycle, the current account and financial inflows to HNFC outflows do not hold before 2002. However, the original results hold when one country at a time is removed from the sample.

Lastly, we observe that domestic growth became one of the factors contributing to HNFC outflows after 2002, most likely through the portfolio growth mechanisms discussed above.

(d) The relationship of household and non-financial corporate sector outflows to FDI and official inflows

The literature on capital flows to emerging market economies during the past decade points out that corporations operating in these countries take advantage of their offshore affiliates to circumvent capital controls, which mainly target banking flows (Bruno and Shin, 2017; De Camino, Pérez Caldentey and Vera, 2023; Kim and Shin, 2021).

Domestic firms accelerate their foreign asset accumulation by capitalizing on the foreign exchange availability that FDI inflows provide. In other words, FDI inflows partly driven by carry trade opportunities might fuel corporate outflows. We analyse this possibility by including FDI inflows as a percentage of GDP in our baseline model. The results are presented in table A8 in annex 8. Overall, the results confirm that this relationship is both positive and significant. We also consider the robustness of this finding when one country at a time is dropped and find that the positive relationship is unaffected.

A similar conclusion emerges when official inflows are considered instead of FDI inflows. When this variable is included, it is positive and statistically significant for the entire sample. However, when Mexico is excluded from the sample, this result is not statistically significant. We thus infer that this result is mainly driven by Mexico.

(e) Capital controls

Table 3 shows that there is no apparent association between HNFC outflows and an aggregate measure of capital controls such as the Chin-Ito index measure considered. In annex 9, we pay closer attention to this association, considering not only aggregate measures of capital controls but also outflow-specific and asset type-specific measures. We draw on Fernández and others (2016) and use measures of outflow restrictions for different asset classes.

We find that the aggregate measure of capital controls shows a significant negative relationship with HNFC outflows, suggesting that these are sensitive to restrictions on capital movements. However, only equity, direct investment and real estate restrictions seem to have a negative and significant impact on outflows. Overall, the main results discussed in section V.1 remain valid. However, as stated above, a more in-depth analysis of the impact of restrictive policies on HNFC outflow dynamics is beyond the scope of our study and should be performed properly in the future.

Our results might also be affected by various tax amnesties implemented in the region. Although the following is not an exhaustive list, such tax policies were applied in Argentina (several times over the sample period, with the tax amnesty of 2016 being the most effective), Brazil (2016), Chile (2014), Colombia (2015 and 2020), Peru (2017 and 2020) and Mexico (2017 and 2020) (Reyes-Tagle and Ospina, 2020). The net impact of such measures on HNFC outflows is nonetheless ambiguous, as each programme is designed differently, either promoting voluntary disclosure of offshore wealth or encouraging asset repatriation, and their effectiveness may vary greatly.

VI. Concluding remarks

The tendency of private, non-financial residents to hold foreign financial assets is important for Latin American economies, which often face episodes of extreme external financial vulnerability. In this context, separating out and focusing on financial outflows from the HNFC sector in particular is an effort worth making, given that they are quantitatively substantial as a source of foreign exchange demand and seem to show distinctive patterns.

Moreover, if anything, the prominence gained by the corporate sector as a key driver of global financial movements in the aftermath of the global financial crisis has only increased the need to clearly understand its overall international financial behaviour, considering both liabilities and assets. Against this backdrop, we show that HNFC outflows are quantitatively similar to inflows to the sector. This contrasts with the results for the whole economy, where inflows are clearly greater, and indicates the need for a more nuanced approach in the discussion of whether "sudden inflow stops" can be offset by retrenchments in residents' outflows.

Despite the importance of these movements, to the best of our knowledge no study has attempted a direct empirical characterization of their dynamics in recent decades.

We document several findings for HNFC outflows that appear robust across different exercises. First, these outflows are, on average, negatively correlated with risk in global financial markets. Second, they are positively associated with the current account balance (and the trade balance), showing that current international transactions contribute directly to the accumulation of foreign assets. Moreover, although it is less robust, we find a positive relationship between domestic economic growth and HNFC outflows. This points to the prevalence of portfolio growth factors, whereby higher savings and foreign exchange availability spur foreign asset accumulation.

Third, we also find a robust positive relationship between HNFC inflows and outflows for the accumulation of domestic financial assets by corporations in emerging market economies with the proceeds of foreign bond issuances. Besides the asymmetry between residents and non-residents in the impact of risk, highlighted by previous research, this might stem from portfolio growth factors or be part of a hedging strategy whereby residents acquire foreign assets as a means of mitigating exchange-rate risk.

Fourth, we fail to find any major indications of HNFC outflows being affected by domestic asset returns or risk, even after controlling for sovereign risk, sovereign debt ratings, exchange-rate expectations, inflation, etc. This leads us to conclude that, on average, HNFC outflows are relatively insensitive to considerations of optimal portfolio reallocation.

These results have implications for countries' external sustainability and financial stability. First, insofar as outflows grow primarily during phases of external and domestic expansion, their role as sources of balance-of-payments and foreign exchange market crises might go unnoticed or at least be underestimated. Second, since foreign inflows to the sector are at least partially matched by outflows,

these results should lead to a revised evaluation of the risks involved in corporate foreign bond issuances. In particular, financial and currency mismatch risks resulting from dollar appreciation and international credit tightening might be lower for firms with larger shares of foreign financial assets.

Lastly, additional research is needed to further clarify the following issues, among others: (i) the prevalence of "HNFC outflow-driven sudden stop" or "sudden flight" episodes in Latin America; (ii) the way the relationships documented here change during such episodes; (iii) the dynamics immediately before and after the implementation of different capital control measures, and particularly their impact on the relationships documented; and (iv) the specific response of outflows to different domestic crisis episodes, whether these are financial, fiscal, political or of some other kind.

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The weakening of the developmental State in Brazil: an analysis of the political economy of the 1970s and 1980s

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Abstract

This article analyses the weakening of the developmental State and the consolidation of neoliberalism in Brazil that took place through the reconfiguration of interests between social classes and groups, as part of the process of the return to democracy and the struggle waged to install a less exclusionary Constitution. It argues that, unlike in central countries, where the transition to neoliberalism had to do above all with containing the rise of the working class, in Brazil, it took the form of an anti-nationalization vision that gained strength from the late 1970s onward and was driven mainly by a repositioning and reconfiguration of power between different factions within the dominant class, amid growing and forceful external pressure to adopt neoliberal formulas.

Keywords

Economic development, development strategies, economic policy, economic reform, neoliberalism, peripheral capitalism, political aspects, economic history, Brazil

JEL classification

O1, O2, O4, O43, N1, N16

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I. Introduction

In the post-war period, interventionist policies came to be normalized both at the core of capitalism, where the "Keynesian-welfare state consensus" was forged, and on the periphery, where developmentalism was predominant. This was in the context of the Cold War, when developed countries' full employment and social protection policies and the industrialization and development of "backward" countries were partially justified by the capitalist system's need for legitimization vis-à-vis the advance of communism.

However, as the 1980s approached, this relative consensus around State interventionism began to crumble, ultimately to be replaced by a new hegemonic neoliberalism, most emblematically with the election of Margaret Thatcher in the United Kingdom and Ronald Reagan in the United States.

As has often occurred over history, many of the peripheral countries followed the lead of the developed world, albeit with some lag. Unlike in the developed world, however, where the process revolved around the need to contain the considerable strength that the working class had built up over years of full employment, wage increases and generous social benefits, in Brazil the advance of neoliberalism had more to do with the reconfiguration of power within dominant classes and factions amid growing external pressures to adopt neoliberal formulas. Although it was not the determining factor in the case of Brazil, the growing strength of workers' and social movements from the late 1970s onward did somewhat complicate the consolidation of hegemonic neoliberalism.

The origin of this process in Brazil may be traced to the second half of the 1970s. Amid shifts in the international scenario and Brazil's Second National Development Plan (II PND), inter-capitalist conflicts intensified and the bourgeoisie grew increasingly dissatisfied with the government, leading to the anti-nationalization campaign and the redemocratization movement, formalized in the "Documento dos oito".[1] Although the two movements had different aims, they both crucially sought greater access to government decision-making spheres, which had become more hermetic from 1974 onward.

Nevertheless, at least until the early years of the Sarney government, much of the industrial business community still supported developmentalist measures compatible with greater State interventionism, partly reflecting the strong alliances it had built up with economists in the Brazilian Democratic Movement Party (PMDB) of the University of Campinas (UNICAMP) amid the struggle for redemocratization.

However, after the failure of the Cruzado Plan and under increasing pressure from the central countries, broadly speaking even those domestic industrial sectors began to take clearer liberal stances. Thus, the anti-nationalization (and slightly later the neoliberal) vision that had been on the rise in Brazil since the mid-1970s became firmly rooted.

In economic theory terms, this vision was endorsed by macroeconomic orthodoxy, as well as by a liberal ideological fundamentalism applied to a whole slew of other economic policies (Bastos and Mello Neto, 2014) and reflected in work by economists mainly from the Rio de Janeiro headquarters of the Getulio Vargas Foundation, the University of São Paulo and, later, the Pontificial Catholic University of Rio de Janeiro (PUC-Rio).

At the same time, workers' and social movements had been on the rise since the late 1970s, which helped to secure important social benefits in the Constitution of 1988, at a time when the tendency around the world was just the opposite.

[1] A document signed and published on 26 June 1978 by 8 of Brazil's 10 foremost businessmen (according to a business survey by *Gazeta Mercantil* a year earlier) in which they set forth a series of demands, including a return to democracy. They were: Cláudio Bardella (former President of the Brazilian Association for the Development of Small Industries (ABDIB) and Chief Executive Officer (CEO) of the Bardella group), Severo Gomes (former Minister of Industry and Trade in the Geisel government and CEO of the Parahyba Group), José Mindlin (Director of the Federation of Industries of the State of São Paulo (FIESP) and CEO of Metal Leve S.A.), Antônio Ermírio de Moraes (CEO of the Votorantim group), Paulo Villares (former President of the Brazilian Institute of Steel and President of the Villares group), Paulo Vellinho (Director of the Brazilian Association of the Electrical and Electronic Products Industry, Vice President of the National Confederation of Industry and Director of the Springer Admiral Group), Laerte Setúbal Filho (CEO of the Duratex group) and Jorge Gerdau (Chair of the Board of Directors of Gerdau group) (Codato, 1995, p. 82).

This work seeks to analyse the complex transition process that culminated in the consolidation of anti-nationalizationism and neoliberalism in Brazil, within the framework of the return to democracy and the struggle to install a Constitution that would be less exclusionary from the social standpoint. The article is organized in five sections, including this introduction. The second section analyses the process of transition to neoliberalism in the central countries, as well as its main effects on the periphery of capitalism and in Brazil in particular. The third section discusses the intensification of inter-capitalist and class conflicts in the second half of the 1970s. The fourth analyses the consolidation of the anti-nationalization vision, in the framework of political opening and the Constituent Assembly. The fifth section offers concluding remarks.

II. International context

1. The transition to neoliberalism in central countries

The post-war period was characterized by the "Keynesian-welfare state" consensus that formed at the centre and the "developmentalist" consensus on the periphery, in the context of the Cold War and United States international dominance in the capitalist world. Along with the Bretton Woods system and its inherent dominance by the United States, other key features of the post-war institutional structure in the advanced countries were the Keynesian welfare-warfare state, trade unions with the power to negotiate wages and working conditions, and the new ideology of the Cold War (Mcdonough, Reich and Kotz, 2010).

Generally speaking, this context produced high growth rates and significant benefits for the working class, while keeping capital–labour relations relatively stable, at least until the mid-1960s. Towards the end of the decade, this relative stability waned and union militancy gained the ascendancy, student and social movements grew, and "social conformism" began to decline in the advanced countries.[2]

As a result, distributive conflict sharpened even as the pace of wage growth rose, leading to a rise in inflation even before the first oil shock, as nominal wage rises were passed through to prices, notwithstanding real wage gains held steady over the period (Serrano, 2004). As a result of this —and given that it was hard to increase nominal profit margins with United States nominal interest rates below the rate of increase in inflation— real profit margins and the profit share of income were squeezed, albeit to varying extents in different countries. This was before the rise in international commodity prices in 1972 and the oil crisis in 1973.

Some authors, such as Serrano (2004) and Cavalieri, Garegnani and Lucci (2004), argue that private investment levels appear not to be directly related to the profit share in income,[3] but do relate directly to the level and growth of effective demand.[4] Nevertheless, the compression of profit margins generates political consequences[5] that can indirectly —through economic policy changes supposedly intended to control inflation— reduce economic growth and push up unemployment, thereby weakening workers' bargaining power and improving the general conditions for profitability.

[2] This is seen in the outbreak of various conflicts in the developed world, including "May 1968" in France, the "Hot Autumn" of 1969 in Germany and Italy, and the prolonged miners' strikes in the United Kingdom in 1973–1974 (Korpi, 1991). The United States saw mobilizations against the Viet Nam War, the radicalization of black workers and unemployed youth, and an explosion of urban protests throughout the 1960s (Panitch and Gindin, 2012).

[3] See Serrano (2015) for a detailed critique of Kaleckian models that support profit-driven growth.

[4] At the end of the 1960s, despite the compression of profit margins, which sharpened distributive conflict and increased inflation, there was also an acceleration of output growth in the main industrialized countries (Serrano, 2004).

[5] As warned by Kalecki (1983).

Capitalist interests needed relatively high levels of unemployment to maintain low wages and workplace discipline. This they could achieve through their strong influence over government policies. These interests became increasingly explicit in official discourse from the late 1960s onward, to the point that in 1970 an economic policy report by the Organisation for Economic Co-operation and Development (OECD) came close to openly recommending letting unemployment rise as a solution to inflation and shrinking profit margins.[6]

According to Korpi (1991), the first oil crisis played a major part in justifying the adoption of contractionary policies, as something supposedly inevitable in response to an external event that was "neutral" from the point of view of the advanced countries' domestic politics. And, given the moderate reactions that ensued, it seemed that the desired increase in unemployment was not as politically dangerous as had been thought.

In economic theory terms, this discourse was supported by orthodox analysis from 1973 onward, according to which real wages were too high and their resistance to adjusting (downward) to the new conditions triggered by external shocks explained the higher level of unemployment. Moreover, many of these approaches began to be based on the notion that, at some point in time, the unemployment rate would be consistent with stable inflation (this principle is known as the non-accelerating inflation rate of unemployment). It was thought that the rate had begun rising in the early 1970s, such that the government had no choice but to accept higher unemployment in order to keep inflation stable (Korpi, 1991).

The oil crisis of 1973 intensified the already mounting distributive conflict and inflation, in addition to generating balance-of-payments problems for countries that were not issuers of reserve currencies. This ushered in a wave of contractionary macroeconomic policies, to differing degrees from one country to another, that would erode economic growth and gradually push up unemployment in advanced countries.

The environment of instability was further aggravated at the end of the 1970s, when Paul Volcker, Chair of the Federal Reserve System, unilaterally increased the United States interest rate in 1979. Added to the fallout from the recent second oil crisis, this pushed the world economy into a major recession (with a significant and steady increase in unemployment) and fuelled inflation (Serrano, 2004).

The counterpart to this was a visible reduction in real wage growth in the manufacturing industry over the period 1973–1982, especially in the United Kingdom and the United States, where it turned negative (Cavalieri, Garegnani and Lucci, 2004).

In this context, the influence of United States power as projected onto other countries in the capitalist orbit is significant. After the collapse of Bretton Woods in 1973, the crisis context reflected in the United States balance-of-payments deficit (with a current account deficit), stagflation, especially in Europe, and uncertainty regarding the new floating exchange-rate regime, was interpreted by some as resulting from the inability of the hegemonic power, the United States, to lead the international economic system. This is turn, was reflected in the weakening of the dollar (Gaspar, 2015).

However, despite increasing tensions between the major economic powers, United States dominance was never seriously challenged and was soon reestablished with the reconfiguration of its role in the international monetary system.

In this context, the consolidation of neoliberalism fed into the strategy of rebuilding the material foundations of the "American empire" and reestablishing the power of the dominant classes. The United States would go on to create the conditions for globalized capitalist accumulation by ensuring that other independent countries were structured as capitalist States, with the corresponding legal, juridical, bureaucratic and coercive institutions and practices (Gaspar, 2015). The transition to neoliberalism in the United States entailed, among other things, spreading and securing price stability and containing workers' and social movements, mainly in other advanced countries, in order to gradually restore the conditions for profitability.

[6] The report was entitled *Inflation: The Present Problem* and included analysis by influential policymakers (see Korpi, 1991, p. 335).

2. Effects of the neoliberal transition at the centre on the periphery of capitalism

The reconfiguration of power at the heart of capitalism, particularly in the United States, resulted in the formation of a nucleus of political power (the "Washington-Wall Street Complex" (Veneroso and Wade, 1998)) that represented the interests of internationalized capital —not only American, but broadly. This new coalition of interests, based on neoliberal ideals, was projected onto a new accumulation strategy and a new hegemony supporting internationalized capital, especially financial capital (Medeiros, 2010).

These transformations were largely felt in the newly industrialized countries. Through the complex relationship of internationally structured political forces, links —or even transnational networks— formed between the global and national economies, and out of these strategic alliances between external and internal agents (Diniz, 2001). In the configuration that took shape throughout the 1980s, national States became increasingly linked in with a supranational power system, in which transnational corporations were also gaining growing influence in structuring countries' domestic economic activities.

The pressure on peripheral countries was amplified —or outright enabled— by the external debt crisis and the discreditation of the "communist threat" amid the crisis occurring in the Union of Soviet Socialist Republics (USSR). Global economic institutions such as the International Monetary Fund (IMF), the World Bank and, a little later, the World Trade Organization became major channels for external interests to exercise liberalizing influence on peripheral countries.

In the case of Brazil, this became more evident starting in late 1982, when, unable to meet its external commitments, the country "submitted" to IMF.[7] Under IMF supervision, Brazil came under mounting pressure to adopt orthodox economic policies to reduce domestic absorption, and to review the development strategies of the national bourgeoisie and adapt them to the new demands of developed countries (Boito, 1999). This movement reflected the interests of the multinational bourgeoisie in the central countries, who saw in the spread of neoliberalism an opportunity to increase profitability, by exploiting the relative lag or structural heterogeneity of the peripheral countries.

The political opening then under way in Brazil should also be seen as a way of adapting to the new international economic order, in which the hegemony of international oligopolistic capitalism would be consolidated by means of "liberal democracy".

A number of the Geisel government's measures were already causing the United States some malaise with the dictatorial regime that country itself had helped to establish. In particular, the trade rapprochement with socialist countries such as China, Angola and Mozambique, the signing of the nuclear agreement with Germany, human rights abuses denounced by the Carter Administration, and the breaking of the military agreement with the United States (Maciel, D., 1999), which enhanced a nationalist perspective on the part of the Brazilian Armed Forces that was troubling for the United States. Brazil also made significant progress in developing its manufacturing industry and entering international trade, posing a minimal threat to the asymmetric dependence between the two countries.

The mounting external pressure towards the end of the 1980s contributed crucially to Brazil's adoption of liberalizing reforms based on the Washington Consensus. According to Medeiros (2010), as the macroeconomic regime and the pattern of international trade participation shifted, the interests of large companies became more clearly divorced from the national industrial strategies that were key to national developmentalism. In this new scenario, or partially displaced from their markets, many of the firms that had been fostered by the developmental State began to see new opportunities for profit, especially through the formation of joint ventures with multinational companies and engagement (or majority control) in large privatization ventures. Initially, then, cosmopolitan (dollarized) financial groups

[7] Given that the country depended on IMF approval in order to restructure its debt and obtain new loans.

and large corporations in general enthusiastically welcomed the pressure exerted throughout the 1990s by the United States, and the international organizations they dominated, to adopt neoliberal formulas (Medeiros, 2010).

However, external pressure notwithstanding, it is important to realize that the national ruling elites and their political support coalitions played a crucial role, in choosing both how Brazil would participate in the international system and the policies to be implemented (Diniz, 2001). This would depend on the correlation of forces between social classes and factions within Brazil.

The following sections explore the role of classes and class factions in Brazil throughout the transition process that culminated with the end of the civil-military dictatorship and, subsequently, the consolidation of neoliberalism.

III. Escalation of conflicts of interest in Brazil: 1974–1979

1. Inter-capitalist conflicts and bourgeois mobilizations during the Geisel government

The configuration of power forged by the 1964 civil-military coup remained relatively stable until the mid-1970s. At that time, conflicts of interest began to intensify, even among the dominant classes and groups that had supported the coup, partisan opposition to the military government mounted and labour and social movements gained strength.

However, although the II PND, adopted at the end of 1974, sought to shift the axis of economic growth towards capital goods and basic inputs —which companies in those sectors obviously welcomed with enthusiasm—, no major conflicts arose with other factions within the ruling class, at least among those involved in industry, when the plan was first launched. On the contrary, there was an apparent consensus regarding the possibility of continued growth under II PND (as opposed to the alternative of adjustment or deceleration) (Moraes, 2018).

It was only a little later that these conflicts seriously intensified. In early 1974 it was perceived that the Plan better served the interests of the domestic industry sectors,[8] but as the international scenario changed and was assimilated domestically, inter-capitalist conflicts sharpened and the benefit shifted towards liberal positions (which even part of the abovementioned domestic industrial factions had begun to adopt) that were more closely linked to transnational capital with greater options to seek profit in the financial sphere.

These segments favoured reducing foreign capital controls, freeing up the movement of capital and affording it greater flexibility.

The counterpart to this was gradual growth in the already visible importance of the financial sector in general (even within firms considered part of the productive sector) and, in particular, of the banking portions of capital (national or transnational). This process would be based on rising interest rates, stimulus for the formation of a capital market and the increase in public debt, in addition to the nationalization of private debt (Moraes, 2018).

[8] According to Moraes (2018), the domestic sector at the time comprised both traditional mass consumption companies and capital goods companies.

Although this trend would intensify at least until the mid-1980s, following the international tendency towards capital liberalization, much of the industrial business community still maintained positions compatible with the developmentalist ideology.

As Cruz (1992) points out, the main problem of II PND was that, although it initially enjoyed a strong base of support, its implementation suffered from over-fragmentation of powers in the attempt to reconcile the interests of different groups within the dominant class. The attempt to smooth over the conflicts between these groups made it difficult to ensure coherence between different measures. Cruz (1997) argued that the interest rate was a measure that produced much discord (between 1976 and 1977), particularly between the banking and industrial sectors, as it increased significantly in real terms between 1976 and 1978 (see Carneiro, 2002, p. 107, table 16). In the words of Dilson Funaro —a well-known representative of the industrial faction— in December 1976, Brazil was being turned into a usurer's paradise (Cruz, 1992, p. 53).

On a broader spectrum, these conflicts were reflected in the divergent stances of the Ministry of Finance (with Mário Henrique Simonsen as minister), more oriented towards short-term policies and somewhat biased towards containment, and the Planning Secretariat,[9] which was responsible for structural development programmes and, indeed, for II PND.

Be this as it may, dissatisfaction was mounting among the different factions of the bourgeoisie, and this translated into two movements that became iconic in the business world throughout the second half of the 1970s: the anti-nationalization campaign and, later, the campaign for redemocratization, formalized in the "Documento dos oito" (1978). Despite the dissatisfaction and disputes over specific issues at the time of II PND that brought different sectors of the ruling classes into conflict —such as the level of protection to be afforded to national industry, cuts in some infrastructure programmes (which reduced the demand for capital goods mainly from the private sector), the somewhat erratic economic policy, and the interest rate—, there seems to have been a broader and more crucial motivation behind these bourgeois movements critical of the Geisel government. That, as will be seen later, was the exclusion of these groups' access to the spheres of economic policy decision-making from 1974 onward (Codato, 1995).

(a) The anti-nationalization campaign

More organized demonstrations against nationalization seem to have emerged first in the liberal press (such as *Visão* journal and the newspaper *O Estado de S.Paulo*) and to have been fuelled, from mid-1975, by some business entities. In this first phase, the commercial and, in particular, the financial sector were the segments that seem to have aligned most explicitly with the campaign. At least initially, some sectors, such as the capital goods industry, appear to have opposed it, while others, such as heavy construction, were indifferent (Cruz, 1995).

At that time (1974–1976), the capital goods sector and small and medium-sized companies operating in the domestic market participated little or not at all in the anti-nationalization campaign, as it ran contrary to their interests, i.e. they were demanding precisely greater incentives and protection from the State (Moraes, 2018).

At first, in 1974 and 1975, nationalization was not a recurrent topic for the Federation of Industries of the State of São Paulo (FIESP) either (Moraes, 2018). However, from 1976 onward, mentions of nationalization became much more frequent and took on a different tone, not only within FIESP, but also in São Paulo's business community in general, at least until the end of the Geisel government. Criticism of alleged over-nationalization became one of the main themes of FIESP publications.

[9] Headed by João Paulo dos Reis Velloso.

Reference was made in particular to the "gigantism" of State companies, the large increase in the tax burden,[10] government interference in price-setting (especially price control through the Interministerial Price Council), monopoly over the collection and allocation of savings (through the Social Integration Programme/Civil Servant Investment Programme of the National Bank for Economic and Social Development (BNDES))[11] and increasingly centralized conduct of economic policy. Among other things, they also opposed competition from State-owned companies in sectors where private initiatives would be viable with government incentives. Further, they demanded the privatization of some State-owned companies and stronger private sector representation in economic policy decision-making spheres (see more detail in Moraes, (2018, p. 164)).

In relation to the argument over State enterprises, the works of Rodrigues (1990) and Abranches (1977) consistently show that their performance could hardly compete with private ventures and, in most cases, even complemented and supported the development of private enterprise.

In fact, as shown in Codato (1995), the last point —the desire for stronger representation in government decision-making spheres— seems to have been one of the main motivations of the campaign against nationalization. Since the administrative reform of 1974, which centralized and concentrated real power over policy formulation and management at the top of the State apparatus,[12] this theme made a frequent appearance in business announcements, particularly those criticizing the "over-nationalism" of the economy.

It bears mentioning that, as discussed in section II, the interventionist policies typical of the period after the Second World War were already weakening at the international level too.

(b) The "Documento dos oito"

As noted earlier, as the second half of the 1970s progressed, the Geisel government no longer seemed capable of reconciling the various, often contradictory, interests of the factions of the ruling class that had initially supported it. It was in this context that movements began to emerge within the bourgeoisie in favour of ending the regime and returning to democracy. This is exemplified by the "Documento dos oito," in which a key player was the Brazilian Association for the Development of Small Industries (ABDIB) itself, which had been one of the government's main support bases during its early years.

Indeed, according to Brandão (2007), the relationship between ABDIB and the Geisel government ran through three stages. In the first, throughout 1974, ABDIB offered unconditional support for the government's measures (with an ABDIB-Geisel government alliance). In the second, between 1975 and 1976, ABDIB began to adopt a more critical position towards the government. By the third, between 1977 and 1978, the Association stepped up its criticism of the government, alleging failure to comply with guarantees to the sector, after the government announced cuts in infrastructure investment programmes and the revision of some goals of II PND. These criticisms culminated in the "Documento dos oito", which would mark the rupture of the alliance between ABDIB and the Geisel government.

In fact, idle capacity in the capital goods sector increased over the period and output growth, which had been quite satisfactory from 1974 to 1976 (13% per year), slowed heavily between 1977 and 1980 (3.4% per year) (Carneiro, 2002).

[10] Interestingly, the gross tax burden remained constant between 1974 and 1975 (at 25.1% of GDP), while the net tax burden fell from 16.3% to 15.7% of GDP in that period (Carneiro, 2002, p. 101). The reference may have been specifically to cuts in subsidies, which fell from 2.7% of GDP in 1975 to 1.6% in 1976 (Carneiro, 2002, p. 101).

[11] Although BNDES allocated most of its resources to the private sector, there was criticism of the fact that the government had the power to prioritize lending to some sectors, limiting the access of others.

[12] Furthermore, this reform, which aimed to rationalize policy formulation and management, also led to major changes in the structure of federal organizational and to the introduction of decision-making mechanisms and routines. The creation, in mid-1974, of the Economic Development Council, centralizing decision-making in economic policy matters, was typical of this (Codato, 1995).

More generally, most of the signatories of the "Documento dos oito" belonged to the capital goods sector and all of them were representatives of monopolistic factions of the national bourgeoisie or identified with their positions.

They included Severo Gomes (former Minister of Industry and Commerce and an overt defender of national industry), who had been replaced in that portfolio in 1977 by a banker (Ângelo Calmon de Sá), who was keen to open the economy to multinational capital, even in the hitherto relatively protected capital goods sector. To an extent, this change already reflected a radical shift in the balance of power —away from the nationalist industrial stance— that was projected onto the State apparatus (Maciel, D., 1999) and added to the reasons for dissatisfaction with the government on the part of ABDIB.

The demands for return to democracy and against the prevailing dictatorial regime were evident, for example, in the following passage from the "Documento dos oito":

> We believe that economic and social development (...) will only be possible within a political framework that allows broad participation by all. And there is only one regime capable of promoting the full expression of interests and opinions, while also being flexible enough to absorb tensions without transforming them into an undesirable class conflict: the democratic regime. Furthermore, we are convinced that the system of free initiative and the market economy are viable and sustainable in Brazil, if we are able to build institutions that protect the rights of citizens and guarantee freedom (*Folha de S.Paulo*, 1978a, p. 20).

It should be noted that, despite different initial coalitions of interests (albeit some intersecting) between factions of the business community, the main objective of both the anti-nationalization movement and the bourgeois redemocratization movement seemed to be to increase their official involvement in government decision-making spheres, after these had become more closed off with the administrative reform of 1974 (Codato, 1995). It was under this generic banner that the two distinct factions came to be confused from 1977–1978 onward. This is evident from the statement by prominent leaders of the anti-nationalization campaign (see Codato (1995)) and, with regard to the bourgeois redemocratization movement, particularly in the Rio de Janeiro Charter, approved by the Fourth National Conference of Producing Classes,[13] and in the "Documento dos oito",[14] in which:

> The implementation of an industrial policy under the model we are advocating requires active participation by the business community in its development. The bodies responsible for formulation of the policy must include representatives of industrialists, who will thus be able to contribute their experience and knowledge to the design of the main policy lines, without interfering in administrative decisions (*Folha de S.Paulo*, 1978a, p. 20).

Although the two documents mentioned both advocated democracy, they indicated that the main path to achieving it was a programme to restore corporate influence in the economic policy decision-making process. Accordingly, although the reference was to democratization, the support of some bourgeois factions had little to do with values of citizenship and social inclusion, although in the "Documento dos oito" they also called for reducing social inequality, inasmuch as it represented a threat to the stability of the system they dominated or to social stability, as they put it, and for increasing the demand for certain industrial products (*Folha de S.Paulo*, 1978a). It will be recalled that by then the first strikes of metalworkers had already broken out in São Paulo ABC and had spread, albeit to a lesser extent, to other industries, as will be seen later.

The following excerpt from José Mindlin, Vice President of FIESP and one of the signatories of the "Documento dos oito", speaks to this point:[15]

[13] Held in November 1977 (Codato, 1995).

[14] Some anti-nationalization tendencies were apparent in the document, although it did not use the standard anti-nationalization rhetoric.

[15] As does the position of Theobaldo de Nigris, then President of FIESP, originally published in *Jornal do Brasil* (1978, p. 18).

> The question of selectivity [in economic policy decisions] (...) should be addressed by a high-level government body. (...). But it should involve representatives of the private sector, of recognized competence and public spirit, in addition to the government. Decisions should be made public as necessary, and the body should always function with open doors (Mindlin, 1978, cited in Codato, 1995, p. 83).[16]

Furthermore, the preparation of the "Documento dos Oito" involved prominent opposition economists, which may have been their first link with the business community in the struggle for democracy. Although it is hard to gauge the degree of these economists' influence on the document, the "benevolent" tone of the business community must also be understood from that point of view, as it at least partially expressed the opinion of traditionally progressive sectors.

2. Growth of labour and social movements

While the social tenets of the "Documento dos oito" partially reflected the progressive vision of the opposition economists involved, they also reflected the fact that the labour and social movements of the time were gaining strength.

The need to contain a supposed over-strengthening of the working class, as in several central countries, may not have been a determinant of the process that would culminate in the transition to neoliberalism in Brazil. Popular struggles did intensify, however, which made the processes of leadership and the construction of hegemony more complex (Fontes, 2010, p. 227).

As the direction of State policy became more distanced from the interests of certain factions of the ruling class, the government moderated its measures in support of the working classes (Saes, 2001). It was in this context that the strike movement broke out, mainly in São Paulo ABC. These mobilizations achieved greater union freedom, changes in wage policy and the right to strike, and fuelled the gradual process of political opening already taking place (Sader and Sandroni, 1980).

Discontent in the business community became evident. At first, some sectors of FIESP were in favour of wage increases, with a view to increasing demand for their products. However, from 1979 onward, the Federation broadly adopted a more critical stance, to the point that its guidance to its members in 1979 included not paying strike hours, firing strikers and exposing the workers involved to State repression (Bianchi, 2004).

However, while great discontent prevailed among the working and popular classes in the late 1970s and early 1980s, their chronic disorganization, much of it stemming from official (State) unionism, prevented workers from obtaining greater benefits and influence in the State (see Boito (1991) and Saes (2001) in this regard).

Be this as it may, the workers' movements and most of the social movements that emerged from the late 1970s onward were grass-roots in nature and thus represented a source of counter-hegemonic resistance. In addition to grass-roots ecclesial communities, these social movements included neighbourhood associations, small associations against racism, sexism and authoritarianism, as well as non-governmental organizations working for redemocratization (Fontes, 2010). Another prominent movement that gained strength from the second half of the 1970s was the pro-health-care movement, which saw some of its demands met in the Constitution of 1988.

[16] Originally published in *Folha de S.Paulo* (1978b, p. 19).

IV. Transition in the 1980s: strengthening the anti-nationalization vision within the framework of political opening and the Constituent Assembly

1. Alliance of "critical economists" and factions of industrial business: the resilience of developmentalism

Following the intensification of inter-capitalist and class conflicts in the second half of the 1970s, the 1980s formed a transitional period culminating with the consolidation of a new configuration of power and institutions.

The link between opposition economists and the business community was strengthened in the early 1980s, when they entered into employers' circles in greater numbers and relations between the two became closer and more formal (Cruz, 1992). This was the case of FIESP, which brought prominent opposition economists, such as Luiz Gonzaga Belluzzo and Luiz Carlos Bresser-Pereira, to serve on its recently established Higher Council of Economics.[17]

The studies and proposals produced by the Council were issued in the FIESP monthly journal (1974–1985), *Indústria e Desenvolvimento.*[18] Although the journal's publications and the positions of FIESP followed different tendencies in the first half of the 1980s, in general the movement went from some support for more interventionist policies, which ensured relatively high growth, to a more liberal stance that was critical of the interventionist State, as the crisis continued and worsened (Moraes, 2018).

This is not to say that the heterodox economists on the Higher Council of Economics of the FIESP at that time, in particular Belluzzo, supported the more liberal position. The Council was quite a heterogeneous body, as may be seen in the choice of economists with such distant visions as Belluzzo and Simonsen, not to mention business leaders of different stances. In the early 1980s, Mello and Belluzzo (1983, p. 20) still openly criticized the anti-nationalization campaign and insisted on the importance of State-owned enterprises for driving economic growth.

There was, nevertheless, a rapprochement between opposition economists and business sectors who openly protested against supposed over-nationalization and argued that the private sector should take the lead in the process of economic development or growth.

There were still members of the wider business community with a more developmentalist outlook in 1983, possibly reflecting (at least in part) the link that was developing with opposition economists. This was made evident in what became known as the "Documento dos doze"[19] of that same year, containing proposals by the business community that were again very close to those of the "critical economists" affiliated with the Brazilian Democratic Movement Party. So much so that that Bresser-Pereira

[17] By early 1982, Belluzzo was already a member of the FIESP Higher Council of Economics, according to an editorial in *O Estado de S. Paulo* (1982, p. 3). In addition to various businesspeople, the council also included, on the side of economists, Adroaldo Moura da Silva and Mário Henrique Simonsen.

[18] These journals are available for consultation in their entirety at the National Library in Rio de Janeiro.

[19] Like the "Documento dos oito", it comprised a set of proposals and demands signed by 12 of the most influential businesspeople at the time (elected at the forum of business leaders organized by the *Gazeta Mercantil* in 1983), many of whom had also signed the first document.

(1983, p. 1) stated that, in the economic sphere, the document reproduced almost all the positions and proposals of the Party economists and leaders of and that the Party document published a year earlier as an alternative economic policy, "Esperança e mudança" ("Hope and change"), was closely related to the "Documento dos doze".[20]

In line with the "Documento dos oito", the "Documento dos doze" also testified to the need for redemocratization. It should be clarified that this did not mean a break with the military, nor that these factions of the business community (with positions compatible with the developmentalist ideology) were essentially against the civil-military regime or authoritarian regimes in general. According to Dreifuss (1989), rather than a break with the military, they sought a realignment of sectors that would enable and channel the transition process that had originated within the dominant system itself.

The "liberal democracy" option was not only seen as a way to expand the influence of these bourgeois segments in decision-making spheres after they had become shut off under the Geisel government, but it also followed the movement taking place in the central countries, by adapting to the interests of transnational capitals based there.

In practice, before the anti-nationalization vision became predominant across almost all business segments, two opposing discourses could be distinguished: one neoliberal and the other developmentalist. The two merged in the mid-1980s in the midst of the economic crisis and the succession issue and both had the support of parts of the business community.

The first group included leaders linked mainly to agroexports and the commercial and financial business community, and also included organic intellectuals, many of whom had worked in military governments and most of whom had academic ties to the Faculty of Economics at the University of São Paulo or the Getulio Vargas Foundation, in Rio de Janeiro. They were already discussing topics that were at the heart of capitalism after the rise of Thatcher and Reagan, such as deregulation, privatization and capitalist growth driven by innovative business, free from state tutelage (Sallum, 1996; Bianchi, 2004). To promote these ideas, a number of businesspeople in Rio de Janeiro created what they called the Liberal Institutes in 1983. Although they did not identify as business associations —but as civil associations— they were mainly established and financed by members of the business community, especially the financial sector (Dreifuss, 1989; Bianchi, 2004; Boito, 1991).

By then, the major banks were identifying with neoliberal ideology and measures and trying to convince other factions of the bourgeoisie. The National Federation of Banks and the Brazilian Federation of Banks lobbied the Figueiredo government for privatization and trade opening, among other neoliberal measures (Boito, 1999).

The argument for developmental measures, meanwhile, came largely from economists in the Brazilian Democratic Movement Party at UNICAMP and found support mainly from domestic industry sectors (Cruz, 1992). With the departure of Dornelles from the Ministry of Finance (in August 1985) and the entry of Dilson Funaro, the Party economists began to gain more ground within the government. They included Cardoso de Mello and Belluzzo, who headed the Ministry and had already worked at the Planning Secretariat and at the São Paulo State Treasury (between 1969 and the early 1970s) under Funaro. Funaro, himself a businessman, always maintained strong ties with FIESP, of which he had been Vice President. As a result, relations grew closer at that time between some "critical economists" and business sectors that had always enjoyed greater or lesser representation in government spheres.

Although there was developmental discourse within the government, as set forth in the document "A nova política industrial da Nova República" of December 1985, which was consistent with developmentalist precepts and based on the work of more heterodox economists, the measures it proposed were barely

[20] The Editorial Board of the Brazilian Democratic Movement Party document (1982) "Esperança emudança", from October–November 1982, included João Manuel Cardoso de Mello, José Serra and Maria da Conceição Tavares.

implemented at all. In June 1987, the "new industrial policy" was explicitly rejected by Sarney (partly as a response to the failure of the Cruzado Plan, supported by the aforementioned heterodox economists) and the new proposals that emerged began to align increasingly with more neoliberal formulas.

In economic theory terms, the starkest divergence between the two main groups of economists behind the economic policy of the Cruzado Plan —those of UNICAMP and those of the Pontificial Catholic University of Rio de Janeiro (PUC-Rio)— also dates to this period. This became especially clear at the Carajás meeting, convened in June 1986 to discuss the difficulties encountered by the Plan. No consensus was reached: the UNICAMP economists argued for the establishment of a holding company to centralize public investments and thereby resume the path of sustainable growth, while the PUC-Rio economists focused on the need for measures to contain demand (Bastos, 2001).[21] From then on, the classical orthodox recipe book —whose effectiveness had been considered limited in the early PUC-Rio formulations, which were based on the theory of inertial inflation— came to form the core of PUC-Rio economic analyses, as would be exemplified in the construction and execution of the Real Plan. This was to be bolstered by a liberal ideological fundamentalism underpinning a whole battery of other economic policies (Bastos and Mello Neto, 2014), which cemented the role of these economists —and others mainly from the Rio de Janeiro headquarters of the Getulio Vargas Foundation and the University of São Paulo— as the organic intellectuals of neoliberalism.

In a sense, the Cruzado Plan could be seen as a turning point: from then on, even the domestic industry sectors that had supported the Plan[22] and generally bought into the more developmentalist views of the "critical economists", became increasingly convinced by the neoliberal vision that was gradually taking shape.

2. Consolidation of the anti-nationalization vision within the framework of political opening and the Constituent Assembly

Following the failure of the Cruzado Plan (and of the Cruzado II Plan), most of the industry sectors that had maintained a vision more or less compatible with developmental interventionism distanced themselves from the government. They explicitly voiced their discontent and called for new paths that would prioritize the "market economy" over State dirigisme. This was set out in a letter to Sarney, signed by the new president of FIESP, Mario Amato, and several other business figures, in January 1987:

> (...) feels that the time has come to think about a reordering of the Economic Stabilization Programme, replacing the directed economy regime with a market economy, and the bureaucratic will with a system of free competition and efficiency (Amato and others, 1987, p. 4, cited in Bianchi, 2004, p. 199).

It will be recalled that by that time neoliberalism was fairly entrenched in the heart of the capitalist sphere, particularly in the United Kingdom and the United States, and that it was having a growing influence on Brazil and peripheral economies in general, on several fronts, not least through global economic institutions such as IMF, in the context of external debt renegotiation. Under IMF supervision, the national industry bourgeoisie was increasingly pressured to revise its development strategies and adapt to the emerging demands of developed countries. An example of this sort of external pressure was the Reagan Administration's demand that Brazil liquidate the market reserve for the national informatics industry (Boito, 1999).

[21] Bastos (2001) also notes that it was strange that no group focused on the key problem, which was the deterioration of the external accounts and its impact on the progress of the plan, and thus on its capacity to stabilize the economy.

[22] For example, industry leaders from FIESP and the Israeli Federation of the State of Rio de Janeiro.

The debates that took place in the Constituent Assembly showed, even more clearly, the divergence of the domestic industry bourgeoisie from the developmentalist vision of the "critical economists" and the gradual construction —although not the completion— of a neoliberal alternative. This agenda became increasingly consensual towards the 1990s and brought together the factions of the industrial, commercial, agrarian and financial bourgeoisie (Bianchi, 2004).

The book produced by FIESP (1990) *Livre para crescer: proposta para um Brasil Moderno*, which was based on the debates between economists from the Higher Council of Economics and guest academics between May 1989 and January 1990, is emblematic of this process. It was prepared mainly by liberal economists (many from the Faculty of Economics at the University of São Paulo) and quite explicitly proposes measures such as the privatization of State companies and services, as well as market opening to imports. It also attributes the crisis of the time mainly to State gigantism and inefficiency and the high degree of economic autarky, in line with the diagnosis of the Collor de Mello government (Bianchi, 2004).

The liberalizing reforms based on the Washington Consensus sealed the decline of State involvement in the economy and the pre-eminence of neoliberalism in Brazil. The factions of the dominant classes that were able to tap into this new framework, by partnering with large transnational groups, began to act as a source of resistance to developmentalist policies that sought to increase national autonomy and reduce structural heterogeneity. The argument for strictly industrial interests was increasingly limited to sectors that were more dependent on the domestic market and were less equipped to seek profit in the financial sector in partnership with international capital. From that point on, it may be argued that the interests of large companies broke away from the national industrial strategies that were central to national developmentalism (Medeiros, 2010).

Despite this new coalition of interests, the Constitution of 1988 enshrined major social benefits, at a time when most central countries were moving in the opposite direction. The institution of a universal health system (*Sistema Único de Saúde*) is an emblematic accomplishment in this regard.[23]

This seems to reflect both a vacuum in the political organization of the right and the "*Centrão*", and the strengthening of social movements, especially since the end of the 1970s. To the first point, the fragmentation of interests and partisanship on the right and at the centre of the political spectrum hindered systematic political consensus-building, thereby somewhat limiting the business community's ability to materialize its demands in the Constituent Assembly (Dreifuss, 1989).

As noted earlier, this constraint and the social benefits enshrined in the 1988 Constitution largely reflected the strengthening of labour and social movements from the second half of the 1970s onward.

The class struggle of the labour and social movements was made explicit and intensified at the national level by the formation of the Workers' Party (PT) in 1980, the Central Workers' Union (CUT) in 1983 and the Landless Rural Workers' Movement (MST) in 1984.

The strike movement underwent some retrenchment at the start of the 1980s, but quickly returned to the fore between 1983 and 1984 and gained strength steadily until 1989, with positive effects on real wages in some sectors. This reflected greater bargaining power of the most organized segments of labour, but not of the lower-skilled sectors, which remained limited in their ability to protect wages against inflation (Pinto, 2019).

The grassroots ecclesial communities also played a crucial role in configuring the social struggle in the 1980s, by setting up and consolidating a popular grassroots movement that originated during the military dictatorship. As noted earlier, in addition to grassroots ecclesial communities, other social

[23] Other important measures adopted were the reduction of the working week to 40 hours and stable employment after a 90-day trial period, which were two of the unions' main demands (Maciel, M., 1999).

movements that arose at that time included neighbourhood associations, small organizations opposed to racism, sexism and authoritarianism, and non-governmental organizations that opposed the dictatorship (Fontes, 2010).

In the specific case of health care, the growing demands by opposition movements and parties, as well as by a more targeted movement in this sector, had positive impacts on the expansion of the public system during the military period. They also changed the way health care was perceived, thereby the foundations for the 1988 reform towards universalization.

Although labour and social movements grew in strength and contributed to political opening and, later, to the social benefits enshrined in the Constitution of 1988, they seem to have played a less prominent role against nationalization and in the erosion of developmentalism, at least directly. They may have contributed indirectly, however, if only by representing a vision that part of the bourgeoisie —which was in favour of the anti-nationalization movement— began to adopt opportunistically in the effort to gain more power in government decision-making spheres and expand free enterprise.

V. Concluding remarks

The article has attempted to show that the process by which developmental interventionism weakened and neoliberalism became consolidated in Brazil was quite complex and involved a series of domestic and external factors. Accordingly, the outcomes were not always self-evident or consistent.

On the one hand, as is often the case, the process was highly influenced by the movement at the core of capitalism, and specifically by the pressure it exerted, which reflected the interests of multinational companies and broader geopolitical interests.

Domestically —although not independently— the anti-nationalization stance began to take shape more visibly in the business community and the media after the mid-1970s, after government decision-making spheres became more shut off. Even so, until the failure of the Cruzado Plan, large parts of the bourgeoisie —especially in the national capital goods sector— supported more interventionist measures, such as those proposed by the "critical economists".

The alliance between these two groupings was strengthened by the struggle for redemocratization, albeit the underlying motivations were essentially different. Whereas, for the business sectors involved, support for redemocratization was linked to the desire for greater influence in government decision-making spheres (as was made explicit in the anti-nationalization campaign), for the "critical economists", it had to do with the quest for a democratic and egalitarian society.

Be this as it may, towards the late 1980s, it was virtually a consensus in the business community that the economy was over-statist and economic growth could only be recovered by liberal reforms that would "pave the way" for the private sector to assume the lead.

Moreover, although the most pressing driver of the transition to neoliberalism in Brazil was not the desire to prevent an excessive rise of the under-classes —as was the case in the central countries— workers' and social movements did gain considerable strength from the second half of the 1970s onward. This, in turn, largely explained the materialization of important social benefits in the Constitution of 1988, when the tendency in other parts of the world was a reduction, or at least a standstill, in the social rights established in the post-war welfare states.

Thus, the broad outcome of the shift to neoliberalism in Brazil was the transition to a democracy with strong vestiges of the civil-military dictatorship, a Constitution marked by very varied interests, but with important social advances and, later, the consolidation of a new hegemonic form of neoliberalism that rearranged positions of power within the dominant classes, and between the dominant and dominated classes.

In economic theory terms, the counterpart to this was the rise of orthodox macroeconomic views, driven above all by authors linked to the University of São Paulo, the Rio de Janeiro headquarters of the Getulio Vargas Foundation, and Pontificial Catholic University of Rio de Janeiro, who served as organic intellectuals of neoliberalism.

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Inflation-targeting systems and exchange rates: the role of global financial variables in emerging economies

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Abstract

In this article the authors seek to determine whether global financial shifts are more costly for emerging economies that have adopted an inflation-targeting system than they are for countries that have no such system in place. The countries' exchange rates and the volatility of those rates are used as yardsticks for measuring these costs. The authors' findings indicate that, if a country adopts an inflation-targeting system and witnesses an increase in foreign capital inflows, it may experience a greater currency depreciation and less exchange rate volatility than a country without such a system. When the world interest rate rises, however, emerging economies with inflation-targeting systems experience greater exchange rate volatility than their counterparts that have no targeting system. In addition, the adoption of an inflation-targeting system by an emerging economy may result in a reduction in the exchange rate pass-through to domestic prices.

Keywords

Economic conditions, inflation, foreign exchange rates, capital movements, monetary policy, international monetary situation, emerging markets, developing countries, mathematical models

JEL classification

E58, F31, F40

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I. Introduction

Currency appreciations and depreciations affect the economic performance of all countries. When an exporting country's currency declines in value, its goods and services become less expensive for importing countries, and the demand for the exporting country's products and its earnings will rise (Kumar and others, 2019). Ever since the introduction of floating exchange rates following the collapse of the Bretton Woods system of fixed exchange rates in 1970, exchange rate volatility and its effect on macroeconomic variables have been a cause of concern for policymakers (Nandwa and Andoh, 2008). These authors contend that exchange rate volatility tends to be persistent and distorted in developing countries because their underdeveloped financial markets have few ways of minimizing risk.

Some countries with floating exchange rates employ inflation-targeting systems in which the central bank's main job is to control short-term interest rates. Meeting other types of targets or goals for the exchange rate or even for economic growth as a whole are not seen as falling within the domain of monetary policy (Central Bank of Brazil, 2016). The use of inflation tolerance bands enables central banks to adjust to shocks, albeit within a limited range of action in order to avoid undermining the credibility of the inflation-targeting system (Central Bank of Brazil, 2016). It is not known, however, to what extent the use of an inflation-targeting system limits or actually reduces policymakers' manoeuvring room when the need arises to manage an external monetary shock's impact on the economy.

The object of this study is to determine whether the emerging economies with an inflation-targeting system that have been selected for this study experience a steeper depreciation of their currencies and greater exchange rate volatility in the presence of changes in global financial variables than other emerging economies. As noted by Gersl and Holub (2006), it may be in countries' best interest to adopt mechanisms for controlling the exchange rate as a means of coping with exogenous shocks.

This study is focusing on emerging economies for a number of reasons. The adoption of an inflation-targeting system is a challenging undertaking for any country, but especially those with emerging economies whose monetary policy approach entails building credibility and reducing inflation while simultaneously dealing with their greater vulnerability to economic shocks (Minella and others, 2003). Emerging nations often differ from industrialized countries in terms of their institutional structure (especially those facets of it that relate to the central bank's credibility and political independence), inflation, their macroeconomic history and their financial markets' level of development (Aizenman, Hutchison and Noy, 2011). The advantages of having an inflation-targeting system include its transparency and the fact that it is readily understandable for the public at large (Mishkin, 2000).

Since the early 1990s, many emerging markets have adopted inflation-targeting systems even though, according to Amato and Gerlach (2002), the preconditions for the operation of such systems are not yet in place. These authors argue that, mainly because of emerging economies' financial structures, the role of the exchange rate should perhaps be given more importance in those economies than it has been. In emerging markets, inflation targets have been set at higher levels than in developed countries that have adopted this system. One of the reasons for this is that emerging economies are generally less committed to their inflation-targeting system than more advanced countries are, since, in the final analysis, it is more difficult for emerging economies to avoid overshooting their inflation targets given their more volatile macroeconomic environment, weaker institutions and less sturdy credibility (Fraga, Goldfajn and Minella, 2003).

The impacts of global financial variables on countries' performances are delineated in the literature. Bhattarai, Chatterjee and Park (2020) have shown how uncertainty in the United States ties in with exchange rate depreciations and reduced capital inflows in emerging economies. They discuss how the outflow of capital from emerging markets that occurs in the presence of an uncertainty shock

—as investors pull out of those markets because they perceive them to be riskier than the United States market— triggers a depreciation of those countries' exchange rates. Along the same lines, Azad and Serletis (2020) have demonstrated that positive monetary policy shocks in the United States tend to lead to an appreciation of emerging economies' exchange rates, while negative shocks tend to cause their exchange rates to depreciate.

The relationship between inflation-targeting systems and exchange rate volatility has been traced in various studies. According to Schmidt-Hebbel and Tapia (2002), the nominal exchange rate in Chile, which has an inflation-targeting system, is not more volatile than in other countries with a flexible exchange rate regime. Galí and Monacelli (2005), however, argue that the combination of inflation targets and a floating exchange rate system can heighten exchange rate volatility, which can therefore be regarded as one of the costs of having an inflation-targeting system.

Rose (2007) has shown that countries with inflation targets experience less exchange rate volatility and less frequent "sudden stops" of capital flows than similar countries that do not use inflation targets. Prasertnukul, Kim and Kakinaka (2010) have found no evidence that the adoption of an inflation-targeting system spurs an increase in the volatility of the nominal exchange rate. Meanwhile, Berganza and Broto (2012) contend that inflation-targeting systems do lead to greater exchange rate volatility than other types of systems and advocate for the use of a flexible inflation-targeting system. Lastly, Plessis and Reid (2015) classified countries with inflation-targeting systems according to whether they had a high or a low inflation target and found that countries with higher targets witnessed greater exchange rate volatility.

Clearly, then, there is no consensus about the nature of the relationship between inflation-targeting systems and exchange rate volatility, and further research concerning that relationship is therefore warranted. This study seeks to delve into that relationship while also taking the role of global financial variables into account. It has not yet been determined whether this approach has been used before. The empirical structure of this study takes three types of global financial changes into consideration (the world interest rate, the supply of foreign capital and external uncertainty) in order to capture the effects of the main sources of volatility and establish which of them is the most detrimental. It will also analyse the impact of the level of the exchange rate and its volatility and the pass-through of the exchange rate to the domestic price index of countries with an inflation-targeting system. The aim is to determine the relevance of the role of the exchange rate in emerging economies with inflation-targeting systems.

Different experts classify emerging countries in different ways, and the dividing line between emerging and developing economies varies as well (Duttagupta and Pazarbasioglu, 2021). This study focuses on both the level and the volatility of the exchange rate and excludes countries with fixed exchange rates or dollarized economies. Based on the data and classification system used in the *World Economic Outlook* of the International Monetary Fund (IMF), this study applies to 26 emerging economies, 17 of which have adopted an inflation-targeting system while the remaining 9 have not. The analysis covers the period between 1995 and 2019. This date range was chosen in order to avoid periods during which some of the countries in the sample suffered from hyperinflation,[3] which was especially a problem in Latin America.

In addition to this introduction, the study is composed of another four sections. The second section reviews the literature on the subject; the third deals with methodological aspects; the fourth presents and analyses the results; and the fifth offers a number of conclusions.

[3] Countries in the sample that weathered periods of hyperinflation during the 1980s and 1990s included Brazil, Chile and Peru.

II. Inflation-targeting systems, flexible monetary policies, exchange rates and exchange rate pass-through

Amato and Gerlach (2002) have listed the main conditions that they feel should be present in order for a country to adopt an inflation-targeting system. That list includes an independent central bank, a solid fiscal policy and an economy that is able to withstand variability in the exchange rate and interest rates. According to these authors, the role of exchange rates may be more important in emerging economies owing chiefly to such countries' financial structures.

Exchange rate volatility is also a subject of debate in the literature. Devereux and Lane (2003) have stated that, in developing countries, strong financial linkages with a creditor country (in the form of portfolio debt or bank loans) are associated with a lower level of bilateral exchange rate variability. Foreign exchange markets can be influenced by monetary shocks (interest rates), financial shocks (national stock indexes) and real shocks (industrial production). In addition, some experts have contended that making greater transparency one of the objectives of national monetary policy reduces bilateral exchange rate volatility (Eichler and Littke, 2018).

Global financial cycles can also help to shape monetary policy and, by extension, inflation-targeting systems. Borio (2012) has characterized global financial cycles as entailing self-reinforcing interactions between perceptions of risk and value and attitudes towards risk and financing constraints. One of the first authors to take a close look at the impact of global financial cycles was Minsky (1986 and 1991), who said that financial interaction among economies within a specific kind of institutional structure involving the full liberalization of international finance can lead to the emergence of hedging, speculative and Ponzi financial postures. When Ponzi financing prevails, financial shocks will inevitably be generated that will have repercussions on these economies owing to their intensive financial interactions, all of which will mainly impact the exchange rate and monetary policy.

According to Rey (2015), the capital flows associated with the global financial cycle link up national economies and establish a hierarchy among them. She contends that the monetary policy of the United States plays a pivotal role in shaping these global cycles and influences the volume and direction of capital flows in ways that have a profound impact on macroeconomic variables. She also emphasizes that the global financial cycle is not aligned with countries' specific macroeconomic conditions, especially those on the periphery, and that it transforms the macroeconomic policy "trilemma" (floating exchange rates, free capital mobility and independent monetary policies) into an "irreconcilable duo" or dilemma, whereby independent monetary policies cannot be reconciled with free capital mobility.

Soe and Kakinaka (2018) have looked at how inflation-targeting systems affect exchange rate depreciation and changes in international reserves. They find that inflation-targeting systems help to stabilize the pressure on developing countries' exchange markets and international reserves while not affecting exchange rate volatility significantly. The present study is working along much the same lines, although it also considers the role of global financial variables in evaluating the impact of inflation-targeting systems on the level and volatility of the exchange rate.

The analysis of the data indicates that financial shifts have a significant impact on the level and volatility of emerging economies' exchange rates. In order to determine just how strong their impact is, the exchange rate pass-through approach is used. The effects of exchange rate movements are of crucial importance for any country, but this is especially true for countries that have numerous international trade links and that engage in frequent capital flow transactions. Countries that rely more heavily on international trade are vulnerable to the transmission of exchange rate shocks to the domestic prices of goods and services, which is usually referred to as "exchange rate pass-through".

Exchange rate pass-throughs to consumer prices in countries with flexible exchange rates and inflation targets have been addressed in the literature. Prasertnukul, Kim and Kakinaka (2010) have found that the adoption of an inflation-targeting system has been associated with exchange rate pass-throughs to domestic prices in Indonesia, the Republic of Korea, the Philippines and Thailand, while Ha, Stocker and Yilmazkuday (2020) found that exchange rate pass-throughs to consumer prices in countries with a flexible exchange rate and an inflation-targeting system tend to be weaker. Kabundi and Miachila (2019) have suggested that the more limited nature of exchange rate pass-through in South Africa can be attributed to the improvement in the credibility of its monetary policy following the adoption of its inflation-targeting system.

According to Galí and Monacelli (2005), the combination of an inflation-targeting system with a floating exchange rate can heighten exchange rate volatility and therefore hinder policymakers from hitting their inflation targets. The main conclusions that Edwards (2006) has drawn from his analysis of the relationship between inflation targets and exchange rates in seven countries between 1985 and 2005 are that countries that adopted inflation targets reduced the magnitude of the exchange rate pass-through to inflation. In addition, increases in exchange rate volatility are not seen as a function of monetary policy when countries have set an inflation target and have a history of high, variable inflation. Nogueira (2007) has pointed to a case where a sharp reduction in exchange rate pass-through to price indices occurred following the adoption of an inflation-targeting system.

Brun-Aguerre, Fuertes and Phylaktis (2012) have suggested that, in the short run, exchange rate pass-throughs in emerging and developed countries are more similar to one another. An and Wang (2012) tracked an exchange rate pass-through to import prices and consumer prices in eight industrialized countries between 1976 and 2005 but also found that the degree of the reduction and the amount of time that it took for the pass-through to be complete increased along the distribution chain. Cheikh and Rault (2016) conducted a study covering the period 1993–2012 to see if the exchange rate pass-through to inflation was non-linear and found that, in heavily indebted countries, the pass-through was greater during macroeconomic crises. They thus determined that heightened macroeconomic instability and declining confidence lead to greater price sensitivity.

Jooste and Jhaveri (2014) have analysed exchange rate pass-through to inflation in consumer prices in South Africa. Their results indicate its presence throughout the time period covered by the study but within the context of low, stable inflation environment. Ponomarev, Trunin and Ulyukaev (2016) have studied exchange rate pass-through to prices in the Russian Federation and detected asymmetrical effects during periods of appreciation and periods of depreciation in all price indices. Whereas the depreciation of the local currency has driven up prices, currency appreciations have not brought prices back down. One important implication for monetary policy, especially in emerging economies, is thus that, if the central bank can succeed in establishing a credible low-inflation regime, exchange rate pass-through should wane quite rapidly (Winkelried, 2014).

Ferreira and Palma (2015) used a generalized Phillips curve in order to forecast Brazilian inflation over the period 2003–2013. They found evidence that the short- and long-term Phillips curve relationship could be rejected in the case of Brazil, while the short- and medium-term exchange rate pass-through decreased in the closing years of that period. They also note that price stability continued to be one of the main objectives of the Central Bank of Brazil. Hara, Hiraki and Ichise (2015) have explored changes in exchange rate pass-through to domestic prices in Japan between 1982 and 2014 and found that the pass-through to the producer and the consumer price indices has been strengthening since the late 2000s, especially in the manufacturing sector.

Ali and Anwar (2016) contend that, if the transmission mechanism for monetary policy includes the cost channel, then exchange rate pass-through can help to resolve the price puzzle. Fonseca, Silva and Araújo (2017) have studied monetary policy under an inflation-targeting system and the effects

of global financial cycles between 2000 and 2014 and found that an upswing in interest rates has the effect of overvaluing the exchange rate, which, in turn, influences prices. Exchange rate pass-through does therefore had a direct impact on price levels.

Pham and others (2023) have analysed the differing strength of exchange rate pass-through in the five founding members of the Association of Southeast Asian Nations (ASEAN) (Indonesia, Malaysia, the Philippines, Singapore and Thailand) with and without inflation targets over the period from 2000 to 2019. Their main findings were that exchange rate shocks do lead to significant changes in inflation and that the effects of such shocks in Singapore, the Philippines and Indonesia were asymmetric. As stated by Kinda and Barry (2021), it is important for monetary policymakers to gain an understanding of the extent and determinants of differing exchange rate pass-throughs, since the speed and scope of the different stages of a pass-through influence consumer price inflation, as well as being necessary inputs for inflation forecasting.

More recently, Anderl and Caporale (2023) have used monthly data to study exchange rate pass-through to consumer prices and import prices in five countries with inflation-targeting systems (Australia, Canada, New Zealand, Sweden and the United Kingdom) and in three countries or areas that do not have such a system (Switzerland, the United States and the eurozone) from 1993 to 2021. The authors found that the pass-through was stronger in the non-linear models, especially in inflation-targeting countries, and that inflation expectations thus become a more important factor in analysing pass-throughs in countries using that type of monetary framework.

III. Methodology

In order to answer the question posed in this study, the difference-in-differences impact evaluation model was used. This method compares the results for the treatment group (countries that have adopted an inflation-targeting system) with the results for the control group (countries that do not use such a system). The samples of both the treatment and control groups include only countries with a floating exchange rate. The data were drawn from a panel of 26 countries over the period from 1995 to 2019.

One of the main assumptions of the difference-in-differences estimator is the parallel trends assumption, that is, that the treatment and control groups have followed parallel trends in terms of the outcome variable over time (Abadie, 2005). In the context of this study, then, the exchange rates of the countries with inflation-targeting systems and those of countries that do not have that system should follow parallel trends so that the only difference observed in the exchange rates of the two groups is attributable to the adoption or non-adoption of an inflation-targeting system. Since this was not observable, an entropy balancing technique was applied so that the two groups of countries would exhibit similar observable characteristics.

The use of an entropy balancing technique makes it possible to overcome the problem of a bias in the observable variables by matching up the observable characteristics of the two groups so that they are similar. A number of macroeconomic variables were used for this purpose, such as the lagged exchange rate, the amount of currency in circulation (as a percentage of GDP), openness to trade (exports plus imports relative to GDP), real per capita GDP growth, the foreign exchange regime and the lagged inflation rate. These variables were also used in the study conducted by Ogrokhina and Rodríguez (2019).

The decision to adopt an inflation-targeting system is not exogenous to the country in question, since it is associated with a country having gone through periods of hyperinflation, crises or some other situation that has impaired its macroeconomic performance. A country's adoption of an inflation-targeting system is invariably related to a set of observable covariables that also influence the outcome variable.

This raises an issue in terms of the selection of observable variables. The fact that the adoption of an inflation-targeting system is not random thus poses a self-selection problem. In order to analyse how the adoption of an inflation-targeting system, global financial changes (in the world interest rate, foreign capital inflows and external uncertainty) and the exchange rate are related to one another, entropy balancing was used in combination with the difference-in-differences model.

The estimated model is shown in equation (1):

$$exchange_{i,t} = \alpha_{3i} + \delta_{3t} + \theta_1 GFC^*_t + \theta_2 GFC^*_t * D_{it} + \theta_3 T_t D_{it} + \theta_4 opentrade_{it} + \theta_5 \frac{cc_{it}}{GDP_{it}} + \theta_6 ipopulation_{it} + \theta_7 GDPpercapita_{it} + e_{3i,t} \quad (1)$$

Equation (1):

The subindex i corresponds to each of the 26[4] emerging economies that were selected. Of those 26 countries, 17 have adopted an inflation-targeting system and 9 have not. As was also done by Berganza and Broto (2012), countries were excluded from the sample if they had a fixed exchange rate pegged to the dollar or any other hard currency, such as the euro, throughout the sample period. This is justified because, in addition to the fact that the treatment and control groups need to be similar —except in regard to the adoption or non-adoption of an inflation-targeting system— exchange rate volatility does not exist in countries with a fixed exchange rate. Fully dollarized countries were also excluded from the sample, since they do not have an independent foreign exchange policy.

The subindex t represents each of the years between 1995 and 2019. This period was chosen because some of the countries in the sample, especially those with emerging economies in Latin America, experienced bouts of hyperinflation.

α_i is the country fixed effect to control for specific characteristics that are invariable over time.

δ_t is the time fixed effect.

$e_{i,t}$ is the error term.

The dependent variable *exchange* denotes the bilateral exchange rate with the United States dollar.

The term GFC refers to global financial changes, which are measured here using three proxies:

(i) The world interest rate: the average for 1995–2019 of the interest rates in the world's main financial centres (the United States, the United Kingdom, Japan and the eurozone).

(ii) Foreign capital inflows: to calculate this shock, net foreign capital inflows to emerging economies (excluding the country in question) were used as a means of capturing international investors' general appetite for emerging market assets. Net capital inflows were then normalized by the Hodrick-Prescott trend of GDP to avoid introducing the volatility caused by short-term fluctuations. This measurement was calculated on the basis of Bergant and others (2020).

(iii) External uncertainty: the volatility index (VIX) of the Chicago Board Options Exchange, which is usually employed in the literature as a proxy for shocks in international risk premiums.

The model was estimated separately for each of the global financial changes. In other words, equation (1) was estimated using the world interest rate as the global financial change first, then again using foreign capital inflows and, finally, once again using external uncertainty as the global financial change.

[4] Countries with an inflation-targeting system: Albania, Brazil, Chile, Colombia, Dominican Republic, Ghana, Guatemala, Hungary, India, Indonesia, Mexico, Peru, Philippines, Romania, Thailand, Türkiye and Uruguay. Countries without an inflation-targeting system: Algeria, Cambodia, Costa Rica, Egypt, Jamaica, Malaysia, Morocco, Poland and Ukraine.

The hypothesis used in this study is resolved by the term $GFC_t^* * D_{it}$. It is expected that emerging economies with an inflation-targeting system will register a negative coefficient for global financial changes. This would indicate that such economies witness a sharper depreciation of their currency as a result of global financial changes than countries without such a system. However, when the models are estimated using exchange rate volatility as the dependent variable, the coefficient is expected to be positive. This would indicate that emerging economies with an inflation-targeting system are subject to greater exchange rate volatility than countries that do not have an inflation-targeting system.

The term $T_t D_{it}$ denotes the impact that selected emerging economies' adoption of an inflation-targeting system has on the exchange rate. This is a dummy variable for capturing the impact of the adoption of inflation-targeting systems that takes a pre-adoption value of 0 and a post-adoption value of 1. D_{it} is a dummy that indicates whether a country has or has not adopted such a system; it takes a value of 1 if the economy adopts an inflation-targeting system during period t and a value of 0 otherwise.

Other controls were included to account for variations in the exchange rate: *opentrade* indicates how open to trade the economy is (the more open it is, the greater the likelihood that there will be variations in the exchange rate); cc/GDP stands for the current account as a percentage of GDP; *population* denotes the number of inhabitants (the larger a population is, the greater the demand for goods, including imports; this translates into a greater demand for foreign currency, which will have an influence on the exchange rate); and real *GDPpercapita*, since a country's GDP can influence its exchange rate via its trade activity and capital flows. These controls have been used previously in the literature, as in the study by Berganza and Broto (2012).

Based on the fact that emerging economies are more susceptible to more intense exchange rate volatility, this study also analysed whether emerging economies with an inflation-targeting system may experience greater exchange rate volatility as a consequence of global financial changes than their non-targeting counterparts. A number of measurements of exchange rate volatility were calculated for this purpose.

One of these measurements was conditional variance (exchange rate volatility (1)). The conditional variance of the exchange rate was obtained by using a generalized autoregressive conditional heteroscedastic (GARCH) model. With the GARCH model, conditional variance is given as a function of past errors squared and the lagged values. The GARCH model (1.1) was estimated for the exchange rate of each of the countries in the sample. Then, a data panel was prepared based on the estimated exchange rate volatilities.

The second variability measure adopted to express exchange rate volatility (exchange rate volatility (2)) was the standard deviation of the percentage return of the nominal exchange rate in relation to the dollar for a given country i. This measurement, which was also used by Berganza and Broto (2012), is given by the following expression:

$$r_t = 100 * \left(\Delta \log E_t\right) \tag{2}$$

In equation (2), E_t corresponds to the bilateral exchange rate in t and Δ is the operator of differences. If its sign is positive, it indicates that the local currency depreciated against the dollar.

Equation (1) was then estimated several more times using different values for the dependent variable. Each of the estimates used the different exchange rate volatilities described above. In addition, the model was re-run several times more while modifying the GFC term and isolating each of the measurements mentioned above.

1. Data sources

The data on bilateral exchange rates (local currency to the dollar) based on a unitary scale as measured at the end of the period were obtained from the International Financial Statistics website of the International Monetary Fund (IMF). The interest rates for the world's principal financial centres and data on foreign capital inflows (in millions of United States dollars) were also obtained from the International Financial Statistics website. Data for the other control variables, such as the degree of trade openness (in percentages), the current account (as percentages of GDP), population (in millions of persons) and per capita GDP (in international dollars), were drawn from the corresponding issue of the IMF *World Economic Outlook*.

IV. Results and analysis

1. Impact of the adoption of an inflation-targeting system and of global financial changes on bilateral exchange rates and exchange rate volatility

Table 1 gives descriptive statistics (mean and standard deviation) for the whole sample and for three categories of countries in the sample that have an inflation-targeting system. The first category (IT) gives data for countries that had an inflation-targeting system throughout the entire study period. The second (PREIT) provides data for countries that adopted an inflation-targeting system early on, while the third category (POSTIT) shows data for countries that adopted an inflation-targeting system later on.

The entire sample of the emerging economies analysed between 1995 and 2019 represents a population of approximately 90,926,317 people with a real per capita GDP of US$ 11,290.42. The mean for trade openness for the sample as a whole is around 13%, and the current account comes to some -2% of GDP. The descriptive statistics indicate that, on average, the bilateral exchange rate (local currency to the United States dollar) appears to have risen following the adoption of inflation-targeting systems.

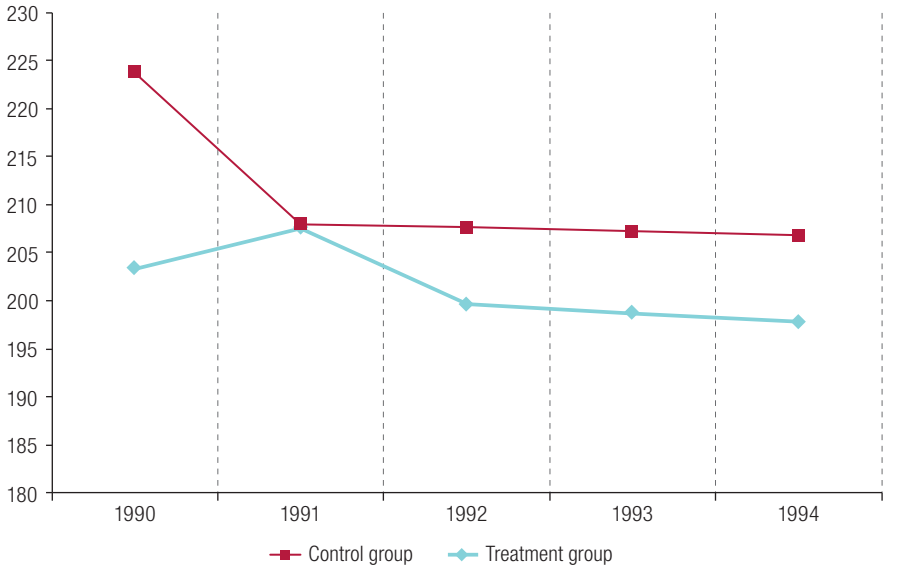
As mentioned earlier, the main assumption of the difference-in-differences model is the parallel trends assumption. Figure 1 traces the path of the bilateral exchange rate for the group of countries with inflation-targeting systems (the treatment group) and the group of countries that did not have such a system (the control group) during the years prior to the study period (1990–1994). It is important to bear in mind that, during this period, the countries under study had not yet adopted an inflation-targeting system.

Table 1
Descriptive statistics on variables included in the models, 1995–2019

Variable	Total		IT		PREIT		POSTIT	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Volatility index (VIX)	19.63544	5.951078	19.63544	5.953506	20.58438	5.424746	18.84647	6.1836
World interest rate	2.009121	1.603968	2.009121	1.604679	3.189731	1.1314	1.052609	1.257486
Capital inflows	94.15679	345.6444	129.7595	428.6611	247.4017	648.5769	55.74325	142.1715
Bilateral exchange rate	673.412	2 081 254	764.6163	2 415 116	529.5807	1 889 176	917.7618	2 702 007
Volatility 1	0.2942885	0.9742187	0.2818248	0.9807477	0.4165491	0.9174991	0.1920759	1.007292
Volatility 2	0.3807104	14.24478	0.9381004	15.22933	5.266323	19.04368	-1.920651	11.05546
Current account	-2.115479	5.345528	-2.363216	4.091832	-3.100173	3.819518	-1.845313	4.163023
Population	90 263.17	21 998.34	12 197.33	26 628.61	16 937.52	34 915.35	85 932.62	17 275.53
Real per capita GDP	11 290.42	5 983.591	11 547.39	5 902.632	8 753.221	4 844.131	13 752.02	5 900.858
Trade openness	13.16762	18.87437	13.5377	17.97258	16.88344	21.59439	11.21465	14.35474

Source: Prepared by the authors.
Note: IT: countries that had an inflation-targeting system throughout the entire study period; PREIT: countries that adopted an inflation-targeting system early on; and POSTIT: countries that adopted an inflation-targeting system later on.

Figure 1
Treatment-group and control-group countries: verification of parallel trends in the bilateral exchange rates, 1990 and 1994
(Local currency relative to the United States dollar)



Source: Prepared by the authors.

As may be seen from figure 1, the bilateral exchange rate for the treatment group did not, on average, exhibit a similar trend to the bilateral exchange rate for the control group, especially in 1990 and 1991. In order to end up with similar observable variables for the two groups, an entropy balancing technique was used. A series of weightings were employed in order to align the inflation-targeting countries with the non-targeters over time and on average. The outcome is a similar counterfactual scenario under which it can be assumed that what differentiates the two groups is the adoption or non-adoption of inflation-targeting systems. The results are shown in table 2.

Table 2
Results of entropy balancing (averages)

	Before matching		After matching	
	Treatment	Control	Treatment	Control
Exchange rate regime	9.768	10.03	9.768	9.769
Per capita GDP	7 965	7 977	7 965	7 965
Inflation	231.3	178.5	231.3	231.3
Trade openness	47.06	73.49	47.06	47.06
Monetary base	37.21	51.15	37.21	37.21
Bilateral exchange rate	209.5	197.4	209.5	209.5

Source: Prepared by the authors.

The results given in table 2 show that, after the matching exercise, the observable variables for the group of countries with inflation-targeting systems are similar to those of the control group, since the mean variables for the exchange rate regime, per capita GDP, inflation, trade openness, the monetary base and the bilateral exchange rate are similar for both groups. This balance is also reflected in the non-rejection of the equality hypothesis test (the mean value for each variable is the same for the treatment and control groups both before and after the adoption of inflation-targeting systems).

Based on the entropy balance, other statistics were calculated as shown in table 3.

Table 3
Other statistics obtained using entropy balancing

	PseudoR^2	LRChi^2	p>Chi^2	B	R
Without matching	0.172	26.540	0.000	93.7*	0.32*
Matched	0.000	0.000	1.000	0.0	1.37

Source: Prepared by the authors.
Note: * significant to 10%.

The pseudo-R-squared value decreased considerably after matching. This suggests that there are no significant differences in the distribution of the variables between the two groups. The B value should be below 25% and the R value should be outside the R interval [0.5; 2] (Rubin, 2001). These statistics can be used to measure the balance between the explanatory variables and the matching adjustment. For the purposes of this study, the values meet this requirement.

Lastly, in order to evaluate the impact of global financial changes on the bilateral exchange rates of countries with inflation-targeting systems as it compares to the impact on non-targeting countries, table 4 shows the results of the difference-in-differences model combined with entropy balancing.

Table 4
Impact of global financial changes on bilateral exchange rates, 1995–2019

	Bilateral exchange rate		
Variables	(1)	(2)	(3)
T*D	0.118$^{\#}$	0.225**	0.147**
	(0.0690)	(0.0958)	(0.0701)
GFC	-0.0656$^{\#}$	0.454**	-0.195*
	(0.0530)	(0.192)	(0.108)
GFC* IT	0.0882$^{\#}$	-0.670***	0.206$^{\#}$
	(0.0739)	(0.181)	(0.123)
Constant	35.12*	30.70	24.47
	(16.84)	(20.72)	(20.01)
N	121	106	112
R squared	0.221	0.345	0.319
N	20	18	20

Source: Prepared by the authors.
Note: *** significant to 1%; ** significant to 5%; * significant to 10%; $^{\#}$ not significant. (1) Results when external uncertainty is used as the global financial change; (2) results when the supply of foreign capital is used as the global financial change; (3) results when the world interest rate is used as the global financial change.

The coefficient of the variable T*D represents the impact of the adoption of an inflation-targeting system. This coefficient was positive and statistically significant, which means that the adoption by the emerging economies selected for this study of an inflation-targeting system could lead to an appreciation of their exchange rate.

The impact of global financial changes is reflected in the GFC coefficient. The result for this coefficient indicates that, when inflows of foreign capital increase, the exchange rates of countries without an inflation-targeting system may appreciate. However, if the world interest rate rises, the selected emerging economies may witness a depreciation.

The third coefficient, GFC*IT, refers to the hypothesis tested in this study. This coefficient was significant only when foreign capital inflows were used as the global financial change. This result indicates that, when capital inflows climb, emerging economies with an inflation-targeting system will be more likely

to see a depreciation of their exchange rate than countries without such a system will. This confirms the idea that emerging economies that adopt an inflation-targeting system may incur a cost in terms of their exchange rate owing to the fact that they have less flexibility in adjusting their monetary policies in the face of global financial changes than countries that do not opt for such a system.

Table 5 depicts the impact of global financial changes in terms of exchange rate volatility. The dependent variables are the measurements of exchange rate volatility (1) and (2).

Table 5
Emerging economies: impact of global financial changes in terms of exchange rate volatility, 1995–2019

Variables	Exchange rate volatility 1			Exchange rate volatility 2		
	(1)	(2)	(3)	(1)	(2)	(3)
T*D	-0.251#	-0.0860#	-0.251#	6.703***	3.846*	6.155***
	(0.455)	(0.654)	(0.455)	(1.051)	(2.135)	(0.213)
GFC	-0.348***	1.771***	-0.348***	23.84***	7.552#	-15.78***
	(0.0947)	(0.556)	(0.0947)	(2.432)	(11.92)	(0.599)
GFC* IT	0.383#	-1.851*	0.383#	-23.81***	-24.45#	15.99***
	(0.303)	(0.999)	(0.303)	(2.890)	(17.95)	(0.543)
Constant	257.8***	209.0***	257.8***	-1.356***	-841.2	-1.133***
	(55.40)	(54.06)	(55.40)	(117.3)	(873.5)	(82.47)
N	121	106	121	30	106	26
R-squared	0.392	0.453	0.392	0.844	0.173	0.975
N	20	18	20	13	18	12

Source: Prepared by the authors.
Note: *** significant to 1%; ** significant to 5%; * significant to 10%; # not significant. (1) Results when external uncertainty is used as the global financial change; (2) results when the supply of foreign capital is used as the global financial change; (3) results when the world interest rate is used as the global financial change.

The coefficient of the variable T*D represents the impact of the adoption of an inflation-targeting system. This coefficient was positive and statistically significant as an explanation for exchange rate volatility (2), which means that the adoption by the emerging economies selected for this study of an inflation-targeting system could make them more likely to experience greater exchange rate volatility.

The GFC term represents global financial changes. The results show that an increase in the world interest rate reduced exchange rate volatility in emerging economies that do not have an inflation-targeting system. When external uncertainty was used as the global financial change, the results were ambiguous. When increased foreign capital inflows were used as the global financial change, the results point to greater exchange rate volatility in the selected emerging economies.

The GFC*IT coefficient was used to test the hypothesis presented in this study regarding exchange rate volatility. An upswing in foreign capital inflows and an increase in external uncertainty both reduced exchange rate volatility in the countries with an inflation-targeting system as compared to their non-targeting counterparts. These results run counter to the hypothesis.

However, a rising world interest rate did trigger greater exchange rate volatility in the emerging economies with an inflation-targeting system than in the countries without such a system. This result does support the hypothesis presented in this study, since it indicates that, in the presence of an increase in the world interest rate, the inflation-targeting countries' greater commitment to controlling inflation may come at the cost of greater exchange rate volatility than that experienced by countries that did not adopt an inflation-targeting system.

Generally speaking, then, the results indicate that the adoption of an inflation-targeting system by emerging economies may lead to an appreciation of their bilateral exchange rate and increased exchange rate volatility. The literature also contains studies on the role of inflation-targeting systems

in the adoption of such systems. For example, Ouyang, Rajan and Li (2016) found that countries that adopt an inflation-targeting system appear to experience greater exchange rate volatility than those with other exchange rate regimes, but Edwards (2006) found that the adoption of an inflation-targeting system did not lead to an increase in conditional nominal or real exchange rate volatility, while Rocha and Curado (2011) have stated that the adoption of an inflation-targeting system by emerging economies, with all else remaining constant, is associated with a reduction in conditional real exchange rate volatility.

Clearly, then, there is no consensus in the literature regarding the possible impact of the adoption of an inflation-targeting system on the volatility or level of the exchange rate. The fact that the results of this study may run counter to other findings discussed in the literature could be due to the specific countries that were selected, the time horizon used and/or the methodology employed. With regard to the specific relationship between the adoption of an inflation-targeting system and the level of the exchange rate and its volatility, this study contributes additional information to the literature which indicates that, in the case of emerging economies, that relationship is both direct and positive.

A number of different kinds of global financial changes were analysed in this study, with differing results in many cases. This points to the need to compile more information on the ways in which global financial challenges may influence exchange rates. If a given country's capital inflows increase, investors' demand for the local currency will expand as well. That stronger demand will, in turn, cause the exchange rate to appreciate, which can have detrimental effects on emerging market economies (Soto, 2003; Klein and Olivei, 2008). According to the authors just cited, these harmful effects may be associated with the fact that, if an emerging market is export-oriented, an appreciation of the exchange rate will depress export earnings. If a given company then witnesses a decline in its revenues, its net profits will also shrink and its shares' performance will suffer, prompting investors to pull out of the stock market.

If an emerging economy adopts an inflation-targeting system, then an upswing in capital inflows (GFC*IT) may spur a reduction in its bilateral exchange rate and dampen exchange rate volatility more than in emerging economies without such a system. This surprising outcome controverts the hypothesis tested in this study. As an expansion of the supply of foreign capital can have a deleterious impact on an emerging market economy, if such an economy adopts an inflation-targeting system and then sees an increase in foreign capital inflows, that will tend to lead to a depreciation of its bilateral exchange rate, and exchange rate volatility will tend to subside. In such cases, emerging-economy export companies will benefit, and export earnings will climb.

An increase in the world interest rate sparked a depreciation in the exchange rate and eased exchange rate volatility in the emerging economies in our sample that do not have an inflation-targeting system (the GFC variable and model (3)). One possible explanation for this result is that, when the interest rate rises in major financial centres, investors tend to place their capital in countries with the strongest institutional profiles. In other words, in this kind of situation, investors tend to shun emerging markets. When foreign capital inflows or outflows shrink, emerging markets may see a weakening demand for their currencies and, as a result, their exchange rates depreciate.

Other types of shocks may also heighten exchange rate volatility more in countries that adopt an inflation-targeting system than in those that do not. For example, Hove, Touna and Tchana (2016) have argued that commodity terms-of-trade shocks have prompted a steeper appreciation of the exchange rate following the adoption of inflation-targeting systems. According to these authors, the adoption of an inflation-targeting system helped these countries to soften their macroeconomic response to commodity trade shocks in comparison to their responses prior to adopting such a system. They also demonstrated that commodity terms-of-trade shocks were responsible for the fact that inflation-targeting countries witnessed sharper exchange rate movements than non-targeting countries did.

When the global financial change used in the model is external uncertainty, countries without an inflation-targeting system also see a decline in exchange rate volatility. Krol (2014) has demonstrated that both domestic and external economic policy uncertainty boost exchange rate volatility in industrial economies. In the case of emerging economies, the study showed that economic policy uncertainty in the country of origin was the only factor responsible for driving up exchange rate volatility when the national economy was performing poorly. This study also showed that economic uncertainty intensified local currency volatility, although not as much as economic policy uncertainty did. The results of the present study also show that the response to a global financial change that takes the form of external uncertainty is quite subdued.

In summary, exchange rate volatility is a serious problem for any country and is especially so for emerging economies. Heightened exchange rate volatility carries over into the volatility of profits and liquid assets, which can curb investment financing and this, in turn, can lower countries' productivity and GDP growth (Aghion and others, 2009). What is more, greater exchange rate volatility can increase the transaction risk associated with trade flows (Baum and Caglayan, 2010). A greater degree of exchange rate volatility also amplifies inflation uncertainty and thus drives up interest rates, thereby dampening consumption and investment (Grier and Grier, 2006). In short, highly volatile exchange rates are costly for any country and especially for emerging economies, as they can have a detrimental impact on businesses, investors, exporters, importers and the population as a whole (Obstfeld and Rogoff, 1998).

2. Empirical research on inflation-targeting systems and exchange rate pass-through in selected emerging economies: the importance of the exchange rate

In order to explore the relationship between exchange rate pass-through and prices in countries with an inflation-targeting system, the following equation was estimated for a number of countries for the period 1995–2019:

$$\Delta \ln PI_{it} = \beta_0 + \beta_1 \Delta \ln ER_{it} + \beta_2 \Delta \ln PI^*_t + \beta_3 \Delta \ln PI_{it-1} + \beta_4 \Delta \ln ER_{it} * POSTIT_{it} + \beta_5 \Delta \ln PI_{it-1} * POSTIT_{it} + e_{it} \quad (3)$$

In equation (3), PI represents the price index in each country, ER corresponds to the real exchange rate and PI^* denotes the foreign country's price index, which in this case is the price index of the United States. The term POSTIT is a dummy variable that takes a value of 1 following the adoption of an inflation-targeting system. The corresponding time periods are different for each country in the sample. The short-run exchange rate pass-through is given by the coefficient β_1 and, adding in the post-adoption period, in the short run, the exchange rate pass-through of countries that adopt an inflation-targeting system is given by the sum of $\beta_1 + \beta_4$.

The results estimated using the pooled, fixed effect and random effects panels are shown in table 6. Different models were estimated in order to obtain more robust results. The error terms are clustered by country.

The main findings of this analysis of exchange rate pass-through in countries with an inflation-targeting system is that the exchange rate pass-through (results for the coefficient $\Delta lnER_{it} * POSTIT_{it}$) to the domestic price index in countries that use this type of system declined. In the short run, overall, the exchange rate pass-through to the price index was positive (results for the term $\Delta lnER_{it}$). However, when the interaction between the post-adoption periods was taken into consideration, then this coefficient became negative.

Table 6
Countries with inflation-targeting systems: exchange rate pass-through to the price index, 1995–2019

	Pooled panel	Fixed effect panel	Random effects panel
$\Delta lnER_{it}$	0.207***	0.205***	0.224***
	(0.0541)	(0.0578)	(0.0555)
$\Delta lnPI_{t}^{*}$	0.680***	0.280	-2.064
	(0.185)	(3.955)	(4.389)
$\Delta lnPI_{it-1}$	0.541***	0.461***	0.551***
	(0.0647)	(0.0742)	(0.0649)
$\Delta lnER_{it} * POSTIT_{it}$	-0.146**	-0.176***	-0.159***
	(0.0599)	(0.0536)	(0.0545)
$\Delta lnPI_{it-1} * POSTIT_{it}$	0.0622	-0.114*	0.0517
	(0.0477)	(0.0562)	(0.0404)
Constant	0.00515	0.0180	0.0499
	(0.00757)	(0.0730)	(0.0796)
Fixed effect (year)	Yes	Yes	Yes
Fixed effect (country)	Yes	Yes	Yes
N	598	598	598
R-squared	0.600	0.518	26

Source: Prepared by the authors.
Note: *** significant to 1%; ** significant to 5%; * significant to 10%; # not significant.

V. Conclusions

Exchange rates are a subject of much debate among scholars and policymakers because they can have either a positive or a negative effect on different sectors and agents. This study's objective was to assess how inflation-targeting systems can influence exchange rate levels and volatility in the presence of global financial changes such as variations in the world interest rate, the supply of foreign capital and external uncertainty, given that countries that use an inflation-targeting system have less flexibility because of their strong commitment to their inflation targets.

The study's main findings are that the adoption of an inflation-targeting system leads to an appreciation of the exchange rate and to an increase in its volatility. It was also observed that countries with an inflation-targeting system are, as a result of that system's adoption, more likely to experience exchange rate volatility and a steeper depreciation of their exchange rate following, respectively, an increase in the world interest rate and an expansion of foreign capital inflows than countries that do not adopt such a system. This finding confirms the hypothesis presented in this study and shows that, because monetary policymakers in countries that adopt an inflation-targeting system have less flexibility in mounting a policy response, when certain types of global financial changes occur, those countries may be faced with costs that will influence their exchange rates. The study's findings also indicate that emerging economies that adopt an inflation-targeting system may see a reduction in the exchange rate pass-through to domestic prices following that system's introduction.

This study is restricted in scope, largely because of the limited availability of the relevant data and the fact that it did not cover all emerging economies. Its results therefore do not serve as a basis for drawing globally valid conclusions. Further research will be needed to achieve a fuller understanding of the relationship between inflation-targeting systems and their possible costs and benefits. In addition, there are various other kinds of shocks that were not addressed in this study whose ramifications should be explored, such as natural disasters, pandemics and climate change, and there are also various other types of costs that also need to be considered. Research concerning the different ways in which increased exchange rate volatility or currency depreciations may affect countries that adopt an

inflation-targeting system may serve as a basis for other types of studies in the future. Future studies might also seek to take a non-linear approach to the evaluation of exchange rate pass-throughs in countries that do and do not use inflation-targeting systems.

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The effects of the coronavirus disease pandemic on the male and female labour supply in Brazil

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Abstract

Using an ordered probit model estimation and quarterly data for the 2018–2020 period from the Continuous National Household Sample Survey (Continuous PNAD), this study sets out to analyse the effects of the coronavirus disease (COVID-19) health crisis on the supply of working hours by men and women in Brazil. The results suggest that the pandemic reduced the probability of men and women supplying larger numbers of working hours, and that women were most affected. In addition, having small children reduced the probability of mothers supplying larger numbers of working hours, while for men that probability increased.

Keywords

COVID-19, pandemics, economic aspects, employment, workforce, labour supply, women's employment, hours of work, econometric models, Brazil

JEL classification

C25, J13, J22

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I. Introduction

A striking feature of Brazil, as of developing countries in general, is the scale of various inequalities, including social, racial and gender inequalities. With regard to gender inequalities in particular, Fernandez (2019) points out that, in addition to the invisibility of the work usually performed by women, gender asymmetry can be observed in other situations outside the private sphere, such as the lack of equal opportunities in the labour market and the disparity in women's earnings compared to those of men with identical qualifications.

Such gender inequalities tended to worsen with the coronavirus disease (COVID-19) pandemic. Attributed to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the disease spread globally. Among the measures recommended by the World Health Organization (WHO) to prevent its spread was physical distancing, which included measures like the closing of public spaces such as commercial establishments and schools, in addition to quarantine and lockdown.

While distancing measures were essential to prevent the spread of COVID-19, they had adverse effects on the economy. In addition to these effects, another development in the health crisis was the closing of day-care centres and schools as a measure to contain the disease, which led to families' demand for home care and childcare increasing. The literature indicates that these conditions were unfavourable for women in terms of participation in the labour market and the division of domestic work (Costa, 2007; Madalozzo, Martins and Shiratori, 2010).

According to Borjas (2015), women's careers are usually suspended during the period of childcare, which indicates that they still have primary responsibility for this. The increase in demand for domestic work thus means that the health crisis may have disproportionally affected women, especially in households with children and adolescents.

Alon and others (2020) showed for the United States that the decline in employment brought about by physical distancing measures had a major impact on sectors with a sizeable percentage of female workers, such as restaurants and hotels. In addition, the closing of schools and day-care centres had a pronounced effect on working mothers. Similarly, Collins and others (2021) concluded that the pandemic disproportionally reduced the hours worked by mothers with young children in the United States, while Couch, Fairlie and Xu (2020a) showed that women with school-going children were more likely to become unemployed than men.

These greater effects on women were also seen in other parts of the world. In South Africa, women reported a higher incidence of unemployment than men during lockdown, in addition to a greater decrease in the number of hours worked and a greater increase in hours dedicated to domestic work (Casale and Posel, 2020). In the United Kingdom, data suggest that mothers were more likely to lose their jobs than fathers. However, in households where the women continued to work and the men lost their jobs, men performed just over half of household care work (Cattan and others, 2020).

Considering the above, it can be inferred that there are still gender differences that result in domestic activities and childcare being mainly carried out by women, and that these effects are accentuated during health crises. Hence, the general objective of this study is to analyse the effects of the COVID-19 pandemic on the supply of hours in the labour market by men and women. More specifically, it sets out to ascertain the effects of the presence of minors on the probability of parents' supplying working hours with the advent of the pandemic. To this end, it uses data from the Continuous National Household Sample Survey (Continuous PNAD) for the second, third and fourth quarters of 2018, 2019 and 2020 and estimates an ordered probit model to analyse the probability of a certain number of hours being supplied, given the characteristics of men and women.

This study contributes to the literature by analysing, from an economic perspective, the relationship between the supply of hours in the labour market by men and women during the COVID-19 pandemic. Since this is quite a recent topic, relatively few studies have looked at gender differences, which makes the present one relevant to the literature.

Two similar studies, conducted by Barbosa, Costa and Hecksher (2020) and by Cateia, Savard and Almeida (2022), were found for Brazil. The present study is set apart by its use of a different method, namely the ordered probit model, which makes it possible to analyse the relationship between the COVID-19 period and different categories capturing five ranges of hours worked in the reference week. This is important because the pandemic not only increased the level of unemployment but also discontinuously reduced the supply of work by men and women. Furthermore, the identification strategy used in this study ascertains the effects of the pandemic on all individuals, whether diagnosed with the disease or not, by means of a categorical variable that isolates the most critical initial period of the pandemic, between the second and fourth quarters of 2020.

The results suggest that COVID-19 reduced the number of hours supplied by both men and women, with women being more severely affected. In addition, having children aged up to 5 reduced the probability of women supplying greater numbers of working hours to the labour market, while for men the effect was the opposite.

Following this introduction, section II considers theoretical and empirical aspects. Section III presents the methodology and database. Section IV provides a descriptive analysis of the data and the results of the econometric model estimation. Section V concludes with final comments.

II. Theoretical and empirical aspects

As theorized by Becker (1965, 1973 and 1974), social dynamics determine individual behaviours and choices within marital relationships. The author treats the family as an indivisible unit where the allocation of time between family care and paid work is decided with the aim of maximizing utility.

The division of labour is determined by marginal productivities, which are affected by human and physical capital. Because of that, it is common for women to specialize in domestic work and men to dedicate themselves to the labour market.

However, this aspect of Becker's theory was contested by Ferber and Birnbaum (1977). For them, in considering the family as an indivisible unit, Becker neglects the complexity of individual preferences and economic power in family decision-making. Other empirical studies suggest that women who are part of the labour market and contribute financially to households have greater bargaining power in family decisions (Blood and Wolfe, 1960).

Another issue with Becker's theory is that the model ignores the tendency for the value of housework to peak at a certain point in life, usually when childcare is required, and then decline, while the value of men's ongoing participation in the labour market increases over a long period and then levels off until retirement. Thus, if the aim is to maximize couples' utility, it would be appropriate for women to acquire marketable skills so that they can join the labour market once their productivity in domestic activities has peaked (Ferber and Birnbaum, 1977).

More recently, Fernández (2007) sought to explain the evolution of women's participation in the labour market by highlighting the importance of intergenerational learning and changes in beliefs over time. In her model, married women evaluate the benefits of increased consumption funded by earnings from work against the expected utility cost of supplying labour. The model yields an S-shaped curve, indicating that learning is slower when few women supply labour and accelerates as more women enter the labour market.

On the basis of the theoretical principles presented, there has been progress with women's rights around the world in recent decades, leading to increased empowerment. Feminist movements and increasing awareness of gender issues have contributed to the implementation of policies and legislation aimed at equality of opportunities and earnings in the labour market, as evidenced in the studies by Perrotta Berlin, Bonnier and Olofsgård (2023), Lowes (2021) and Brulé and Gaikwad (2021).

Despite the progress, gender inequalities persist and remain particularly large in developing countries such as Brazil. According to Borjas (2015), women's careers are affected by an average discontinuity of seven years outside the labour market due to childcare, but the same does not hold for men. In addition, women tend to be segregated into an occupational cluster of activities in which skills do not need to be frequently updated. One explanation for this phenomenon is that society itself apportions certain occupations to women, further increasing gender inequalities.

These inequalities tend to worsen when extreme events occur, as with the COVID-19 pandemic. There are different hypotheses regarding the way the labour market behaves for men and women during economic and social crises. According to Lee and Cho (2005), two effects operate in workers' reaction to economic recession and structural adjustment. The first is the "discouraged worker effect", whereby workers are discouraged from looking for a job in periods of high unemployment and decide to leave the workforce. The other is the "added worker effect", which assumes that when the main wage earners in households become unemployed during economic downturns, other family members join the labour force to maintain the family income. The authors conduct a comparative analysis of the situations in Buenos Aires (Argentina) and Seoul over the period 1991–1995, with the results suggesting that one of the two effects operated in each country. Thus, in Buenos Aires, the effect of more women joining the labour market was what predominated, while in Seoul, women decided to leave the labour force.

However, the COVID-19 pandemic differed from other economic crises in its effects on sectors such as education and childcare. This was a key factor in the supply of working hours since, as has been seen, childcare and domestic work have traditionally been and remain a largely female preserve.

Because of the difference in the dynamics of men and women in the labour market, some studies have focused on this aspect of gender. Thus, a study carried out in the United States suggests that the drop in employment because of physical distancing measures had a major impact on sectors with a high percentage of female workers. In addition, the closure of schools and day-care centres had a pronounced effect on family childcare, particularly impacting working mothers (Alon and others, 2020).

Collins and others (2021) analysed changes in hours worked by fathers and mothers in the United States from February to April 2020. Using monthly data from the Current Population Survey (CPS) and with the estimation of a series of fixed-effects regression models, the results suggested that mothers reduced their working hours significantly more than fathers, and that the effect was greatest among mothers of small children.

Similarly, using the same database and the triple difference method, Couch, Fairlie and Xu (2020a) showed that women with school-age children presented higher levels of unemployment during the early months of the pandemic. In addition, of people who continued to work, women with school-age children also presented greater reductions in working hours.

In other countries, the negative effects of the pandemic on the work of men and women were also much in evidence. Much as in the studies already presented, Cattan and others (2020) examined gender divisions in paid and domestic work during the lockdown period in the United Kingdom. For their study, questionnaires were administered to 4,915 parents who were living with their children between 29 April and 15 May 2020. A descriptive analysis of the data suggests that, by contrast with previous recessions, mothers were more likely than fathers to lose their employment, as they were still mainly responsible for taking care of their children and home. However, in households where the father lost his job and the mother went on working, males carried out just over half of all household work and childcare.

In South Africa, Casale and Posel (2020) analysed the effects of the COVID-19 pandemic on the work of women and men during the period of strictest lockdown (February and April 2020) in economies which paid welfare benefits and those which did not. Using data from the National Income Dynamics Study-Coronavirus Rapid Mobile Survey (NIDS-CRAM), they found that 46% of women and 59% of men over the age of 18 reported being employed in February 2020. In April 2020, the month of the strictest isolation measures, 36% of women and 54% of men reported being employed. Of the people who went on working, women presented the greatest decrease in the number of hours worked. As regards unpaid work, 74% of women and 61% of men reported living with at least one child aged 0 to 17 in April, and of those living with children, 73% of women and 66% of men reported spending more time than usual taking care of them.

In the case of Brazil, as reported by Cateia, Savard and Almeida (2022), it is important to highlight that the country was one of those that recorded the highest numbers of COVID-19 cases and deaths. It was also one of the last to recognize the disease as a pandemic and to implement physical distancing measures, which may have contributed to a sharper decrease in employment levels for both men and women. Additionally, regional disparities in COVID-19 death rates were large, which may be explained by the considerations outlined by Kapitsinis (2021). According to the author, there was great divergence between the mitigation actions taken by some local governments and those taken by the federal government.

Regarding the disparities between men and women in the country, Barbosa, Costa and Hecksher (2020) used data from the Continuous National Household Sample Survey (Continuous PNAD) between 2018 and 2020 to conduct a descriptive analysis of job losses when the restrictive measures began to be implemented. The results show that women, black people, the less educated and workers without a formal contract suffered the greatest job losses.

Furthermore, by pairing National Household Sample Survey (PNAD)-COVID19 2020 data with Continuous PNAD 2019 data and carrying out a probit model estimation, Cateia, Savard and Almeida (2022) found that women had a 7 percentage point lower probability of participating in the labour force than men. However, the term for the interaction between COVID-19 and gender was not significant in the estimation conducted.

III. Methodology and database

To analyse whether the COVID-19 pandemic impacted the supply of men's and women's working hours, an ordered probit model was used. This type of model is employed when the dependent variable is grouped into more than two categories. In the case of this study, the variable for the range of hours worked in the reference week is used, following the existing categories in the Continuous PNAD, as shown in table 1 below.

Table 1
Description of hour ranges worked by men and women

	Range of hours worked
1	Up to 14 hours
2	15 to 39 hours
3	40 to 44 hours
4	45 to 48 hours
5	49 hours or more

Source: Prepared by the authors.

The structural model is given by:

$$Y_i = X_i \beta + \mu \tag{1}$$

where Y represents the dependent variable, $X_i \beta$ is the set of characteristics which determine Y, and μ is the random component. Thus, the probability of person i working j range of hours is calculated in the light of their observable characteristics. This equation is represented by:

$$P(yi = 1 \mid xi) = F(u1 - \beta' xi) \tag{2}$$

$$P(yi = 2 \mid xi) = F(u2 - \beta' xi) - F(u1 - \beta' xi) \tag{3}$$

$$P(yi = 3 \mid xi) = F(u3 - \beta' xi) - F(u2 - \beta' xi) \tag{4}$$

$$P(yi = 4 \mid xi) = F(u4 - \beta' xi) - F(u3 - \beta' xi) \tag{5}$$

$$P(yi = 5 \mid xi) = 1 - F(u4 - \beta' xi) \tag{6}$$

where $F(.)$ is the cumulative distribution function of the random error term ε_i estimated in x. These probabilities will be positive if the limits satisfy the restrictions $\mu_1 < \mu_2 < \mu_3 < \mu_4$. The effects that the explanatory variables have on the dependent variable can be calculated. To do so, the partial derivatives are calculated and the marginal effects thus obtained.

Two models are estimated, the first of which seeks to capture the effects of COVID-19 on the supply of men's and women's working hours. The second model is estimated using the same control variables as the first, but its aim is to analyse the effects of the COVID-19 pandemic specifically on men and women with children who are minors. For this, three variables which interact with COVID-19 (interaction dummies) are inserted: children aged 0 to 5 (0–5), 6 to 12 (6–12) and 13 to 17 (13–17).

These interaction dummies are introduced with a view to analysing how the presence of children and adolescents affected their parents' supply of labour during the pandemic period since, as discussed in previous sections, male and female dynamics in the labour market were completely different and the presence of children played a key role in this relationship.

The data used were taken from the Continuous PNAD for the second, third and fourth quarters of 2018, 2019 and 2020. The rationale for this choice of periods is that the effects of the pandemic in Brazil began to materialize at the end of the first quarter of 2020, so the impacts would be expected to be noticeable from the second quarter onward. The same quarters as are analysed in 2020 are then taken for the other years.

The Continuous PNAD was definitively implemented in January 2012, and one of its objectives is to monitor quarterly fluctuations in the workforce. The survey covers the entire country with exceptions such as indigenous territories, military bases, prisons and some others (IBGE, 2016). It provides annual and quarterly information related to the labour market, as well as demographic and educational information. (IBGE, 2016). The Continuous PNAD has a 1-2(5) type sample rotation system, i.e. a household is interviewed one month and leaves the sample for the two following months, and this sequence is repeated five times (IBGE, 2016).

The sample used in the regression is complex, i.e. the sample data are weighted. Thus, each population element has a known probability of selection which may differ from one to another, based on census sectors, strata or clusters. The sample is composed of 1,761,463 observations.

The sample was constructed with male and female household heads, or spouses of the head, aged from 30 to 65. It was decided to select only people aged 30 and older to include the possibility that these men and women might have adolescent children. When someone did not declare that they had worked outside the home during the reference week, a value of 0 was assigned for the working hours category and the person was included in the first range of hours worked, i.e. between 0 and 14 hours. Hours worked during the reference week in any job were considered.

With respect to the explanatory variables, the main one and the focus of this study, namely COVID-19, takes a value of 1 if the period falls within the second, third and fourth quarters of 2020 and 0 if it falls within the second, third and fourth quarters of 2018 and 2019. Thus, the identification strategy used considers the effects of the pandemic not only on those diagnosed with the disease, but on everyone, since physical distancing measures impacted the whole of society regardless of individual health status. Moreover, considering only those diagnosed with the virus would tend to understate the effects of the disease, as many individuals with mild symptoms or none were not diagnosed.

Regarding the other variables, the children variable includes children of the household head and his or her spouse plus children or stepchildren of the household head alone. Regarding the race variable, white individuals were separated from non-white individuals, i.e. *amarelo* (literally yellow, meaning of Asian descent), Indigenous, *preto* (black) and *pardo* (literally brown, meaning mixed). For the married variable, spouses or partners were considered. Lastly, the estimation was performed separately for men and women because of the different dynamics of the genders in the labour market, as already discussed.

The variables selected, which are listed in table 2, were chosen in the light of the data available and of earlier studies dealing with the subject, such as those by Barbosa, Costa and Hecksher (2020) and Collins and others (2021).

Table 2
Variables used in the econometric model estimation

Name of variable	Description
Dependent variable	
Hours worked	Range of hours actually worked in the reference week
Explanatory variables	
COVID-19	Dummy: 1 if the period was in the second, third or fourth quarter of 2020, 0 otherwise
Married	Dummy: 1 if married, 0 otherwise
Race	Dummy: 1 if white, 0 otherwise
Years of education	Total years of education
Children 0–5	Dummy: 1 if there are children aged 0 to 5, 0 otherwise
Children 6–12	Dummy: 1 if there are children aged 6 to 12, 0 otherwise
Children 13–17	Dummy: 1 if there are children aged 13 to 17, 0 otherwise
COVID-19 x children 0–5	Interaction dummy: COVID-19 multiplied by children aged 0 to 5
COVID-19 x children 6–12	Interaction dummy: COVID-19 multiplied by children aged 6 to 12
COVID-19 x children 13–17	Interaction dummy: COVID-19 multiplied by children aged 13 to 17
Other control variables	
North	Dummy: 1 if it is the North region, 0 otherwise
South	Dummy: 1 if it is the South region, 0 otherwise
South-east	Dummy: 1 if it is the South-east region, 0 otherwise
Centre-west	Dummy: 1 if it is the Centre-west region, 0 otherwise
North-east	Dummy: 1 if it is the North-east region, 0 otherwise

Source: Prepared by the authors.

IV. Results and discussion

1. Descriptive analysis

As table 3 shows, 53.45% of the sample of household heads and spouses of heads was composed of women and 46.55% of men. Of these, 80.06% were married and 19.94% single. A total of 75.08% of the women and 85.79% of the men were married.

Table 3
Married and single men and women in the sample
(Numbers and percentages)

	Women	Men	Total	Percentage
Married	706 813	703 488	1 410 301	80.06
Single	234 634	116 528	351 162	19.94
Total	941 447	820 016	1 761 463	100.00
Percentage	53.45	46.55	100.00	

Source: Prepared by the authors.

Table 4 presents the distribution of men and women across the five categories of hours worked by period. Here it was decided to aggregate the average values of the quarters in the pre-pandemic years, i.e. 2018 and 2019, since there was not enough variability in the statistics to justify disaggregation as in 2020.

Table 4
Hours worked by men and women, by period, 2018–2024
(Percentages)

	Period	Range of hours worked					Total
		0 to 14	15 to 39	40 to 44	45 to 48	49 and over	
Women	2018	52.54	16.71	22.26	3.61	4.88	100
	2019	52.04	16.55	22.60	3.67	5.14	100
	Second quarter of 2020	65.47	13.74	15.36	2.23	3.20	100
	Third quarter of 2020	60.26	15.22	18.03	2.70	3.78	100
	Fourth quarter of 2020	57.12	16.20	19.46	2.94	4.28	100
Men	2018	24.89	14.93	38.15	8.87	13.16	100
	2019	24.59	14.72	38.50	8.74	13.46	100
	Second quarter of 2020	37.91	15.83	30.04	6.45	9.78	100
	Third quarter of 2020	31.59	15.52	34.37	7.37	11.15	100
	Fourth quarter of 2020	28.44	15.48	35.96	8.04	12.08	100

Source: Prepared by the authors.

Table 4 shows that the measures taken to prevent the spread of COVID-19 had the greatest effects in the second quarter of 2020, for both women and men. In 2019, for example, the average proportions of women working between 45 and 48 hours (category 4) and more than 49 hours (category 5) during the reference week were 3.67% and 5.14%, respectively. In the second quarter of 2020, the proportions dropped to 2.23% in the 45 to 48 hours group and 3.20% in the 49 hours or over group, a decline of 1.44 percentage points and 1.94 percentage points, respectively.

Reductions also occurred in category 3 (40 to 44 hours) and category 2 (15 to 39 hours) in the second quarter of 2020. The decline in the former was from 22.60% in 2019 to 15.36%, or 7.24 percentage points, while in the latter it was from 16.55% to 13.74%, or 2.81 percentage points. Lastly, category 1 (0 to 14 hours) was alone in showing a large increase, from 52.04% in 2019 to 65.47% in the second quarter of 2020, a rise of 13.43 percentage points.

During the subsequent quarters of 2020, however, the effect of the pandemic decreased so that the distribution of hours worked trended back towards pre-pandemic levels. For example, the proportion of women working less than 14 hours dropped to 60.26% in the third quarter of 2020 and to 57.12% in the fourth. Likewise, the proportion of women working in the labour market for more than 14 hours per week increased in the third and fourth quarters.

One possible explanation for this may have been the need to gradually resume economic activities because government benefits such as Emergency Aid[1] and the Emergency Employment and Income Maintenance Programme[2] had end dates. In addition, one of the criticisms of these programmes was that they failed to guarantee the incomes of the workers affected (Reis and Costa, 2020), i.e. that the benefits provided by the government were insufficient to sustain families' consumption patterns. It is thus thought that families had to gradually return to the labour market to maintain these.

The trend for men was similar to that for women. The proportion of men working a maximum of 39 hours per week increased, while the proportions in the other categories decreased. Thus, 60.7% of men were working for 40 hours a week or more in 2019 but only 46.27% by the second quarter of 2020.

As with women, the proportion of men in the longer working hours categories tended to increase and the proportion in the shorter categories to decrease over the subsequent quarters of 2020, so that the values once more approached their pre-pandemic levels. As can be seen in table 4, the proportions of men working in the first, second, third, fourth and fifth hourly ranges in the fourth quarter of 2020 were 28.44%, 15.48%, 35.96%, 8.04% and 12.08%, respectively. These were close to the 2019 values of 24.59%, 14.72%, 38.50%, 8.74% and 13.46%, respectively.

Since the main objective of this study is to analyse any possible discrepancies between men and women, it is essential to assess how married and single individuals behaved in terms of time allocated to paid work (see table 5).

Table 5
Hours worked by married and single women and men, second, third and fourth quarters of 2018, 2019 and 2020
(Percentages)

		Range of hours worked					Total
		0 to 14	15 to 39	40 to 44	45 to 48	49 an over	
Women	Married	55.28	15.88	21.12	3.18	4.54	100
	Single	52.10	17.27	21.46	4.00	5.16	100
Men	Married	25.54	14.81	38.05	8.62	12.98	100
	Single	33.85	16.27	31.37	7.25	11.25	100

Source: Prepared by the authors.

[1] *Auxílio Brasil*, a benefit granted to families impacted by COVID-19 in accordance with criteria set by the Brazilian government. These criteria included being over 18 years old, not being in formal employment, being from a family with a monthly per capita income of up to half a minimum wage (522.50 reais) or a total monthly family income of up to three minimum wages (3,135.00 reais) and not having earned taxable income of over 28,559.70 reais in 2018.

[2] The Emergency Employment and Income Maintenance Programme (BEm) was established in 2020 as a Brazilian government programme aimed at mitigating the economic impacts of the COVID-19 pandemic on labour relations.

It can be seen that 28.84% of married women worked 40 hours a week or more, as against 30.62% of single women, while for men the difference was greater, with 59.65% of married men working 40 hours a week or more as against 49.87% of single men.

Table 6 presents the proportions of men and women with and without children up to 5 years of age, distributed by the range of hours worked. The table shows that 30.6% of women with children up to 5 years of age worked 40 hours or more a week, while 29.1% of women without children in that age group worked 40 hours or more.

Table 6
Hours worked by men and women with and without children up to 5 years of age, second, third and fourth quarters of 2018, 2019, and 2020
(Percentages)

		Range of hours worked					Total
		0 to 14	15 to 39	40 to 44	45 to 48	49 and over	
Women	With	52.48	16.92	22.96	3.43	4.21	100
	Without	54.82	16.11	20.93	3.37	4.77	100
Men	With	17.15	15.23	43.07	10.08	14.48	100
	Without	28.80	14.97	35.81	8.07	12.35	100

Source: Prepared by the authors.

A larger proportion of men than of women worked 40 hours or more, as already shown in table 2. In this case, men with children up to 5 years of age worked proportionally more hours than those without children: 67.63% of men with children in that age group worked 40 hours or more, while for other men the proportion was 56.23%. The effect was greater among men than among women in the same situation, since, as shown, there was little difference in the number of hours worked by women with or without children up to 5 years of age.

Lastly, table 7 presents the distribution of individuals in the five Brazilian regions by the range of hours worked. It shows that 34.59% of individuals in the North-east region worked 40 hours or more per week in 2018 and 2019, but that in 2020 the value was 25.97%. In the North region, the proportion working 40 hours or more was 43.52% before the pandemic but fell to 35.78% in 2020.

Table 7
Distribution of individuals by hours worked, by region, second, third and fourth quarters of 2018, 2019, and 2020
(Percentages)

		Range of hours worked					Total
		0 to 14	15 to 39	40 to 44	45 to 48	49 and over	
North-east	2018–2019	48.48	16.92	23.50	5.07	6.02	100
North		37.32	19.17	30.88	6.11	6.53	100
South		34.08	13.15	35.34	5.18	12.26	100
South-east		35.85	14.92	31.30	7.40	10.53	100
Centre-west		33.01	15.11	34.68	6.94	10.26	100
North-east	2020	58.63	15.40	17.74	3.88	4.35	100
North		45.08	19.13	25.76	5.05	4.97	100
South		40.09	13.65	31.37	4.42	10.47	100
South-east		45.79	15.01	25.37	5.49	8.33	100
Centre-west		41.30	14.08	31.33	5.40	7.88	100

Source: Prepared by the authors.

In the South region, 52.78% of people worked 40 hours or more per week before the pandemic, but this value dropped to 46.26% during 2020. In the South-east region, 49.23% worked 40 hours or more, but with the advent of the pandemic the proportion fell to 39.19%. In the Centre-west region, the decline was from 51.88% to 44.61%.

2. Econometric results

The main results of the ordered probit model estimation will now be presented. Table 8 shows the results of the estimation of the marginal effects for women, while table 9 gives them for men. The findings for women show that COVID-19 reduced the probability of their working 15 to 39 hours, 40 to 44 hours, 45 to 48 hours and 49 hours or over by -1.59%, -5.76%, -1.45% and -2.31%, respectively. As a result, the probability in the 0 to 14 hours range was positive at 11.12%.

Table 8
Marginal effects of the ordered probit model estimation for women

Variable	Range of hours worked				
	0 to 14	15 to 39	40 to 44	45 to 48	49 and over
	dy/dx	*dy/dx*	*dy/dx*	*dy/dx*	*dy/dx*
COVID-19	0.1111677***	-0.0159437***	-0.0576131***	-0.0145372***	-0.0230737***
Married	0.0406148***	-0.0046975***	-0.0208636***	-0.0056455***	-0.0094083***
Race	-0.0047995**	0.0006037**	0.0024777**	0.0006527**	0.0010654**
Years of education	-0.0291532***	0.003675***	0.0150516***	0.0039624***	0.0064642***
North	-0.0333597***	0.0037188***	0.0171037***	0.0046784***	0.0078587***
South	-0.1139994***	0.0095856***	0.0573397***	0.0169035***	0.0301706***
South-east	-0.0715156***	0.008681***	0.0368048***	0.0098189***	0.0162109***
Centre-west	-0.0853451***	0.0075405***	0.0431144***	0.0125502***	0.0221401***
Children 0–5	0.0393533***	-0.0054824***	-0.0204145***	-0.0051938***	-0.0082626***
Children 6–12	-0.022297***	0.0026902***	0.0114835***	0.0030663***	0.005057***
Children 13–17	-0.0542588***	0.0060617***	0.0278099***	0.0076052***	0.0127819***

Source: Prepared by the authors.
Note: ** Significant at 5%; *** significant at 1%.

In the case of men, the pandemic also had the effect of reducing the hours worked. As table 9 shows, COVID-19 reduced the probability of men working in the 40 to 44 hours, 45 to 48 hours and 49 hours or over ranges by -2.50%, -2.00% and -4.68%, respectively. In turn, the probability of their working in the 0 to 14 hours and 15 to 39 hours ranges increased by 7.58% and 1.60%, respectively.

Table 9
Marginal effects of the ordered probit model estimation for men

Variable	Range of hours worked				
	0 to 14	15 to 39	40 to 44	45 to 48	49 and over
	dy/dx	*dy/dx*	*dy/dx*	*dy/dx*	*dy/dx*
COVID-19	0.0758242***	0.0159692***	-0.0250207***	-0.0199927***	-0.04678***
Married	-0.0306171***	-0.0065532***	0.0100236***	0.0081219***	0.0190249***
Race	-0.0191489***	-0.0044785***	0.0056575***	0.0052085***	0.0127615***
Years of education	-0.0111235***	-0.0025777***	0.003329***	0.0030182***	0.007354***
North	-0.0463257***	-0.0123331***	0.0109693***	0.0130555***	0.034634***
South	-0.070164***	-0.0192304***	0.0154112***	0.0199003***	0.0540829***
South-east	-0.0682935***	-0.0162526***	0.0195066***	0.0186334***	0.0464061***
Centre-west	-0.0873121***	-0.0261316***	0.0145431***	0.0252937***	0.0736069***
Children 0–5	-0.0512176***	-0.0132075***	0.0128992***	0.0143036***	0.0372224***
Children 6–12	-0.0412774***	-0.0102216***	0.011181***	0.0114028***	0.0289152***
Children 13–17	-0.0381713***	-0.0095482***	0.0101769***	0.0105758***	0.0269667***

Source: Prepared by the authors.
Note: *** Significant at 1%.

The reason for these results, as previously discussed, is that the advent of the pandemic generated economic shocks which impacted not only the consumption of goods and services but also the financial market through a loss of wealth, increased saving rates and reduced consumption expenditure, while causing interruptions in supply that led to a decline in production activities. These, in turn, negatively affected the labour market by increasing unemployment (Carlsson-Szlezak, Reeves and Swartz, 2020a and 2020b).

The pandemic caused job losses because of physical distancing measures. Services such as schools and day-care centres were interrupted or reduced, as were non-essential services such as bars and restaurants. In Brazil, furthermore, a reduction of up to 70% in the working day was allowed for up to 90 days (Brazil, 2020). Thus, it can be inferred that the pandemic had direct effects on the number of work hours supplied by both men and women.

It is also important to note that the handling of the pandemic in Brazil was marked by a number of challenges and controversies. The delay in adopting effective containment measures and the lack of coordination between different levels of government were crucial factors that contributed to an escalation of the number of cases and deaths. Furthermore, as already pointed out, the country was one of the last to recognize the disease as a pandemic and to adopt physical distancing measures (Cateia, Savard and Almeida, 2022).

In addition, it can be concluded that the effects were greater for women, unsurprisingly given the great gender inequalities that still persist in Brazil, as already emphasized. Women presented an 11.12% positive probability of being unemployed or of working up to 14 hours per week, while for men this value was 7.58%. These results are consistent with recent studies on the COVID-19 pandemic, which suggest that women reduced their working hours proportionally more than men (Casale and Posel, 2020; Collins and others, 2021; Couch, Fairlie and Xu, 2020b; Cateia, Savard and Almeida, 2022).

Among the factors explaining this disparity, Alon and others (2020) conclude that the pandemic mainly affected sectors with greater proportions of female workers, such as those involving food and accommodation. In addition to this aspect, they suggest that with the closing of day-care centres and schools, the demand for domestic services grew considerably, something that disproportionally impacts women since, as discussed by Becker (1973 and 1974), the differences in returns in the labour market make it common for women to allocate more of their time than men to taking care of the home and children.

This factor of increased demand for childcare is one that has been quite well explored in the literature in the effort to explain the differential effects of the pandemic on men and women. As shown by Couch, Fairlie and Xu (2020a), mothers with school-age children were more affected by both increased unemployment and reduced working hours. This indicates that young children were a key factor in the differential effects of the pandemic by gender.

Regarding the other control variables, it can be seen that married women were less likely to work 40 hours a week or more than single women. As table 8 shows, being married reduced the probability of their working 40 to 44 hours, 45 to 48 hours and 49 hours or over by -2.09%, -0.56% and -0.94%, respectively. Table 9 shows that married men had a positive 1.00%, 0.81% and 1.90% probability of working 40 to 44 hours, 45 to 48 hours and 49 hours or over, respectively. The results thus suggest that married women tended to give less time to paid work, as suggested by Becker (1973 and 1974).

Another key result is that for the race variable. According to the estimates, in the samples of both women and men, whites were more likely than non-whites to work 40 hours or more. Specifically, white women had a 0.25%, 0.07% and 0.11% greater probability than non-white women of working in the 40 to 44 hours, 45 to 48 hours and 49 hours or over ranges, respectively. For men, the values were 0.57%, 0.52% and 1.28% higher for the same ranges of working hours.

This difference was also found in the case of the years of education variable. As can be seen from tables 8 and 9, a greater number of years of education increased the probability of women working 40 to 44 hours, 45 to 48 hours and 49 hours or over by 1.51%, 0.40% and 0.65%, respectively. For men, the probability was positive at 0.33%, 0.30% and 0.74% for 40 to 44 hours, 45 to 48 hours and 49 hours or over, respectively. This result corroborates that of other studies (Bell, 1998; Freeman and Holzer, 1986; Pinheiro and others, 2009).

Regarding regional dummies, the North-east region was used as a benchmark. For women, it can be seen from table 8 that all regions presented a positive probability in the 40 hours or more range: if a woman lived in a region other than the North-east, her probability of working 40 hours a week or more increased by 2.96%, 10.44%, 6.28% and 7.78% in the North, South, South-east and Centre-west regions, respectively.

This pattern is maintained in the analysis of table 9, which presents the results for men. In general, the fact of living in the North, South, South-east and Centre-west increased the probability of working 40 hours a week or more by 5.87%, 8.94%, 8.45% and 11.34%, respectively. This result confirms the hypothesis that lower human capital in the North-east region negatively affects the supply of working hours.

Another key result involves the variables denoting the presence of minors in the household. For women, it is noted that the presence of children up to 5 years of age reduced the probability of mothers working 15 to 39 hours, 40 to 44 hours, 45 to 48 hours and 49 hours or over by -0.55%, -2.04%, -0.52% and -0.83%, respectively. For the second variable, which analyses the presence of children aged between 6 and 12, the effect was the opposite, with increases of 0.27%, 1.15%, 0.31% and 0.51% for the same ranges of working hours. For women with children and adolescents aged between 13 and 17, lastly, the effect was also positive, with their presence increasing the probability of women working 15 to 39 hours, 40 to 44 hours, 45 to 48 hours and 49 hours or over by 0.61%, 2.78%, 0.76% and 1.28%, respectively.

These results suggest that the younger the child, the greater the probability of mothers working less than 40 hours a week. This finding is in line with those in studies by Connelly, DeGraff and Levison (1996) and Soares and Izaki (2002), which suggest that the presence of adolescents in the home represents less of a burden of domestic obligations for mothers and boosts their entry into the labour market.

For men, the presence of children of any age increased the probability of their supplying a greater number of hours. This result reflects the traditional gender division of labour, whereby men take responsibility for the financial support and economic reproduction of the family, carrying out financially remunerated work in the public sphere, while women are responsible for physical reproduction and domestic tasks, which constitute unpaid, private work (Fernandez, 2019).

Table 9 shows that having children up to 5 years of age increased the probability of men supplying 40 to 44 hours, 45 to 48 hours and 49 hours or over of work by 1.29%, 1.43% and 3.72%, respectively. Having children between 6 and 12 years of age increased the probability by 1.12%, 1.14% and 2.89% for the same ranges of working hours, while having children aged between 13 and 17 increased the probability by 1.02%, 1.06% and 2.70%. Thus, there was an increased probability of fathers supplying more working hours irrespective of their children's ages, which is different from the situation found with women. This result suggests that women face unfavourable conditions in terms of their participation in the labour market and in the division of housework, as suggested in studies by Costa (2007) and Madalozzo, Martins and Shiratori (2010).

As already mentioned, studies suggest that the presence of young children affects the male and female labour supply differently (Borjas, 2015), and recent studies indicate that the pandemic amplified these gender differences (Alon and others, 2020; Barbosa, Costa and Hecksher, 2020; Collins and

others, 2021; Couch, Fairlie and Xu, 2020b). It is thus important to analyse the behaviour of the supply of labour by men and women who had children in different age groups during the pandemic. To do this, the model included three interaction dummies relating the supply of labour to the presence of children during the pandemic period, while keeping the other control variables unchanged. Tables 10 and 11 show the results of the estimation of the marginal effects of the second model for women and men, respectively.

Table 10
Marginal effects of the ordered probit model estimation for women

Variable	0 to 14 hours	15 to 39 hours	40 to 44 hours	45 to 48 hours	49 hours and over
	dy/dx	*dy/dx*	*dy/dx*	*dy/dx*	*dy/dx*
COVID-19	0.1227783***	-0.0177308***	-0.0635232***	-0.016027***	-0.0254972***
Married	0.0403489***	-0.0046429***	-0.0206876***	-0.0056177***	-0.0094008***
Race	-0.003168 NS	0.0003966 NS	0.0016325 NS	0.0004316 NS	0.0007073 NS
Years of education	-0.0286767***	0.0035955***	0.0147784***	0.003905***	0.0063978***
North	-0.0351595***	0.0038686***	0.0179828***	0.0049476***	0.0083604***
South	-0.1128724***	0.0094714***	0.0566642***	0.0167462***	0.0299907***
South-east	-0.0702226***	0.0084834***	0.0360743***	0.0096572***	0.0160077***
Centre-west	-0.0850848***	0.0074755***	0.0428909***	0.0125275***	0.0221909***
COVID-19 x children 0–5	0.0184344***	-0.0024631***	-0.0095313***	-0.0024652***	-0.0039748***
COVID-19 x children 6–12		0.0020039***	0.0087021***	0.0023425***	0.0038924***
COVID-19 x children 13–17	-0.0421172***	0.004518***	0.0215075***	0.005961***	0.0101307***

Source: Prepared by the authors.
Note: *** significant at 1%; ** significant at 5%; * significant at 10%; NS not significant.

Table 11
Marginal effects of the ordered probit model estimation for men

Variable	0 to 14 hours	15 to 39 hours	40 to 44 hours	45 to 48 hours	49 hours and over
	dy/dx	*dy/dx*	*dy/dx*	*dy/dx*	*dy/dx*
COVID-19	0.105183***	0.0210492***	-0.0354097***	-0.0272915***	-0.0635309***
Married	-0.0535381***	-0.0106583***	0.0183491***	0.0139076***	0.0319398***
Race	-0.0165726***	-0.0038304***	0.0048518***	0.0044877***	0.0110634***
Years of education	-0.0115559***	-0.0026495***	0.0034211***	0.0031227***	0.0076617***
North	-0.0477225***	-0.0126223***	0.0110567***	0.0133968***	0.0358913***
South	-0.0685106***	-0.0185082***	0.0150014***	0.0193149***	0.0527024***
South-east	-0.065154***	-0.0153262***	0.0184487***	0.0176995***	0.044332***
Centre-west	-0.0861252***	-0.0254165***	0.0143254***	0.0247896***	0.0724266***
COVID-19 x children 0–5	-0.049237***	-0.0131156***	0.0112262***	0.0138472***	0.0372792***
COVID-19 x children 6–12	-0.0329026***	-0.0083033***	0.008391***	0.0091249***	0.02369***
COVID-19 x children 13–17	-0.0336058***	-0.0085361***	0.0084687***	0.0093364***	0.0243369***

Source: Prepared by the authors.
Note: *** significant at 1%; ** significant at 5%; * significant at 10%.

According to table 10, the interaction between the COVID-19 and children 0–5 variables increased the probability of women supplying between 0 and 14 hours by 1.84%. For the other ranges, the probability was negative. When the other interaction variables are analysed, the results suggest that the interaction between COVID-19 and children 6–12 reduced the probability of women supplying between 0 and 14 working hours by -1.69%, while it increased the probability in the other ranges. The same is true of the interaction between COVID-19 and children 13–17, but in this case there was a reduction of 4.21% for the same range of working hours. As regards the other control variables, the results were generally consistent with the first estimation.

The results for men are shown in table 11, where the interaction between the COVID-19 variable and the children 0–5 variable is positive at 1.12%, 1.38% and 3.73% for 40 to 44 hours, 45 to 48 hours and 49 hours or over, respectively. The second interaction, between COVID-19 and children 6–12, was positive at 0.84%, 0.91% and 2.37% for the same ranges, while the last interaction, between COVID-19 and children 13–17, was also positive at 0.85%, 0.93% and 2.43% for 40 to 44 hours, 45 to 48 hours and 49 hours or over, respectively.

In general, it can be concluded that mothers were most impacted by the presence of children in terms of the supply of their labour to the market. This is seen in studies which suggest the importance of day-care centres in increasing the supply of female labour (Anderson and Levine, 1999; Baker, Gruber and Milligan, 2008; Del Boca and Sauer, 2009; Heckman, 1974; Peña-Parga and Glassman, 2004). Through its estimation of the first model, the present study has also confirmed the relationship found in the literature between the presence of minors and the number of hours worked by women.

According to the results, the presence of children up to 5 years of age reduced the probability of women supplying a greater number of working hours during the pandemic. For men, the presence of children of any age increased the probability of labour being supplied. This result suggests that women were more affected by the pandemic than men, which is in line with other studies such as that by Alon and others (2020), indicating that school and day-care centre closures had greater effects on working mothers, and studies by Collins and others (2021) and Couch, Fairlie and Xu (2020b), which concluded that the pandemic disproportionally reduced the hours worked by mothers with young children.

It can also be concluded that these discrepancies were amplified by the advent of the pandemic, as found by Alon and others (2020), Collins and others (2021) and Couch, Fairlie and Xu (2020b). This aspect was brought out in the present study through the estimation of the second model, which showed that having children between 0 and 5 years of age reduced the participation of women in the labour market during the pandemic. This result suggests that mothers are still the primary caregivers for their children, as suggested by Madalozzo, Martins and Shiratori (2010).

In line with the finding of Borjas (2015) that women put their careers on hold for an average of seven years because of the need to care for their children, the present study presents results suggesting that mothers were most impacted by the reduction in hours supplied, largely because of childcare.

V. Final comments

The present study set out to analyse the effects of the COVID-19 health crisis on the supply of working hours by men and women. To this end, data from the Continuous PNAD for the second, third and fourth quarters of 2018, 2019 and 2020 were used and four ordered probit models were estimated. First, the effects of COVID-19 on the labour supply were estimated for men and women. Then the effects of COVID-19 on the supply of men's and women's labour when they were parents of young children were analysed by means of a dummy capturing interaction with COVID-19, while the other control variables were kept unchanged.

The results suggest that the pandemic reduced the probability of men and women supplying 40 or more hours of work per week because its advent led to a number of positions disappearing or because their hours were reduced as a result of the decrease in consumption and production activities. In addition, it was found that the effect was greater for women than for men because the pandemic increased the demand for housework, a task still disproportionally assigned to women, who remain largely responsible for caring for children and the home.

The results for the other control variables suggest that married women were less likely to increase their supply of working hours than single women. However, for men the opposite relationship was seen, i.e. married men were more likely to increase their supply of working hours than single men. It should also be noted that non-whites and those with less education, whether male or female, were less likely to increase their supply of working hours than whites.

The North-east region presented the lowest probability of hours worked falling into the range of 40 hours and over per week for both men and women. Lastly, the presence of children up to 5 years of age reduced the probability of mothers supplying a greater number of hours of work. For mothers with children aged between 6 and 12 and adolescents aged between 13 and 17, however, the effect was the opposite. For men, the effect was positive irrespective of the age of the child, meaning that the probability of their supplying working hours increased.

The results of the second model estimated suggest that mothers with children up to 5 years of age were the most impacted during the COVID-19 pandemic, although when their children were over 6 years of age, the effect was the opposite. In other words, while the presence of children up to 5 years of age reduced women's participation in the labour market, the presence of children older than 6 increased their participation. In the case of men, the presence of children at any age increased the probability of their supplying more working hours during the pandemic. These results suggest that mothers are still the main carers for their children and those most likely to put their careers on hold to dedicate themselves to childcare, i.e. in the dynamics of allocating time between work and childcare, mothers disproportionally reduce their hours in the labour market to take care of their children relative to fathers.

The present study is limited in that its analysis is confined to men and women who are heads of household or spouses of the head. In terms of public policy, the results of the study suggest that the supply of childcare establishments should be increased because, as discussed in the findings, having minors in the household reduces the probability of mothers supplying more hours of work, a situation which is intensified in an economic crisis, such as that caused by the COVID-19 pandemic.

Furthermore, it seems crucial to develop public policies capable of promoting equality in the labour market and economic autonomy for women, considering the great inequalities that exist, particularly in developing countries such as Brazil. In this regard, specific actions could be considered to eliminate the gender division of labour, with emphasis on securing rights, wage equality and equal opportunities.

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Structure of employment associated with international trade in Brazil from a gender perspective

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Abstract

This article analyses the volume and structure of female employment linked to Brazil's foreign trade with its different partners in 2019, on the basis of estimations made from the Brazilian input-output table and on trade and employment statistics. Jobs linked to exports account for a small share of total employment in Brazil, especially in the case of women. Comparing the number of jobs generated by exports with those threatened by imports, the balance is smaller for women than for men. In addition, the quality of export-related employment is below the economy-wide average, for both women and men alike. Nonetheless, trade-related jobs in Brazil vary across trading partners, reflecting the country's heterogeneous pattern of trade specialization.

Keywords

Foreign trade, employment, labour market, gender, women's employment, gender equality, working conditions, input-output analysis, Brazil

JEL classification

F16, F15, B54

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I. Introduction

A key issue in the field of international trade is the relationship between foreign trade and the labour market or social inequalities (Çağatay, 2005). The debate on the distributive effects of international trade is an old and recurrent one; and it often concerns the labour market,[1] since some of the jobs in an economy are directly or indirectly linked to its exports or imports of goods and services.

Fluctuations in trade flows affect job creation and destruction. The volume and profile of these two effects depends, firstly, on the sectoral composition of trade and, secondly, on the pattern of employment in the different sectors of the country in question. A recurring theme in the related literature is how trade liberalization affects existing employment opportunities, in terms of both the quantity of jobs affected by trade and their composition and quality.

Employment conditions differ between social groups, and the labour market effects of trade reproduce, mitigate or accentuate these differences. In the case of gender, how international trade affects women's employment is an open debate, and there is no consensus on how trade reproduces, mitigates or aggravates gender inequalities. The growing importance of this debate is reflected, for example, in the proliferation of provisions and chapters dealing with gender and trade in trade agreements. Between 1957 and 2022, 110 agreements including gender-related provisions were signed, which may encompass gender equality, women's rights and other issues. In the same period there were also seven trade agreements that contained a chapter on the recognition of gender inequalities present in the economy and the development of policies to ensure that international trade does not accentuate them (Ferreira and Castilho, 2024). Even more significant, however, is the fact that gender equality is the subject of United Nations Sustainable Development Goal 5; and it also contributes to the achievement of two others: Goal 8 —Decent work and economic growth and Goal 9— Industry, innovation and infrastructure.

Women engage in society differently than men, owing to the sexual division of the paid and unpaid labour market, and other spheres of social and economic life;[2] and also because trade flows, with their sectoral and geographical characteristics, affect the two groups differently. Several authors, such as Fontana (2009), Staritz (2013) and Urmeneta (2021), postulate that export-related jobs are more egalitarian in terms of formality, pay and participation, among other characteristics, than those linked to production that is targeted exclusively to the domestic market. Other studies, such as those of Azar, Espino and Salvador (2009) and Barrientos (2001), claim that international trade can accentuate existing discrimination in the labour market, either because the impact of changes in international trade varies across the different sectors of the economy, or else through indirect mechanisms. These include the fact that unpaid work tends to be a female responsibility, which restricts women's participation in the paid labour market (Ferreira, 2022). It should be noted that the relationship between trade and employment is bidirectional from a gender perspective: trade movements affect gender disparities in employment and can also create spurious conditions for export competitiveness (Fajnzylber, 1983).

In addition to different perceptions of the effects of international trade on women's employment, some female authors argue that the effects may also vary according to country-specific normative, institutional and cultural factors. For this reason, it seems impossible to generalize the effects of changes in international trade on gender inequalities; and studies would need to be performed on specific countries or sectors (Barafani and Barral Verna, 2020; Çağatay, 2005).

[1] This is not the only transmission channel linking international trade with the distribution of income or employment. Others include entrepreneurial activity, consumption and unpaid work. For further discussion, see Çağatay (2005) and Ferreira and Castilho (2024).

[2] These differences are accentuated by the different social markers that affect men and women, such as colour and race, sexual orientation or gender identity, and social class (Fontana, 2003).

This article aims to analyse how trade flows contribute to gender inequalities in the Brazilian labour market. It starts by considering the structure of the country's trade, which has displayed a regressive specialization trend since the decade of 2000, in which the share of mineral and agricultural goods with little or no processing has increased. In contrast Brazil's import structure is concentrated in products with a higher degree of processing (Nassif and Castilho, 2020). Nonetheless the structure of the country's trade varies significantly across its different trading partners. For example, exports to China —currently Brazil's main trading partner— are concentrated in agricultural and mineral products, whereas its exports to the rest of South America are largely manufactures of higher technological content. These individual partner specializations give rise to specific trade-related employment structures, as discussed below.

The volume and structure of trade-related employment is analysed by estimating the female and male employment content of exports and imports, and by evaluating the job characteristics that are used to gauge its quality. Employment content is estimated using a methodology that is well established in the literature, whereby the labour input coefficient used in domestic production is applied to the values of exports and imports, both direct and indirect (in other words, employment associated with the manufacture of inputs used in the production of goods and services). The characteristics of the labour market, including the gender division of employment, are obtained from statistical surveys on the Brazilian labour market. The objective is to examine the extent to which jobs linked to foreign trade are of equal, worse or better quality than employment in the economy at large, which would indicate whether trade reproduces, mitigates or accentuates gender inequalities in the Brazilian labour market. This analysis has been performed in both aggregate and disaggregated form, with respect to Brazil's main trading partners,[3] since its trade specialization varies in each case.

The article is divided into four sections, including this introduction and final remarks. Section II describes the content of employment (volume and sectoral composition) related to Brazilian exports and imports, both total and by trading partner. It then presents the methodology adopted. Section III uses the employment quality indicator to analyse the profile of jobs linked to international trade, both as a whole and according to each selected partner.

II. Female and male employment associated with Brazil's international trade

The paid labour market is a specially fertile area for analysing how changes in international trade flows affect society and the well-being of its population. This is because, in any country, some of the jobs —both those generated by exports and those threatened by imports— are linked to trade flows. While the production of exported goods and services creates jobs both directly and indirectly, the sectors that are most sensitive to competition from imports may contract, thereby putting the associated jobs at risk (ECLAC, 2021a; Fontana, 2020). Not surprisingly therefore, a key issue in the field of international trade is the relationship between foreign trade and the labour market (Çağatay, 2005).

As is the case in other large economies, Brazil's goods trade in 2019 represented only a small share (16.8%) of its GDP.[4] However, the country has several trading partners —which have varied over recent decades— with which it maintains more or less intense relations and a pattern of trade specialization that varies according to each partner. Trade structures can be more or less sophisticated and may be associated with a larger or smaller number of jobs, of higher or lower quality. This is demonstrated in

[3] These are China, the United States, the European Union, South America, Argentina, Japan, Mexico and the United Kingdom.

[4] Authors' calculations based on the Computerized Integrated System of Foreign Trade (SISCOMEX), the Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV) and the input-output table estimated by Alves-Passoni and Freitas (2020).

Castilho (2010), which notes that Brazil mainly exports manufactures with a low or medium degree of processing but imports manufactures of greater value added. Nonetheless, while Brazil's trade with its more developed partners, such as Japan and the European Union, reflects the north-south archetype, it exports more sophisticated products to its developing-country partners.

This section analyses the content of paid labour associated with Brazil's international trade, both as a whole and with each of its main trading partners in 2019, the shares of which are reported below. The methodology used for the calculation is described briefly in subsection II.1, and the results are presented in subsection II.2. In 2019, the six trading partners with the largest shares in Brazil's exports and imports were China, the European Union, the United States, Latin America, Japan and the United Kingdom, which jointly absorbed 75.4% of its exports and supplied 74.9% of its imports. Within Latin America, the largest trading partners are Mexico and South America, especially Argentina. Accordingly, the analysis in this article focuses on bilateral trade with China, the European Union, the United States, South America, Argentina, Japan, Mexico and the United Kingdom, in addition to total trade. In 2019, these trading partners together accounted for 75.6% of Brazil's exports and 76.5% of its imports (see table 1).

Table 1
Brazil: international trade, by main trading partners, 2019
(Millions of dollars and percentages)

Trading partners	Exports *(Millions of dollars)*	Imports *(Millions of dollars)*	Exports *(Percentages)*	Imports *(Percentages)*
China	64 021	36 891	25.44	15.87
European Union	42 936	53 762	17.06	23.13
Netherlands (Kingdom of the)	15 762	12 810	6.26	5.51
Germany	6 071	12 929	2.41	5.56
France	3 192	5 820	1.27	2.50
Others	17 911	22 203	7.12	9.55
United States	37 395	47 950	14.86	20.63
Latin America	39 644	29 705	15.75	12.78
South America	30 172	23 349	11.99	10.05
Argentina	10 178	10 930	4.04	4.70
Chile	5 456	3 366	2.17	1.45
Uruguay	2 816	1 448	1.12	0.62
Other	11 721	7 606	4.66	3.27
Central America	4 193	978	1.67	0.42
Mexico	5 280	5 378	2.10	2.31
Japan	5 856	5 684	2.33	2.45
United Kingdom	4 547	6 136	1.81	2.64
Republic of Korea	3 535	5 484	1.40	2.36
India	2 935	4 671	1.17	2.01
Rest of the world	50 791	42 149	20.18	18.13
Grand total	251 661	232 432	100.00	100.00

Source: Prepared by the authors, on the basis of Computerized Integrated System of Foreign Trade (SISCOMEX) and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).
Note: The European Union comprises 27 European countries.

In 2019, 36.5% of Brazil's exports were specialized in agriculture, livestock, forestry, fishing and aquaculture, and in agricultural commodities. The next largest export category was industrial commodities, with a 32.8% share. On the import side the highest concentrations were in innovative industry (36.3%), traditional industry (20.0%) and industrial commodities (18.7%).[5] [6]

As noted above, this profile varies between trading partners. While bilateral trade with China, the European Union and Japan displays a trend similar to that of trade as a whole, the United States, South America, Argentina and Mexico, for example, are the only trading partners in which innovative industry has a significant presence in Brazil's exports. In the case of exports destined for Argentina and elsewhere in South America, all industrial groups are represented strongly.[7]

1. Methodology

The methodology used to calculate the employment content associated with Brazil's total and bilateral exports and imports is based on studies by Castilho (2007), ECLAC (2021a, 2021b and 2022) and Ferreira (2022).

The data sources used were the input-output table estimated by Alves-Passoni and Freitas (2020); data on employment, exports and the gross value of Brazilian production were taken from the System of National Accounts of the Brazilian Institute of Geography and Statistics; labour market data were obtained from the Continuous National Household Sample Survey (*PNAD Contínua*); and statistics on trade in goods and services were sourced from the SISCOMEX and SISCOSERV portals, respectively. The year chosen to calculate the employment content was 2019, because it is the latest for which all the necessary data are available.

It should be noted that trade has been measured in gross terms because there is little difference between gross exports and their domestic value added. This is because Brazilian exports are heavily concentrated in natural resource-intensive products of low import content (Ferreira, 2022; Marcato, 2018). This reflects Brazil's scant participation in global value chains, especially when measured in terms of the foreign content of its exports (Costa, 2018; Ferraz, Gutierre and Cabral, 2015; Ferreira, 2022). Lastly, use of the Brazilian input-output table affords greater compatibility with national gender-specific labour market statistics, and with foreign trade statistics, with a more detailed sectoral breakdown than those contained in international input-output matrices.

The employment content of exports is calculated for jobs that are linked to exports directly and also for indirect jobs related to the production of inputs incorporated in those exports. To calculate export-related employment, it is first necessary to calculate the direct employment coefficient:

$$n_{67\times 1} = E_{67\times 1} \oslash V_{67\times 1} \quad (1)$$

[5] Agricultural commodities involve activities that make greater use of natural resources and energy, and consist mainly of homogeneous products with lower technological content. Industrial commodities also comprise activities that make heavy use of natural resources, but are associated with mineral extraction, metallurgy and basic chemistry. Traditional industry, meanwhile, focuses on the production of goods of lower technological content with few requirements in terms of scale of production, and the production of wage goods and industrial complements, for example. Lastly, innovative industry produces goods of higher technological content, including more sophisticated activities. Its component sectors are said to be responsible for inducing technical progress in the economy (Alves-Passoni and Freitas, 2017; Torracca and Kupfer, 2014).

[6] Authors' calculations based on SISCOMEX and SISCOSERV.

[7] Authors' calculations based on SISCOMEX and SISCOSERV.

where:

$n_{67\times 1}$ = direct employment coefficient, by activity,

$E_{67\times 1}$ = total employment, by activity,

$V_{67\times 1}$ = gross value of production at current prices, by activity, and

$\oslash$ = elementwise division.

To calculate the direct employment associated with exports, the direct employment coefficient is multiplied by the exports column vector:

$$ED_{67\times 1} = n_{67\times 1} \odot X_{67\times 1} \tag{2}$$

where:

$ED_{67\times 1}$ = direct employment linked to exports, by activity,

$X_{67\times 1}$ = total exports of goods and services, by activity, and

$\odot$ = elementwise multiplication.

Indirect export-related employment consists of jobs associated with the production of inputs used to produce the exported goods and services. This is calculated by firstly estimating the total production associated with exports:

$$Q^{X}_{67\times 1} = \left\{\left(I - A^{d}\right)^{-1}\right\}_{67\times 67} \cdot X_{67\times 1} \tag{3}$$

where:

$Q^{X}_{67\times 1}$ = direct and indirect domestic production associated with exports, and

$\left\{\left(I - A^{d}\right)^{-1}\right\}_{67\times 67}$ = Leontief inverse matrix.

Total employment (both direct and indirect) is then calculated by applying the employment coefficient to the domestic production associated with exports:

$$ET_{67\times 1} = N_{67\times 67} \cdot Q^{X}_{67\times 1} \tag{4}$$

$N_{67\times 67}$ = matrix in which the values in the main diagonal correspond to the direct employment coefficient, by activity;

where total employment (TE) corresponds to the sum of direct employment (DE) and indirect employment (IE) linked to exports. In other words, EI can be obtained as follows:

$$EI_{67\times 1} = ET_{67\times 1} - ED_{67\times 1} \tag{5}$$

This methodology is used to calculate the direct and indirect jobs associated with the total exports of the economy in question, by activity. The male and female employment shares are distinguished by harmonizing the System of National Accounts (level 67) with the Continuous National Household Sample Survey classification (National Classification of Economic Activities (CNAE) domicile 2.0). The data are then grouped into 56 activities.

Subsequently, the male and female shares are applied to the employment content associated with each activity in the column vectors:

$$ED^{f}_{56\times 1} = e^{f}_{56\times 1} \odot ED_{56\times 1} \tag{6}$$

$$EI^{f}_{56\times 1} = e^{f}_{56\times 1} \odot EI_{56\times 1} \tag{7}$$

$$E^{f}_{56\times 1} = e^{f}_{56\times 1} \odot E_{56\times 1} \tag{8}$$

where:

$e^{f}_{56\times 1}$ = female participation in total employment, by activity,

$ED^{f}_{56\times 1}$ = female employment directly linked to exports, by activity,

$EI^{f}_{56\times 1}$ = female employment indirectly linked to exports, by activity, and

$E^{f}_{56\times 1}$ = total female employment linked to exports, by activity.

The same exercise is performed for men.

To estimate the employment content by trading partner, the vector $X_{67\times 1}$ is disaggregated by trading partners.

To estimate the employment content that is threatened by imports, the export vectors are replaced by total and bilateral import vectors.

2. Employment content associated with Brazilian foreign trade

In 2019, 14.2 million domestic jobs were linked to Brazilian exports, representing 14.9% of all jobs in the Brazilian economy.[8] Of these 14.2 million, 25% were held by women. This means that women are even more underrepresented in export-related employment than in the labour market generally, where they held 42.8% of all jobs in the same year. Nonetheless, export-related jobs contribute significantly to women's total employment: in 2019 there were 3.5 million women employed in activities linked to Brazilian exports, representing approximately 8.7% of all women employed in the entire labour market (see table 2).

Meanwhile, an estimated 11.5 million jobs were threatened by imports in 2019. Of these, 30.6% were held by women, which is more than their share of the jobs generated by exports. This percentage also represents approximately 3.5 million women, or 8.7% of female employment in the entire economy. Thus, female employment linked to international trade in 2019 generated a net balance of just 31,202 jobs, representing merely 0.1% of women employed in the Brazilian economy (see table 2).

The situation is different for men: in 2019 there were 10.6 million jobs linked to exports and 8.0 million threatened by imports, equivalent to 19.6% and 14.7% of total male employment respectively. The net balance of male employment associated with international trade in that year was considerably larger than in the case of women, at 2.7 million jobs, representing 4.9% of total male employment (see table 2).

In 2019, the employment content of bilateral trade with China, the United States, the European Union, South America, Argentina, Japan, Mexico and the United Kingdom accounted jointly for more than 70% of the jobs associated with Brazil's total exports and imports. Of these partners, only China, South America, Japan and the United Kingdom generated a positive net employment balance both for women and for men. Mexico displayed a positive employment balance for men only, which exceeds the negative balance for women. The United States, the European Union and Argentina display negative employment balances for both women and men (see table 2).

[8] According to the Continuous National Household Sample Survey (2022), there were 40.6 million women and 54.3 million men in the paid labour market in 2019.

Table 2
Brazil: content of employment directly and indirectly linked to international trade, by trading partner and sex, 2019
(Number of employed people)

Trading partners	Exports				Imports				Balance (exports – imports)	
	Women		Men		Women		Men		Women	Men
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect		
China	331 553	466 079	1 256 626	1 473 005	266 144	341 676	342 881	844 869	189 812	1 541 881
United States	218 006	311 100	519 364	899 536	325 706	386 292	573 354	1 024 286	-182 892	-178 740
European Union	216 774	312 091	602 360	945 506	244 232	391 236	510 990	1 041 715	-106 602	-4 839
South America	157 711	297 889	347 345	844 490	142 446	231 993	333 496	677 212	81 161	181 126
Argentina	37 259	96 865	94 712	268 539	57 317	117 056	164 994	335 371	-40 249	-137 115
Japan	40 036	56 026	128 073	179 001	22 055	44 770	53 693	115 966	29 237	137 416
Mexico	27 141	47 066	84 245	133 942	26 240	52 927	50 852	141 678	-4 960	25 658
United Kingdom	26 554	36 653	63 496	106 302	11 278	34 833	26 759	96 239	17 096	46 800
Rest of the world	326 669	541 510	923 740	1 769 367	420 523	399 058	636 939	1 002 572	48 598	1 053 597
Total	1 381 704	2 165 280	4 019 962	6 619 689	1 515 942	1 999 841	2 693 959	5 279 907	31 202	2 665 785
National total	40 609 501 14		54 346 658		40 609 501		54 346 658		40 609 501	54 346 658

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

The share of these countries in the net jobs balance is heterogeneous. Considering the sum of the female and male balances, China accounted for 64.2% of the total balance of national jobs linked to international trade. The partner with the second largest positive balance was South America, but this only represented 9.7% of the total. However, while the number of net jobs generated, in the case of China, is positive for both women and men and accounts for a large share of the number of jobs created, women represented just 11.0% of the total balance. In the case of South America, the balance was more evenly distributed, although there is still a gender gap, with women accounting for 30.9% of the balance generated (see table 2).

Japan and the United Kingdom —the two remaining partners with a positive total employment balance— presented a similar picture of female underrepresentation: women accounted for 17.5% of the balance of employment linked to bilateral trade with Japan and 26.8% of the balance with the United Kingdom. In Mexico, as noted above, despite a positive net employment balance overall, the female balance was negative (see table 2).

In contrast, an analysis of partners with a negative employment balance for both men and women reveals the opposite. In bilateral trade with the United States and the European Union, women are overrepresented, accounting for 50.6% and 95.7% respectively of the negative employment balance. In the case of bilateral trade with Argentina, contrary to the pattern observed thus far, men account for the vast majority (77.3%) of the negative employment balance (see table 2).

However, having analysed the volume of employment linked to, or threatened by, international trade, the following subsections consider its sectoral composition and characteristics.

3. Sector composition of the employment content

The sector composition of male and female employment linked to international trade has a direct impact on the quality of the jobs both created and threatened. The sectors and activities that generate these jobs are not homogeneous: they may be more or less capital-intensive and more or less (female and male) labour-intensive; they may also have greater or lesser potential to stimulate the economy,[9] with more or less desirable characteristics for workers; and they may create or threaten a larger or smaller number of jobs linked to international trade.

(a) Characterization of the sectors

Various authors, such as Clark (1940), Hirschman (1958) and Kaldor (1978),[10] generally identify manufacturing, among the three large macro-sectors, as the sector that is capable of driving economic development. The observation that the manufacturing sector is the core of economic growth was enshrined in Kaldor's three laws, which postulate a positive relationship between: (i) the growth of manufacturing and the growth rate of total production; (ii) the rate of manufacturing productivity growth and the growth rate of industrial production (which became known as the Kaldor-Verdoorn law) owing to economies of scale; and (iii) the growth of manufacturing production and employment and the growth of aggregate productivity in the national economy as a whole. Rocha (2016) notes that since manufacturing has a higher capital-labour ratio than other sectors of the economy, it also has a higher initial level of labour productivity than the other sectors. Manufacturing industry would therefore serve as the engine of the economy as it has the capacity to promote productivity growth, innovation and skill accumulation.

[9] The sectors that drive the economy are those that require greater knowledge and have greater potential to generate quality jobs, as well as a greater capacity for innovation and the incorporation of technological advances. The sectors in question are: the renewable energy transition, the digital revolution, urban electromobility, the bioeconomy, the care economy, the circular economy, the health-care manufacturing industry and sustainable tourism (ECLAC, 2020).

[10] Other authors, such as Weiss and Jalilian (2016), emphasize other factors that explain why manufacturing is the engine of economic growth, such as its greater potential for expansion through exports than other sectors.

In addition to being the main source of capital accumulation and technological progress, manufacturing has great capacity to propagate technical progress and growth to the rest of the economy. Nonetheless, Brazilian manufacturing industry displays structural heterogeneity across several dimensions.[11] The more sophisticated sectors play a greater role in generating and propagating of technical progress and promoting economic growth, by purchasing goods and services from other sectors (Nassif, 2008).

Nassif (2008) also emphasizes that the capital goods industry is one of the drivers of a country's economic development, since it creates productive capacity and induces technical progress, thus playing a strategic role in the economic development process.

The Sustainable Development Goals recognize the importance of the industrial sector for socioeconomic development, beyond the academic debate. Goal 9 deals specifically with industry, innovation and infrastructure; and its various targets include the need to increase industry's share of to GDP and employment, and promote inclusive and sustainable industrialization (target 9.2).

There are other important ways to add value and foster technological development in specific value chains. These include promoting the innovative industrialization of agriculture, which can boost productivity, give access to new global markets and foster productive diversification. However, this entails transforming agricultural activities into highly productive industrial processes. This, in turn, requires flexible and dynamic industrial policies that respond to the specific characteristics of each country and are not confined to the manufacturing sector, but pursue innovation and technological upgrading (Andreoni and Tregenna, 2020).

Several authors, such as Bresser-Pereira, Nassif and Feijó (2016), argue that specific service subsectors —the technologically sophisticated tradable ones— along with sectors of high technological content, play a strategic role in economic development, because they contain high levels of value added per capita and pay their workers high wages.[12] Following recent transformations in the organization of production —as a result of the proliferation of global and regional value chains, which has led to the outsourcing of various activities that were previously performed within the organization or firm— the distinction between manufacturing and commerce has become more blurred, and the service content of manufacturing production has increased significantly. This process is known as the servitization of manufacturing (ILO, 2019). Servitization generates both under- and overestimations in international production and trade statistics, because the services content in manufactured products, and vice versa, is increasing but hard to distinguish. At the same time, the services sector comprises a large number of subsectors that vary widely in terms of productivity, the knowledge required to perform them and the jobs created.

(b) Analysis of employment content by sector

The sectoral composition of jobs linked to Brazil's international trade varies according to its trading partners. In trade with China, Japan and the European Union, the sectoral composition of female and male export-related jobs is far less diversified than in trade with Argentina or South America as a whole, or with Mexico, the United Kingdom or the United States, (see tables A1.1, A1.2, A1.3 and A1.4 in

[11] The firms that make up the industry differ in size and in ownership and corporate structures, shares in industry value added or in the rate of productivity growth, or different strategies for increasing their technological and export potential (Nassif, 2008). In developing countries, this structural heterogeneity is expressed in wide differences in labour productivity, both between sectors of the economy and within each sector —much larger than in developed countries. These differences are sufficiently marked to segment the productive system and the labour market clearly into different strata, in which technological and remuneration conditions are pronouncedly asymmetric (ECLAC, 2010; Cimoli and Porcile, 2013).

[12] For a discussion of the importance of the service sector for economic development and its relationship with manufacturing industry, see Cassini and Robert (2020), for example. According to these authors, in the current context it is difficult to predict whether a productive profile specialized in services will produce the desired growth and development effects, if it has not previously reached a higher level of industrialization.

the annex). This is an important detail, since export diversification can serve as a way to promote economic growth. Developing countries should seek to diversify their exports both geographically and between sectors, since this would help mitigate the instability caused by the volatility of commodity prices and would increase the income elasticity of exports and thus boost economic growth (Hesse, 2008; Sarin, Mahapatra and Sood, 2022).

In addition to sectoral diversification, the types of goods in which each country's production specializes also affect its economic performance. As Hausmann, Hwang and Rodrik (2007) note, developing economies would be better off producing the same types of goods as rich countries, rather than commodities. This section will focus on the latter point.

In bilateral trade with most of the selected partners, export-related female employment content is concentrated largely in three activities: agriculture; commerce; and scientific, professional and technical activities. In bilateral trade with China, the European Union and Japan, the export-related female employment content pertains mostly to the agriculture sector. This sector also accounts for a considerable share (more than 17%) in bilateral trade with Mexico and the United Kingdom, but it is not the largest job creator. In the case of Mexico, most of the employment content is associated with commerce, while in trade with the United Kingdom it is linked to scientific, professional and technical activities (see tables A1.1 and A1.2 in the annex).

Argentina, South America and the United States are Brazil's only trading partners for which the employment content associated with agriculture is not among the top three sectors. In trade with the United States, the accommodation and food services sector ranks third in terms of female employment content. In bilateral trade with Argentina and South America as a whole, this place is taken by traditional industry (see tables A1.1 and A1.2 in the annex).

In terms of imports, the three sectors that most threaten female employment content include commerce, and scientific, professional and technical activities —in the case of all selected trading partners. In trade with China, the threatened female employment content is mostly concentrated in traditional industry; and in trade with Japan, the third sector posing the greatest threat to female employment content is innovative industry. In contrast, in trade with the United States, the European Union and Mexico, much of the threatened employment content pertains to the accommodation and food sector. Argentina and South America, meanwhile, are the only trading partners in which the female employment content associated with agriculture is among the most threatened (see tables A1.1 and A1.2 in the annex).

As noted above, only four trading partners display a positive net female employment content: China, Japan, South America and the United Kingdom. Of these, only trade with South America generates a positive balance of jobs associated with all industrial sectors. In fact, trade with this partner generates a negative female jobs balance in just two sectors: agriculture, and accommodation and food services. In the case of Argentina, although the total balance of trade-related female jobs is negative, it displays positive balances in innovative industry, traditional industry and industrial commodities. These are offset by clearly negative balances in sectors such as agriculture, commerce, accommodation and food services, and agricultural commodities (see tables A1.1 and A1.2 in the annex).

In the case of men, most of the employment content linked to exports is concentrated in agriculture; transportation, storage, support activities for transportation and postal services; and also in commerce. The agriculture sector is clearly much more predominant in trade with China, the European Union and Japan, than with other partners. In trade with Argentina, innovative industry is one of the three sectors that generate the most employment linked to exports, while in the case of the United Kingdom and the United States it is the scientific, professional and technical activities sector (see tables A1.3 and A1.4 in the annex).

In terms of male jobs threatened by imports, the commerce sector and the transportation, storage, support activities for transportation and postal services sector are among the three that most threaten employment content in trade with all selected trading partners (except commerce in the case of Japan). A large proportion of the male jobs threatened by trade with China is concentrated in traditional industry and, in the case of Japan and Mexico, in innovative industry. Conversely, in trade with Argentina and South America as a whole, most of the threatened male employment content pertains to the agriculture sector (see tables A1.3 and A1.4 in the annex).

Regarding the balance of male jobs, as noted above, trade with China, Japan, Mexico, South America and the United Kingdom generates more jobs than it threatens. Here again, South America is the only trading partner for which the jobs balance is positive in all industrial sectors. In fact, with the exception of Argentina —where industrial commodities and innovative industry generate a positive balance— and the United States —where traditional industry has a positive balance— the only industrial sector in which the other partners generate a positive balance in male jobs is agricultural commodities (see tables A1.3 and A1.4 in the annex).

III. Quality of female and male employment linked to Brazil's international trade

This section estimates an "indicator of job quality" (both domestic and trade-related) to gauge the extent to which differences in the sectoral composition of female and male employment influence the different quality of both total employment and that specifically linked to exports or threatened by imports. The employment quality indicator is calculated using the methodology proposed by Saboia and Kubrusly (2014), which makes it possible to combine employment characteristics into a synthetic indicator similar to the United Nations Human Development Index. The following variables were combined for this purpose: pay per hour worked, participation in leadership or managerial positions, share of formal employment, and time spent in jobs (or turnover). The higher the values of these variables, the better the employment characteristics for workers.

The employment content (both generated and threatened) in the 10 activities with the highest total employment quality indicators in 2019, among the selected partners, is discussed below. For simplicity, hereinafter these activities are referred to as the drivers of the Brazilian economy.[13]

1. Employment content of the drivers of the Brazilian economy

According to the calculation of the job quality indicator, in 2019 the following 10 activities considered drivers of the Brazilian economy were distinguished as offering higher quality to their workers, namely the extraction of oil and gas, including supporting activities; financial intermediation, insurance and supplementary pension plans; public administration, defence and social security; manufacturing of pharmaceutical products and chemicals; electricity, gas and other utilities; publishing and printing; manufacturing of chemicals; air transportation; manufacture of coke, petroleum products and biofuels; and manufacture of motor vehicles, trailers and coachwork (see tables A1.1 and A1.2 of the annex).

The first noteworthy feature is the fact that few of the driving activities have a significant share[14] in the female employment content of exports. Bilateral trade with Argentina and South America as a whole, and with Mexico, includes the manufacture of motor vehicles, trailers and coachwork, while trade

[13] Criteria such as environmental sustainability, for example, have not been considered here, despite the importance of this debate.

[14] Defined as those of the 10 activities that have the largest share of female employment content linked to Brazilian exports.

with China and the United Kingdom includes financial activities, insurance and related services. The manufacture of motor vehicles, trailers and coachwork is also among the 10 activities with the largest share in the content of female jobs that are threatened by imports from Argentina, Japan and Mexico; and it only displays a positive balance in bilateral trade with South America. Financial activities, insurance and related services, meanwhile, are among the 10 activities with the largest share of the content of jobs threatened by imports from the European Union, the United Kingdom and the United States; and the sector displays a positive balance in trade with China, South America and the United Kingdom (see tables A1.1 and A1.2 in the annex).

In the case of men, the manufacture of motor vehicles, trailers and coachwork was the only one of the 10 driving activities that was among those with the largest shares in export-related employment, including in bilateral trade with Argentina, South America and Mexico. However, this sector is also one of those with the largest employment content threatened by imports from Argentina and South America, and from Japan and Mexico; and it only displays a positive balance in trade with South America (see tables A1.3 and A1.4 in the annex).

Several of these economic drivers are among the ten activities that generate the smallest shares of export-related employment for both women and men. These are: (i) the extraction of oil and gas, including supporting activities —in trade with Argentina, the European Union, Japan, the United Kingdom and the United States, in terms of female job creation; and with Argentina, Japan, Mexico and the United Kingdom in terms of male jobs; (ii) the manufacture of coke, petroleum products and biofuels, in trade with Argentina, China, the European Union, the United Kingdom and the United States, in job creation for women; and with Argentina and South America, the European Union and Mexico in the case of men; (iii) the manufacture of pharmo-chemical and pharmaceutical products, in trade with China, Japan, the United Kingdom and the United States, in terms of job creation for women, and with all partners except Mexico in the case of male employment; (iv) electricity, gas and other utilities in trade with the European Union and the United States, in terms of job creation for women; (v) air transportation, in trade with Argentina and South America as a whole, for both female and male job creation; and lastly, (vi) publishing and printing, in trade with China in the case of female employment, and with China, the European Union, the United Kingdom and the United States in the case of men (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

Analysis of the importance of the aforementioned activities in terms of employment generated by bilateral trade with each of the partners analysed thus far, has revealed that export-related employment in these activities, whether for women or for men, is relatively minor in most of the countries analysed. In other words, given the structure of Brazilian international trade, these activities generate relatively few female and male export-related jobs.

Argentina is the partner that generates proportionally most female and male export-related employment associated with these activities: 8.9% and 10%, respectively, of the employment content related to exports to this partner. It is followed by Mexico and South America, which account for 8.1% and 6.8%, respectively, of the female and male employment content of exports associated with these activities. In Brazil's trade with other partners, the total female and male employment content linked to these activities is less than 5%, and no more than 3.1% in the cases of China and Japan (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

The aggregate balance of female jobs associated with these activities is positive solely in bilateral trade with South America, where the only negative balance is in the manufacture of coke, petroleum products and biofuels. In the case of men, the aggregate balance is positive in trade with China and South America —owing mainly to the extraction of oil and gas, including supporting activities, in the case of China; and to the manufacture of motor vehicles, trailers and coachwork, in the case of South America. In contrast, the European Union is the partner that generates the largest negative balance of female and male jobs associated with these activities —minus 43,752 in the case of women and minus 73,917 in the case of men (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

The activities classified as drivers of the Brazilian economy include the following three in particular: the manufacture of pharmo-chemical and pharmaceutical products (an indirect indicator of the health-care industry and considered a driving sector of the economy by the Economic Commission for Latin America and the Caribbean (ECLAC)), the manufacture of chemical products, and the manufacture of coke, petroleum derivatives and biofuels, all of which were key activities for the Brazilian economy in 2019 (Ferreira, 2022).

The trading partners with the largest share of the export-related employment content associated with these activities are Argentina and South America —2.3% and 1.8%, respectively in the case of women and 1.9% and 1.6% in the case of men. Moreover, South America is the only partner with a positive aggregate job balance in these activities for both women and men, thanks mainly to the manufacture of chemical products (see tables A1.1, A1.2, A1.3 and A1.4 in the annex).

The next section considers the quality indicator of employment associated with total and bilateral Brazilian exports and imports in aggregate terms, with a view to comparing the quality of jobs generated and threatened among the selected trading partners.

2. Quality of aggregate employment content

In aggregate terms, Brazil's export specialization is such that the structure of employment in the economy as a whole is of higher quality (based on the definition established in this paper) than that linked to total exports, both for women and for men (see table 3).

Table 3
Brazil: employment quality indicator, by category, trading partner and sex, 2019

Trading partners	Women		Men	
	Exports	Imports	Exports	Imports
Total Brazil	0.545	0.545	0.562	0.562
Total trade	0.516	0.538	0.497	0.564
China	0.507	0.515	0.460	0.568
United States	0.527	0.534	0.542	0.575
European Union	0.515	0.566	0.502	0.579
South America	0.528	0.507	0.546	0.513
Argentina	0.536	0.511	0.566	0.519
Japan	0.502	0.563	0.467	0.612
Mexico	0.527	0.517	0.532	0.576
United Kingdom	0.532	0.576	0.531	0.593

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Whereas in the labour market as a whole, the employment quality indicator is higher for men than for women, the opposite is true for jobs associated with total exports (see table 3). However, if the agriculture sector is excluded from the calculation, the quality indicator for export-related employment is again higher for men than for women. As Brumer (2004) notes, this sector is ignored because of the overwhelming invisibility of women's work in agriculture, which is usually considered an extension of unpaid domestic work and, therefore, results in women's participation in the sector being underestimated. Thus, given the characteristics of the agriculture sector and its share of total employment, its inclusion in the employment quality indicator could mask this reality. Meanwhile, in the case of employment content threatened by imports, the resulting job quality indicator is higher than for jobs linked to exports, for both women and men alike (see table 3).

Accordingly, the analysis of total trade shows clearly that growth in international trade that reinforces these characteristics will do little to reduce gender inequalities in the labour market, or to promote the country's socioeconomic development and improve employment opportunities for workers. Nonetheless, as noted above, it is also necessary to understand how this dynamic varies with each trading partner.

Trade with Argentina, for example, has the highest quality indicator in export-related employment for both women and men. In the case of men, it even exceeds the quality indicator for male employment in the Brazilian economy as a whole. Meanwhile, the quality of jobs threatened by imports from Argentina, for both women and men, is among the lowest, being surpassed only by South America. In short, bilateral trade with Argentina, with respect to the other selected trading partners and taking into account the aforementioned employment characteristics, not only generates the best jobs but also only threatens those with the least desirable characteristics for workers (see table 3).

In bilateral trade with South America, the pattern is similar. Female jobs linked to exports have the third best job quality indicator, and male jobs have the second best. However, as mentioned above, in terms of jobs threatened by imports, trade with South America has the worst aggregate job quality indicators both for women and for men. Thus, as with Argentina, the jobs generated in trade with South America have a better job quality indicator than those that are threatened, for both sexes. In the case of men, Argentina and South America are the only partners where this is the case. For women, this also applies to bilateral trade with Mexico (see table 3).

In the case of Mexico, for both women and men, trade as a whole generates and threatens jobs of intermediate skill level. However, as just noted, the quality indicator for female employment linked to exports is higher than that of employment threatened by imports. The same is not true for men.

The United States displays a pattern similar to that of Mexico in the case of women, in terms of the ranking of the employment quality indicator among the countries analysed. However, the quality indicator for female employment linked to exports is lower than that related to imports. As for men, jobs linked to bilateral trade with the United States have the third highest male job quality indicator, while those under threat have the fifth highest. In either case, the quality indicator for jobs threatened by imports exceeds that of jobs supported by exports (see table 3).

Bilateral trade with Japan, the European Union, the United Kingdom and China, meanwhile, has a very detrimental impact on the Brazilian labour market. In the case of both female and male employment, Japan and the European Union are among partners that generate jobs with a lower employment quality indicator but threaten higher-quality jobs. In trade with the United Kingdom, female export-related jobs have the second highest job quality indicator, but those threatened by imports have the highest. The situation is worse for men: jobs linked to exports have the fourth lowest job quality indicator, while those threatened by imports have the second highest. Lastly, in the case of trade with China, the jobs both generated and threatened have some of the worst quality indicators, both for women and for men. In bilateral trade with all of these partners, the job quality indicator for employment linked to imports is higher than that linked to exports, for women and men alike (see table 3).

In the case of exports to Argentina and South America, and to Mexico and the United States, the employment quality indicator is higher for men than for women, as in the Brazilian labour market as a whole. However, the female jobs associated with exports to China, the European Union, Japan and the United Kingdom are of higher quality than the corresponding male jobs. In the case of the European Union and the United Kingdom, however, and as noted above, if the agriculture sector is excluded from the calculation, male export-related jobs are of higher quality than their female counterparts. Moreover, for both women and men, the employment content in bilateral trade with China and Japan reports the two worst job quality indicators analysed (see table 3).

IV. Concluding remarks

Brazil's foreign trade, like that of other large economies, represents a relatively small share of GDP (16.8%). This, together with the sectoral composition of its trade, explains the small proportion of net employment that is linked to trade flows (2.8% of total employment in 2019). However, the contribution of trade is weak not only quantitatively but also in terms of quality. The quality indicator for export-linked employment suggests that the characteristics of trade-related jobs are less desirable than those of jobs linked to the domestic market. At the same time, according to the job quality indicator calculated in this article, the quality of jobs linked to, or threatened by, imports is higher. Naturally, the characteristics in question vary across Brazil's different States; but these quantitative and qualitative observations on jobs linked to foreign trade flows are valid for the country as a whole.

Premised on the belief that economic phenomena —including international trade in goods and services— are not gender-neutral, this article has attempted to analyse the qualitative and quantitative differences between male and female employment associated with Brazilian imports and exports. These differences stem basically from the sectoral composition of trade and the extent of female employment in each sector.

In 2019, there were 3.5 million female and 10.6 million male jobs supported by exports, and there were 3.5 million female and 8.0 million male jobs threatened by imports. Trade is therefore not a significant net source of jobs for women, but it is for men. In fact, women were even more underrepresented in trade-related employment (25%) than in the wage-earning labour market generally, where they accounted for 42.8% of total Brazilian employment.

Trade-related employment is highly heterogeneous across Brazil's different partners, reflecting its equally diverse trade specialization in each case. Bilateral trade with Argentina and South America as a whole, Mexico, the United Kingdom and the United States is more diversified, in terms of both female and male employment, than trade with China, the European Union and Japan. This reflects the degree of diversification of exports with these partners.

Trade with Argentina and South America supports a more highly skilled job content and more desirable job characteristics for workers; it also has the best job quality indicators in export-related employment and the lowest quality of jobs threatened by imports. In contrast, bilateral trade with the other partners analysed is generally less favourable for the Brazilian labour market: the quality of jobs threatened by imports tends to be higher than that of jobs generated by exports.

Although international trade can have adverse effects by reinforcing and creating gender inequalities, it can also be a way for countries to promote socioeconomic development and for women to gain greater equality and economic autonomy. Promoting socioeconomic development entails encouraging a progressive (as opposed to a regressive) shift in the country's productive and trade specialization towards more highly processed sectors, which are generally associated with better jobs. Meanwhile, gender discrimination must be combated with targeted policies, to prevent trade and other economic phenomena from exploiting or widening the gaps that exist.

The first of these aims requires adopting a productive development strategy that harnesses industrial, innovation, trade and foreign policy, so as to stimulate development of a more sophisticated production mix. This would redirect Brazil's productive specialization to enable the country to move up the value chain in international production networks. The second depends on mainstreaming gender in Brazil's various economic policies.

Given the structure of Brazil's bilateral trade with Argentina and with South America as a whole, this strategy should encourage regional integration. This is important from the standpoint of economic momentum associated with the strengthening of relatively more sophisticated sectors, which, as noted

above, are the main creators of "good" jobs, particularly for women. Greater regional integration can stimulate intersectoral productive complementarity, help achieve more efficient scales of production, and foster a productive and trade diversification process that generates international engagement with benefits including better-quality jobs for all workers, both women and men alike.

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Annex A1

Table A1.1

Brazil: job quality indicator and female employment content linked to Brazilian exports by activity, sectoral group and trading partner, 2019

(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2.0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	896 304	343 517	41 113	113 073	38 643	7 451	35 304	12 022	10 710
	Forestry, fishing and aquaculture	0.279	35 782	7 700	7 587	7 512	2 393	713	1 445	560	450
Industrial commodities	Mining of coal and non-metallic minerals	0.336	3 164	679	595	636	377	123	54	76	38
	Extraction of oil and gas, including supporting activities	0.734	3 572	1 922	507	315	295	25	17	12	11
	Mining of metallic minerals	0.440	7 331	2 815	345	1 770	256	108	202	154	63
Agricultural commodities	Manufacture of food products	0.296	182 575	27 059	10 872	34 499	13 670	2 454	6 232	1 286	2 747
Traditional industry	Manufacture of beverages	0.381	1 849	52	196	120	1 273	44	19	10	14
Agricultural commodities	Manufacture of tobacco products	0.344	3 107	568	281	1 108	179	52	0	12	14
Traditional industry	Manufacture of textiles	0.268	46 956	9 204	5 036	4 689	9 062	3 068	481	1 135	403
	Manufacture of clothing and accessories	0.269	60 828	3 390	12 271	7 428	26 311	3 348	708	779	890
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	55 523	7 414	9 860	13 410	10 060	3 117	159	1 325	710
Agricultural commodities	Manufacture of wood products	0.263	34 665	2 481	13 514	5 981	2 508	477	1 035	2 291	1 062
	Manufacture of pulp, paper and paper products	0.379	31 203	9 852	4 678	6 435	3 896	1 415	630	460	601
Traditional industry	Printing and reproduction of recorded media	0.499	6 625	1 056	1 242	1 009	1 043	298	153	155	428
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	2 958	443	872	357	226	72	67	34	29
Traditional industry	Manufacture of chemicals	0.560	29 193	6 706	3 124	3 953	6 920	2 618	794	966	374
Innovative industry	Manufacture of pharmo-chemical and pharmaceutical products	0.614	4 314	414	591	823	1 018	348	60	262	46
Industrial commodities	Manufacture of rubber and plastics products	0.408	27 343	2 770	5 240	3 252	8 802	3 691	418	1 311	286
Traditional industry	Manufacture of non-metallic mineral products	0.337	15 949	1 621	5 531	1 523	3 437	1 077	189	517	225
Industrial commodities	Metallurgy	0.530	9 706	872	1 996	1 087	1 268	529	207	230	444
	Manufacture of metal products, except machinery and equipment	0.351	15 601	2 067	3 528	1 983	3 810	1 290	247	536	174
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	3 960	285	1 329	591	833	355	25	147	77
	Manufacture of electrical machinery, apparatus and equipment	0.402	10 481	614	2 968	1 427	3 305	1 004	74	327	144
	Manufacture of machinery and equipment	0.516	14 906	1 323	4 153	1 775	3 915	1 212	190	683	133
	Manufacture of motor vehicles, trailers and coachwork	0.536	20 763	688	2 305	2 061	10 297	5 621	141	2 707	259
	Manufacture of other transport equipment, except motor vehicles	0.449	12 563	43	7 343	1 967	663	191	230	77	212
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	15 281	695	4 967	2 760	3 182	702	78	317	668
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	11 056	2 239	2 107	1 606	1 406	475	221	244	176
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	5 194	1 243	755	762	652	230	144	122	103
	Water, sewerage and waste management	0.289	9 660	1 521	1 950	1 337	1 417	514	222	250	255

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2.0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	6 767	1 459	1 810	1 251	491	209	124	190	109
Commerce	Trade and repair of automobiles, motorcycles	0.285	707 960	146 256	113 384	104 981	107 992	38 469	18 861	18 061	12 496
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	241 643	57 558	35 706	36 125	33 279	11 010	5 887	5 056	3 560
	Water transportation	0.381	352	34	34	118	84	40	4	12	3
	Air transportation	0.556	4 178	519	953	1 083	471	113	100	195	103
	Warehousing, support activities for transportation and postal activities	0.408	30 083	5 348	3 967	5 877	3 740	1 036	641	524	641
Accommodation and food services	Accommodation	0.352	73 519	3 754	23 619	13 645	13 628	7 014	996	2 360	2 486
	Food services	0.167	78 938	4 730	33 117	16 299	8 184	3 091	2 036	1 544	2 060
Information and communication	Publishing and printing	0.569	7 850	461	1 747	910	2 535	392	252	368	125
	Television, radio, cinema, sound and image recording and publishing activities	0.488	9 657	1 090	2 493	1 653	1 639	430	221	191	279
	Telecommunications	0.319	6 106	858	1 301	1 021	923	347	105	156	243
	Development of information systems and other information services	0.526	17 551	1 664	5 454	3 471	1 905	578	226	398	526
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	52 242	10 182	9 822	7 347	6 729	1 996	1 108	1 121	1 828
Real estate activities	Real estate activities	0.377	3 642	452	1 407	466	414	122	58	63	54
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	224 478	40 784	33 282	28 852	23 234	7 083	4 107	3 558	4 625
	Architectural, engineering, technical analysis and R&D services,	0.485	66 714	4 364	23 503	18 319	4 156	1 323	990	681	2 491
	Other professional, scientific and technical activities	0.393	40 667	5 111	9 509	7 042	6 545	1 994	1 081	922	939
	Non-real estate rental and management of intangible non-financial assets	0.368	35 357	6 873	5 970	4 269	7 191	1 783	567	1 029	813
	Other administrative activities and complementary services	0.279	183 066	34 636	38 031	28 200	26 195	7 976	4 744	4 790	4 082
	Surveillance, security and investigation activities	0.300	10 661	2 003	1 775	1 683	1 676	578	231	270	208
Administration and social security	Public administration, defence and social security	0.685	10 806	2 318	1 764	1 650	1 632	544	247	250	195
Public and private health and education	Education	0.499	43 464	8 856	7 431	6 756	5 562	1 877	975	958	917
	Public and private health	0.454	4 522	74	2 497	755	499	53	10	17	83
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	44 526	1 388	2 891	2 597	27 037	569	1 367	1 077	1 469
Other service activities	Associative organizations and other personal services	0.215	63 825	15 606	10 785	9 247	8 740	2 876	1 378	1 409	1 125
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	3 546 984	797 632	529 107	528 865	455 600	134 124	96 062	74 208	63 207

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multissetorial baseada no modelo insumo-produto", Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to denote the 10 activities with the highest job quality indicator.

Table A1.2

Brazil: employment quality indicator and import-related female employment content by activity, sectoral group and trading partner, 2019

(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	152 403	12 299	24 830	24 470	59 291	35 009	697	3 246	865
	Forestry, fishing and aquaculture	0.279	22 419	1 490	1 185	1 706	10 118	566	177	183	160
Industrial commodities	Mining of coal and non-metallic minerals	0.336	9 885	443	3 093	532	1 434	164	46	93	48
	Extraction of oil and gas, including supporting activities	0.734	1 867	75	626	177	250	40	10	11	14
	Mining of metallic minerals	0.440	2 026	173	154	188	1 127	42	29	28	33
Agricultural commodities	Manufacture of food products	0.296	44 744	3 399	7 618	10 461	13 464	6 946	240	635	439
Traditional industry	Manufacture of beverages	0.381	4 785	39	506	1 237	2 224	986	10	139	288
Agricultural commodities	Manufacture of tobacco products	0.344	3 459	1	38	818	1 284	24	1	449	5
Traditional industry	Manufacture of textiles	0.268	149 370	81 106	6 850	11 800	12 434	3 287	1 069	1 716	591
	Manufacture of clothing and accessories	0.269	235 660	125 609	4 941	10 606	17 717	1 861	353	1 306	428
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	24 251	10 704	372	2 601	630	156	27	110	60
Agricultural commodities	Manufacture of wood products	0.263	8 009	2 292	1 440	1 689	597	310	174	239	117
	Manufacture of pulp, paper and paper products	0.379	9 663	1 802	1 549	2 522	1 201	617	184	240	135
Traditional industry	Printing and reproduction of recorded media	0.499	9 152	1 195	1 988	1 567	686	358	174	191	1 195
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	3 404	199	1 689	492	314	110	27	32	29
Traditional industry	Manufacture of chemicals	0.560	54 021	7 716	11 202	12 061	5 239	2 760	740	1 495	874
Innovative industry	Manufacture of pharmo-chemical and pharmaceutical products	0.614	26 956	2 185	3 805	12 975	493	351	316	258	791
Industrial commodities	Manufacture of rubber and plastics products	0.408	43 056	9 016	6 832	8 514	5 466	3 138	1 464	1 454	736
Traditional industry	Manufacture of non-metallic mineral products	0.337	14 540	3 466	1 741	3 760	1 630	1 005	333	615	274
Industrial commodities	Metallurgy	0.530	7 049	1 292	783	1 339	1 127	323	213	219	239
	Manufacture of metal products, except machinery and equipment	0.351	23 793	5 610	3 820	5 629	1 776	980	927	607	483
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	51 317	21 800	4 720	4 503	160	113	1 416	1 552	338
	Manufacture of electrical machinery, apparatus and equipment	0.402	27 924	12 305	3 228	5 197	467	285	870	857	384
	Manufacture of machinery and equipment	0.516	28 164	5 811	6 343	9 259	673	475	1 307	402	689
	Manufacture of motor vehicles, trailers and coachwork	0.536	31 616	2 951	2 385	7 389	7 536	6 675	2 343	3 695	496
	Manufacture of other transport equipment, except motor vehicles	0.449	18 191	4 097	6 148	3 388	27	17	683	206	231
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	39 107	13 060	6 806	7 810	1 018	383	921	1 696	351
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	16 087	1 414	5 437	3 348	1 012	384	293	223	224
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	5 710	725	809	879	562	255	100	118	1 234
	Water, sewerage and waste management	0.289	9 473	1 432	1 675	1 939	1 067	450	237	245	222

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	4 484	688	846	956	371	120	65	68	45
Commerce	Trade and repair of automobiles, motorcycles	0.285	712 898	132 774	129 223	138 930	81 631	44 367	18 089	20 896	12 349
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	216 323	33 051	40 056	43 819	25 044	12 444	4 585	5 147	4 042
	Water transportation	0.381	284	34	38	73	21	7	4	3	2
	Air transportation	0.556	4 871	870	1 238	1 184	239	72	108	76	27
	Warehousing, support activities for transportation and postal activities	0.408	17 768	2 686	3 412	3 795	2 249	1 193	366	443	298
Accommodation and food services	Accommodation	0.352	185 074	2 971	32 214	55 291	11 507	2 623	2 161	1 569	1 954
	Food services	0.167	204 572	6 681	112 625	24 646	32 040	12 949	643	10 828	553
Information and communication	Publishing and printing	0.569	14 762	2 002	4 280	3 390	552	285	145	271	862
	Television, radio, cinema, sound and image recording and publishing activities	0.488	12 397	1 183	4 446	2 142	1 035	583	243	294	188
	Telecommunications	0.319	8 110	1 040	2 033	1 791	664	380	180	204	108
	Development of information systems and other information services	0.526	32 558	2 273	15 694	6 351	1 314	689	345	379	222
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	85 649	6 888	21 733	22 109	4 993	2 364	1 302	1 449	909
Real estate activities	Real estate activities	0.377	4 714	415	2 104	725	290	133	72	70	51
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	210 947	25 693	53 679	42 774	17 995	8 213	8 817	4 188	4 807
	Architectural, engineering, technical analysis and R&D services	0.485	44 859	2 830	21 383	8 989	2 175	1 081	1 113	595	391
	Other professional, scientific and technical activities	0.393	56 306	5 818	18 914	10 174	5 146	2 907	1 202	1 392	942
	Non-real estate rental and management of intangible non-financial assets	0.368	181 978	2 068	18 274	21 161	5 102	946	4 595	467	342
	Other administrative activities and complementary services	0.279	219 265	23 919	40 961	42 377	16 374	7 638	3 814	4 866	3 280
	Surveillance, security and investigation activities	0.300	11 759	1 646	2 397	2 494	1 214	646	276	328	199
Administration and social security	Public administration, defence and social security	0.685	11 642	1 694	2 341	2 357	1 256	634	257	294	233
Public and private health and education	Education	0.499	58 417	5 045	17 789	11 659	4 228	2 017	1 202	977	830
	Public and private health	0.454	5 905	75	1 685	1 442	221	38	40	176	8
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	62 284	1 408	26 917	14 486	1 410	889	247	298	223
Other service activities	Associative organizations and other personal services	0.215	69 861	10 362	15 103	13 499	6 343	3 082	1 577	1 631	1 270
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	3 515 783	607 820	711 999	635 468	374 439	174 373	66 825	79 168	46 111

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multissetorial baseada no modelo insumo-produto", Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to denote the 10 activities with the highest job quality indicator.

Table A1.3

Brazil: employment quality indicator and export-related male employment content by activity, sectoral group and trading partner, 2019

(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	3 704 588	1 419 819	169 928	467 350	159 717	30 797	145 918	49 688	44 265
	Forestry, fishing and aquaculture	0.279	157 942	33 990	33 488	33 160	10 564	3 148	6 379	2 470	1 986
Industrial commodities	Mining of coal and non-metallic minerals	0.336	29 073	6 236	5 463	5 845	3 465	1 129	492	699	353
	Extraction of oil and gas, including supporting activities	0.734	25 761	13 860	3 658	2 268	2 130	184	121	89	82
	Mining of metallic minerals	0.440	43 353	16 648	2 038	10 470	1 512	636	1 193	913	373
Agricultural commodities	Manufacture of food products	0.296	374 443	55 495	22 298	70 754	28 036	5 034	12 781	2 637	5 633
Traditional industry	Manufacture of beverages	0.381	10 310	289	1 092	670	7 098	246	107	53	79
Agricultural commodities	Manufacture of tobacco products	0.344	5 507	1 007	498	1 965	317	92	1	22	26
Traditional industry	Manufacture of textiles	0.268	24 474	4 797	2 625	2 444	4 723	1 599	251	592	210
	Manufacture of clothing and accessories	0.269	17 289	964	3 488	2 111	7 478	952	201	221	253
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	60 537	8 084	10 751	14 621	10 968	3 399	174	1 444	774
Agricultural commodities	Manufacture of wood products	0.263	131 173	9 390	51 137	22 634	9 489	1 806	3 915	8 671	4 020
	Manufacture of pulp, paper and paper products	0.379	68 178	21 526	10 222	14 059	8 512	3 093	1 377	1 006	1 313
Traditional industry	Printing and reproduction of recorded media	0.499	14 521	2 314	2 721	2 211	2 287	654	335	339	939
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	14 960	2 240	4 409	1 804	1 145	362	341	171	146
Traditional industry	Manufacture of chemicals	0.560	69 262	15 910	7 413	9 379	16 419	6 212	1 884	2 292	886
Innovative industry	Manufacture of pharmo-chemical and pharmaceutical products	0.614	4 257	408	583	812	1 004	343	59	259	45
Industrial commodities	Manufacture of rubber and plastics products	0.408	71 562	7 248	13 715	8 511	23 037	9 661	1 094	3 431	749
Traditional industry	Manufacture of non-metallic mineral products	0.337	81 625	8 297	28 306	7 795	17 587	5 513	966	2 647	1 149
Industrial commodities	Metallurgy	0.530	125 948	11 322	25 901	14 104	16 456	6 861	2 685	2 986	5 756
	Manufacture of metal products, except machinery and equipment	0.351	128 922	17 085	29 154	16 383	31 488	10 659	2 041	4 434	1 436
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	5 380	388	1 805	803	1 132	483	34	200	105
	Manufacture of electrical machinery, apparatus and equipment	0.402	27 977	1 639	7 922	3 809	8 821	2 680	198	874	385
	Manufacture of machinery and equipment	0.516	99 244	8 810	27 650	11 819	26 070	8 071	1 262	4 545	887
	Manufacture of motor vehicles, trailers and coachwork	0.536	92 715	3 072	10 292	9 201	45 981	25 098	631	12 088	1 155
	Manufacture of other transport equipment, except motor vehicles	0.449	79 933	275	46 719	12 518	4 216	1 213	1 463	488	1 350
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	55 464	2 523	18 027	10 016	11 549	2 546	282	1 149	2 423
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	124 505	25 211	23 734	18 092	15 836	5 354	2 484	2 749	1 988
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	14 525	3 476	2 111	2 131	1 822	643	402	340	288
	Water, sewerage and waste management	0.289	33 888	5 338	6 841	4 692	4 970	1 801	779	878	895

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Exports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	171 163	36 903	45 783	31 644	12 423	5 282	3 127	4 801	2 755
Commerce	Trade and repair of automobiles, motorcycles	0.285	958 164	197 945	153 455	142 083	146 158	52 064	25 527	24 444	16 913
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	2 460 891	586 177	363 632	367 896	338 916	112 123	59 949	51 489	36 256
	Water transportation	0.381	1 866	180	182	624	447	212	20	66	16
	Air transportation	0.556	9 437	1 172	2 153	2 447	1 064	255	226	440	233
	Warehousing, support activities for transportation and postal activities	0.408	170 199	30 255	22 444	33 252	21 162	5 863	3 627	2 962	3 625
Accommodation and food services	Accommodation	0.352	60 571	3 093	19 459	11 242	11 228	5 779	820	1 945	2 048
	Food services	0.167	63 349	3 796	26 577	13 080	6 567	2 480	1 634	1 239	1 653
Information and communication	Publishing and printing	0.569	7 773	457	1 729	901	2 510	388	249	365	124
	Television, radio, cinema, sound and image recording and publishing activities	0.488	17 365	1 960	4 482	2 972	2 948	773	397	344	502
	Telecommunications	0.319	9 552	1 342	2 035	1 597	1 444	542	165	244	381
	Development of information systems and other information services	0.526	60 023	5 691	18 653	11 870	6 516	1 976	773	1 360	1 799
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	53 364	10 400	10 032	7 505	6 873	2 039	1 131	1 145	1 867
Real estate activities	Real estate activities	0.377	5 237	650	2 023	670	596	176	83	91	77
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	212 260	38 564	31 471	27 281	21 969	6 697	3 884	3 365	4 374
	Architectural, engineering, technical analysis and R&D services,	0.485	111 691	7 307	39 348	30 668	6 958	2 215	1 658	1 140	4 171
	Other professional, scientific and technical activities	0.393	46 548	5 851	10 884	8 061	7 491	2 282	1 238	1 056	1 074
	Non-real estate rental and management of intangible non-financial assets	0.368	55 264	10 742	9 331	6 673	11 240	2 787	887	1 609	1 271
	Other administrative activities and complementary services	0.279	244 968	46 348	50 890	37 735	35 053	10 673	6 349	6 410	5 462
	Surveillance, security and investigation activities	0.300	75 475	14 179	12 569	11 914	11 864	4 089	1 632	1 908	1 474
Administration and social security	Public administration, defence and social security	0.685	17 061	3 660	2 786	2 606	2 577	859	390	394	308
Public and private health and education	Education	0.499	14 378	2 929	2 458	2 235	1 840	621	323	317	303
	Public and private health	0.454	1 510	25	834	252	167	18	4	6	28
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	73 045	2 277	4 743	4 260	44 355	934	2 243	1 767	2 410
Other service activities	Associative organizations and other personal services	0.215	41 181	10 069	6 958	5 966	5 639	1 856	889	909	726
	Domestic services	0.066	-	–	-	-	-	–	-	–	–
Total		0.400	10 639 651	2 729 631	1 418 900	1 547 866	1 191 834	363 251	307 074	218 188	169 798

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multissetorial baseada no modelo insumo-produto", Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to denote the 10 activities with the highest job quality indicator.

Table A1.4

Brazil: employment quality indicator and import-related male employment content by activity, sectoral group and trading partner, 2019

(Number of employed people)

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Agriculture	Agriculture, livestock and related services	0.275	629 909	50 835	102 629	101 140	245 060	144 701	2 880	13 417	3 575
	Forestry, fishing and aquaculture	0.279	98 957	6 575	5 229	7 528	44 663	2 500	780	810	706
Industrial commodities	Mining of coal and non-metallic minerals	0.336	90 823	4 067	28 422	4 890	13 174	1 507	424	851	438
	Extraction of oil and gas, including supporting activities	0.734	13 466	539	4 514	1 278	1 805	292	73	76	99
	Mining of metallic minerals	0.440	11 980	1 023	911	1 113	6 663	246	173	163	196
Agricultural commodities	Manufacture of food products	0.296	91 766	6 971	15 624	21 454	27 613	14 246	493	1 302	901
Traditional industry	Manufacture of beverages	0.381	26 675	215	2 821	6 897	12 401	5 496	55	778	1 606
Agricultural commodities	Manufacture of tobacco products	0.344	6 131	3	67	1 451	2 276	43	1	795	9
Traditional industry	Manufacture of textiles	0.268	77 853	42 273	3 570	6 150	6 481	1 713	557	894	308
	Manufacture of clothing and accessories	0.269	66 980	35 701	1 404	3 014	5 036	529	100	371	122
	Preparation of leather and manufacture of leather products, travel accessories, footwear	0.328	26 441	11 671	406	2 836	687	170	29	120	65
Agricultural commodities	Manufacture of wood products	0.263	30 307	8 672	5 449	6 392	2 259	1 175	658	906	444
	Manufacture of pulp, paper and paper products	0.379	21 114	3 938	3 385	5 510	2 625	1 348	403	524	295
Traditional industry	Printing and reproduction of recorded media	0.499	20 060	2 620	4 358	3 434	1 503	784	381	419	2 619
Industrial commodities	Manufacture of coke, petroleum products and biofuels	0.538	17 214	1 004	8 541	2 488	1 586	556	138	162	148
Traditional industry	Manufacture of chemicals	0.560	128 169	18 307	26 578	28 615	12 430	6 549	1 756	3 547	2 074
Innovative industry	Manufacture of pharmo-chemical and pharmaceutical products	0.614	26 598	2 155	3 754	12 802	487	346	312	254	780
Industrial commodities	Manufacture of rubber and plastics products	0.408	112 687	23 597	17 880	22 283	14 305	8 212	3 832	3 805	1.928
Traditional industry	Manufacture of non-metallic mineral products	0.337	74 414	17 736	8 911	19 242	8 340	5 145	1 706	3 149	1 403
Industrial commodities	Metallurgy	0.530	91 474	16 763	10 166	17 374	14 630	4 198	2 765	2 842	3 103
	Manufacture of metal products, except machinery and equipment	0.351	196 621	46 363	31 568	46 515	14 674	8 102	7 663	5 015	3 988
Innovative industry	Manufacture of computer hardware, electronic and optical products	0.459	69 713	29 615	6 412	6 118	217	154	1 924	2 108	459
	Manufacture of electrical machinery, apparatus and equipment	0.402	74 535	32 843	8 616	13 872	1 246	760	2 321	2 287	1 025
	Manufacture of machinery and equipment	0.516	187 518	38 693	42 236	61 647	4 483	3 163	8 704	2 674	4 590
	Manufacture of motor vehicles, trailers and coachwork	0.536	141 173	13 179	10 649	32 994	33 650	29 805	10 460	16 501	2 216
	Manufacture of other transport equipment, except motor vehicles	0.449	115 742	26 067	39 116	21 557	170	106	4 347	1 313	1 471
Traditional industry	Manufacture of furniture and miscellaneous industrial products	0.365	141 941	47 403	24 704	28 347	3 695	1 389	3 343	6 155	1 274
Maintenance, repair and installation of machinery and equipment	Maintenance, repair and installation of machinery and equipment	0.333	181 171	15 927	61 230	37 709	11 401	4 327	3 298	2 511	2 520
Production and distribution of electricity, gas and water, for example	Electricity, gas and other utilities	0.569	15 969	2 027	2 262	2 458	1 571	713	279	329	3 451
	Water, sewerage and waste management	0.289	33 232	5 024	5 876	6 803	3 742	1 579	831	858	778

Group of sectors – Classification based on Alves-Passoni and Freitas (2017)	Activities–Harmonized classification between the National Classification of Economic Activities (CNAE) domicile 2.0, CNAE 2,0 and the System of National Accounts level 67	Total employment quality indicator	Employment content – Imports								
			Total	China	United States	European Union	South America	Argentina	Japan	Mexico	United Kingdom
Construction	Construction	0.199	113 433	17 414	21 409	24 179	9 396	3 043	1 638	1 720	1 151
Commerce	Trade and repair of automobiles, motorcycles	0.285	964 847	179 698	174 892	188 029	110 480	60 047	24 481	28 280	16 713
Transportation, storage, support activities for transportation and postal services	Land transportation	0.258	2 203 036	336 587	407 927	446 256	255 044	126 731	46 690	52 421	41 164
	Water transportation	0.381	1 502	183	199	389	112	37	21	17	12
	Air transportation	0.556	11 003	1 965	2 796	2 675	540	162	244	172	62
	Warehousing, support activities for transportation and postal activities	0.408	100 523	15 197	19 304	21 471	12 723	6 748	2 071	2 504	1 685
Accommodation and food services	Accommodation	0.352	152 479	2 448	26 540	45 553	9 480	2 161	1 780	1 292	1 610
	Food services	0.167	164 171	5 361	90 383	19 778	25 712	10 392	516	8 690	444
Information and communication	Publishing and printing	0.569	14 616	1 982	4 238	3 357	546	282	143	268	854
	Television, radio, cinema, sound and image recording and publishing activities	0.488	22 293	2 127	7 995	3 851	1 861	1 048	436	528	337
	Telecommunications	0.319	12 687	1 627	3 180	2 802	1 039	594	281	320	170
	Development of information systems and other information services	0.526	111 346	7 773	53 672	21 720	4 494	2 357	1 180	1 297	760
Financial activities, insurance and related services	Financial intermediation, insurance and supplementary pension plans	0.711	87 487	7 036	22 200	22 583	5 100	2 415	1 330	1 480	929
Real estate activities	Real estate activities	0.377	6 778	597	3 026	1 043	418	191	104	101	73
Scientific, professional and technical activities	Legal, accounting, consulting and head office activities	0.430	199 466	24 295	50 757	40 446	17 016	7 766	8 337	3 960	4 546
	Architectural, engineering, technical analysis and R&D services,	0.485	75 101	4 737	35 799	15 050	3 641	1 809	1 863	997	655
	Other professional, scientific and technical activities	0.393	64 448	6 659	21 649	11 645	5 890	3 327	1 375	1 594	1 078
	Non-real estate rental and management of intangible non-financial assets	0.368	284 431	3 233	28 563	33 075	7 975	1 478	7 182	730	535
	Other administrative activities and complementary services	0.279	293 407	32 007	54 812	56 707	21 910	10 221	5 103	6 512	4 389
	Surveillance, security and investigation activities	0.300	83 248	11 653	16 966	17 655	8 595	4 573	1 956	2 324	1 411
Administration and social security	Public administration, defence and social security	0.685	18 381	2 675	3 696	3 721	1 983	1 001	406	464	368
Public and private health and education	Education	0.499	19 324	1 669	5 884	3 857	1 399	667	398	323	275
	Public and private health	0.454	1 972	25	562	481	74	13	13	59	3
Art, culture, sports and leisure	Creative, arts and entertainment activities	0.295	102 177	2 310	44 157	23 764	2 314	1 458	405	490	365
Other service activities	Associative organizations and other personal services	0.215	45 075	6 686	9 745	8 709	4 093	1 988	1 017	1 052	819
	Domestic services	0.066	-	-	-	-	-	-	-	-	-
Total		0.400	7 973 866	1 187 750	1 597 641	1 552 705	1 010 708	500 365	169 658	192 530	122 998

Source: Prepared by the authors, on the basis of P. Alves-Passoni and F. Freitas, "Estrutura produtiva e indicadores de encadeamento na economia brasileira entre 2010 e 2014: uma análise multissetorial baseada no modelo insumo-produto", Second National Meeting on Industrial Economy and Innovation, *Blucher Engineering Proceedings*, vol. 4, No. 2, Rio de Janeiro, Editora Blucher, 2017; P. Alves-Passoni and F. Freitas, "Estimação de matrizes insumo-produto anuais para o Brasil no Sistema de Contas Nacionais: referência 2010", *Texto para Discussão*, No. 25, Institute of Economics, Federal University of Rio de Janeiro (UFRJ), 2020; Continuous National Household Survey 2022; Computerized Integrated System of Foreign Trade (SISCOMEX), and Integrated System of Foreign Trade in Services, Intangibles and other Operations that Produce Variations in Equity (SISCOSERV).

Note: A beige border is used to indicate the 10 activities with the highest job quality indicator.

Using benchmarking to improve urban mobility: a new tool for building smart cities in emerging countries

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Abstract

Currently, smart city measurements and rankings often overlook key factors, such as size, population and economic tradition, leading to unrealistic goals being set when cities with different histories are compared with unattainable benchmarks. The present article argues that considering these factors can help city planners to achieve more efficient, incremental improvements. Focusing on mobility, this study compares a mid-sized city in southern Brazil with Aarhus, Denmark, a city of similar size and economic tradition. A diagnostic tool was developed to assess the urban mobility strengths and weaknesses of the Brazilian city through benchmarking. The results indicated that the city's urban mobility could be improved by implementing simple solutions: (i) enhancing the attractiveness of the public transport system; (ii) promoting bicycle use; and (iii) improving access to real-time information.

Keywords

Cities, urban areas, physical infrastructure, urban transport, bicycles, urban planning, urban development, quality of life, sustainable development, case studies, Brazil, Denmark

JEL classification

P25, O18, R58

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I. Introduction

The concept of smart cities has emerged in the academic literature to describe how cities integrate information technologies with public service management to automate processes and enhance citizens' well-being (Lombardi and others, 2012). Some frequently cited definitions (e.g. Neirotti and others, 2014; Jin and others, 2014; Zanella and others, 2014; and Arneodo, Castelli and Botta, 2017) emphasize technical and operational features, often at the expense of a systemic and managerial approach. This focus may lead city managers to prioritize the acquisition of technology irrespective of the actual benefits it can provide (Greenfield, 2013). According to Batty and others (2012), what makes cities smart is not merely automating routine functions but using the data generated to monitor, analyse and plan with a view to improving efficiency, equity and quality of life in real time. Hence, cities with more information and communications technology systems are not necessarily more efficient (Neirotti and others, 2014).

The difficulty of linking effort to performance in smart city projects often shifts the discussion to the political arena, where subjective issues may dominate. This is compounded by the lack of a clear, widely accepted business model for leveraging the necessary investments (Laya, Markendahl and Andersson, 2013; Zanella and others, 2014). Effective governance is essential for transforming isolated solutions into a coherent and integrated system (Gardner and Hespanhol, 2018; Praharaj and Han, 2019; Ruhlandt and others, 2020). A fundamental assumption of this project is that smart cities must make smart decisions, implementing solutions that align with citizens' needs and with available resources. Considering both priorities and resources optimizes decision-making and avoids common pitfalls associated with fashionable concepts. Creating and applying a unified information model provides a comprehensive view of urban activity (Naphade and others, 2011). Under this governance principle, a city's "smartness" is quantified by its ability to cohesively achieve its goals (JTC 1, 2015).

Holistic implementation of the smart city concept need not be immediate, as cities often have initiatives that, while isolated, are subject to some form of governance. Smart city projects can thus progress incrementally, with specific improvements, in urban mobility for example, enhancing the city's overall smartness and benefiting citizens. Benchmarking can facilitate this transformation. The main objective of this article is to propose parameters that can guide cities so that they measure themselves against realistic standards, accounting for population, size, location, economic tradition and culture before implementing projects. Urban benchmarking involves comparing the indicators of one city with those of similar units (Rok and Szmajda, 2014) and providing a clear diagnosis of development relative to a reference group. We propose a method for selecting appropriate benchmarks and establishing parameters to improve urban mobility in emerging cities. The urban mobility dimension was chosen for its direct impact on quality of life (Mylonakou and others, 2023; Chen and others, 2017), its disproportionate effect on poorer populations (Guzmán and others, 2023) and its significant contribution to urban pollution (Ghaffarpasand and others, 2024).

The study is organized into five sections after this introduction. The second section examines the theoretical background to the smart cities concept and the challenge of developing appropriate policy frameworks. The third section enlarges on the methodology employed, which is exploratory and descriptive in character. The fourth section presents the results, the fifth touches on data analysis and diagnostics, and the sixth presents conclusions.

II. Theoretical background

Cities are limited geographical areas with high population densities where goods and services flow multilaterally. Because of the concentration of people and services, they tend to attract incomers (Polèse, 2010). This concentration creates specific demands and consumes part of the city's wealth

(Newman, 1999). However, addressing these self-generated problems can drive innovation, stimulate economic activity and generate more wealth (Schaffers and others, 2011; Mora, Deakin and Reid, 2019). Conversely, unresolved issues lead to inefficiency, environmental problems and reduced citizen satisfaction (Hollands, 2015; Kumar, 2017; Ghaffarpasand and others, 2024).

Scholars advocate a systemic approach to managing and understanding smart cities (Fu and Peng, 2014; Hollands, 2015). Viewing a city as a metasystem highlights the complexity that city managers face and the interconnectedness needed for resource optimization (Naphade and others, 2011). Caragliu, Del Bo and Nijkamp (2011) describe a smart city as one where investments in human and social capital, along with traditional and modern communications infrastructure, fuel sustainable economic growth and high quality of life through participatory governance. The defining feature of a smart city is not its infrastructure but how citizens interact with these systems and each other (Walravens and Balon, 2013). Smartness involves integrating various urban fields into a unified governance system to optimize resource allocation for citizens' well-being (Angelidou, 2017).

Smart cities, as sophisticated systems, incur high costs owing to redundancy. Efficiency can be gained by identifying and reducing duplicated capabilities (Maier, 1998). This means identifying all city systems and establishing a governance arrangement to intertwine them. The challenge of building a smart city involves identifying and integrating existing systems (Zhuhadar and others, 2017). This integration provides city managers with quality data for informed decision-making (Neirotti and others, 2014). A core goal in planning a smart city is aggregating real-time information to address challenges and manage resources effectively (Fu and Peng, 2014; Ardito and others, 2019). Three main approaches define smart cities, one of them technological, one humanistic and one managerial. The technological approach focuses on using smart computing technologies to interconnect city activities (Washburn and Sindhu, 2010). This interconnectivity integrates complex data into a platform that informs operational decisions (Harrison and others, 2010). The humanistic approach views smart cities as those that meet community needs, with creativity being a key aspect (Albino, Berardi and Dangelico, 2015). The managerial approach defines smart cities as those that excel in terms of their economy, people, governance, mobility, environment and quality of life by leveraging the endowments and activities of informed citizens (Nam and Pardo, 2011).

Berrone and Ricart (2018) presented the cities in motion index, which analyses nine city dimensions to identify strengths and weaknesses with a view to contributing to development planning and a better quality of life. The ISO 37122:2019 standards provide indicators for analysing smart cities across various areas, emphasizing coordinated city functions and stakeholder interactions within a smart macro system (Fu and Peng, 2014; Kumar, 2017). Managing smart cities is complex because of the diversity of data sources, and requires active, problem-solving governance that values collaboration (Goldsmith and Crawford, 2014; Barns, 2018). Collaborative, data-driven models of governance open government processes to citizens, fostering co-produced solutions. Data can streamline government services, replacing bureaucratic structures (Clarke and Margetts, 2014; Davies and Bawa, 2012).

The challenge is to develop policy frameworks that facilitate investment in data-driven services aligned with city priorities. Each smart city is unique, requiring tailored models (Kumar, 2015). Balancing social development and economic growth in a highly urbanized context drives interest in smart cities, necessitating strategies that integrate multiple sectors into a systemic vision. However, some scholars view the city as a collective entity, behaving like a homogeneous body with one voice (Vanolo, 2014). Urban mobility, a critical dimension of smart cities, directly impacts quality of life (Mylonakou and others, 2023; Chen and others, 2017). Efficient urban mobility solutions can reduce traffic congestion, lower greenhouse gas emissions and improve accessibility (Guzmán and others, 2023; Ghaffarpasand and others, 2024). Recent advances with autonomous vehicles, shared mobility services and real-time traffic management systems highlight the potential for smart technologies to revolutionize urban transport (Cohen and Shaheen, 2016; Acheampong and others, 2020).

III. Method

The methodology employed in this paper is a case study. Data collection and analysis adopted a heterodox approach, incorporating both qualitative and quantitative data from primary and secondary sources. This approach was deemed appropriate given the nature of the research problem, the absence of a unified source encompassing all pertinent information and the necessity of incorporating diverse perspectives to achieve data triangulation and an unbiased diagnosis (Yin, 2018; Baxter and Jack, 2008; Flyvbjerg, 2011; Matyas and Kamargianni, 2021).

This study is exploratory and descriptive, aiming to provide a better understanding of the mobility phenomenon, describe the characteristics of the subject in specific cities and establish connections between variables. The case study approach is particularly suitable for exploratory and descriptive research, as it is the most comprehensive type of research design. It encompasses both "people data" and "paper data", utilizing a wide range of information sources that include personal interviews and website analysis (Gil, 2002; Stake, 1995; Crowe and others, 2011). By employing a case study methodology, this research benefits from a flexible, in-depth examination of the subject matter, allowing for a nuanced understanding of complex issues within real-world contexts (Flyvbjerg, 2011).

1. The research context

Brazil's Growth Acceleration Programme (PAC 2) for Urban Mobility has allocated approximately 40 million reais since June 2018 for the implementation of bus lanes, asphalt repair on bus routes and the development of commuter stations in the city of Caxias do Sul (Ministry of Planning, Development and Management of Brazil, 2016). This programme aims to reduce social inequalities by prioritizing public transport, thereby transforming cities into more humane environments. To achieve this goal, the State of Rio Grande do Sul supports "projects that promote the physical and fare integration of public transport, as well as large- and medium-capacity projects, such as underground railways, bus rapid transit, bus corridors, light rail vehicles and aerial vehicles, among others" (Ministry of Urban Affairs of Brazil, 2015).

Given that Caxias do Sul is actively pursuing smart city initiatives and making the corresponding investments, a comprehensive evaluation of the city's needs in various sectors is necessary. This study specifically explores urban mobility as a critical area for improvement, recognizing it as a fundamental step towards achieving the city's ambitious goals.

2. Data collection

To identify suitable projects for the city of Caxias do Sul with a view to enhancing its mobility infrastructure, the data collection process for this study was divided into two distinct segments: (i) collection of mobility data specific to Caxias do Sul; and (ii) collection of mobility data from a city that is a benchmark in the field. For the first segment, a diagnostic tool was utilized to assess the present state of urban mobility in Caxias do Sul according to internationally recognized standards. This tool is elaborated upon in subsection 3 below. Following the application of the tool, the findings were compared with those for the benchmark city, which was selected on the basis of the criteria outlined in point (b) below. Table 1 lists the primary information sources employed to gather the requisite data for this study.

Table 1
Data sources used in the study

Source	Information type	Collection method
Ministry of Planning and Budget [online] https://www.gov.br/planejamento/pt-br	Investments in the city	Online
Caxias do Sul Cycling Union (UNICCA)	Cycling infrastructure projects	Telephone
MobiCaxias[a]	Urban mobility projects	Telephone
Viação Santa Tereza (VISATE) (public transport company)	Bus quality, coverage, usage and satisfaction level	Email
Caxias do Sul City Hall [online] https://caxias.rs.gov.br/	City demographic information	Online
Rádio Caxias (radio station) [online] https://radiocaxias.com.br/portal/noticias/prefeitura-estuda-criacao-de-ciclofaixa-que-ligue-as-zonas-leste-e-oeste-de-caxias-do-sul-111274	Cyclists' views on cycling conditions in the city	Online
Pioneiro (local newspaper) [online] http://pioneiro.clicrbs.com.br/rs/politica/noticia/2019/06/gestao-de-mobilidade-urbana-em-caxias-vai-na-contramao-do-que-e-adequado-dizem-especialistas-10942793.html	Increase in car ownership over the years	Online
Viação Santa Tereza (VISATE) (public transport company) [online] https://www.visate.com.br/site/	Frequency of bus services	Online
Aarhus Kommune	Public transport quality, coverage, usage and satisfaction, and number of private cars	Email
Cycling Embassy of Denmark and Aarhus Landscape Architecture Platform	Cycling infrastructure, number of cyclists, increase in cycle use	Email
Municipality of Aarhus [online] https://aarhus.dk/	Investments in the Aarhus smart mobility project	Online
VisitAarhus [online] https://www.visitaarhus.com/corporate/about-organisation-visitaarhus	Means of transport	Online
State of Green, *Sustainable Urban Transportation*, 2016 [online] [online] https://cyclingsolutions.info/wp-content/uploads//2020/12/Sustainable-Urban-Transportation.pdf	Aarhus's plans for sustainable mobility	Online
International Centre, "Buses in Aarhus", Aarhus University, 2016 [online] https://www.au.dk/fileadmin/www.au.dk/Internationalt_Center/Housing/Practical_social/BUSES_in_Aarhus.pdf	Bus fares	Online
M. S. Nicolaisen, "Mobility and Urban Development in Aarhus", n.d. [online] https://bransch.trafikverket.se/contentassets/b9cca53e177349d39d98584b597f3674/mobility-and-urban-development-in-aarhus-morten-skou-nicolaisen.pdf	Aarhus demographics and description of the city	Online
International academic resources	Means of transport	Online
LetsGo - Lev simpelt (car sharing service) [online] https://letsgo.dk/om-letsgo	Car sharing	Online
Smart Aarhus [online] https://aarhus.dk/	Mobility as a service programme	Online
Donkey Republic (bicycle sharing service) [online] https://www.donkey.bike/	Bicycle sharing programme	Online
Minimum-Wage.org [online] https://www.minimum-wage.org/	Minimum wage	Online
IQAir [online] https://www.iqair.com/	Air quality	Online

Source: Prepared by the authors.

[a] The civil society organization Mobilization for Caxias do Sul (MobiCaxias) is founded on principles and conceptual frameworks aligned with the academic literature on innovation and innovative ecosystems in Brazil. It is structured around the triple and, more recently, quadruple helix models, which include the active participation of representatives and leaders from four key sectors: public sector (executive and legislative authorities), private sector (business entities), academia (universities and colleges) and organized civil society. The latter includes unions, associations and other community, cultural and social institutions and organizations, as well as individuals who are united in their commitment to envisioning and building a prosperous future for Caxias do Sul.

(a) Tool for diagnosing mobility in Caxias do Sul

An analysis of mobility in Caxias do Sul was conducted for the initial phase of data collection in this study. To evaluate the efficacy and functionality of the city's mobility options, the indicators listed in table 2 were employed, drawing upon the research conducted by Tischer and Polette (2019) on urban mobility assessment. This methodology was selected for its capacity to bring out factors that significantly impact city residents' quality of life and transportation, including cycling infrastructure,

urban design, public spaces, public transport, length of commutes and private vehicle usage. Tischer and Polette (2019) emphasize that these indicators are widely recognized and employed globally, with their findings serving not only to evaluate a city's performance but also to propose enhancements to its urban processes.

Table 2
Mobility quality indicators

Indicator	Aspects measured
Urban mobility innovation index (International Association of Public Transport)	Population size and density; public transport use; public transport frequency; financial attractiveness of public transport; level of public satisfaction with the public transport system; area of the city that has access to the public transport system; public sector encouragement of public transport; registered vehicles; inhabitants per car; car sharing
Copenhagenize index	Public support for and culture of bicycle use; special facilities for bicycles; cycle lane or path infrastructure; bicycle sharing programmes; bicycle use by gender; bicycle use as a means of transport; increase in bicycle use; perceptions of safety; public policies and urban planning; social acceptance; cargo and logistics bicycles
European Green Capital Award	Nature and biodiversity; sustainable mobility; air quality and waste
Quality of living ranking (Mercer)	Natural spaces; transport options provided by the city
Walk score	Distance between homes and the public transport system

Source: Prepared by the authors, on the basis of V. Tischer and M. Polette, "Sistema de avaliação de cidades de referência em transportes e mobilidade urbana sustentável", *Cadernos Metrópole*, vol. 21, No. 45, May–August 2019.

(b) Mobility in the benchmark city

In the subsequent phase of this study, data from Aarhus in Denmark were examined. Aarhus was selected as the benchmark against which Caxias do Sul was to be compared owing to its recognition as the second-ranked smart city globally and the third-ranked for mobility (Vienna University of Technology, 2014) and because of its considerable comparability with Caxias do Sul across various dimensions. Aarhus is the second most populous city in Denmark, with approximately 350,000 residents, while Caxias do Sul is the second-largest city in the state of Rio Grande do Sul, a region akin to Denmark in both size and population. Aarhus has experienced considerable population growth and is home to a prominent university attended by over 40,000 students. Moreover, the city's harbour is predominantly industrial, with its container port ranking as Denmark's largest, and primarily carries out export of grains (UrbanAct, 2020).

Caxias do Sul similarly hosts a significant university and relies mainly on industrial sectors for its economic sustenance. Given Aarhus's standing as the third-ranked smart city for urban mobility and its substantial comparability with Caxias do Sul in terms of size and economic profile, it was deemed an appropriate benchmark. The data collection process for Aarhus was divided into two components: (i) compilation of data obtained using the diagnostic tool developed to assess mobility in Caxias do Sul (the indicators listed in table 2); and (ii) a comprehensive description of the primary mobility initiatives undertaken by the city. These amalgamated data were then analysed to identify measures applicable to Caxias do Sul and elucidate potential adaptations or analogous concepts.

(c) Data analysis

The scope of the factors required for a city to transition into a smart city is extensive, making it impractical to comprehensively analyse all facets within the confines of this study. However, as posited by Naphade and others (2011), a prudent approach is to identify a single area for improvement as a starting point for progress. Consequently, this study focuses on the mobility aspect of smart cities. To achieve the objectives of this study, the data triangulation method was employed for data analysis. This

method was selected because of its ability to synthesize data from multiple sources, in the recognition that reliance on a single data source would be likely to yield insufficient information. Thus, the utilization of both qualitative and quantitative sources in tandem was deemed imperative, as they provide complementary insights that can enrich the overall analysis process (Creswell and Clark, 2011). The incorporation of mixed data into the triangulation framework serves to mitigate potential bias in single-faceted research methodologies, particularly qualitative approaches, thereby facilitating the attainment of more accurate and veracious outcomes (Holland, 2009).

IV. Results

The results were spliced into three main sections: (i) the quality of urban mobility in Caxias do Sul, as ascertained from the results for the table 2 indicators; (ii) the quality of urban mobility in Aarhus, as ascertained from the results for the table 2 indicators; and (iii) Aarhus's mobility plans.

1. Quality of urban mobility in Caxias do Sul

To obtain the results that follow, we interviewed the executive director of MobiCaxias and the leaders of the Caxias do Sul Cycling Union and of Viação Santa Tereza (VISATE), the company that runs the city's public transport system. We also consulted the websites of the city's prefecture, the local radio station and *Pioneiro* newspaper, the Murbi transport service, *Diário do Transporte* online news service, PwC and the Caxias do Sul Taxi Association (ACTL), as well as a study on mobility and tourism by Simon, Gastal and Dos Santos (2014) and research into the sustainability of urban waste disposal (Caxias do Sul, 2024).

(a) Urban mobility index

Analysis of Caxias do Sul's urban mobility index provides several key insights into the city's public transport system. Managed by a private company, the system caters to approximately 90,000 passengers monthly, with a reported satisfaction rate of 75.9%. Each bus operates an average of 5.8 trips per day across 82 routes, ensuring comprehensive coverage of the city's urban areas. Despite the system's extensive reach, however, its financial attractiveness is deemed relatively low, as evidenced by the one-way ticket price of 4.80 reais. Considering that the city's minimum wage stands at approximately 5.80 reais per hour, acquiring a return ticket to commute between home and work necessitates more than one hour of work.

With a population of approximately 500,000 and a population density of 280.52 inhabitants per square kilometre (IBGE, 2022), Caxias do Sul also has to cope with high vehicle density, since there are approximately 306,000 registered vehicles in the city, equating to 1.6 inhabitants per vehicle. In response to these challenges, the city has outlined plans to introduce special parking spaces for shared cars by 2024 as a means of promoting car-pooling initiatives.

Furthermore, alongside the conventional bus system, Caxias do Sul offers two additional modes of public transportation: the Murbi system and shuttle services. Murbi operates on an on-demand basis, primarily catering to students and faculty members of the University of Caxias do Sul. Users can access the service via a dedicated mobile application, selecting from predetermined routes and opting for either Murbi Pop, priced at 2.00 reais per ride, or Murbi Easy, priced at 5.20 reais per ride and offering door-to-door drop-off services.

The shuttle service operates much like a standard bus service, but on a more limited scale, serving only four routes within Caxias do Sul. Positioned as a premium transport option between buses and taxis or ride-sharing services, the shuttle accommodates a maximum of 20 passengers per trip, with a fare of 3.60 reais per ride. The shuttle service currently faces operational challenges, with approximately 20 vehicles operating under suboptimal conditions.

To optimize urban mobility and address transport disparities, Caxias do Sul needs to prioritize strategic interventions aimed at enhancing the accessibility, affordability and efficiency of public transport. Implementing targeted initiatives, such as shared parking facilities and improved shuttle service operations, could facilitate the city's transition towards a more sustainable and equitable urban mobility ecosystem.

(b) Copenhagenize index

The analysis of the urban mobility index revealed a conspicuous lack of robust public support for cycling as a viable mode of transport within Caxias do Sul. Cycling is understood in the city predominantly as a recreational or sporting activity and is overshadowed by a pervasive "car culture" that treats cycling as a subordinate choice for commuting. Despite sporadic promotional events aimed at fostering cycling engagement and centring primarily on recreational pursuits, cycling as a mode of transport remains marginal.

The city's cycling infrastructure exhibits significant deficiencies, in particular a dearth of designated cycle paths and lanes, with only two currently in existence. Furthermore, this infrastructure is poorly planned, as it is not designed to take in points of interest or provide optimal connectivity across the city. Critical amenities, such as bicycle parking facilities, are only sporadically available, primarily at a selection of establishments such as shopping centres, universities and restaurants, which further constrains accessibility and convenience for cyclists.

While grass-roots calls for improved cycling infrastructure have spurred some municipal initiatives since July 2018, including proposed cycle tracks spanning the city and a 1.7 km cycle lane in the Ana Rech district, progress remains sluggish. Held back by inadequate infrastructure and safety concerns, the adoption of cycling as a viable mode of transport progresses at a lethargic pace. Vital prerequisites for a cycling-friendly environment include comprehensive cycle track systems and secure parking facilities to safeguard cyclists' well-being and promote a modal shift. Moreover, engendering a cultural shift in societal perceptions of cycling, beyond its recreational connotations, is paramount to foster broader social acceptance and uptake.

In the realm of cargo transportation, the emergence of delivery apps has spotlighted the potential utility of bicycles for logistical purposes. However, the absence of a formal cargo cycling infrastructure, coupled with the lack of a regulatory framework, precludes the widespread adoption of cargo cycling initiatives within the city. Despite burgeoning interest, the prospects for integrating cargo bicycles into Caxias do Sul's transport ecosystem remain nebulous in the absence of concerted municipal efforts to formalize such initiatives.

(c) European Green Capital Award

Caxias do Sul's urban landscape is poised for transformation, with plans under way to develop and furnish urbanized public spaces across the city. By 2024, it is anticipated that 50% of Caxias do Sul's public areas will have been comprehensively inventoried and neighbourhood-specific utilization plans and maintenance strategies will be in place. The initial plan was to convert Júlio de Castilhos Avenue into a linear park by 2022, incorporating commercial and service amenities to enhance public accessibility

and recreational opportunities. Owing to public opinion and operational challenges, this transformation did not take place. Nevertheless, the project has been included in the new mobility plan and remains part of the city's goals, with completion now projected for 2030.

In line with Sustainable Development Goal (SDG) target 11.2, Caxias do Sul is endeavouring to develop a more sustainable, inclusive and equitable urban mobility framework by 2030. Concurrently, efforts to achieve SDG target 11.6 involve implementing comprehensive air quality and waste management protocols, with the aim of mitigating adverse environmental impacts. Caxias do Sul ranks as the fifth most sustainable city in Brazil for urban sanitation, attesting to its compliance with legal prescriptions governing solid waste management from collection to disposal.

Caxias do Sul currently boasts commendable air quality, with a United States air quality index (AQI) score of 47 based on data for the week from 9 November to 15 November 2020. However, while this score is within the "good" range, a relatively small rise to 51 on the AQI would take it into the inferior category of "moderate" air quality. Ongoing monitoring and proactive measures are therefore essential to sustainably manage air quality levels and preserve environmental integrity within the urban milieu.

(d) Mercer quality of living ranking

Analysis of this ranking reveals that Caxias do Sul is making strides towards SDG target 11.7, which is to provide universal access to safe, inclusive and accessible, green and public spaces by 2030, with a particular focus on vulnerable groups, such as women, children, older persons and individuals with disabilities. This underscores the city's commitment to fostering equitable and accessible urban environments conducive to social inclusion and well-being.

Abrantes (2016) conducted a comprehensive assessment of Brazilian cities, encompassing well-being, safety, education, health and economic indicators, among other dimensions. Caxias do Sul earned the distinction of being ranked eighteenth on these criteria, reflecting its good overall performance across multiple domains. This recognition underscores the city's ongoing efforts to enhance liveability, promote socioeconomic development and foster an enabling environment for its residents.

(e) Walk score

Regrettably, data on the walkability score for Caxias do Sul were not accessible. This underscores the data deficits that prevail in many developing nations, in particular for their urban centres. These lacunae are probably attributable to fundamental societal needs, such as healthcare and education being prioritized in resource allocation, which limits the availability of comprehensive data on urban infrastructure and liveability indices.

2. Quality of urban mobility in Aarhus

To acquire the information presented below, correspondence was initiated via email with key stakeholders, including the Head of Transport Planning of Aarhus, the Cycling Embassy of Denmark and a landscape architecture platform affiliated with Aarhus. In addition, information was extracted from various websites, such as those of the municipality of Aarhus, the Danish Ministry of Environment, Visit Aarhus, international academic resources, LetsGo - Lev Simpelt, Smart Aarhus, Donkey Republic and Minimum-Wage.org. Relevant research materials were also consulted, including "Buses in Aarhus" (International Centre, 2016), and *Sustainable Urban Transportation* (State of Green, 2016).

(a) Urban mobility index

Analysis of this index shows that public transport in Aarhus has a considerable ridership of between 40 million and 45 million passengers a year. The light rail and primary bus lines operate at frequencies ranging from 6 to 12 departures per hour during peak periods, and an impressive 70% of public transit users rate the service at between 7 and 10 on a scale of 0 to 10. Moreover, the entire city is effectively served by public transit, overseen by five regional public bus companies. Various ticketing options are available, the most prevalent being the 30-day pass, priced at 365 kroner as of 2020 (approximately 308 reais), which permits unlimited rides within the designated period. As regards affordability, with the minimum wage set at 18 kroner (roughly 15.20 reais) per hour, the cost of a round-trip ticket equates to less than an hour's labour.

Aarhus, home to nearly 350,000 inhabitants, has a population density of 2,874 people per square kilometre and 119,825 registered private vehicles, translating to nearly three inhabitants per car. Notably, the city hosts several car-sharing initiatives, with LetsGo - Lev Simpelt being a prominent example. Membership of this organization gives people access to a fleet of shared vehicles that are available for booking as needed. Members typically pay a monthly subscription fee plus fuel and mileage costs accrued during usage. The precise rental fee for each booking may vary depending on the subscription plan selected.

(b) Copenhagenize index

It is evident from this index that Aarhus fosters a robust cycling culture, with bicycles serving as a major mode of transportation. The city embarked on the implementation of its Cycling Action Plan in 2007, and this resulted in the establishment of various initiatives, including the creation of new cycle routes and paths, the installation of over 3,000 bicycle parking facilities, the deployment of additional traffic signage, air pumps and bicycle barometers, and enhanced snow clearance efforts during the winter. Aarhus boasts an extensive cycling infrastructure comprising 675 km of cycle lanes. Furthermore, the city has a bike-sharing programme operated by Donkey Republic, which allows users to rent bicycles via a mobile application for flexible durations.

Cycling demographics in Aarhus are notably diverse, with an even split between male and female cyclists. Over 50% of cyclists are employed, while 26% are students and 22% fall into the non-employed or other categories. Remarkably, 85% of the population has access to a bicycle, with 58% cycling regularly. There is a growing trend towards the adoption of cargo bicycles, which constitute 3% of the total cycle fleet and are primarily utilized for transporting children and goods.

Reflecting the broader cycling ethos of Denmark, Aarhus has witnessed a considerable surge in bicycle usage over the past decade, with a 20% increase recorded. Future plans, as outlined in 2019, encompass the construction of two new cycling superhighways, the development of a bicycle parking facility at the main train station capable of accommodating 2,000 bicycles, and the introduction of three fully automated bicycle parking towers inspired by similar structures in Japan.

(c) European Green Capital Award

Aarhus has undertaken significant initiatives in the realm of sustainable mobility since 2016, forging partnerships with more than 40 climate partners to address traffic congestion and promote sustainable mobility practices. Emphasizing public-private collaboration, these efforts aim to incentivize investment in both areas with a view to creating a more environmentally friendly transportation landscape. Within

Aarhus's business district, notable developments include the inauguration of a light rail system in 2017, complemented by plans to establish a comprehensive network of cycling paths integrated with bus stops and light rail stations. In addition, the business park intends to provide employees with access to a range of bicycles and cargo bicycle services for small-scale deliveries, further encouraging eco-friendly commuting practices. A key objective of the city is to achieve carbon neutrality in the foreseeable future.

As regards air quality, Aarhus currently has favourable conditions, with an AQI score of 28 during the week of 9 November to 15 November 2020.The city makes it a priority to maintain minimal AQI levels, indicative of high air quality. Notably, Aarhus has garnered acclaim for its innovative waste management strategies since 2012. The implementation of over 800 underground waste containers has significantly enhanced waste collection efficiency, reduced noise pollution associated with traditional waste disposal methods and mitigated odour-related concerns. Moreover, this initiative has garnered widespread public approval, with over 90% of residents expressing satisfaction with the improved waste management infrastructure.

(d) Mercer quality of living ranking

Aarhus offers a plethora of green and accessible spaces, boasting over 20 parks that cater to diverse recreational activities, such as sports, leisurely strolls and family outings. These parks serve as vibrant communal hubs where residents can immerse themselves in nature, engage in physical activities or simply unwind amidst verdant surroundings and serene bodies of water. Regarding transportation options, Aarhus provides a comprehensive range of choices, including buses, the light rail system (Aarhus Letbane), bicycles, personal vehicles and taxis. Nomad List, a prominent website specializing in city rankings, conducted an assessment of the most desirable Danish cities for residents, considering a variety of factors, such as walkability, weather conditions, cost of living, educational opportunities and safety standards. In this assessment, Aarhus ranked third, confirming its appeal as an attractive urban destination characterized by favourable living conditions and amenities.

(e) Walk score

Around 99% of public transport users live within 800 m of their nearest bus stop.

3. Aarhus's plans for mobility

In 2007, the Municipality of Aarhus implemented a Cycling Action Plan aimed at enhancing the quality of cycling infrastructure to promote cycling as a primary mode of transportation. The plan's objective was to increase the number of individuals opting for bicycles, thereby yielding positive outcomes for Aarhus's public health, climate and traffic congestion mitigation efforts. This strategy was underpinned by the recognition that cycling offers health benefits, produces zero CO2 emissions and substantially reduces congestion and traffic jams (Aarhus Kommune, 2024).

In 2017, furthermore, Aarhus introduced the concept of mobility as a service, which prioritizes solutions, such as car-pooling and traffic reduction. Concurrently, the city launched the GoTur mobile application, designed to integrate various transportation modalities including buses, trains, light rail, bicycle-sharing schemes and electric scooters. Available for download on both the Android and the iOS platforms, GoTur asks users to input their current location and desired destination and then furnishes them with optimized route suggestions encompassing public transit, cycling options, electric scooters and ride-sharing services provided by private motorists.

4. Overall results

The indicator data gathered for both Caxias do Sul and Aarhus are presented in table 3. It should be noted that Aarhus has launched an open data initiative aimed at giving citizens access to a range of information sets covering various domains, including urban mobility. Caxias do Sul has recently initiated a similar open data project, though it remains in the developmental phase. The use of open data is of paramount importance in the effort to achieve smart city status. This initiative helps researchers and businesses to refine their offerings by leveraging insights from different data sets. It also affords developers the opportunity to devise applications predicated on real-time data, spanning domains such as transport and health care. Thus, both municipalities are positioned to embark on a trajectory of enhanced data availability in which disparate data sources are effectively integrated to facilitate enhanced urban management practices.

Table 3
Indicators and results

Indicator	Aspect measured	Results for Caxias do Sul	Results for Aarhus
Urban mobility innovation index	Population size	About 500,000 inhabitants	About 350,000 inhabitants
	Population density	280.52 inhabitants per km^2	2,900.00 inhabitants per km^2
	Public transport use	1.08 million passengers a year	40 million passengers a year
	Public transport frequency	2.5 times per hour	6 times per hour
	Financial attractiveness of public transport	Low	High
	Level of public satisfaction with the public transport system	75.9%	70%
	Area of the city that has access to the public transport system	100%	100%
	Public sector encouragement of public transport	The system is run by two private companies	The system is run by five regional public bus companies
	Registered vehicles	306,029	119,825
	Inhabitants per car	1.6	2.8
	Car sharing	The plan to implement special parking spaces for car sharing by 2024 was not implemented	Aarhus has a number of car-sharing associations, such as LetsGo - Lev Simpelt
Copenhagenize index	Public support for and culture of bicycle use	The city has a "car culture" with almost no public support for bicycle use	Aarhus has a culture of bicycle use, and more than 150 million kroner has been invested in promoting cycling over the past few years
	Special facilities for bicycles	Only a few establishments such as shopping centres, universities and a few restaurants offer bicycle parking	The city's Cycling Action Plan (2007) included: (i) creating new cycle routes; (ii) creating new cycle paths; (iii) creating parking for more than 3,000 bicycles; (iv) installing new traffic signs, air pumps and bicycle barometers; and (v) enhancing snow clearing in winter
	Cycle lane or path infrastructure	Only two isolated cycle lanes	675 km of cycle lanes
	Bicycle sharing programmes	None	Donkey Republic bicycle sharing programme
	Bicycle use by gender	No information on bicycle use as a means of transport, but sporting use is mainly by men	50% of users are men and 50% women
	Bicycle use as a means of transport	Still mainly seen as a leisure activity	85% of the population has access to a bicycle and 58% cycle on a regular basis
	Increase in bicycle use	Slow increase	20% increase in the past 10 years
	Perception of safety	Bicycle use is perceived as unsafe, which keeps numbers from growing	Unavailable
	Public policies and urban planning	Lacking, although Caxias do Sul Cycling Union (UNICCA) advocates for them	Plans for the future include the construction of two new cycle superhighways, a bicycle parking facility at the main train station with a capacity of 2,000 parking places and three fully automated bicycle parking towers
	Social acceptance	Low, with little visibility and few incentives	Like all of Denmark, Aarhus has a very strong cycling culture, and cycling is a highly acceptable means of transport
	Cargo and logistics bicycles	Only used for deliveries ordered through applications	3% of bicycles are cargo bicycles, mainly used to transport children and goods

Indicator	Aspect measured	Results for Caxias do Sul	Results for Aarhus
European Green Capital Award	Nature and biodiversity	The plan for urbanized public spaces to be developed and available throughout the city by 2024 and for Júlio de Castilhos Avenue to be a linear park with commerce and services by 2022 was not implemented	Unavailable
	Sustainable mobility	In line with SDG target 11.2, the aim is to have a more sustainable, inclusive, effective and fair urban mobility system by 2030	Aarhus has partnered with over 40 climate partners since 2016, seeking ways to reduce congestion, make mobility more sustainable and encourage the public and private companies to invest in these ideas, while also aiming to be carbon-neutral in the near future
	Air quality and waste	The plan is for all cities with more than 500,000 inhabitants to have implemented methods of tracking air quality and waste by 2030, so as to reduce negative impacts; Caxias do Sul currently scores an AQI of 47, which is good but almost bordering on moderate	Aarhus currently has an AQI score of 28 (good air quality) and is recognized for the waste management and collection strategies it has had in place since 2012
Quality of living ranking (Mercer)	Natural spaces	The plan is for Caxias do Sul to provide universal access to safe, inclusive and accessible, green and public spaces by 2030, in particular for people with disabilities and other vulnerable groups	Aarhus has many green and accessible places, with more than 20 parks where people can take their children, practise sports and relax amid green surroundings and water
Quality of living ranking (Mercer)	Transport options provided by the city	Buses (run by one private company), shuttle services, the Murbi on-demand system, personal vehicles, taxis and the Uber application	Buses (run by five regional public companies), the Letbane light rail system, cycling (numerous cycle tracks and a bicycle sharing system), personal vehicles and taxis
Walk score	Distance between homes and the public transport system	Unavailable	99% of public transport users have a bus stop within 800 m of their home

Source: Prepared by the authors.

V. Data analysis and diagnostics

Analysis of the data presented in this paper revealed numerous areas and avenues for improvement in Caxias do Sul. The primary recommendations include: (i) increasing bicycle use and reshaping public perceptions of cycling; (ii) enhancing the attractiveness of public transport; and (iii) developing a comprehensive application that integrates traffic information and transport options. Another recommendation is for the municipality to enhance its data management system and show greater commitment to project implementation (Flyvbjerg, 2011; Zhang, Gao and Mei, 2018; Matyas and Kamargianni, 2021).

Caxias do Sul stands to benefit from an improved approach to bicycle infrastructure and cyclist relations, drawing insights from the substantial positive developments observed in Aarhus's urban mobility. A concerted effort to enhance cycling infrastructure, including dedicated lanes and special parking facilities, is warranted. Initiatives to improve cyclists' perception of safety, coupled with educational efforts in schools and transit departments, are also advocated to promote cycling as a viable mode of transport. The importance of accessibility is underscored by the efficacy of Aarhus's bicycle-sharing system, and the introduction of an affordable programme of this type, potentially incorporating electric bicycles tailored to the city's topography, is suggested.

Caxias do Sul's aspirations to develop green natural spaces also require greater efforts, in line with the ISO smart city recommendations. While Aarhus has a plethora of verdant, accessible parks, Caxias do Sul's plans for such spaces remain nascent. Furthermore, the imperative of ensuring good air quality, a hallmark of smart cities, reinforces the need for sustainable mobility initiatives. Efforts to achieve carbon neutrality, reduce traffic congestion and incentivize public transport and cycle use are advocated.

The disparity between transport preferences in Caxias do Sul and Aarhus underscores the need to enhance the appeal of public transport in the former. Strategies to make bus fares more affordable and develop real-time mobility applications, in line with Aarhus's example, have been proposed.

It is also vital to address deficiencies in data management and project implementation. Enhanced data collection, storage and accessibility are advocated, alongside a more steadfast commitment to project execution.

While progress in enhancing urban mobility in Caxias do Sul represents a major stride towards smart city status, it is acknowledged that broader challenges persist. A nuanced approach, anchored in feasible benchmarks and incremental advances, is recommended. Furthermore, it is imperative to deal with the disparity in data availability and implementation efficacy between Caxias do Sul and Aarhus, which is indicative of broader governance and infrastructure challenges. The Urban Transport and Mobility Master Plan (Planmob) is a pivotal initiative, but effective implementation will require political will, financial resources and community engagement.

In conclusion, while the recommendations outlined here, if implemented, would represent major steps towards enhanced urban mobility, they represent only a fraction of the multifaceted endeavour required to turn Caxias do Sul into a smart city. Nonetheless, a concerted effort underpinned by actionable strategies and robust governance frameworks would hold out the promise of an improved urban mobility landscape and incremental progress towards smart city status.

VI. Conclusions

The review of existing research and studies that was conducted for this paper has made it clear that many multifaceted elements go to make a smart city. This holistic concept encompasses inclusiveness, robust health and safety programmes, community cohesion, environmental harmony, entrepreneurial opportunities, cultural enrichment, talent recognition, technological advances, efficient, pedestrian-friendly mobility solutions, educational investments, encouragement for creativity, connectivity, abundant green spaces and proactive climate change mitigation and adaptation measures (Caragliu and others, 2011; Nam and Pardo, 2011; Hollands, 2008; Acuto and others, 2018).

Furthermore, turning conventional cities into smart ones is not only feasible but imperative, irrespective of their age or stage of development (Ahvenniemi and others, 2017). This transformative journey necessitates a methodical approach in which each facet requiring enhancement is systematically addressed. In the case of Caxias do Sul, urban mobility emerges as a focal point for initial intervention. To gauge the quality of urban mobility in Caxias do Sul, a bespoke analytical tool was devised, leveraging insights from comparable cities such as Aarhus, which is renowned for its smart city efforts (Giffinger and others, 2007). A meticulous process of urban benchmarking and comparative analysis made it apparent that Caxias do Sul had substantial shortcomings in its urban mobility infrastructure (Albino, Berardi and Dangelico, 2015).

Addressing these deficiencies requires multifaceted interventions, encompassing not only enhanced data management and project implementation but also strategic investments in cycling infrastructure, the establishment of a bicycle-sharing programme and measures to increase the attractiveness of public transport (Deakin, Waer and Higgins, 2012). Integral to this endeavour is the development of a real-time mobility application that empowers citizens through access to critical transport information (Zhang, Gao and Mei, 2018). By making public transport and cycling more attractive while discouraging reliance on personal vehicles, Caxias do Sul stands to mitigate traffic congestion, improve air quality, enhance community inclusiveness and improve overall quality of life (Ergen and Gungor, 2014).

Proactive climate change mitigation measures also need to be integrated into Caxias do Sul's urban development agenda. This entails reducing greenhouse gas emissions through modal shifts towards sustainable forms of transport, such as cycling and public transit, and promoting energy-efficient urban design and renewable energy deployment (Acuto, Parnell and Seto, 2018). Embracing nature-based

solutions, such as an increase in urban green spaces and enhanced urban biodiversity, can bolster climate resilience and mitigate the urban heat island effect (Wamsler, Pauleit and Kaltenborn, 2020). In addition, fostering community resilience and adaptation through robust disaster preparedness and response mechanisms is essential to confront the escalating risks posed by climate change-induced extreme weather events (Pelling, O'Brien and Matyas, 2015).

However, this study is not without its limitations. The challenge of data accessibility, exacerbated by the coronavirus disease (COVID-19) pandemic, underscores the need for methodological flexibility and resilience in research efforts (Cervero and Kockelman, 1997). The pandemic also engendered uncertainties concerning its enduring impact on urban dynamics, a subject that should be explored in future studies. Potential avenues for further investigation include the pandemic's ramifications for public health, transport preparedness and broader aspects of urban resilience and sustainability (Matyas and Kamargianni, 2021).

In conclusion, while the journey towards smart city status is fraught with challenges, the concerted pursuit of incremental advances promises transformative outcomes for Caxias do Sul. By embracing a multifaceted approach to urban development, underpinned by robust governance frameworks, community engagement and proactive climate change mitigation and adaptation measures, Caxias do Sul can navigate the complexities of modern urban living and emerge as a beacon of smart city innovation, sustainability and resilience.

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Reflections from the Chinese perspective on Sino-Brazilian cooperation in the twenty-first century[1]

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Abstract

Sino-Brazilian cooperation has advanced rapidly in the twenty-first century. Although its successes have made it a model for South-South cooperation, the relationship also faces many challenges. This study focuses on the trade imbalance and the resultant risk of "deindustrialization" for Brazil, proposing that fostering technology transfer in the context of investments and situating Chinese companies in Brazil are two ways to mitigate its negative effects. However, the main response to these challenges is well-defined, comprehensive development planning by the Brazilian State with a strong commitment to reindustrialization. Since South-South cooperation is often more complex than North-South or North-North cooperation and few relevant academic studies exist on cooperation between developing countries, this article also advocates for a rational and holistic vision of Sino-Brazilian cooperation.

Keywords

Economic relations, foreign relations, economic cooperation, international trade, technology transfer, investments, industrial location, economic development, development planning, China, Brazil

JEL classification

F50

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I. Introduction

Amid the deepening of relationships in this era of economic globalization, cooperation is stronger not only among developed countries, but also among developing countries. Given scant prior contact and a dearth of academic studies, advances in cooperation between developing countries are more complex, with a series of problems that have not been adequately addressed. The marked differences between the economic and business structures of countries in the developing world mean that trade flows between these countries have given rise to asymmetrical ties. In many Latin American countries, raw material exports to Asia are more common than in the past, and the degree to which those revenues offset manufacturing deficits varies. They have even contributed to the trade surplus in the region. Accordingly, some countries in East and South-East Asia have undergone rapid industrialization,[2] while many countries in Latin America are at risk of "premature deindustrialization". Because of its size and rapid development, China has played a significant role in this process.

Specific cases of South-South cooperation have been discussed in academia and in the media, with stances ranging from a stringent critique of the win-win model to a resolute celebration of the successes of these ties that contest the political and economic hegemony of the global North. In any case, in a globalized world, no country can sustain long-term development without exchange, meaning that disengaging is not a solution. As such, the time is ripe to once again focus the discussion on cooperation and for rigorous academic reflection on the causes and possible solutions to the problems that it occasions.

This article discusses cooperation between Brazil and China as two emerging global powers. Within the complexities of this link, it focuses on the socioeconomic dimension, refraining from addressing political and ideological aspects. The two countries established diplomatic relations in 1974 and their strategic partnership in 1993. However, there were no major advances in bilateral trade until the early twenty-first century. With strong support from both governments, relations grew steadily, branching out into new areas, such as high tech, through joint projects on Earth observation satellites. This was accompanied by significant friction, which is understandable in the early stages of relations. As such, neither blind optimism nor a refusal to deepen this link is warranted in attempting to understand Sino-Brazilian cooperation. In view of the critiques and extreme stances, it is essential to take a rational approach to the issue and analyse the difficulties to foster mutual benefit.

Although this study aims to present an impartial and objective assessment, possible constraints exist and must be mentioned. The authors reside in China, which could lead to some bias in the study, based on the public opinion and culture of that country. In fact, although the article carefully considers both the cultural differences that underpin the economic problems as well as dissimilarities in social aspects, its comments and conclusions could unconsciously reflect the national interests of China. The authors are also more familiar with China than with Brazil, and consequently could be presenting an incomplete view of Brazilian politics and society. Despite these factors, this analysis of the subject should foster discussion to arrive at a robust academic approach that makes real contributions to South-South cooperation.

II. Methodology

In this study, South-South cooperation is understood as an intergovernmental mechanism that aims to foster constructive agendas among developing countries through the exchange of goods (primary, semi-manufactured and manufactured), capital and technological know-how for mutual progress and

[2] In this study, industrialization is defined on the basis of growth in the industry share of gross domestic product (GDP), growth in value added, and the technological sophistication of output.

shared development. Although its original purpose was to establish equitable horizontal interactions, developing countries vary widely in their economic development, social structures, political systems, values and ideologies. Most countries also face domestic problems, such as weak rule of law and governance, economic imbalances and a lack of social cohesion. All these factors affect companies' behaviour in cross-border operations and in the business environments of host countries. According to some segments of the Brazilian population, the rapid advance of cooperation jeopardizes their material interests. However, this perspective provides only a simplistic and limited vision of a link with innumerable facets. In reality, these complaints or questions, rather than being purely underpinned by concrete issues, also reflect other factors, such as a lack of a sense of identity, worries about Brazil's own development model, stereotypical impressions of China or a combination thereof. As such, when Jair Bolsonaro was President of Brazil, his position on trade with China was largely a reflection of the sentiments of his supporters.

III. The Bolsonaro government's ambivalence regarding the relationship with China

In October 2018, during his presidential campaign, Jair Bolsonaro began to express misgivings about developing partnerships with Beijing, going so far as to say that the Chinese were not only buying in Brazil, but were "buying Brazil" (Reuters, 2018), a statement that foreshadowed the possibility of tension in the two countries' relations if he were elected. Although Bolsonaro moderated his discourse after taking office, he kept a distance from the Chinese presence in Brazil in a bid to establish closer ties with the administration of Donald Trump. For example, with regard to the implementation of fifthgeneration (5G) mobile networks, the President of Brazil, in an address broadcast over the Internet on 11 June 2020, said that sovereignty, data security and foreign policy would be taken into account in that process (Paulino, 2020, p. 162). He then, however, decided to accept a US$ 1 billion loan from the United States to procure equipment from Telefonaktiebolaget LM Ericsson and Nokia (Martello and Mazui, 2020) and excluded Huawei, a Chinese company that has been operating in Brazil for more than 20 years and owns 35% of the country's telecommunications infrastructure (Trevisan, 2020). The decision contrasted with that of Brazil's neighbour, Argentina, which decided to include Huawei in its own 5G project owing to the company's competitive prices (Garrison, 2019).

On the trade front, Ernesto Araújo, Minister for Foreign Affairs in the Bolsonaro government, was in favour of disengaging from China, claiming that there would be no repercussions for Brazil from the change of stance. From his perspective, given that China's main food suppliers were the United States, Brazil and Australia, if all three united to support Donald Trump, the Chinese would have no choice but to continue importing from those countries (Paulino, 2020, p. 162). Even the coronavirus disease (COVID-19) pandemic created diplomatic incidents. Federal congressman Eduardo Bolsonaro, son of the then President of Brazil, who was a key member of the Foreign Affairs and National Defence Committee of the Brazilian Congress, blamed China for the crisis in a social media post on 18 March 2020 (Phillips, 2020).[3] Ernesto Araújo also said in his blog that addressing the coronavirus was not enough, and that the "virus of communism" would also have to be confronted (Araújo, 2020).

[3] That same day, Yang Wanming, China's ambassador to Brazil, responded in a social media post that China vehemently condemned the congressman's remarks and demanded that he immediately withdraw them and apologize to the Chinese people. In response, Rodrigo Maia, President of the lower house of Brazil's Congress, swiftly posted an apology to China and to the ambassador on behalf of the lower house, on the same social media platform. China condemned the remarks of Ernesto Araújo and demanded a personal apology from Eduardo Bolsonaro to the Chinese people (see BRICS, "Brazilian President's son creates diplomatic crisis between Brazil and China", 24 March 2020 [online] https://infobrics.org/post/30605).

Despite the hostile rhetoric, there was rather more continuity than rupture with China during the Bolsonaro government, as seen in its indecisive and moderate policies. In March 2019, just two months after taking office, Bolsonaro announced a trade mission to China. He said that he was looking forward to the visit, since China was his country's main trading partner and he was interested in strengthening relations and exploring new horizons. He added that, to a great degree, Brazil and China were mutually dependent (Verdélio, 2019). In spite of his remarks on the campaign trail, during his meeting with Chinese President Xi Jinping, the President of Brazil invited Chinese companies to participate in an auction of oil and gas concessions the following month (Verdélio, 2019; Vidal Liy and Gortázar, 2019). In the end, China National Offshore Oil Corporation and China National Oil and Gas Exploration and Development Company were the only foreign bidders. During the trip, Bolsonaro also visited several firms to seek investment and signed 25 agreements and memorandums of understanding in the areas of technology, education, commerce, energy and agriculture, among others. At the eleventh summit of the countries in the BRICS group (Brazil, the Russian Federation, India, China and South Africa), held in Brasilia in November 2019, Bolsonaro welcomed Xi Jinping and remarked that China was an ever greater part of Brazil's future (Mazui, Barbiéri and Rodrigues, 2019). The two leaders signed a series of agreements on infrastructure, agriculture, livestock and energy (Mendes and Zaia, 2019). During the China-Brazil Economic Development Strategic Dialogue held the same year in July, Brazilian Foreign Minister Ernesto Araújo had said in a meeting with his Chinese counterpart Wang Yi that he expected China to have a greater presence in infrastructure tenders in Brazil, through both bilateral investments and initiatives financed by the New Development Bank of the BRICS countries (*EFE*, 2019). In addition to these visits, in 2019, the two countries re-established the Sino-Brazilian High Level Commission for Coordination and Cooperation (COSBAN), co-chaired by their vice-presidents, with six meetings having been held by 2022. Following the election of Joe Biden as President of the United States, disputes between Brazil and the United States on climate change and environmental issues prompted the Government of Brazil to seek closer ties with Beijing.

The Bolsonaro government actively promoted the formalization of exchange with China, while simultaneously speaking critically of the Chinese presence in Brazil. In a *Global Times* article published on 20 March 2020, Zhou Zhiwei, Executive Director of the Latin American Institute of the Chinese Academy of Social Sciences, said "the current Brazilian government is a close follower of the Trump government ideologically, but they are opportunistic and a double dealer in terms of cooperation in the field of economy and trade with China" (Wang and Lu, 2020). The ambivalence of the Government of Brazil appears to reflect the country's dilemma over the growth of trade with China: it sought to develop through its interactions with China but was struggling to find an appropriate way to benefit.

IV. Achievements and challenges of Sino-Brazilian cooperation in the twenty-first century

In the twenty-first century, a series of government protocols have formed the programme of action for Sino-Brazilian cooperation. The main drivers of rapprochement were economic necessity, complementary comparative advantages and a desire for equitable exchange between developing countries.

1. A brief overview of Sino-Brazilian relations and the successes of the twenty-first century

By the twenty-first century, China's membership in the World Trade Organization, which it joined in 2001, and the policies set by the Workers' Party in Brazil had established a solid foundation for the rapid development of trade between these two emerging powers. Fostered by both governments,

bilateral trade grew by an annual average of 30% in the 2000s, and by 2009, China had displaced the United States to become the number one destination of Brazilian exports. Although conditions were less favourable in the second decade of the century, bilateral trade continued to grow. According to a World Bank report, the value of Brazil's exports to China grew from US$ 35.608 billion in 2015 to US$ 63.358 billion in 2019 (WITS, n/d a). Between 2000 and 2021, Brazil registered a trade surplus with China 17 times and deficits were only recorded in four years: 2000, 2007, 2008 and 2011. In 2019, the Brazilian surplus topped US$ 28.1 billion, a gap that continued to widen until exports to China became one of the main sources of income for the country amid a full-blown economic recession (WITS, n/d b).

Foreign direct investment also reflected unprecedented growth, especially after 2015, when Brazil became the region's main destination for cooperation projects following the establishment of the China-LAC Industrial Cooperation Investment Fund. That year also marked the beginning of a period in which tough economic conditions prompted the sale of assets by Brazilian companies, an opportunity that some Chinese companies seized to accelerate their entry into the local market. In 2016, Chinese mergers and acquisitions in Brazil amounted to US$ 4 billion (Zhou, 2019). Investments were increasingly diversified into areas ranging from minerals to manufacturing, especially in the machinery and automotive sector, later progressing to the services sector, mainly through Chinese banks' presence in electricity production, generation and distribution. In 2019, rising protectionism around the world and growing trade tensions between China and the United States triggered a drop of 8.2% in non-financial foreign investment by China compared to 2018 (Reuters, 2020), but the value of Chinese investments in Brazil grew substantially and, for the first time, the northeastern part of the country became the top destination for projects (34%). The following year, investment plummeted, owing mainly to the outbreak of COVID-19. By 2022, more than 200 Chinese companies were operating in Brazil. In contrast, Brazilian manufacturing companies entered China mainly through joint public-private ownership, seeking to explore the global market with Chinese partners, as in the case of refrigeration equipment produced by Embraco, airplanes manufactured by Embraer and the steel products of Vale do Rio Doce, for example.

One of the most important strategic areas for Sino-Brazilian cooperation, other than economic affairs, has been science and technology, in an example of South-South cooperation which, to date, has no equal in any similar project between developing countries. Cooperation in this area dates back to 1982 when China and Brazil signed the Intergovernmental Science and Technology Cooperation Agreement, but there was no real progress until the signing in 1998 of the Protocol on approval of research and production of the earth resources satellite (for the launch of the China-Brazil Earth Resources Satellite (CBERS) programme), under which it was agreed that the first satellite would be launched a year later. Since then, the study of space has been a priority for scientific cooperation between Brazil and China. The successful launch of five satellites (CBERS-1, -2, -2B, -2C and -4) ended the dependence on developed countries in the domain of aerospace and conclusively demonstrated the potential of high-tech cooperation among developing countries (Zhou, 2019).

Fruitful exchanges also took place in the areas of hydropower, transport, agriculture, livestock and biomedicine, among others. In 2012, both countries signed the 2012–2021 Ten-Year Cooperation Plan, which expanded on the 2010–2014 Brazil-China Joint Action Plan. Under the Ten-Year Cooperation Plan, research centres and laboratories would be created to study climate change, energy, agriculture and nanotechnology. Cooperation on projects involving satellites, hydropower construction and the services supply chain meets a real need and implies that the parties have complementary resources. In that regard, the Brazilian ambassador to China at the time, Sérgio Serra, said that science and technology cooperation was essential for a strategic partnership between Brazil and China (Zhou, 2019). In his opinion, Brazil was truly demanding that relations go beyond mere trade to encompass the possibility of cooperation in areas such as space, hydropower construction and service provision (Zhou, 2019).

As a model for South-South cooperation, Sino-Brazilian exchanges advanced under the framework of intergovernmental agreements with staunch support from both countries for their measures. When the Prime Minister of China, Wen Jiabao, visited Rio de Janeiro in 2012, the two governments agreed to establish a strategic global partnership. Two years later, while visiting the country, President Xi Jinping proposed in Brasilia that China and Latin America and the Caribbean build a community with a shared future. In 2015, the first Ministerial Meeting of the Forum of China and the Community of Latin American and Caribbean States (CELAC) was held in Beijing, at which China proposed the 1+3+6 mechanism[4] for comprehensive cooperation. It included a series of financial support policies and institutions, such as the China-LAC Cooperation Fund and the Special Loan Program for China-Latin America Infrastructure. Brazil, the largest country in the region, is undoubtedly a key partner in advancing these projects.

2. Perception of the imbalance in bilateral relations

As in many cases of South-South cooperation, trade between China and Brazil is shaped by the comparative advantages of each country: Brazil's abundance of natural resources and China's relative leadership in the manufacturing sector, by their nature, have led to a trade imbalance. Currency appreciation and the clearly widening trade surplus prompted a fear in Brazilian society of the possibility of "Dutch disease".[5]

Complementarity in commodities, based on China's huge demand and Brazil's large supply, has driven trade. Between 2000 and 2020, the share of Chinese agribusiness imports grew from 2% to 35% of the Brazilian export basket (Jank, Guo and Miranda, 2020). In 2013, China displaced the European Union as the number one buyer of Brazilian agricultural products, although other products were also traded. The top products were soybeans, iron, oil, beef and pork, wood pulp, chicken, cotton and copper, so much so that in 2018, the first three accounted for 81.8% of Brazilian exports to China (Paulino, 2020, p. 169).

The soybean trade illustrates this trend of concentration. In 2002, purchases from Brazil accounted for 35% of China's soybean imports, a share that had reached 77% by 2019, almost two decades later (Gale, Valdes and Ash, 2019, p. 19). While this increase was partially driven by external factors, such as the reduction in China's purchases from the United States owing to trade tensions, the rise in commodity prices boosted Brazilian exports (Duarte, 2018). In the technology sectors, China has a clear comparative advantage. Almost 100% of Brazilian imports from China are manufactures. The top products include telecommunications equipment, valves and thermionic tubes, platforms and floating structures, organic and inorganic compounds, electronic and circuit protection devices, accessories for data-processing machines, and drugs and pharmaceuticals (Varejão, 2021).

Chinese companies are also gaining ground in high-tech sectors such as artificial intelligence, value chain digitalization and live streaming. Like trade, investment is also concentrated in specific sectors (although diversification is gradually increasing) and two-way exchanges are extremely unbalanced. Until 2020, the six largest Chinese corporations operating in Brazil were all State-owned and active in the energy and infrastructure sectors: State Grid Corporation of China, China Petroleum and Chemical Corporation, China Three Gorges Corporation, China National Petroleum Corporation, China National Offshore Oil Corporation and Sinochem International Corporation (Zhou, 2019). Between 2007 and 2020, the Brazilian electricity sector attracted 48% of Chinese investments in the country, followed by oil extraction (28%) and mining (7%) (Cariello, 2021). Looking at the number of projects, Chinese

[4] In the naming of the 1+3+6 mechanism, 1 stands for an inclusive growth and sustainable development programme; 3 refers to the three drivers comprising the promotion of cooperation, trade, and financial investment and partnerships; and 6 alludes to the six priority areas: energy, infrastructure, agriculture, manufacturing, scientific innovation, and computer technology (Cui and Zhou, 2019).

[5] In the 1960s, foreign currency flooded into the Netherlands following the discovery of large deposits of natural gas. The Dutch currency appreciated, making exports from other sectors less competitive. Ever since, the term "Dutch disease" has been used to refer to a crisis created, paradoxically, by a large influx of foreign currency.

investments are more evenly distributed, with 31% in the electricity sector and 28% in manufacturing, followed by areas such as information technology and agriculture, at 7% each, and financial services, at 6% (Cariello, 2021). Conversely, investment is relatively limited: the Brazilian Association of Chinese Enterprises has approximately 60 members and almost a dozen companies have industrial units in China (Paulino, 2020, p. 166).

With cooperation, the benefits to the population vary (somewhat) based on the relationship between the sector in question and the exchanges with China. For example, agriculture, in which mostly low-income groups and owners participate, probably reaps the greatest benefits from exports to China, which is why this population has a good understanding of the importance of protecting the partnership and customer relationship with the Asian country. Indeed, the Brazilian Minister of Agriculture at the time, Tereza Cristina, actively promoted the normalization of relations with China, aiming to introduce greater nuance into the discourse of President Bolsonaro. From her perspective, any provocation related to issues such as 5G or COVID-19 would harm agricultural productivity, a major source of revenue during the pandemic. In an interview with Xinhua, the main news agency in China, she said that Brazil would remain a trustworthy partner for China (*Xinhua*, 2019). Her attitude contrasted with the ambivalence expressed by those in some sectors, mostly manufacturing or technology-related, who felt threatened by the competition.

In turn, the redistributive policies of the Workers' Party government have also complicated the public's perception of the effects of the trade imbalance with China. Under the win-win model, China would get the resources it needs for its development, while the income flowing to Brazil could reduce external constraints and stimulate growth. However, in practice, that goal has only been partially achieved. In the first 15 years of the twenty-first century, a period of unprecedented growth, the presidents of Brazil, who belonged to the Workers' Party, implemented a series of social projects to benefit low-income groups, using national income as a source of public investment.[6] They achieved steady economic development and managed to reduce poverty from 30% to 15%.

However, new social problems emerged. Between 2001 and 2015, although the cumulative per capita income of the Brazilian population grew by 56%, distribution was uneven: low-income groups and the top 1% reflected remarkable increases of 72% and 69%, respectively, in contrast with the middle-income segments, who reaped relatively lower gains from development dividends and whose income grew by only 42% (Alvaredo and others, 2018, pp. 143–144). A sense of deprivation gave rise to the idea of an "exclusive populism" in Brazil, which culminated in the election of Bolsonaro as president (Gethin and Morgan, 2018, p. 7).[7] This partially explains Bolsonaro's rhetoric of mistrust regarding cooperation between Brasilia and Beijing.

Another notable aspect from the perspective of China is the social psychology of the Brazilian people: there is a relative lack of identity among social groups owing to factors such as a wide social gap, the corporativist tradition and a low level of racial integration. In other words, each sector's understanding of cooperation with China tends to spring from its own circumstances and interests rather than from a collective, integrated perspective. In this regard, the benefits derived by certain ethnic groups or sectors do not necessarily translate into greater approval by others, unlike in Chinese society, where consensus between social groups is easier to attain, perhaps because of a relatively monocultural tradition and cohesive national identity. This difference is a cultural barrier that makes it difficult for Chinese people and their South American partners to understand each other, regarding the dissatisfaction over trade, despite the surplus.

[6] Examples include the *Bolsa Família* programme and the Growth Acceleration Programme.

[7] A survey conducted in the context of the 2018 presidential election showed a lack of consensus on the country's future. Voters' demands were closely tied to their socioeconomic position: most low-income segments continued to support the left, with 53% of people expressing concern over a number of issues, especially jobs and medicines. In contrast, 55% of middle-income voters and the elite felt that issues such as education, security and corruption were more pressing, and expressed a desire for change in the country (Gethin and Morgan, 2018).

V. Possible solutions to the current dilemma

Since the lack of balance in Sino-Brazilian cooperation reflects a multidimensional structural problem that extends to both countries and is even shaped by international factors, the likelihood of overcoming it over the short to medium term is slim. This paper advocates for increasing technology transfer and situating more Chinese companies in Brazil as two possible solutions, while acknowledging that they are insufficient to address the problem in its entirety.

1. Fostering technology transfer within investments

The most important step towards balancing trade between the two countries is to enhance Brazil's comparative advantages in the manufacturing and high-tech sectors. However, success will mainly hinge on domestic industrial policy and support measures. In other words, as an independent cooperation stakeholder, Brazil must plan and implement measures to make optimal use of cooperation resources, in keeping with its interests.

Promoting technology transfer can contribute to collective development through the pooling of stakeholders' resources (such as capital, personnel, technology and market knowledge), as shown by the fact that many pioneering companies have entered Brazil through joint ventures to compete in the market. In 2016, Chinese company TCL and SEMP, a leading Brazilian appliance company with more than 70 years of experience in the local market, established TCL Brasil. For five consecutive years following its establishment, this joint venture held one of the top three spots in the Brazilian market for televisions. The company's market share continued to expand even through the lean years of theCOVID-19 pandemic, rising to 15% in the first seven months of 2021, while running the gauntlet of integrated circuit and screen supply shortages, insufficient sea cargo capacity and a fickle Brazilian consumer market (Luo, 2021). In May 2022, the company opened its third factory, a 34,000 m^2 plant located in Manaus (in the State of Amazonas) that produces air conditioners and employs more than 1,000 local workers (Fórum Macao, 2022). According to the company's Vice-President, Felipe Hennel Fay, the outstanding performance of this joint venture can be attributed to many factors, including technological advantages, the transnational corporation's supply chain, and above all, knowledge of and integration into the local market, which enabled it to offer economical manufactures to Brazilian consumers (Luo, 2021). The presence of TCL in Brazil is not a one-off. Many Chinese manufacturers, including Jialing Motorcycle, Sany Heavy Industry, Gree Electric Appliances and JAC Motors, launched production in Brazil over the same period.

In 2015, with funding from the China-LAC Cooperation Fund, China Three Gorges Corporation placed the winning bid in the auction for a 30-year concession to operate the Ilha Solteira and Jubia hydroelectric power stations. Under the agreement, all production in 2016 would be sold to the regulated market, with projected revenue of 2.38 billion reais for the year (Jiang, 2016). From 2017 onward, 30% would be sold on the free market at a price adjusted for annual inflation. With the technology of the Chinese company, both power stations began recovering, and in 2019, four new units were installed following a series of tests. Notwithstanding the disputes that arose during their construction and operation, these projects have proven essential in a country where infrastructure deficits continue to shape local economic development.

The Government of Brazil has also embarked on a process of reindustrialization in recent years. In a 2022 interview, Paulo Alvim, Minister of Science, Technology and Innovation of Brazil, said that devising a new reindustrialization policy, through a new strategy and by repositioning the country as a global competitor, was its greatest challenge (*Xinhua*, 2022). Fostering high-quality investment and

promoting technology transfer must now be deemed essential to achieve this objective. Discussing the subject could create new opportunities for trade between the two nations, which, as developing countries, have similar experiences and shared development objectives.

Chinese executives with experience in the Brazilian market agree on the importance of adapting to local management practices and understanding the cultural context of their partners, and on the need to overcome the obstacles arising from an unfavourable political environment. For Brazil, further reducing political barriers and guiding Chinese companies in transnational operations is key for securing investment and high-quality technology transfer. Chery, a well-known Chinese automobile manufacturer, entered the Brazilian market in 2009 and established its production base in the country. In September 2011, the government announced a 30% tax hike on automobile imports (Lu, 2012). Under the new policy, Chery had to lower its 2013 sales target from 80,000 to 50,000 units, and it faced significant challenges in the ensuing years owing to the economic and political crisis. In 2015, it sold 5,400 vehicles in Brazil, a year-on-year decline of 42%, and in 2016, sales fell to 2,160 units, down 63% from the year-earlier period (Yang, 2017). In addition to the company's operational deficiencies, the director commented that taxes on automobiles in Brazil, including those on costs, tariffs and VAT, consumed up to 40% or even 50% of the profits from sales, a situation compounded by the company's limited access to financing and high infrastructure and logistics costs (Yan, 2013). In 2017, Chery partnered with Grupo CAOA (the country's largest vehicle manufacturer and dealer), selling 50% of its Brazilian operations to the group and placing its plant in São Paulo under joint administration to manage local risks.

In other cases, companies' failures forced them to leave Brazil. China Communications Construction Company began operations in November 2016, with plans to implement a series of large projects, such as the construction of a megaport in São Luís with export capacity of 10 million tons per year; a railway line in the State of Pará, which would connect the iron ore-producing areas of the Amazon with the country's ports; and the 12-km-long Salvador-Itaparica bridge. Half a decade later, none of the projects had been completed. In a 2019 press release, the company cited labour laws, a complex tax structure and cultural challenges as the likely main obstacles (Grisotto, 2022). In 2021, the Chinese State-owned company announced that it was withdrawing from the megaport project and selling its stake to a Brazilian company, and it showed no interest in other large tenders in the country that year. Speaking with the newspaper *Valor Económico,* Helder Dantas, then Managing Director of the corporation, mentioned how difficult it was to explain the excessive red tape in Brazil to his Chinese colleagues (Grisotto, 2022).

2. Situating more Chinese companies in Brazil

Another viable solution is to encourage Chinese companies to integrate into local communities, or in other words, to establish operations there. In this area, business gain is obviously the main incentive for transnational companies to operate in a socially responsible way. In fact, some Chinese companies with a long-term vision for their operations in Brazil are already establishing contact with local communities, despite the difficulties and differences that can arise in those interactions.

At the end of the twentieth century, Jialing Motorcycle entered the Brazilian market with its own brand, TRAXX Motos, and in 2006, established a factory in Manaus. The initial contact between Chinese and Brazilian colleagues revealed some discord in their working methods, owing to a lack of awareness and cultural differences. Chinese workers, who were more accustomed to an intense pace and collective action, had to work with local colleagues who, in their view, were more individualistic and relaxed in the workplace. However, the company improved its management practices, and following intense outreach campaigns, managed to get local workers on board. By 2021, the factory had more than 500 employees, with only 3% from China (Zhang, 2021). According to Jiang Yonghong, the chief

engineer of TRAXX, unlike the Chinese workers, who were in direct communication with the technical department of the head office in China, the Brazilian workers focused on logistics, sales and procurement owing to their familiarity with the local culture (Yan, 2013). He said that since the company had local partners in many outward-facing roles, such as after-sales service, cultural barriers had to be overcome strategically, with sensitivity to the local context, in addition to seeking professional support from consultants. As part of its localization process, the Chinese company also had to learn a lesson, after paying for its lack of awareness during the annual union- and government-led evaluation of workplace conditions and safety. Following a number of disputes, the company understood the importance of obtaining the certificate to avoid the fines levied because of health issues that could be attributed to working conditions (Yan, 2013).

Another notable case is the experience of Gree, a company that had been operating successfully in Brazil for 20 years and had production facilities in 24 States. The head office of the conglomerate, which is China's largest manufacturer of air conditioners, is located in Zhuhai, a city in the province of Guangdong. It entered the Brazilian market as a company with a wholly-owned subsidiary, and after setting up its first factory in Brazil, faced union protests because it was unfamiliar with local laws and failed to adjust salaries for annual inflation (Duan, 2021). To foster integration, the company set out to create an inclusive work culture that aligned with local customs. In a break with Chinese tradition, which prizes individual sacrifice for collective benefit, the administrative rules were amended to grant holidays on certain dates, including for football matches, visits to the head office in China, birthday celebrations and language lessons. The company also tried to address the concerns of the local population on issues such as energy and environmental conservation and the company's contribution to local government. All efforts sought to strengthen mutual understanding so that both parties could settle their differences and work together. Different needs were also coordinated to meet trade objectives, the business priority. The company also explored different ways of boosting productivity to stay competitive: at the Manaus factory, qualified workers were offered an attractive salary and quality of life, while strict compliance with labour requirements was also demanded. In an interview, the company's General Manager, Xie Dongbo, said that in addition to technology, localization was another recipe for breaking into the Brazilian market, noting that while his company was doing business in Brazil, it also sought to benefit the local economy and people (Zhang, 2017).

VI. Conclusion

Grounded in the benefits for both parties, Sino-Brazilian cooperation has advanced considerably in the twenty-first century, strongly supported by both governments. Its achievements should not be underestimated. The realization of projects met the needs of both parties, not only generating profits and jobs but also modernizing infrastructure. As bilateral trade progressed, the interdependence of China and Brazil increased, in line with the inexorable trend of global convergence. According to the 2021 annual report of the Central Bank of Brazil, more subdued economic growth in China and higher domestic interest rates stemming from inflation were detrimental for exports (BCB, 2022, p. 10). However, on the science front, five satellites were launched, an achievement for cooperation among developing countries.

While trade and communication are progressing rapidly, there have also been frictions and disputes between the two partners. A trade imbalance and the consequent risk of economic "reprimarization" in Brazil became a worrying trend. In that regard, the Bolsonaro government's bias against China reflected a frustrated desire to restore Brazil's global competitiveness. These concerns can be addressed, but furthering cooperation essentially depends on the economic structures of

each country, their own economic planning and the State's industrial policies. Accordingly, the risk of "premature deindustrialization" in Brazil cannot be attributed to trade with China, but rather reflects a broader decline in the global economic competitiveness of Brazil's industrial sector.

Although cultural differences, the potential obstacles to mutual understanding and the imbalance in comparative advantages are problems that have no short-term solutions, development plans and industrial and trade policies depend on the will of those who formulate them. Each State, with full autonomy and sovereignty over its domestic affairs, must take responsibility for its own development, regardless of other stakeholders. Well-defined strategic development plans, well-designed and complementary industrial policies[8] and a programme to execute them will be determining factors in the process of industrialization (Salama, 2012, p. 22).

In the short and medium term, both the governments and companies of each country can take steps to mitigate the negative effects of the problems that have arisen. Case studies have shown that the intergovernmental agreement has established a cooperative framework within which companies operate. Trade benefits have also been the greatest incentive for companies to continuously reform their cross-border operations. With almost 212 million people, the Brazilian market is attractive enough to motivate Chinese companies to find ways to overcome difficulties and seek good relations with the State and the local population. In fact, as they look to the future, many Chinese companies are attempting to gain a foothold in the Brazilian market, although not all have succeeded. From the Brazilian side, the government must determine how to lead cooperation, through policies that can guide transnational companies in meeting strategic national objectives (e.g. economic restructuring and reform of the development model). Although the task is complex, Brazil must rely on its own strengths to accomplish it. For Brazilian firms, a key challenge will be to strategically leverage their competitive advantages to strengthen their presence in the Chinese market, and where relative disadvantages exist, efforts must focus on enhancing competitiveness through technology transfer or other mechanisms.

Optimism should prevail over the questions regarding Sino-Brazilian relations. South-South cooperation is more complex than North-South or North-North cooperation, insofar as the countries of the South have domestic problems, such as unbalanced economic development, an imperfect rule of law, weak governance and deep-seated social conflicts, which hamper the smooth flow of trade. This is compounded by stereotypes and a lack of mutual understanding, the result of scant prior contact and the lower status of developing economies in global cultural communication. Historical knowledge gaps and cultural differences may intensify conflicts that emerge at the operational level. In that regard, as a precursor of South-South cooperation, Sino-Brazilian relations are still in a "trial and error" phase, and bilateral trade friction should therefore be approached with calm and rationality. The desire of both countries for development will provide a strong foundation for dialogue and understanding: emerging from the periphery of the global economy, achieving an equal voice on the international political stage and promoting equity and social justice at home are shared objectives.

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[8] For example, monetary policy, interest rates, quotas and subsidies are all extremely important for achieving growth that is compatible with industrialization.

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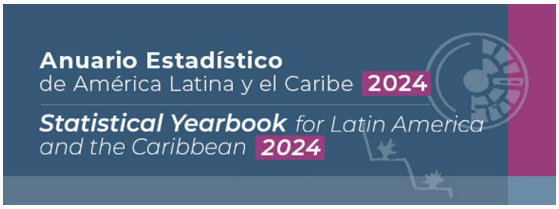

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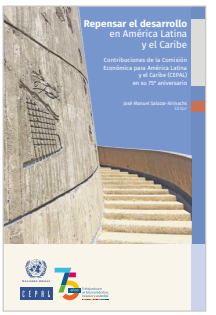

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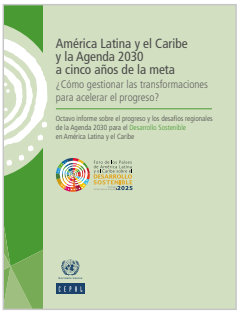

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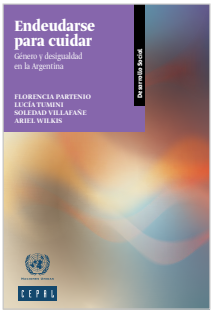

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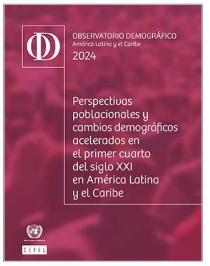

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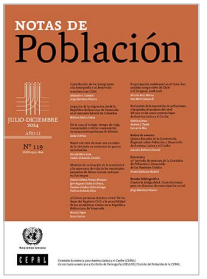

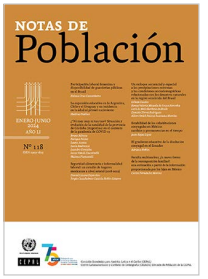

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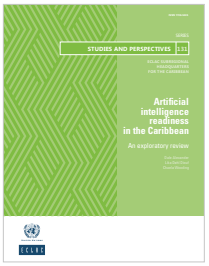

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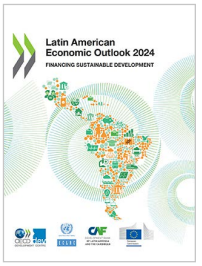

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