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Sustainability in Latin America and the Caribbean: an analysis of the impact of socioeconomic and political arrangements* **

Sostenibilidad en América Latina y el Caribe: un análisis del impacto de los arreglos socioeconómicos y políticos

Maria Regina de Araújo Ramos***
Alexandrina Sobreira de Moura****
Luiza Vilela Amelotti*****

ABSTRACT

How do socioeconomic and political arrangements relate to sustainability? Based on a sample of 24 countries in Latin America and the Caribbean, between 2011 and 2019, this study exami-

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*** Sustainability Assistant B.A. in Political Science from the Federal University of Pernambuco; Secretary of Environment, Sustainability and Fernando de Noronha of the State of Pernambuco; mregiiaraujo@gmail.com; https://orcid.org/0000-0001-7704-3066.

**** Senior Researcher; Ph.D. in Juridical Science from the University of Wisconsin-Madison; Joaquim Nabuco Foundation - Ministry of Education, Brazil; alexandrina.sobreira@fundaj.gov.br; https://orcid.org/0000-0002-9643-7180.

***** PhD candidate; Master in Political Science from the Federal University of Pernambuco; Federal University of Pernambuco; luiza.amelotti@ufpe.br; https://orcid.org/0000-0003-3505-5776. Recibido: 6 de julio de 2023. Aceptado: 28 de noviembre de 2023

nes the hypothesis that better performance in socioeconomic and political variables is associated with higher levels of sustainability. Here, this concept is measured through the Social Progress Index (SPI) and Sustainable Development Goals (SDGs) 10, "Reduced Inequalities", and 11, "Sustainable Cities and Communities". The research design considers correlation tests, panel data regression, and an empirical description of the Chilean and Brazilian contexts. The results show that performance in the SPI and the SDG 11 is primarily associated with economic arrangements, while the SDG 10 is more closely linked to the political dynamics of the State. Furthermore, by analyzing Chile and Brazil, this study identifies that the countries also have particular effects on the indices. The conceptual impact of these results enriches socioeconomic and political interventions for sustainability and provides valuable insights for future research.

Keywords: Sustainability – Social Progress Index – Sustainable Development Goals – Latin America and the Caribbean – Urbanization.

RESUMEN

¿Cuál es la relación entre los arreglos socioeconómicos y políticos y la sostenibilidad? Utilizando una muestra de 24 países de América Latina y el Caribe entre 2011 y 2019, este estudio pone a prueba la hipótesis de que un mejor desempeño en variables socioeconómicas y políticas está asociado con mayores índices de sostenibilidad. En esta investigación, la sostenibilidad se mide a través del Índice de Progreso Social (IPS) y los Objetivos de Desarrollo Sostenible (ODS) 10, "Reducción de las Desigualdades", y 11, "Ciudades y Comunidades Sostenibles". El diseño de la investigación considera pruebas de correlación, regresión con datos en panel y una descripción empírica de las situaciones en Chile y Brasil. Se observa que el desempeño en el IPS y el ODS 11 están mayoritariamente asociados con arreglos económicos, mientras que el ODS 10 está relacionado con la dinámica política del Estado. Al analizar Chile y Brasil, se identifica que estos países también tienen efectos particulares en los índices. Con un impacto conceptual, los resultados de este estudio enriquecen las intervenciones socioeconómicas y políticas a favor de la sostenibilidad, y pueden servir de base para el desarrollo de futuras investigaciones en el campo.

Palabras clave: Sostenibilidad – Índice de Progreso Social – Objetivos de Desarrollo Sostenible – América Latina y el Caribe – Urbanización.

1.- Introduction

How do socioeconomic and political arrangements relate to sustainability? In order to ensure the preservation of natural resources in a way that does not compromise the needs of future generations (World Wide Fund for Nature, 2023), sustainable cities must act as catalysts for the balance between social, political, economic, and environmental dynamics (UN Habitat, 2010; Revi and Rosenzweig, 2013).

This research aims to test the hypothesis that better performance in socioeconomic and political variables is associated with higher sustainability indices in Latin America and the Caribbean. The choice of this sample is justified by the fact that the region holds the title of the most urbanized territory in the world, with an average of 81% of the population living in urban clusters (World Bank, 2022). Given the prominent role of cities in the subject, Latin America and the Caribbean represent a unique source for studies related to sustainable development (UN Habitat, 2010).

Sustainability is analyzed through the Sustainable Development Goals (SDGs) 10, "Reduced Inequalities", and 11, "Sustainable Cities and Communities", and the Social Progress Index (SPI), urban-social parameters that reflect the development of sustainable urbanization models. This research considers their final scores collected from the Sustainable Development Report (2022) and the Social Progress Index dataset (2021)[1]. The SDGs and SPI provide a comprehensive framework for evaluating sustainable development. The global recognition of SDGs offers a standardized language for cross-country comparisons and ensures alignment with the international policy agenda, specifically the 2030 Agenda. It reflects a commitment to addressing economic, social, and environmental dimensions.

Moreover, the practical applicability of the SPI within individual countries allows a detailed examination of specific components related to human needs, well-being, and opportunities and our deliberate focus on SDGs 10 and 11 underscores a commitment to human development within the context of sustainable growth, ensuring a nuanced and comprehensive exploration of social progress and urban sustainability.

Despite an extensive descriptive literature, there are few projects that compare specific metrics of national progress. Substantively, the study of SDGs 10 and 11 and the SPI in a comparative perspective provides an understanding of the influence of national

1 Available at https://bityli.com/Sustainable-Development-Report and https://bityli.com/Social-Progress-Index

characteristics on sustainable development indicators. Therefore, the results of this work have the potential to support socioeconomic and political interventions in favor of sustainability.

Methodologically, this study begins with an investigation of the aforementioned indexes by calculating the Pearson correlation coefficient to confirm that the SPI and SDGs 10 and 11 are distinct measurement objects. Subsequently, the effects of socioeconomic and political arrangements on the final scores of these sustainable indices are quantified using panel data regression.

The socioeconomic and political variables are Unemployment, GDP per capita, Industry, Agriculture, Imports, Exports, Gross Capital Formation, Rule of Law, Regulatory Quality, Government Effectiveness, and Control of Corruption. They were collected from the World Bank (2022) and the Worldwide Governance Indicators dataset (2022)[2]. The central idea is to underscore the multifaceted nature of factors influencing sustainable development, spanning social, economic, and political dimensions.

Firstly, GDP per capita and unemployment are indicators of social productivity and creativity, crucial for social sustainability (Lefebvre,1967; UN Habitat, 2010; Revi & Rosenzweig, 2013; Lizarralde, 2014). Secondly, the level of industrialization, economy based on primary goods, trade and capital formation shape the economic prosperity of urban centers (Prebisch, 1962 and Norris, 2012), reflecting the realization of the envisioned scenario in the Brundtland Report (1987). The political dimension is also pivotal, with good governance and government responsiveness facilitating the attainment of sustainable goals (Golubchikov and Badyina, 2012; Norris, 2012).

Using a time-series-cross-section (TSCS) approach, this study evaluates a sample of 24 countries over the period 2011 to 2019. This time frame is justified by the availability of information and the outbreak of the Covid-19 pandemic in 2020, which led to significant socioeconomic impacts and a shift in governmental priorities (CEPAL, 2021).

To a better understanding of the statistical findings, two countries are selected as exemplifying scenarios: Chile and Brazil. The first is chosen due to its highest sustainable development ranking in the region, while Brazil faces significant challenges in implementing effective policies (Lizarralde, 2014). The combination of a large-N quantitative perspective and a small-N qualitative investigation provides more robust inferences about

2 Available at https://data.worldbank.org and https://info.worldbank.org/governance/wgi/.

the phenomenon of interest (Lieberman, 2005).

This paper is structured into five main sections. Following the introduction, the second section provides a contextualization of the Latin America and Caribbean region in the sustainable agenda and introduces the SPI and SDGs 10 and 11. Subsequently, the third section outlines the process of data systematization and the analytical tools employed. Finally, the fourth and fifth sections discuss the results and the concluding remarks, respectively.

2 Theorical Debate

The concept of sustainability is defined as "satisfying the needs of the present without compromising the ability of future generations to fulfill their own needs" (Jokura, 2022). The term emerged from discussions held at the First United Nations Conference on the Environment and Development in Stockholm, Sweden in 1972. At the event, professionals, activists, and institutions at various levels recognized the negative effects of the uncontrolled use of natural resources (Decicino, 2022).

In the Brundtland Report - Our Common Future (1987), a model of sustainable development was proposed based on the finitude of resources. This model advocates for governments to integrate strategies that promote a scenario where the economy prospers, poverty is eradicated, citizens have conducive spaces for development, and the environment is preserved (UN Sustainable Development Solutions Network, 2015). With the increasing migration to urban centers[3], the concept of sustainable cities becomes imperative for the harmonious functioning of environmental, economic, and sociopolitical aspects (Torresi, 2010). National leaders then began to advocate for more inclusive, participatory, and unified cities (UN Sustainable Development Solutions Network, 2015).

Effective organization of urban spaces is crucial for fostering sustainable growth in a country (UN Habitat, 2014). Urban centers, as synergistic environments, attract investments, reduce transaction costs, and provide employment opportunities, fostering creativity, higher living standards, social empowerment, democratic responsiveness, and economic progress (Lizarralde, 2014). However, this ideal is not universally realized.

3 From 1960 to 2021, the global urban population has increased from 33% to 56%, as reported by the World Bank (2022).

Despite Lefebvre's "Right to the City" (1967), many Latin American and Caribbean nations struggle to provide adequate urban infrastructure, facing issues like violence and unemployment. Approximately 81% of the region's population resides in urban areas[4] (Castells-Quintana, 2017), but the way that the urbanization was configured in the region created barriers, including the growth of slums and severe restrictions in the labor market, exacerbating segregation (UN Habitat, 2010). Instead of addressing inequalities, cities often concentrate vulnerable populations (UN Habitat, 2014).

In 2017, the region had 22.8 million unemployed individuals, particularly women, indigenous, and Afro-descendants (CEPAL, 2018). Inefficient social protection systems contribute to gaps in housing, basic sanitation, and services within urban communities (UN Habitat, 2012). These social deficits directly impact daily productivity and the general performance in socioeconomic and political structures has serious impacts on sustainability outcomes (Satterthwaite et al., 2020; Revi and Rosenzweig, 2013).

Regarding economic characteristics, the State of the World Cities 2010/2011 report by UN Habitat (2010:10) states that "no country has achieved sustained economic growth or rapid social development without urbanization". This document highlights that the per capita income of countries with more cities is higher than those that have not experienced urbanization. Prebisch (1962) emphasized the importance of human empowerment, investment attraction, and modernization of production in these places to boost national progress.

In general, Latin American and Caribbean countries have economies focused on the export of primary goods (Freitas, 2023). Due to the region's late industrialization, the trade of raw materials accounts for 60% of national exports (Barros, 2015). Prebisch (1962), in turn, argued that the tendency towards devaluation, terms of trade and the threat of substitution are factors in the Latin American and Caribbean economy that reinforce the underdevelopment of the region and slow down the economic prosperity of urban areas[5].

4 According to World Bank data (2022), the urban population (% of total population) in other regions of the world is as follows: 75% in the European Union, 66% in East Asia and Pacific, and 61% in the Middle East and North Africa, making Latin America and the Caribbean the most urbanized region in the world.

5 Prebisch (1962) highlights: 1) The limited demand for primary goods persists despite an increase in consumer income, due to their own inelasticity; 2) the terms of trade for primary exporting countries are lower than the value required to import secondary or industrial goods; and 3) primary goods are more susceptible to substitutions than technological goods.

Norris (2012:20) underscores that "states which are more competent, effective and efficient when steering the economy are more likely to produce stable growth and security, acting as partners for achieving developmental goals in conjunction with the international community". Thus, democracies are better poised to experience sustainable development and operationalize public policies that promote urban modernization.

Democratic political systems offer several advantages, including enhanced governmental effectiveness in providing public services and ensuring the rule of law. This, in turn, increases the accountability of the government with its citizens. Additionally, elected leaders who can control corruption and regulate the private sector add positively to the quality of the prevailing political regime. Consequently, democracies with good governance attract more investments and partnerships that facilitate the transformation of cities towards sustainability (Golubchikov and Badyina, 2012; Norris, 2012).

This discussion shows that the way in which the social, economic, and political dynamics of states are configured affects the process of building sustainable cities. Therefore, political representatives are increasingly investing in mechanisms that identify the elements that hinder urban sustainability. One of these tools is the use of indicators that measure access to basic services, guarantee of personal rights, and environmental quality (UN Sustainable Development Solutions Network, 2015).

The Social Progress Index stands out in identifying challenges and ensuring programs that maximize sustainable progress. With social and environmental indicators, the SPI measures the ability of a society to "(1) meet basic human needs, (2) establish the building blocks that allow citizens to improve their quality of life, and (3) create the conditions for people and communities to achieve their full potential" (Deloitte, 2022).

Another important instrument is the UN's universal plan titled "Transforming our world: the 2030 Agenda for Sustainable Development". Among its guidelines, the 17 Sustainable Development Goals were developed to ensure government agendas are based on sustainability criteria (Fraga and Alves, 2021). SDGs 10 and 11, in particular, address "access to urban land, housing, sanitation, urban infrastructure, transportation and public services, work, and leisure" (Bazzoli and Silva, 2021:24).

The theoretical framework regarding urban sustainability is progressively occupying analytical spheres of international relations. The agenda involving cities, sustainability and inequalities is prominent in international conferences with extensive scientific production (Hoornweg et al.,

2011; Benmergui, 2012; Satterthwaite and Mitlin, 2013; Klopp and Petretta, 2017; Chisholm, 2019). It is noteworthy, however, that there are few studies that examine specific sustainable indicators, such as the IPS and SDGs 10 and 11.

In summary, this discussion highlights key aspects directly linked to sustainable development. Firstly, aligning with Lefebvre (1967), UN Habitat (2010), and Revi & Rosenzweig (2013), we regard GDP per capita and unemployment as indicators of social productivity and creativity — fundamental elements of social sustainability (Lizarralde, 2014). Secondly, drawing on Prebisch (1962) and Norris (2012), we recognize that the level of industrialization, an economy based on primary goods, and international trade influence the economic prosperity of urban centers. Collectively, these variables serve as indicators of whether the envisioned scenario in the Brundtland Report (1987) is being realized.

Another crucial dimension considered is the political aspect. As previously observed, good governance and government responsiveness, as emphasized by Golubchikov & Badyina (2012) and Norris (2012), facilitate the achievement of sustainable goals. Thus, adherence to norms (reflected in the Rule of Law and control of corruption) and the ability to create, implement, and ensure the quality of policies (expressed through regulatory quality and government effectiveness) are deemed critical elements impacting the level of sustainability.

Therefore, we investigate the challenges and discrepancies in achieving sustainable urban development in Latin America and the Caribbean. The insufficient provision of urban infrastructure raises questions about the effectiveness of urbanization strategies in addressing inequalities. The research problem thus involves understanding the complex interplay of urbanization, social inequalities, and the effectiveness of socioeconomic and political structures in achieving sustainability outcomes.

In this context, the following subtopics present metrics that interconnect the urban spectrum with sustainability. The "Social Progress Index (SPI)" and "Sustainable Development Goals: SDGs 10 and 11" emphasize the role of indices in understanding sustainable development.

2.1 Social Progress Index (SPI)

In 2013, The Social Progress Imperative, an American organization, developed the Social Progress Index, aimed at providing concrete tools to address issues ranging from food and housing to education and the fulfillment of rights (The Social Progress Imperative, 2018). This index "provides the first concrete framework for assessing and prioritizing an action agenda that

promotes social and economic development" (Pereira, 2021).

Veiga (2010:40) points out that "sustainability requires a trio of indicators, as it can only be properly evaluated if there are simultaneous measures of the environmental dimension, economic performance, and quality of life (or well-being)". In other words, analyses based solely on income indicators such as GDP or generic data on satisfaction are insufficient for establishing efficient sustainable programs.

In view of this caveat, the SPI emphasizes indicators that go beyond investments and income by encompassing three main dimensions: (1) Basic Human Needs, (2) Foundations of Wellbeing, and (3) Opportunity. Each of these dimensions is divided into four specific components formed by indicators (The Social Progress Imperative, 2018). Table 1 below describes the elements of the SPI.

Table 1 — Elements of SPI

Dimensions	Components	Indicators
Basic Human Needs	Nutrition and Basic Medical Care	Infectious diseases, child mortality rate, child stunting, maternal mortality rate, undernourishment, and diet low in fruits and vegetables.
	Water and Sanitation	Access to improved sanitation, access to improved water source, unsafe water, sanitation and hygiene, and satisfaction with water quality.
	Shelter	Household air pollution, dissatisfaction with housing affordability, access to electricity, and usage of clean fuels and technology for cooking.
	Personal Safety	Interpersonal violence, transportation related injuries, political killings and torture, intimate partner violence, and money stolen.
Foundations of Wellbeing	Access to Basic Knowledge	Population with no schooling, equal access to quality education, primary school enrollment, secondary school attainment, and gender parity in secondary attainment.

Foundations of Wellbeing	Access to Information and Communications	Access to online governance, internet users, mobile telephone subscriptions, and alternative sources of information index.
	Health and Wellness	Life expectancy at 60, premature deaths from non-communicable diseases, equal access to quality healthcare, access to essential health services, and satisfaction with availability of quality healthcare.
	Environmental Quality	Outdoor air pollution, lead exposure, particulate matter pollution, and species protection.
Opportunity	Individual Rights	Access to justice, freedom of religion, political rights, property rights for women, freedom of peaceful assembly, and freedom of discussion.
	Personal Freedom and Choice	Satisfied demand for contraception, perception of corruption, early marriage, young people not in education, employment or training, vulnerable employment, and freedom of domestic movement.
	Inclusiveness	Equal protection index, equal access index, power distributed by sexual orientation, access to public services distributed by social group, discrimination and violence against minorities, and acceptance of gays and lesbians.
	Access to Advanced Education	Citable documents, academic freedom, women with advanced education, expected years of tertiary schooling, and quality weighted universities.

Source: The Social Progress Imperative (2018)

The SPI conducts annual monitoring, offering insights into a country's performance across its components and overall dimensions. Despite its recent introduction, this tool serves as a valuable political instrument, furnishing numerical data on internal changes and global trends. This information equips states to formulate effective urban programs, ensuring

comprehensive sustainability on both local and global scales (The Social Progress Imperative, 2018).

2.2 Sustainable Development Goals: SDGs 10 and 11

In the 2000s, the formulation of integrated policies that encompassed a multi-level and multi-participatory implementation system dominated the forums of the United Nations. Consequently, eight Millennium Development Goals (MDGs) were established, outlining the path to improving the international scenario by 2015. By setting goals focused on eradicating poverty and gender equality, states cooperated to achieve a fairer and more peaceful world (United Cities and Local Governments, 2019).

Building upon the resolutions of the Millennium Summit, the 2030 Agenda was formulated in 2015, consisting of a total of 169 targets concerning social, economic, and ecological aspects. To complement the work of the MDGs and address new challenges, the 17 Sustainable Development Goals of the new agenda encompass guidelines for sustainable growth in the next 20 years (Fraga and Alves, 2021).

As sustainable development is directly related to urbanization, the strategies of SDG 10, "Reduced Inequalities," and SDG 11, "Sustainable Cities and Communities," respond to the human and environmental implications in urban areas (Fraga and Alves, 2021). SDG 10 aims to "achieve and sustain income growth for the bottom 40% of the population at a rate higher than the national average" (IPEA, 2019), while SDG 11 commits to "making cities and human settlements inclusive, safe, resilient and sustainable" (IPEA, 2019)[6].

For each goal, the UN considers specific parameters that reflect the targets. Thus, SDG 10 consists of two inequality indicators, while SDG 11 is based on four other indicators (Sachs et al., 2022). Table 2 below describes their respective elements.

Since the MDGs, global agendas have begun to align themselves in favor of resolving highly interconnected challenges that affect various territories worldwide (United Cities and Local Governments, 2019). Specifically, SDGs 10 and 11 direct efforts towards the adoption of mechanisms that promote the realization of universal urban citizenship (IPEA, 2019). If successful, sustainable urbanization will facilitate the implementation of other development goals as well (Fraga and Alves, 2021).

6 The general United Nations targets for the achievement of goal 10 and 11 are cataloged on the official IPEA (2019) website, available at: https://www.ipea.gov.br/ods/ods11.html. Accessed on: 15 December 2022.

Table 2 — Elements of SDG 10 and 11

SDG	Indicators
10	Gini coefficient and Palma Ratio.
11	Proportion of urban population living in slums (%), annual mean concentration of particulate matter of less than 2.5 microns in diameter (PM2.5) ($\mu g/m^3$), access to improved water source, piped (% of urban population), and satisfaction with public transport (%).

Source: Sustainable Development Report (2022)

3 Methods and Data[7]

In order to address the inquiry "How do socioeconomic and political arrangements relate to sustainability?", a study is conducted on the countries of Latin America and the Caribbean, utilizing national variables and sustainable metrics. The primary hypothesis under examination posits that superior performance in socio-economic and political variables is correlated with higher levels of sustainability.

Drawing on the literature review presented in the preceding chapter, the secondary hypotheses explicated in Table 3 delineate the anticipated associations between the socio-economic and political indicators and the scores of Latin American and Caribbean countries on the SPI and SDGs 10 and 11.

To test these hypotheses, the investigation employs a time-series-cross-section approach on Latin American and Caribbean data from 2011 to 2019. This period was selected based on data availability and the emergence of the Covid-19 pandemic, an extraordinary event that commenced in 2020 and caused significant socio-economic downturns and new government focus on emergency responses (CEPAL, 2021).

Initially, this study calculates the linear association between the SPI and

7 Replication materials, including data, computational scripts, and annexes, are available at https://osf.io/npjbf/?view_only=749881bfb6e248ec9b14d009dac58fa2..

Table 3 — The secondary hypotheses

H1: Higher unemployment rates lead Latin-Caribbean countries to achieve lower SPI and SDGs 10 and 11 scores.
H2: Higher GDP per capita leads Latin-Caribbean countries to achieve higher SPI and SDGs 10 and 11 scores.
H3: Higher investment in industries leads Latin-Caribbean countries to achieve higher SPI and SDGs 10 and 11 scores.
H4: Higher investment in agriculture leads Latin-Caribbean countries to achieve lower scores in the SPI and in SDGs 10 and 11.
H5: Higher import rates lead Latin-Caribbean countries to achieve lower scores in the SPI and in SDGs 10 and 11.
H6: Higher export rates lead Latin-Caribbean countries to achieve higher scores in the SPI and in SDGs 10 and 11.
H7: Higher rates of gross capital formation lead Latin-Caribbean countries to achieve higher scores in the SPI and in SDGs 10 and 11.
H8: Higher rule of law leads Latin-Caribbean countries to achieve higher scores in the SPI and in SDGs 10 and 11.
H9: Higher regulatory quality leads Latin-Caribbean countries to achieve higher scores in the SPI and in SDGs 10 and 11.
H10: Higher government effectiveness leads Latin-Caribbean countries to achieve higher scores in the SPI and in SDGs 10 and 11.
H11: Higher control of corruption leads Latin-Caribbean countries to achieve higher scores in the SPI and in SDGs 10 and 11.

Source: own elaboration.

SDGs 10 and 11. Building on the literature review, it is intuitional to surmise that these indices are urban parameters composed of highly similar indicators,

to the point of being considered equivalent metrics. Thus, their level of correlation is measured.

With results ranging from -1 to 1, the sample Pearson correlation coefficient (r) provides a comparative overview of the variability of these metrics. While not implying causation, "the higher the absolute value of r, the greater the degree of linear association between the variables" (Martins and Rodrigues, 2014:1). Thus, r, computed using the R language, is classified as strong, weak, or moderate correlation, according to the Dancey and Reidy (2006) scale[8].

The SPI data are derived from the Social Progress Index dataset (2021) from The Social Progress Imperative, while the SDGs 10 and 11 information is obtained from the Sustainable Development Report (2022) by the United Nations. Presented as continuous scores ranging from 0 to 100, the values considered are those corresponding to the final score of each objective and the SPI, constituted by the arithmetic mean of their respective indicators. Thus, the closer a country's score is to 100, the more sustainable it is considered.

In order to mitigate the risk of spurious correlations (Paranhos et al., 2014), data from both sources are compiled into an original database for countries in Latin America and the Caribbean that have available data. The sample consists of 24 countries: Brazil, Chile, Argentina, Peru, Haiti, Cuba, Jamaica, Honduras, Bolivia, Nicaragua, Ecuador, Guatemala, Paraguay, El Salvador, Dominican Republic, Suriname, Guyana, Costa Rica, Trinidad and Tobago, Colombia, Panama, Uruguay, Mexico, and Barbados[9].

Based on the findings of the correlations, this research is then directed towards identifying political and socioeconomic factors that are related to SDGs 10 and 11 and the SPI. As discussed in the theoretical discussion, countries are marked by distinct socioeconomic contexts and political characteristics, and these differences ultimately reflect in their rankings in international rankings.

Thus, the dependent variables under analysis are the SPI and SDGs 10 and 11. Meanwhile, the independent

8 According to Dancey and Reidy (2006), Pearson correlation coefficients (r) can be positive or negative and are classified as follows: values equal to 0 represent null or nonexistent correlations; values between 0 and 0.39 indicate weak correlations; values between 0.4 and 0.69 indicate moderate correlations; values between 0.7 and 1 represent strong correlations; and values equal to 1 represent perfect correlations.

9 The countries of Santa Lucia, Dominica, Antigua and Barbuda, Grenada, Saint Kitts and Nevis, Bahamas, and Saint Vincent and the Grenadines are not included in the Sustainable Development Report (2022). Venezuela and Belize did not provide data for the Social Progress Index dataset (2021).

variables are socioeconomic and political indicators inspired by Norris (2012) but different from those already measured by the SPI and SDGs. The results, which are continuous and listed in Table 4 below, were gathered from international databases.

Table 4 — The independent variables

Variable	Description	Source
Unemployment	% of the total labor force that is without a job but available for work and looking for a job.	World Bank
GDP per capita	Gross domestic product by population in dollars.	
Industry	Value added as % of GDP in mining, manufacturing (also indicated as a separate subgroup), construction, electricity, water and gas.	
Agriculture	Value added as % of GDP in forestry, hunting and fishing, as well as grain crops and livestock.	
Imports of goods and services	Value as % of GDP of all goods and other market services received from the rest of the world.	
Exports of goods and services	Value as a % of GDP of all goods and other market services provided to the rest of the world.	
Gross Capital Formation	Value as a % of GDP related to additions to the fixed assets of the economy plus net changes in the level of inventories.	

Rule of Law	Perception of the extent to which (1) agents have trust in and abide by the rules of society, (2) the quality of contract enforcement, property rights, police and courts, and the likelihood of crime and violence. This governance estimate ranges from approximately -2.5 (weak performance) to 2.5 (strong performance).	Worldwide Governance Indicators (WGI) dataset
Regulatory Quality	Perception of the government ability to formulate and implement sound policies and regulations that enable and promote private sector development. This governance estimate ranges from approximately -2.5 (weak performance) to 2.5 (strong performance).	
Government Effectiveness	Perceptions of (1) the quality of public services, (2) the quality of the civil service and the degree of its independence from political pressures, (3) the quality of policy formulation and implementation, and (4) the credibility of the government's commitment to such policies. This governance estimate ranges from approximately -2.5 (weak performance) to 2.5 (strong performance).	
Control of Corruption	Perception of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as the "capture" of the state by elites and private interests. This governance estimate ranges from approximately -2.5 (weak performance) to 2.5 (strong performance).	

Source: own elaboration.

In order to quantify the pattern of association among these variables, a panel data regression analysis is conducted with the 24 countries. This technique is ideal for studies with repeated spatial units at regular time intervals. Among its inferential benefits, this regression " (1) facilitates the detection of causality; (2) measures individual variation; (3) reduces measurement errors; (4) increases the sample size; and (5) controls for omitted variable problems" (Mesquita et al., 2021:445).

The panels typify how spatial units respond to events over time, recognizing that individual heterogeneity can generate biases. For this research, data normalization employed a scaling technique - considering means and standard deviations of the columns to standardize measurements for variables comparability. The F-test for individual effects[10] established the fixed effects panel model as the most suitable[11]. In this model, unobservable individual effects correlate with independent variables and individual heterogeneity remains constant (Marques, 2000; Mesquita et al., 2021).

Considering that the data better fit the requirements of the fixed effects model[12], the regression calculation is performed using R language (v.4.2.0), the within estimator, and the plm package. This method identifies, through significance code and the Estimate (β) value, the socioeconomic and political indicators that impact the SPI and SDGs 10 and 11 scores over 2011-2019.

Using the statistical findings from the regression, the research is then narrowed down to an empirical description of two cases within the large sample: Chile and Brazil. This approach provides practical understanding of the relationship between socioeconomic and political arrangements in urban indices. The evaluations of the selected cases test the deductively formulated hypotheses and generate more valid inferences (Lieberman, 2005).

Chile and Brazil were selected to observe different sustainability scenarios. In the Latin-Caribbean region, Chile is a positive standout in the creative use of its resources and holds the highest ranking in the annual classification of the level of implementation of the SDGs – 28th overall – and the SPI – 37th overall. On the other hand,

10 Test to identify the most suitable approach for longitudinal samples. The F-test for individual effects is utilized to compare the effectiveness of models utilizing fixed effects versus Pooled OLS (Mesquita et al., 2021).

11 The p-value of the F-test for individual effects was < 0.001 for the three sustainability indices.

12 This assumption considers both the conceptual construction of the variables and the results of the Hausman Test, which showed that for the SPI, SDG10 and 11, the p-value were <0.001, 1 and 0.3897, respectively.

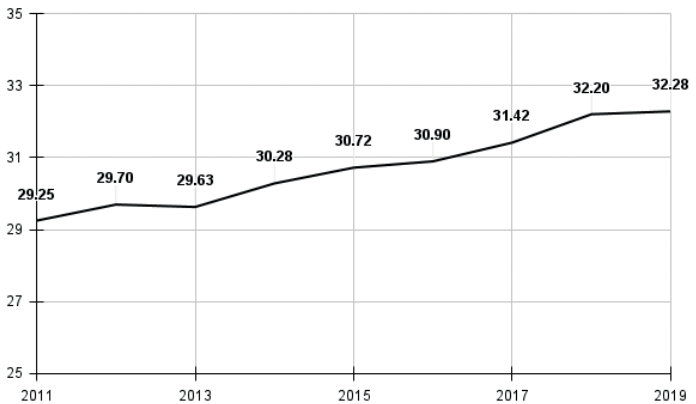
Brazil is in the 53rd place in the overall SDG ranking and the 65th place in the SPI ranking, despite being the largest country in the region with prominence in various areas and a wide variety of natural resources. The Brazilian nation is marked by significant difficulties in achieving sustainability (Social Progress Index dataset, 2021; Sachs et al., 2022).

Landman and Carvalho (2000) contend that empirical descriptions of two countries allow for the exploration of specific nuances of each state. By using a smaller sample size, the level of abstraction is reduced and conceptual stretching is avoided, thus establishing equivalencies that facilitate the creation of theories. Consequently, this research provides a stronger foundation for causal inference on socioeconomic and political arrangements vis-à-vis the SPI and SDGs 10 and 11.

4 Results

According to Lizarralde's (2014) argumentation, urbanization is frequently correlated with positive social outcomes, including technological innovation, economic progress, and effective governance. As the most urbanized region globally, Latin America and the Caribbean can be viewed as a benchmark in assessing national sustainability indicators. However, the final scores for SDG 10 underscore the issue of inequality in the region.

Graph 1 — SDG 10 (average) for Latin America and Caribbean (2011-2019)

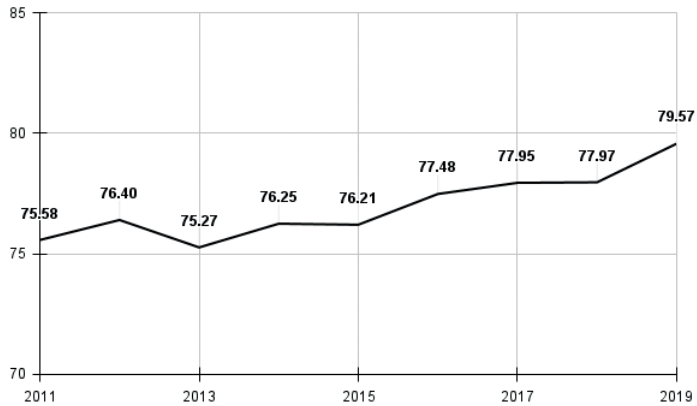


Source: own elaboration.

Despite a gradual increase over the years (see Graph 1), the highest attained score by countries was 32.28 points in 2019.

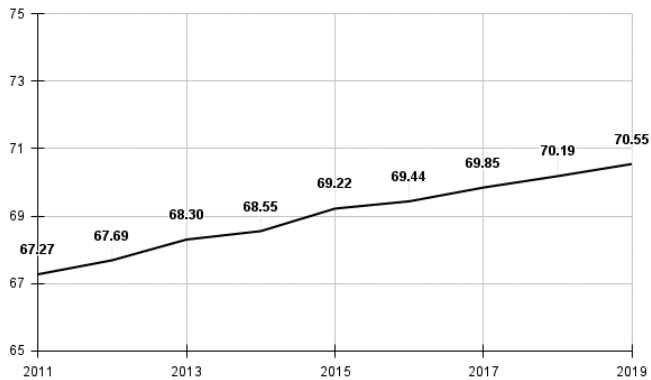
In the urban indicators of SDG 11, the data highlights a slow but steady increase in the region's performance (see Graph 2). Despite fluctuations between 2012 and 2015, the regional average remained above 75 points (out of 100), reaching a maximum of 79.57 points in 2019.

Graph 2 — SDG 11 (average) for Latin America and Caribbean (2011-2019)



Source: own elaboration.

Graph 3 — SPI (average) for Latin America and Caribbean (2011-2019)



Source: own elaboration.

Similarly, the variation of the regional average SPI was characterized by a gradual increase from 67.27 points in 2011 to 70.55 points in 2019 (see Graph 3).

It is commonly assumed that the SPI and SDGs 10 and 11 are equivalent sustainable metrics, given that their indicators assess interrelated aspects of society. Despite the similarity, the correlation between SDG 10 - IPS is weak (r: -0.04), between SDG 11 - IPS is moderate (r: 0.67), and between SDG 10 - SDG 11 is weak (r: -0.25). It is thus confirmed that these sustainability indices are distinct analytical tools.

Satterthwaite et al. (2020) link the characteristics of social, economic, and political dynamics of states to sustainable development. It is expected that national performance in socioeconomic and political arrangements affects the results of sustainability indices, particularly the SPI and SDGs 10 and 11. In Latin America and the Caribbean, the average of independent variables displayed considerable

Table 5 - Descriptive statistics

Variable	N	Ndist	Mean	SD	Min	Min
Unemployment	188	173	0.06	0.03	0.01	0.01
GDP per capita	216	216	8311.72	5004.21	1287.95	1287.95
Industry	216	216	0.27	0.07	0.002	0.002
Agriculture	216	216	0.08	0.05	0.004	0.004
Imports	189	189	0.35	0.15	0.10	0.10
Exports	189	189	0.29	0.12	0.09	0.09
Gross Capital Formation	189	189	0.22	0.07	0.07	0.07
Rule of Law	216	127	-0.35	0.62	-1.42	-1.42
Regulatory Quality	216	137	-0.11	0.65	-1.63	-1.63

Government Effectiveness	216	130	-0.16	0.63	-2.14	-2.14
Control of Corruption	216	135	-0.25	0.72	-1.33	-1.33
SDG10	216	109	30.72	12.19	11.83	11.83
SDG11	216	208	76.96	10.51	31.71	31.71
SPI	216	211	69.01	8.46	40.69	40.69

Source: own elaboration.

variability, including notable periods of decline. Descriptive statistics for the selected variables are presented in the following table.

For instance, considering the regional average, the unemployment rate fluctuated over the nine years, but since 2017, it has presented a gradual increase, reaching a peak of 6.90% (2019) of unemployed individuals. Despite the GDP per capita rising from $7,797.23 (2011) to $8,537.01 (2019), the average of economic arrangements, in general, regressed over the years. Concerning the value added as a percentage of GDP, the Industry sector accounted for 28.36% (2011), but it dropped to 25.97% in 2019. This trend was replicated in Agriculture, which decreased from 8.55% (2011) to 7.42% (2019).

The variation is also significant in terms of Import, where the percentage of 38.87% (2011) declined to 32.26% (2019), and in Export, which reduced from 32.44% (2011) to 27.61% (2019). In addition, the average of Gross Capital Formation also decreased gradually and reached its lowest value (20.16%) in 2019.

In governance assessments, the results of the Rule of Law indicator varied considerably over the years, with its best performance in 2014 (-0.31). In terms of Regulatory Quality, the perception of governmental capacity to formulate and implement policies decreased from -0.06 (2011) to -0.17 (2019), as did Government Effectiveness - from -0.13 (2011) to -0.20 (2019) - and Control of Corruption - from -0.16 (2011) to -0.29 (2019). In summary, there is clear evidence of a decline in the evaluation of governmental performance in the region.

The following table presents the results of the regression models with fixed effects for the three dependent variables. After that, we discuss each model, illustrating them through the graphs 4 to 6.

Table 6 – Regression Results

	SPI				SDG10				SDG11			
Variables	**β**	**Se**	**T-value**	**Pr(>|t|)**	**β**	**Se**	**T-value**	**Pr(>|t|)**	**β**	**Se**	**T-value**	**Pr(>|t|)**
Unemployment	-0.130	0.030	-4.388	0.000 ***	-0.100	0.050	-2.011	0.046 *	0.059	0.058	1.029	0.305
GDP per capita	0.070	0.069	1.016	0.312	0.165	0.116	1.426	0.156	-0.005	0.134	-0.037	0.970
Industry	-0.079	0.026	-3.077	0.003 **	-0.044	0.043	-1.018	0.310	-0.010	0.050	-0.194	0.847
Agriculture	-0.148	0.087	-1.699	0.092 .	-0.274	0.146	-1.878	0.062 .	-0.444	0.169	-2.625	0.010 **
Imports	0.091	0.080	1.136	0.258	0.229	0.134	1.712	0.089 .	-0.080	0.155	-0.516	0.607
Exports	-0.233	0.057	-4.111	0.000 ***	-0.205	0.095	-2.165	0.032 *	-0.103	0.110	-0.940	0.349
Gross Capital Formation	-0.219	0.062	-3.560	0.001 ***	-0.141	0.103	-1.373	0.172	-0.143	0.120	-1.194	0.234
Rule of Law	0.106	0.058	1.836	0.069 .	0.224	0.097	2.319	0.022 *	0.197	0.112	1.753	0.082 .
Regulatory Quality	-0.142	0.065	-2.190	0.030 *	-0.337	0.108	-3.105	0.002 **	-0.178	0.126	-1.411	0.160
Government Effectiveness	0.055	0.051	1.082	0.281	-0.170	0.086	-1.990	0.049 *	-0.051	0.099	-0.515	0.608
Control of Corruption	-0.012	0.060	-0.197	0.844	-0.078	0.101	-0.771	0.442	-0.055	0.117	-0.467	0.641
R^2	0.45821				0.23608				0.27296			
Adj.R^2	0.33993				0.069309				0.11423			
F-statistic	10.9175 on 11 and 142 DF, p-value: 1.97E-14				3.98939 on 11 and 142 DF, p-value: 4.5022E-05				4.84648 on 11 and 142 DF, p-value: 2.48E-06			

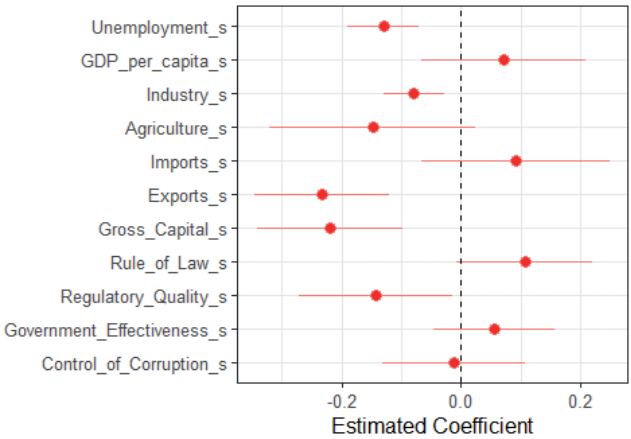
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Unbalanced Panels: n = 21, T = 1-9, N = 174
Source: own elaboration.

The panel data regression highlights the variables that have significant effects on the final scores of the SPI, namely: Unemployment, Industry, Export, Gross Capital Formation, and Regulatory Quality. These results are illustrated in Graph 4, where the red lines represent the 95% confidence interval and the points denote the Estimate (β) value of each variable. If an independent variable does not have statistical significance for the model, its line will intersect with the zero line.

The variables with the highest significance in the regression analysis are Unemployment, Exports, and Gross Capital Formation. According to the values of β, an increase of one unit in Unemployment, Exports, and Gross Capital Formation reduces the final SPI score by 0.13, 0.23, and 0.22 units, respectively.

Industry and Regulatory Quality showed lower effects in the regression, with β equal to -0.08 and -0.14, respectively. Thus, increasing Industry by one unit reduces the final SPI score by 0.08 units. In Regulatory Quality, the regression reveals that an extra unit in its value decreases the final SPI score by 0.14 units.

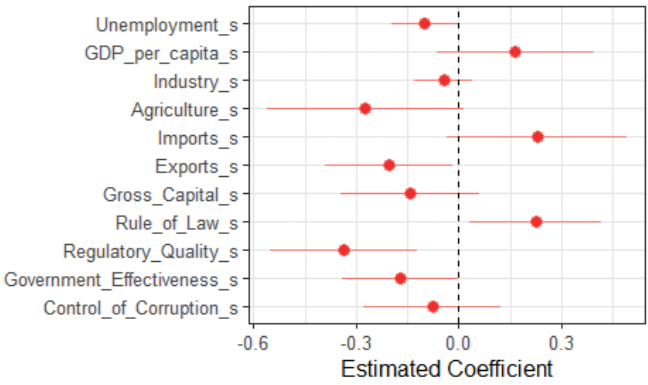
Graph 4 — SPI regression



Source: own elaboration.

When considering SDG 10, the panel data regression highlights Unemployment (β= -0.10), Exports (β = -0.20), Rule of Law (β = 0.22), Regulatory Quality (β = -0.34), and Government Effectiveness (β = -0.17) as variables with significant effects. With greater significance in the regression, an increase in one unit in the value of Regulatory Quality reduces the final score of SDG 10 by 0.34 units (see Graph 5).

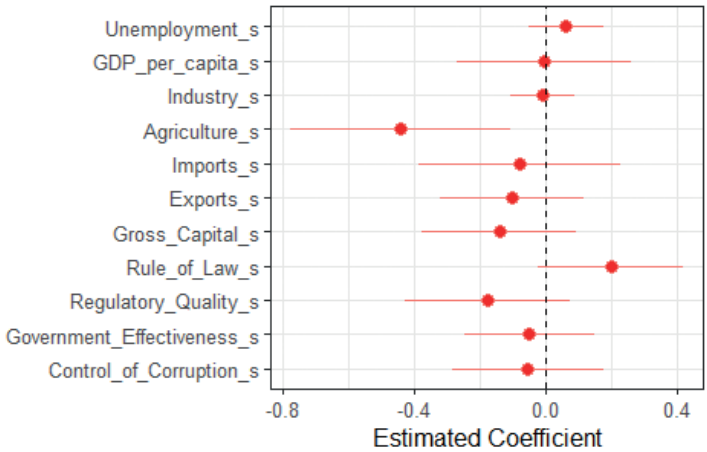
Graph 5 — SDG 10 regression



Source: own elaboration.

Regarding the regression of SDG 11, the results displayed in Graph 6 demonstrate a statistically significant association between this indicator and Agriculture ($\beta = -0.44$). Specifically, an increase of one unit in the value of Agriculture is associated with a reduction of 0.44 units in the outcome of this index.

Graph 6 — SDG 11 regression



Source: own elaboration.

The SPI and SDG 11 are characterized by the prevalence of economic arrangements among the independent variables with the greatest significance in the regression. Hence, the economy is considered a critical factor for the success of social progress and the formation of sustainable cities. However, contrary to the theoretical debate, the statistical findings demonstrate that increased investment in industries has a negative impact on the SPI, as do higher rates of exports, gross capital formation, and regulatory quality.

The achievement of the goal proposed in SDG 10 is primarily influenced by the political dynamics of the nation, given the significance of three political variables. Nevertheless, contrary to the expected findings from the literature, the data indicate that higher regulatory quality, government effectiveness, and exports lead Latin American and Caribbean countries to achieve lower scores.

Consequently, the hypothesis of this research is partially supported. Indeed, better performance in some socio-economic and political variables

is associated with higher sustainability indices. Table 7 below summarizes the testing of secondary hypotheses with results that either fully support or refute them, or partially support them - when variables had an effect on one or two of the indices.

Table 7 — Secondary Hypothesis Test

Secondary Hypothesis	Statistical Results	Conclusion
H1	Higher unemployment rates lead Latin-Caribbean countries to achieve lower SPI and SDG 10 scores.	Hypothesis partially corroborated
H2	GDP per capita has no significant effects on SPI and SDGs 10 and 11 scores.	Hypothesis refuted
H3	Higher investment in industries leads Latin-Caribbean countries to achieve lower SPI scores.	Hypothesis refuted
H4	Higher investment in agriculture leads Latin-Caribbean countries to achieve lower SDG 11 scores.	Hypothesis partially corroborated
H5	Import taxes have no significant effects on SPI and SDGs 10 and 11 scores.	Hypothesis refuted
H6	Higher export rates lead Latin-Caribbean countries to achieve lower SPI and SDG 10 scores.	Hypothesis refuted
H7	Higher rates of gross capital formation lead Latin-Caribbean countries to achieve lower SPI scores.	Hypothesis refuted
H8	Higher rule of law leads Latin-Caribbean countries to achieve higher SDG 10 scores.	Hypothesis partially corroborated

H9	Higher regulatory quality leads Latin-Caribbean countries to achieve lower SPI and SDG 10 scores.	Hypothesis refuted
H10	Higher government effectiveness leads Latin-Caribbean countries to achieve lower SDG 10 scores.	Hypothesis refuted
H11	Control of corruption shows no significant effects on SPI and SDGs 10 and 11 scores.	Hypothesis refuted

Source: own elaboration.

There are cases where the relationship proposed in the secondary hypothesis is significant for only one (or two) of the indices, as stated in H1, H4, and H8, according to the regression. However, in the majority of cases, the inferences emphasize that the predicted effect of the variable diverges from the statistical findings, as seen in H3, H6, H7, H9, and H10.

Finally, not all independent variables considered presented significant effects on the dependent variables. GDP per capita, Imports, and Corruption Control are variables that do not show significance for any of the regressions with these sustainable indices. Consequently, H2, H5, and H11 were rejected.

Understanding the determinants of sustainable development, as revealed by this study, is crucial for several reasons. Firstly, identifying economic factors as significant contributors to the SPI and SDG 11 prompts a reassessment of the economy's role in shaping social progress and sustainable urban development. This insight is essential for policymakers, guiding more effective strategies to enhance sustainability. Secondly, the negative impact of certain economic variables on the SPI underscores the complex relationship between economic activities and social progress. This challenges assumptions and highlights the need for careful consideration of economic policies to ensure that they align with sustainability objectives.

Similarly, the political dynamics play a key role in achieving SDG 10 emphasizes the need for a nuanced approach to political interventions for advancing social equality. The unexpected correlation between higher regulatory quality, government effectiveness, and exports with lower scores in Latin American and Caribbean countries indicates potential areas for

policy refinement to better align with sustainability goals.

4.1 Chile and Brazil: exemplifying the findings

Here we examine the behavior of the variables within two scenarios: Chile, showcasing optimal performance in dependent variables, and Brazil, a more complex case despite its significant size and resources. Brazil's paradoxical lower sustainable development index rates, despite its advantages, prompts meaningful discussion.

Among the countries in Latin America and the Caribbean, the Republic of Chile is one of the nations with the highest degree of urbanization (Murillo, 2015). With a population of 19,212,362 inhabitants, 88% are urban residents (World Bank, 2022). With three-quarters of the population residing in the central region, Chile's dense urban network demands greater government attention and efforts to address the large contingent of citizens (Murillo, 2015).

In the midst of modernization, Chilean policies have focused mainly on public infrastructure works and the removal of irregular settlements. For example, between 1941 and 1958, the implemented housing project provided for the construction and distribution of 5,000 new homes per year throughout the country. These programs were generally offered by the government in partnership with private sectors responsible for both financing and implementation (Rubin, 2013).

The concern for urban issues is reflected in the results of the Chilean SPI, which stands out from 2011 to 2019 as the Latin American and Caribbean country with the highest score: 78.44 (2011) and 82.23 (2019) points (Social Progress Index dataset, 2021). In the overall ranking of the implementation of the SDGs, the UN highlights Chile as having the highest score in the region. Moreover, between 2011 and 2019, Chile's performance varied by 9.62% and 7.17% in SDG 10 (from 23.9 to 26.2) and SDG 11 (from 80.9 to 86.7), respectively. Overall, Chile shows a moderate growth trend with significant changes being implemented (Sachs et al., 2022).

However, despite the high scores in sustainability indices, Chile is marked by significant fluctuations in the performance of socioeconomic and political variables over the 2011-2019 period (see Table 8).

Table 8 — Performance of socioeconomic and political variables in Chile (2011-2019)

Variable	Value in 2011	Value in 2019	Average (2011-2019)	Δ%
Unemployment	7.32%	7.27%	6.83%	-0.68%
GDP per capita	$14,577.63	$14,699.46	$14,770.81	0.84%
Industry	32.44%	27.20%	25.54%	-16.15%
Agriculture	3.63%	3.98%	3.82%	9.64%
Imports of goods and services	34.79%	29.69%	31.12%	-14.66%
Exports of goods and services	37.69%	27.83%	30.94%	-26.16%
Gross Capital Formation	26.65%	25.05%	25.48%	-6%
Rule of Law	1.26	0.95	1.15	-24.6%
Regulatory Quality	1.44	1.17	1.38	-18.75%
Government Effectiveness	1.16	0.89	1	-23.28%
Control of Corruption	1.48	1.01	1.25	-31.76%

Source: own elaboration.

According to the regression findings, the increase in Chile's SPI is accompanied by a reduction in variables such as Unemployment, Industry, Exports, Gross Capital Formation, and Regulatory Quality. Furthermore, the higher performance in SDG 10 is also marked by a decrease in ratings for Unemployment, Exports, Regulatory Quality, and Government Effectiveness.

Although the regression identifies the significance of the Rule of Law and Agriculture on SDGs 10 and 11, respectively, the Chilean data does not correspond with the calculated effect. The regression shows that the growth of SDG 10 scores is accompanied by a higher Rule of Law, but in Chile, the SDG 10 scores increased while the Rule of Law evaluations decreased. Regarding SDG 11, according to the regression results, higher SDG 11 scores are influenced by a decrease in Agriculture, but both the Chilean SDG 11 and its Agriculture increased.

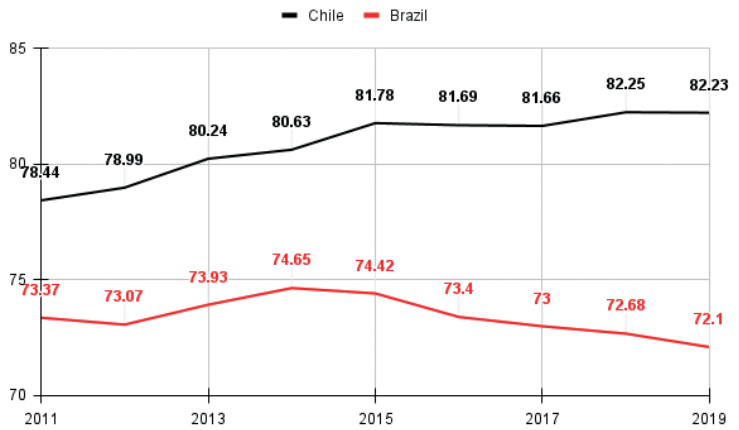
Regarding the Federative Republic of Brazil, with a total population of 213,993,441 people, 87% of the inhabitants live in urban areas (World Bank, 2022). Since the migration shift to cities in the early 20th century, the country has experienced a much faster urbanization process than that of developed countries (Brito and Pinho, 2012; Matos, 2012). However, until 1960, the federal level "did not have a national urban policy, only specific policies for certain areas" (Rubin, 2013:130-131).

Despite the expansion of industrial activities, the Brazilian urban landscape perpetuates social inequalities, and the formed peripheries reproduce strong socio-spatial segregation. The way migration to cities was configured ended up demanding state intervention in these locations (Brito and Pinho, 2012; Nuijten et al., 2012; Formicki, 2019). For instance, data from the National Household Sample Survey (Pnad), conducted by the Brazilian Institute of Geography and Statistics (IBGE), identifies Brasília, the Brazilian capital, as the most segregated region in the world (Rodrigues, 2022).

The Brazilian Federal Constitution of 1988 is the first to officially recognize urban planning and coordination policies in the country. In 2001, with the creation of the City Statute and the establishment of the Ministry of Cities in 2003, Brazil underwent an institutional rearrangement and investments in excluded sectors became prominent in national urban policies (Rubin, 2013).

However, social justice issues are not normatively guaranteed and the state neglects measures to support housing (Csaba and Schiffer, 2004). At the same time, it is worth noting the existence of inadequate settlements with a deficit in public services for citizens (Rubin, 2013). This information is reflected in Brazil's scores on the SPI. In contrast to Chile's prominent ranking (see Graph 7), Brazil's final scores have been declining since 2011 — from 73.37 (2011) to 72.1 (2019) points with a variation of -1.73% (Social Progress Index dataset, 2021).

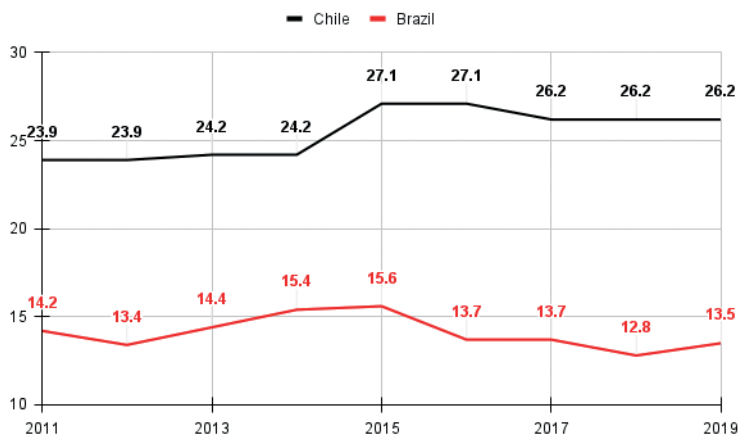
Graph 7 — SPI variation in Chile and Brazil (2011-2019)



Source: own elaboration.

Regarding the implementation of SDGs, Brazil demonstrates a lower level of goal attainment than Chile. As evidenced in Graph 8, Brazil's final scores for SDG 10 decreased by 4.93% from 2011 to 2019, declining from 14.2 to 13.5 points.

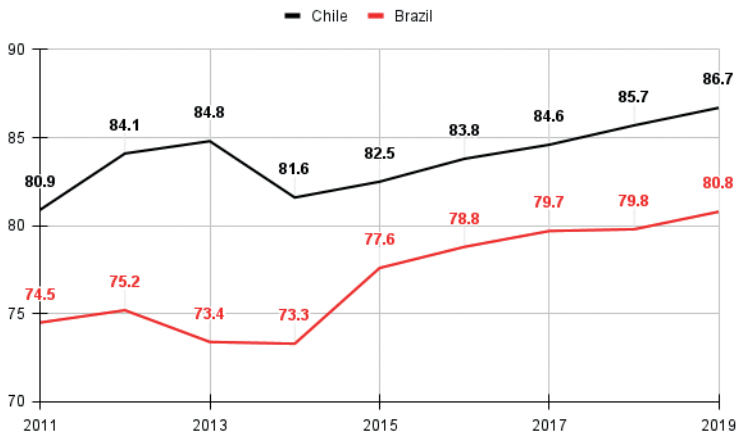
Graph 8 — SDG 10 variation in Chile and Brazil (2011-2019)



Source: own elaboration.

In contrast, Brazilian achievements in SDG 11 (see Graph 9) increased by 8.46% (from 74.5 to 80.8 points). Nevertheless, the country still faces significant challenges and a downward trend in urban improvement persists (Sachs et al., 2022).

Graph 9 — SDG 11 variation in Chile and Brazil (2011-2019)



Source: own elaboration.

About the Brazilian socioeconomic and political arrangements, Table 9 highlights their variations over the course of nine years (2011-2019).

Table 9 — Performance of socioeconomic and political variables in Brazil (2011-2019)

Variable	Value in 2011	Value in 2019	Average (2011-2019)	Δ%
Unemployment	6.92%	11.93%	9.43%	72.40%
GDP per capita	$13,245.39	$8,876.06	$10,612.11	-32.99%
Industry	23.10%	18.75%	20.04%	-18.83%
Agriculture	4.34%	4.21%	4.42%	-3%

Imports of goods and services	12.35%	14.77%	13.36%	19.60%
Exports of goods and services	11.58%	14.12%	12.54%	21.93%
Gross Capital Formation	21.83%	15.52%	18.12%	-29%
Rule of Law	0.05	-0.2	-0.14	-500%
Regulatory Quality	0.26	-0.11	-0.03	-142.31
Government Effectiveness	-0.16	-0.21	-0.23	-31.24%
Control of Corruption	0.17	-0.39	-0.29	-329.41%

Source: own elaboration.

As predicted by the regression analysis, the decline in Brazil's SPI and SDG 10 scores is accompanied by an increase in unemployment and exports and a decrease in the rule of law. Additionally, the increase in SDG 11 results is accompanied by a decrease in Agriculture.

For the variables of Industry, Gross Capital Formation, Regulatory Quality, and Government Effectiveness, Brazil's data does not support the regression results. While SPI and SDG 10 decreased, the percentage of Gross Capital Formation, Industry, Regulatory Quality, and Government Effectiveness also decreased, despite the regression suggesting their increase.

In summary, regarding Chile and Brazil, most of the relationships between socioeconomic and political arrangements and sustainability indices estimated by regression were confirmed. However, for Brazil specifically, six inferences diverged from the statistical results found, indicating that countries have particular effects on sustainability indices.

Regression analysis shows that being Brazil has a significant effect on the three dependent variables — SPI (β: 0.17; p-value = 0.046), SDG 10 (β: -1.62; p-value < 0.001), and SDG 11 (β: -0.74; p-value < 0.001). On the other hand, for Chile, the effect of the country is significant only on the SPI (β: 1.42;

p-value < 0.001). Therefore, socioeconomic, and political arrangements do affect sustainability, but caution is necessary when replicating regional results in local analyses.

5 Conclusion

Throughout the 20th century, sustainability has been a topic discussed in international conferences and meetings, which mobilize decision-makers and activists. Given the finite nature of natural resources, nation-states invest increasingly in tools that identify elements that compromise sustainability. Among these mechanisms, three indexes stand out, which, despite measuring synergistic spheres, are different: SDGs 10 and 11, and the SPI.

Considering 24 countries in Latin America and the Caribbean during the period of 2011-2019, the main hypothesis of this research, "How do socioeconomic and political arrangements relate to sustainability?", is partially supported. Indeed, better performance in some socioeconomic and political variables is associated with higher sustainability indexes.

The final scores of the SPI and SDG 11, for instance, are mainly associated with economic arrangements. The variable that affects SDG 11 is Agriculture, whereas the SPI is influenced by Industry, Export, Gross Capital Formation, Unemployment, and Regulatory Quality. As for SDG 10, its scores vary according to the Rule of Law, Regulatory Quality, Government Effectiveness, Unemployment, and Export.

However, some results diverge from what was predicted in the reviewed literature, and variables such as GDP per capita, Imports, and Control of Corruption do not have significant effects on any of the sustainable indices. Furthermore, when analyzing Chile and Brazil, specific inferences from the cases are identified that differ from the regression results because the countries have unique effects on the indices.

In summary, these findings are important as they provide a more nuanced and context-specific understanding of the factors influencing sustainable development, offering valuable insights for policymakers, researchers, and stakeholders striving to create more effective and tailored strategies for sustainable progress.

Given the temporal and spatial limitations, refinement of the models is necessary to enhance the analysis of the indices. The final scores of the sustainability indices are results of arithmetic means that disregard the variation of the indicator weights.

Furthermore, it is important to establish control variables to ensure more accurate inferences about the effects of socioeconomic and political arrangements on the SPI and SDGs 10 and 11.

In future research, sustainability indices can be measured through factor analysis to quantify sustainable development more efficiently. It is also worthwhile to test, using other measurement methods, the variables that the literature highlights as important but did not show significant effects in panel data regression models.

This study does not exhaust the investigation on the subject. As a future research agenda, we suggest expanding the indices under analysis to encompass, for instance, the other Sustainable Development Goals comprising the UN's 2030 Agenda. By considering other regions of the world, findings on socioeconomic and political arrangements towards sustainability will achieve global impact. Finally, promising avenues include combining statistical evaluations of large-N with in-depth case studies to understand the role of historical and institutional elements in sustainable practices.

Thus, this research provides an understanding of how national characteristics influence sustainable indicators. The results have conceptual implications for sustainable intervention projects, as well as enriching and informing future research in the field.

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