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Fiscal decentralization and human development: an analysis for Latin America

Descentralización fiscal y desarrollo humano: un análisis para América Latina

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Abstract

This study examines the relationship between fiscal decentralization and human development in Latin America, using data from 15 countries between 1990 and 2020. The objective is to assess how subnational spending, alongside variables such as access to drinking water, education and health expenditures, and regulatory quality, influence the Human Development Index (HDI). Static and dynamic panel models were employed, including the Arellano-Bond method to control for endogeneity. Results indicate that fiscal decentralization and access to drinking water have a positive and significant impact on HDI, while education and health spending show variable effects. The study concludes that efficient public management and reducing inequalities are crucial for enhancing human development in the region.

Keywords: Fiscal Decentralization, Human Development, Subnational Spending, Panel Data.

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Resumen
Este estudio analiza la relación entre la descentralización fiscal y el desarrollo humano en América Latina, utilizando datos de 15 países entre 1990 y 2020. El objetivo es evaluar cómo el gasto subnacional, junto con variables como el acceso al agua potable, el gasto en educación y salud, y la calidad regulatoria, influyen en el Índice de Desarrollo Humano (IDH). Se emplearon modelos de panel estáticos y dinámicos, incluyendo el método de Arellano-Bond para controlar la endogeneidad. Los resultados muestran que la descentralización fiscal y el acceso al agua potable tienen un impacto positivo y significativo en el IDH, mientras que el gasto en educación y salud presenta efectos variables. Se concluye que la eficiencia en la gestión pública y la reducción de desigualdades son clave para mejorar el desarrollo humano en la región.
Palabras clave: Descentralización Fiscal, Desarrollo Humano, Gasto Subnacional, Datos De Panel.

Introduction

The relationship between fiscal decentralization and human development in Latin America has been extensively studied in academic literature. It has been proposed that fiscal decentralization allows for better distribution of resources and greater efficiency in the provision of public services, which could have a positive impact on human development.

From a theoretical perspective, authors such as Oates (1972) and Smith (2013) have pointed out that decentralization allows for a more efficient allocation of public resources by bringing decision-making closer to citizens and facilitating a more precise response to their needs. This logic is based on the assumption that subnational governments have better information about local demands, which should translate into improvements in public services, especially in health,

education, and drinking water, considered fundamental pillars of human development.

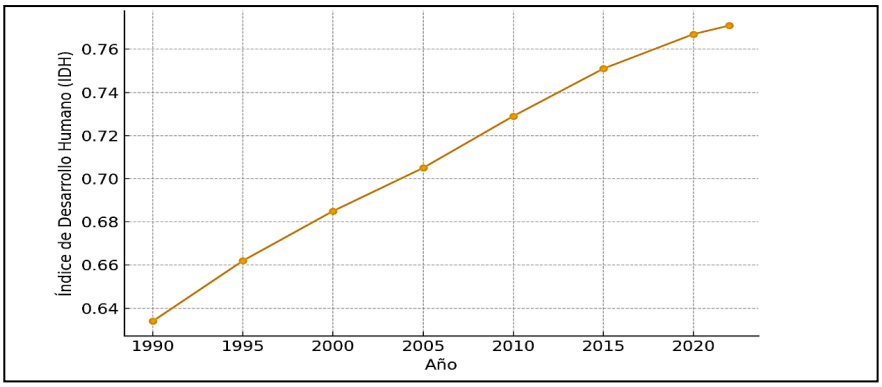
However, empirical evidence shows mixed results. In some countries, such as Brazil and Colombia, decentralization has had positive impacts in terms of basic service coverage and territorial equity. In contrast, in countries such as Mexico, Venezuela, and Argentina, the effects have been limited or even negative, mainly due to structural failures such as the limited administrative capacity of local governments, excessive dependence on fiscal transfers, and corruption (Mehmood & Sadiq, 2010; Miranda-Lescano et al., 2022).

In this regard, it is essential to understand what institutional conditions allow fiscal decentralization to effectively contribute to human development. For Pinilla-Rodríguez et al. (2015), the success of the decentralization model requires not only financial autonomy, but also clear rules of accountability, social control mechanisms, and technical capacities at the subnational levels of government. Otherwise, decentralization can perpetuate or even deepen regional inequalities (The Problem of Corruption in Government Organizations, 2021).

For its part, human development has been conceptualized by the United Nations Development Program (UNDP) as a process of expanding people's real freedoms, beyond mere economic growth. At its core, human development involves access to opportunities that improve the quality of life, such as education, health, and a decent standard of living (UNDP, 2023). The main instrument for measuring this is the Human Development Index (HDI), which integrates three dimensions: life expectancy, years of schooling, and adjusted GDP per capita.

In Latin America, the HDI has shown an upward trend in recent decades, although with marked inequalities between countries and regions. The following graph illustrates the evolution of the HDI in the region between 1990 and 2022

Figure 1: Evolution of the HDI in Latin America according to UNDP data (2023)



Source: UNDP (2023)

In Latin America, the HDI has experienced an upward trend in recent decades, rising from 0.634 in 1990 to 0.771 in 2022 (UNDP, 2023). However, these figures mask deep inequalities. While countries such as Chile and Uruguay exhibit high levels of human development, others such as Honduras and Nicaragua lag significantly behind. Economic crises, natural disasters, and political instability have negatively affected human development at different points in history, accentuating the fragility of social protection systems (Sofilda et al., 2023; Ginanjar et al., 2020).

Factors such as economic crises, political instability, and natural disasters have negatively affected human development in the region. In addition, social inequality and informal employment continue to limit equitable access to basic public services (Sofilda et al., 2023; The Problem of Corruption in Government Organizations, 2021).

According to recent studies, investment in human capital has been one of the main drivers of growth in countries with higher HDI. For example, in Uruguay, education policy and universal health coverage have helped reduce inequality gaps (Pinilla-Rodríguez et al., 2015).

Human development in Latin America has been a topic of extensive academic and political debate, especially in recent

decades. Authors such as Amartya Sen and Martha Nussbaum, and organizations such as the United Nations Development Program (UNDP), have contributed significantly to the understanding of the factors that influence human development in the region. This concept, which goes beyond economic growth, focuses on expanding people's capabilities and opportunities to lead lives they value. This text explores the main determinants of human development in Latin America, based on authors and real references.

One of the main obstacles to human development in Latin America is persistent economic and social inequality. According to the UNDP report (2020), the region remains one of the most unequal in the world, with a Gini coefficient exceeding 0.45 in many countries. Authors such as Thomas Piketty (2014) have highlighted how the concentration of wealth in the hands of a minority limits access to basic services such as education, health, and housing for large sectors of the population.

This inequality affects not only material well-being, but also opportunities for social mobility and the development of individual capacities. Education is a fundamental pillar of human development, as Amartya Sen pointed out in his book Development as Freedom (1999). In Latin America, although there have been significant advances in educational coverage, challenges remain in terms of quality and equity.

According to the Economic Commission for Latin America and the Caribbean (ECLAC, 2018), educational gaps between urban and rural areas, as well as between different socioeconomic strata, remain significant. In addition, authors such as Heckman (2006) have emphasized the importance of early education and its impact on the development of cognitive and non-cognitive skills, which is crucial for breaking cycles of poverty.

Health is another key determinant of human development. Martha Nussbaum, in her capabilities approach, highlights the importance of a healthy life as one of the fundamental

freedoms. In Latin America, although there have been improvements in indicators such as life expectancy and reduced infant mortality, inequalities in access to quality health services persist. According to the Pan American Health Organization (PAHO, 2019), rural populations and indigenous groups face significant barriers to accessing adequate medical care. In addition, the COVID-19 pandemic has exacerbated these inequalities, highlighting the fragility of health systems in the region.

The quality of institutions and governance also play a crucial role in human development. Douglass North, in his work "Institutions, Institutional Change and Economic Performance" (1990), argues that institutions are fundamental to economic and social development. In Latin America, institutional weakness, corruption, and lack of transparency have been persistent obstacles. According to Transparency International's Corruption Perceptions Index (2021), many countries in the region score low, which affects the efficiency of public policies and citizens' trust in the state.

Gender equality is another determining factor in human development. Authors such as Naila Kabeer (2005) have highlighted how gender discrimination limits women's opportunities and, therefore, the development of their capacities. In Latin America, although there have been advances in women's political and labor participation, wage gaps and cultural barriers persist that limit their full development. According to the UNDP report (2019), gender-based violence and lack of access to reproductive health services are serious problems affecting women's well-being in the region.

The environment and sustainability are also key determinants of human development. Authors such as Jeffrey Sachs, in his book "The Age of Sustainable Development" (2015), have emphasized the importance of a sustainable approach to ensuring the well-being of future generations. In Latin America,

environmental degradation, deforestation, and climate change are negatively affecting the quality of life of millions of people. According to the World Bank (2020), natural disasters and biodiversity loss are exacerbating poverty and inequality in the region.

Finally, culture and diversity are aspects that cannot be ignored when discussing human development. Authors such as Arjun Appadurai (1996) have highlighted how culture influences people's aspirations and capabilities. In Latin America, cultural and ethnic diversity is a fundamental characteristic, but also a challenge in terms of inclusion and recognition of rights. According to ECLAC (2020), indigenous peoples and Afro-descendants face higher levels of poverty and exclusion, which limits their human development.

Thus, economic and social inequality, education, health, the quality of institutions, gender equality, the environment, and culture are factors that interact dynamically to influence people's opportunities and capabilities. Authors such as Amartya Sen and Martha Nussbaum, and organizations such as the UNDP and ECLAC, have provided theoretical frameworks and empirical evidence that allow for a better understanding of these challenges. To advance toward more inclusive and sustainable human development in the region, it is necessary to address these determinants in a comprehensive manner, with public policies that promote equity, social justice, and respect for diversity.

Fiscal decentralization in Latin America has been promoted as a mechanism to improve public resource management and strengthen citizen participation in decision-making. This process involves the transfer of powers and funds from central governments to subnational governments (Oates, 1972; Pinilla-Rodríguez et al., 2015; Smith, 2013).

Decentralization models vary within the region. Brazil and Argentina have implemented federal systems with a high degree of autonomy for their local governments, while

countries such as Peru and Colombia have adopted decentralized systems in which the central government retains considerable control over resource distribution (Hung & Thanh, 2022; Sofilda et al., 2023).

One of the main challenges of fiscal decentralization in the region is the inequality in local governments' revenue-generating capacity. While some localities have a strong tax base, others depend almost exclusively on transfers from the central government, which perpetuates inequalities in access to goods and services (The Problem of Corruption in Government Organizations, 2021; Mehmood & Sadiq, 2010).

Studies on fiscal decentralization have found that, in some cases, the process has led to better resource distribution, but in others it has led to increased corruption and inefficient administration (Delgado et al., 2022).

The relationship between fiscal decentralization and human development has been widely discussed in the literature, with studies arguing both for and against its effects. In theoretical terms, it is argued that fiscal decentralization can improve human development by allowing for a more efficient allocation of resources that is better tailored to local needs. However, empirical results have been mixed and depend largely on the institutional and economic context of each country (Ginanjar et al., 2020; Sofilda et al., 2023).

In some Latin American countries, decentralization has led to improvements in education and public health. In Brazil, for example, the strengthening of local governments has facilitated a better distribution of health services, increasing life expectancy and reducing infant mortality. However, in Mexico and Argentina, decentralization has been marked by problems of corruption and inequalities in the allocation of funds, resulting in uneven quality of public services across regions (Delgado et al., 2022; Mehmood & Sadiq, 2010; Miranda-Lescano et al., 2022).

Another relevant aspect is the capacity of local governments to manage decentralized resources. In cases where local administrations have a solid structure and an adequate level of fiscal autonomy, significant progress has been made in human development. However, in regions where resources are captured by political elites or used inefficiently, decentralization has had a negative or no impact on the well-being of the population (The Problem of Corruption in Government Organizations, 2021; Sofilda et al., 2023).

Furthermore, recent studies suggest that fiscal decentralization must be accompanied by adequate oversight and transparency mechanisms to prevent mismanagement of funds. Lack of regulation and control can lead to decentralization generating more inequality, benefiting certain regions while leaving others without sufficient resources to improve their human development (Pinilla-Rodríguez et al., 2015; Hung & Thanh, 2022).

Finally, the cultural and ethnic diversity that characterizes Latin America also poses a significant challenge for the design of inclusive public policies. The historical marginalization of indigenous and Afro-descendant peoples has led to high levels of poverty and exclusion, requiring an intercultural approach to human development (ECLAC, 2020).

In this complex and multidimensional context, this research proposes to analyze the effect of subnational spending—as a proxy for fiscal decentralization—on human development in 15 Latin American countries during the period 1990-2020. Through the use of panel data models, we seek to understand whether greater autonomy in the use of public resources by local governments translates into improved living conditions for the population.

Methodology

In order to determine the effect of subnational spending on human development in Latin America, 15 countries (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, and Uruguay) were analyzed during the period from 1990 to 2020.

To this end, the Human Development Index (HDI) was considered as the dependent variable, and subnational spending (expsub, decentralization variable), access to drinking water (water), spending on primary education per student (eduexp), public spending on health (health), and regulatory quality (rolaw), as detailed in Table 1.

Table 1: Variables used in the study

Variable	Definición	Fuente
Índice de Desarrollo Humano (IDH)	Es un indicador estadístico compuesto que mide el nivel de desarrollo de los países en función de tres dimensiones básicas del desarrollo humano. Oscila entre 0 y 1, donde este valor indica el mayor desarrollo humano	PNUD (2025)
Acceso al agua potable (water)	Porcentaje de personas que utilizan al menos servicios básicos de agua. Este indicador abarca tanto a las personas que utilizan los servicios básicos de agua como a las que utilizan servicios de agua gestionados de forma segura	Banco Mundial (2024)
Gasto público en salud per cápita expresado en dólares (eduexp)	El gasto público por estudiante es el gasto promedio del gobierno general (corriente, capital y transferencias) por estudiante en un determinado nivel de educación, expresado como porcentaje del PIB per cápita	Banco Mundial (2024)
Gasto público	Gasto público para prestar servicios de salud a	Banco Mundial

en educación (health)	la población, independientemente de la entidad que lo haya financiado o gestionado, expresado en términos per cápita.	(2024)
Estado de Derecho (rolaw)	Capta las percepciones de hasta qué punto los agentes confían en las normas de la sociedad y las cumplen, y en particular la calidad de la ejecución de los contratos, los derechos de propiedad, la policía y los tribunales, así como la probabilidad de delitos y violencia	Banco Mundial (2024)
Gasto subnacional (expsub)	Relación del gasto propio ejecutado directamente por los gobiernos subnacionales en relación con el gasto total del gobierno general.	Fondo Monetario Internacional. (2024).

The relationships between the explanatory variables and the HDI are expected to be positive and significant, as suggested in the literature, contrasting them through the estimation of the following equation:

$$IDH_{it} = \beta_o + \beta_1 expsub_{it} + \beta_2 water_{it} + \beta_3 eduexp_{it} + \beta_4 health_{it} + \beta_5 rolaw_{it} + \varepsilon_{it}$$

Where:

Human Development Index (HDI): a composite measure developed by the United Nations Development Program (UNDP) that assesses countries' development by considering three key dimensions: health (life expectancy at birth), education (expected years of schooling and average years of schooling), and standard of living (adjusted gross national income per capita). Its objective is to provide a more comprehensive view of human well-being, beyond mere economic growth (UNDP, 2023). Its values range from 0 to 1, where 1 is maximum human development. The data are taken from the United Nations Development Program (UNDP, 2025).

Decentralization of subnational government spending (ratio of subnational own spending to general government spending)

(ExpSub). Measures the proportion of spending executed directly by subnational governments in relation to total general government spending. It is expressed as the ratio of subnational government own expenditure (excluding transfers) to total public sector expenditure, reflecting the degree of financial autonomy and decentralized management capacity (OECD, 2019). The data comes from the International Monetary Fund's fiscal decentralization database (IMF, 2001).

People using at least one basic drinking water service (% of population) (Water). This indicator covers both people using basic water services and those using safely managed water services. Basic drinking water services are defined as drinking water from an improved source, provided that the collection time does not exceed 30 minutes for a round trip. Improved water sources include piped water, drilled or tube wells, protected dug wells, protected springs, and packaged or delivered water. Data are from the WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation (WHO/UNICEF, 2023).

Access to safe drinking water is considered essential for human development. Lack of adequate water and sanitation services contributes to the spread of disease, affecting health and reducing the productivity of populations. It has been estimated that 80% of all diseases and more than a third of deaths in developing countries were due to contaminated water consumption (Villena, 2018). In addition, the World Bank (2023) highlights that improving access to clean water drives economic development and is essential for achieving the Sustainable Development Goals. Therefore, ensuring universal access to safe drinking water is crucial to improving the Human Development Index in nations.

Public expenditure per student, primary education (% of GDP per capita) (eduexp). Calculated by dividing total public expenditure on primary education by the number of students in primary education, expressed as a percentage of GDP per

capita. Aggregate data are World Bank estimates. A positive and direct relationship is considered to exist between public spending on education and the Human Development Index (HDI). Adequate investment in the education sector improves the quality of life and economic opportunities of the population, although this relationship may be mediated by the efficiency and equity that characterizes this spending (López et al., 2016; IDB, 2018).

General government health expenditure per capita (constant 2015 dollars) (Health). Public spending on health usually includes expenditures made to provide health services to the population (vaccination campaigns, dissemination of information on health and healthy lifestyles, occupational health, health services provided to individuals and groups, etc.), regardless of the entity that financed or managed them. It includes internal transfers and subsidies, transfers and subsidies to voluntary schemes, as well as social security contributions for health. This indicator describes the role of internal sources of general government in the financing of health care compared to private and external sources. The data come from the World Bank.

In general, higher health expenditure tends to correlate positively with a higher HDI. This is because the HDI not only considers life expectancy, but also education and per capita income, all of which are affected by the quality of and access to health services. Countries that spend a higher percentage of their GDP on health generally have a higher HDI, demonstrating a direct relationship between these variables (UNDP, 2022).

Rule of law (Rolaw). This captures the perception of the degree of trust and compliance with social norms by agents, in particular the quality of contract enforcement, property rights, police and courts, as well as the likelihood of crime and violence. The estimate provides the country's score on the

aggregate indicator, in units of a standard normal distribution, i.e., with a range of approximately 1 to 6.

A strong rule of law is understood to contribute significantly to social and economic development, which in turn is reflected in a higher HDI. Compliance with the rule of law guarantees the protection of human rights and fundamental freedoms. For example, an effective and accessible justice system, or an environment of predictability that encourages investment and economic growth, are essential to ensure that all people can enjoy their basic rights, which directly impacts human development (UNDP, 2016; Foundation for Global Justice, 2021).

Given that the data correspond to time series and cross-sectional data, panel data are estimated, both static, in which the past of the variable is not considered, and dynamic, given that the HDI is a non-stationary variable that depends on the behavior of its lags.

In the first case, heterogeneity is analyzed through fixed and random effects, and selection is performed using the Hausman test, whose null hypothesis is the preference for random effects. In both cases, the presence of heterogeneity generates problems in the estimation because the error with this type of data is divided into the estimation residual and that linked to unobservable heterogeneity. This part of the error is correlated with the explanatory variables, which means that the estimation is not the most efficient.

Fixed effects assume that the correlation between the residuals and the explanatory variables is different from zero and correct the problem by subtracting the difference of each variable minus its mean, so that heterogeneity resides in the differences between individuals. Random effects, on the other hand, assume that the correlation is zero and the estimation is performed by subtracting each variable from a proportion of the mean, placing the weight of heterogeneity on chance.

While the estimation of random effects does not require any validation in terms of autocorrelation and heteroscedasticity, because it is a generalized least squares model, the estimation of fixed effects requires the validation of both assumptions and, if this model is chosen, its correction in the presence of any of the problems indicated.

If autocorrelation is evident, this problem may suggest that the dependent variable is linked to its past behavior and would require dynamic estimation, which considers the lag of the dependent variable. For this purpose, the Arellano-Bond method is used, which can be analyzed in terms of long-term behavior with influence from the past.

The Arellano-Bond method is a technique based on the Generalized Moment Estimator (GMM) that allows for dealing with endogeneity in dynamic panel data. In simple terms, this method transforms the original equation to eliminate unobserved fixed effects and then uses past values of the dependent variable as instruments to efficiently estimate the model coefficients.

To achieve this, the method takes differences in the equations to eliminate time-invariant factors that could be biasing the estimates; past values of the dependent variable are used as instruments, assuming that they are correlated with the current dependent variable but not with the model errors; and GMM is applied to find the most accurate coefficients.

To ensure the validity of the instruments, the Sargan test is applied to assess whether the instruments used in the model are truly exogenous, i.e., whether they are uncorrelated with the model errors. If the Sargan test yielded a high p-value, it meant that the instruments were adequate. But if the p-value was very low, it meant that the instruments might be poorly chosen and that the model still suffered from endogeneity problems.

Results

To understand the relationship between different socioeconomic variables and the Human Development Index (HDI), static and dynamic estimation models have been applied to assess the impact of variables such as subnational spending (expsub), access to drinking water (Water), primary education expenditure per student (Eduexp), government expenditure on health per capita (Health), and the rule of law (Rolaw).

First, Table 2 provides a statistical summary of the variables used in the models. It can be seen that the HDI has a minimum value of 0.49 and a maximum of 0.859, with a mean of 0.6972 and a standard deviation of 0.0814. This suggests moderate variability in human development within the sample of Latin American countries analyzed.

Table 2: *Descriptive statistics of the variables*

Variable	N	Período		Valor mínimo	Valor máximo
		Media	DE		
IDH	465	0,6972	0,0814	0,49	0,859
expsub	306	0,2282	0,1438	0,011	0,467
Water	311	0,9286	0,0533	0,762	1,000
Eduexp	204	0,1278	0,0427	0,029	0,267
Health	315	265,56	242,03	13,94	1172,97
Rolaw	330	3,1375	0,6471	2,255	4,849

· 68.3% of participants stated that they had in-depth knowledge of the chain of custody, while 21.7% indicated that they had partial knowledge, and 10.0% acknowledged that they did not fully understand the protocols.

· The average self-perceived knowledge (rated on a scale of 1 to 5) was 4.0, with a standard error of 0.25.

Subnational expenditure (expsub) has a minimum value of 0.011 and a maximum of 0.467, with an average of 0.2282, indicating significant differences in the decentralization of

public spending. Access to drinking water (Water) shows an average of 0.9286 with a standard deviation of 0.0533, reflecting high and relatively homogeneous coverage within the sample.

On the other hand, primary education expenditure per student (Eduexp) has an average of 0.1278 with a deviation of 0.0427, suggesting that there are differences in educational investment relative to each country's GDP per capita. In terms of per capita health expenditure (Health), there is a wide dispersion, with values ranging from 13.94 to 1172.97, reflecting disparities in public health investment.

Finally, the variable measuring the rule of law (Rolaw) ranges from 2.255 to 4.849, with an average of 3.1375, indicating that Latin American countries have different levels of trust in the legal and institutional system. Table 3 presents the HDI estimate under a static model, using fixed and random effects.

It can be seen that access to drinking water (Water) has a positive and highly significant coefficient (0.3511 in fixed effects and 0.3513 in random effects, both with a significance of 1%). This suggests that a higher proportion of the population with access to drinking water is associated with an increase in human development.

Table 3: *Static estimation of the HDI*

Recibió formación específica	Frecuencia	Porcentaje
Sí	33	55.0%
No	27	45.0%
Total	60	100%

Note: Values in parentheses are standard errors. Significance: 1% (***), 5% (**), 10%(*)

Primary education expenditure per student (Eduexp) shows a positive and significant coefficient at 5% in the fixed effects model (0.1392), but is not significant in the random effects model. This indicates that investment in education contributes to the HDI, although its impact may depend on specific characteristics of each country.

Per capita health expenditure (Health) also has a positive and highly significant effect in both models (coefficients of 0.0007 and 0.00008 with 1% significance). Although the coefficient is small, it suggests that higher health expenditure is correlated with improvements in the HDI.

The rule of law (Rolaw) also has a positive and significant impact in both model specifications (0.0133 in fixed effects and 0.0172 in random effects, with 1% significance). This indicates that trust in the legal system and the protection of rights are key factors for human development.

As for subnational spending (expsub), its effect is not significant in the fixed effects model (0.0412), but it is in the random effects model (0.0572 with 10% significance). This suggests that decentralization of public spending could have a positive impact on human development, although its effect varies depending on the methodological approach used.

The model's goodness-of-fit indicators show that the explained variance (R^2) is high, with values of 0.6405 in the fixed effects model and 0.6669 in the random effects model. In addition, the Hausman test suggests that the random effects model is the most efficient.

Finally, autocorrelation and heteroscedasticity are observed in the data, as indicated by the Wooldridge and heteroscedasticity tests. This reinforces the need to use dynamic methods that correct these problems.

To address the dynamics of the HDI and control for possible endogeneity problems, the Arellano-Bond method is applied in Table 4. In this model, the HDI lagged by one period (HDI (-

1)) has a positive and significant coefficient (0.6035, with 1% significance), indicating high persistence in human development over time. In other words, countries with a high HDI in the past tend to maintain high levels of development in the present.

Table 4: *Dynamic estimation of the HDI*

	Coeficiente / Error estándar
IDH (-1)	0,6035***
	(0,0928)
IDH(-2)	0,2140**
	(0,0929)
expsub	0,0375**
	(0,0167)
Water	0,1129***
	(0,0436)
Eduexp	-0,0219
	(0,0253)
Health	0,00001**
	(4,45e-6)
Rolaw	0,0002
	(0,0036)
Constante	0,0241
	(0,0265)
Wald / F	2927,28***
Prueba de Sargan	106,028

Note: Values in parentheses are standard errors. Significance: 1% (***), 5% (**), 10% (*)

The two-period lagged HDI (HDI (-2)) is also significant at 5%, with a coefficient of 0.2140, suggesting that human development does not only depend on the immediately preceding period, but has a long-term trajectory.

Subnational spending (expsub) has a positive and significant coefficient (0.0375 at 5%), reinforcing the idea that

decentralization of public spending favors human development when dynamic effects and endogeneity problems are controlled for.

Access to drinking water (Water) maintains a positive and significant effect (0.1129 at 1%), although its magnitude is lower than in the static estimate, which could indicate that its impact is more immediate and less persistent over time.

Primary education expenditure per student (Eduexp), unlike in the static model, is not significant in the dynamic estimate.

This suggests that the effects of educational investment on human development may require a longer period to materialize.

Per capita health expenditure (Health) remains significant at 5%, although with a very low coefficient (0.00001), indicating that its impact on human development is positive but marginal.

On the other hand, the rule of law (Rolaw) is not significant in this model, suggesting that its effect on the HDI could be better captured in a static specification or in interactions with other institutional variables.

The quality of the model is verified by the Wald test, which indicates strong overall significance of the model. The Sargan test shows a value of 106.028, suggesting that the overidentification constraints are valid and that the instruments used in the estimation are appropriate.

These results highlight the importance of applying dynamic models to understand human development, as they allow us to capture not only the contemporary effects of socioeconomic variables, but also the persistent influence of historical performance. The significance of the HDI in its two lags shows that human progress does not reset each year, but rather accumulates positive (or negative) effects over time. Likewise, instrumental validation using the Sargan test ensures the consistency of the estimated model.

At the empirical level, the impact of subnational spending reinforces the hypothesis that greater financial autonomy for local governments can improve human well-being, provided it is accompanied by efficient public management. The Water variable, with highly significant effects, ranks as one of the most decisive, highlighting the urgency of policies for universal access to drinking water. In contrast, the Eduexp variable, although significant in static models, loses strength in the dynamic model, which could reflect that its benefits require long-term horizons to consolidate.

Finally, the insignificant behavior of Rolaw in the dynamic model suggests that institutional impact operates through more structural channels or requires interactions with other variables—such as public investment or citizen trust—to become evident. These differences in significance between models reinforce the need to employ multiple methodological strategies to capture the complexity of human development in Latin America.

Conclusions

The analysis of the determinants of the Human Development Index (HDI) using static and dynamic models provides robust empirical evidence on the factors that affect the quality of life of the population in Latin America. The region has deep structural inequalities, institutional weaknesses, and territorial fragmentation, which condition the results obtained. In this context, it is essential to interpret the findings not only in terms of their statistical significance, but also in terms of their practical relevance and their interaction with the institutional, social, and economic conditions of each country.

One of the key findings is the positive relationship between subnational spending (expsub) and the HDI, which is particularly significant in the dynamic model. This result confirms the hypothesis that fiscal decentralization can be an engine of human development by allowing local governments

to design policies that are better tailored to the needs of their territories. However, its impact is conditional: in countries such as Brazil or Colombia, where subnational governments have administrative autonomy and technical capacities, the benefits are more visible. In contrast, in contexts such as Venezuela or Honduras, where political centralization and institutional weakness prevail, decentralization does not translate into effective improvements in well-being (Hung & Thanh, 2022; Sofilda et al., 2023).

Economic theory supports this evidence by pointing out that decentralization improves resource allocation and the efficiency of public services. However, the effect of decentralization is only statistically significant in certain models, suggesting that its effectiveness depends largely on institutional quality, local administrative capacity, and the existence of accountability mechanisms (Pinilla-Rodríguez et al., 2015; Delgado et al., 2022). Indeed, decentralization without governance can lead to clientelism or local capture of resources (Berçintürk & Yereli, 2022).

Another relevant finding is the strong correlation between access to drinking water (Water) and the HDI. Its significance in all models shows that basic service coverage continues to be a structural factor in development. However, beyond statistics, drinking water must be conceived as a fundamental human right (United Nations, 2010). Severe inequalities persist in the region, particularly in rural and indigenous areas, where coverage has not translated into regular, safe, and quality access. In countries such as Bolivia and Peru, expansion programs have had positive effects, but in others, such as Haiti and Nicaragua, water infrastructure remains precarious. Furthermore, when coverage is high—as in Chile or Uruguay—the marginal effect may be reduced, evidencing diminishing returns and suggesting that policies should also focus on quality, sustainability, and governance of the resource.

Spending on primary education per student (Eduexp) was significant in the static model but not in the dynamic model, which can be interpreted as a temporary lag in the educational effect on human development. Education has a stronger impact in the medium and long term, and its effect depends not only on the amount invested, but also on its efficiency, equity, and orientation. In Latin America, although education systems have improved in terms of coverage, they continue to reproduce inequalities: there are significant gaps between urban and rural areas and between public and private education (ECLAC, 2018). Countries such as Argentina and Chile, with high levels of investment, still show uneven results due to structural flaws in the quality of the system, which would explain the inconsistent effect of Eduexp on the HDI.

With regard to per capita health spending (Health), its positive but small effect suggests that, while health investment is important, its direct impact on the HDI is limited when not accompanied by improved spending efficiency. In countries such as Uruguay and Costa Rica, where there are solid universal systems, the impact is more tangible. However, in Guatemala, Paraguay, and El Salvador, the fragmentation of the health system, low investment, and corruption limit its effectiveness. Hence, it is necessary not only to increase spending but also to strengthen the governance of the health system (PAHO, 2019).

The rule of law (Rolaw) presents an interesting result: significant in the static model, but not in the dynamic model. This behavior suggests that legal institutions and trust in the legal system have a structural, but not immediate, impact on human development. In Latin America, the weakness of the rule of law—manifested in corruption, impunity, and the absence of efficient justice—has been a persistent obstacle. However, its effect could operate through indirect mechanisms, such as economic stability, the attraction of investment, or the efficiency of social spending. This implies that institutional strengthening must accompany any decentralization or public

investment policy, even if its effects on the HDI are only apparent in the long term.

Furthermore, it should be noted that the effects of the variables analyzed are not homogeneous across all social groups. Women, indigenous peoples, persons with disabilities, and rural populations often face multiple barriers that prevent them from equitably benefiting from public services, even when these are expanded or better financed. In this regard, it is essential to incorporate an intersectional and territorial approach in the formulation of public policies so that decentralization and social investment generate effective improvements in human development.

Finally, the results of the dynamic model, in which the HDI of previous years largely explains the current HDI, reinforce the idea that human development is a cumulative and structural process. This requires governments to maintain sustained, coherent, and long-term policies, especially in areas such as education, health, democratic governance, and water management. Political volatility and frequent changes in investment priorities can break the virtuous cycle required to improve human well-being in a sustained manner.

In conclusion, improving human development in Latin America requires solid multilevel governance, in which the central, regional, and local levels act in a coordinated manner, with clear rules, strengthened technical capacities, and a rights-based approach. Fiscal decentralization should be understood not as an end in itself, but as a means to democratize access to services, reduce inequality gaps, and empower territories in their development process.

Empirical analysis using static and dynamic models leads to the conclusion that access to drinking water and the decentralization of public spending are determining factors in improving the Human Development Index (HDI) in Latin America. These variables have a direct impact on the provision of basic services and on the responsiveness of subnational

governments to local needs. Investment in health and education also plays an important role, although its impact varies depending on the methodological approach: while education shows a significant effect only in the static model, health spending maintains a positive but marginal coefficient in both models. This shows that it is not enough to increase the resources allocated to these sectors, but that it is necessary to improve the efficiency and equity of their management, as well as to consider the time lags that characterize human capital outcomes.

As for the rule of law, its significance in the static model, but not in the dynamic model, suggests that its effect on human development operates through structural and long-term mechanisms, such as institutional stability, citizen trust, and legal certainty. For its part, the persistence of the HDI over time confirms that human development is not achieved through one-off interventions, but through sustained processes that require continuity of public policies, stable technical capacities, and favorable institutional environments. This cumulative trajectory reinforces the need to adopt comprehensive development strategies with a territorial focus that articulate social investment, institutional strengthening, and social cohesion.

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