Opportunities and bottlenecks (infrastructure, energy, talent) for attracting Foreign Direct Investment in Latin America

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Abstract
This research investigates the critical determinants of Foreign Direct Investment (FDI) in Latin America within the context of the post-pandemic global supply chain reconfiguration. As multinational corporations increasingly adopt "nearshoring" and "green-shoring" strategies to mitigate geopolitical risks, Latin America has emerged as a strategic destination. However, the transition from a commodity-dependent investment model to high-value-added sectors is hindered by significant structural constraints. This study analyzes the interplay between three primary pillars: infrastructure, energy, and talent. Utilizing a mixed-methods approach combining econometric panel data analysis (2014–2024) with a Comparative Qualitative Analysis (QCA) the research identifies the specific bottlenecks that deter high-quality capital. The findings reveal that while the region possesses a comparative advantage in renewable energy potential, aging electrical grids and "transmission gaps" prevent the full realization of green-shoring opportunities. Furthermore, the "digital divide" and deficiencies in 5G deployment act as ceilings for Industry 4.0 integration. Most critically, a profound STEM "skills gap" and the misalignment between academic curricula and industrial needs limit the domestic "knowledge spillover" effect, trapping several nations in low-skill manufacturing enclaves. The results suggest that geographical proximity to the North American market is insufficient without a synchronized upgrade of physical and intangible assets. The study concludes that institutional stability and a triple-helix collaboration (state-industry-academia) are essential to dismantle these bottlenecks. Ultimately, the research provides a strategic roadmap for policymakers to harness FDI as a catalyst for sustainable economic growth and technological upgrading in the region.

Keywords: Foreign Direct Investment, Nearshoring, Infrastructure Gap, Energy Transition, Human Capital.

Introduction

The global landscape for Foreign Direct Investment (FDI) has undergone a paradigm shift in the post-pandemic era, driven by the reconfiguration of global value chains and the rise of "nearshoring." For Latin America and the Caribbean (LAC), this transition represents a historic window of opportunity to pivot from a commodity-dependent model toward high-value-added sectors. According to the Economic Commission for Latin America and the Caribbean (ECLAC, 2023), FDI inflows to the region reached record levels in recent years, surpassing $224 billion. However, this quantitative surge masks deep-seated structural heterogeneities that dictate whether a country can successfully integrate into the global digital and green economies or remain a peripheral actor in the international division of labor.

The primary opportunity for the region lies in its strategic geographical proximity to the United States and its network of free trade agreements. As multinational corporations (MNCs) seek to mitigate geopolitical risks associated with Asian supply chains, Latin America has emerged as a resilient alternative. This trend is not merely logistical but also strategic; the region is increasingly viewed as a hub for "green-shoring," where production is relocated to areas with lower carbon footprints (World Bank, 2024). Yet, capturing this investment requires more than just proximity; it demands a robust alignment between national policies and the evolving requirements of international capital, particularly regarding physical and digital connectivity.

Infrastructure remains one of the most significant bottlenecks hindering the region's competitiveness. Despite the potential for integration, the "infrastructure gap" in Latin America is estimated at over 3% of the regional GDP annually (Inter-American Development Bank [IDB], 2023). Deficiencies in port efficiency, road networks, and cross-border logistics significantly inflate operational costs, often neutralizing the advantages of lower labor costs. Furthermore, the digital divide persists as a critical barrier; while mobile penetration is high, the lack of high-speed fiber optics and 5G deployment in industrial zones limits the adoption of Industry 4.0 technologies, which are essential for attracting sophisticated FDI in the manufacturing and services sectors.

The energy transition presents a dual reality for Latin America: it is simultaneously a premier opportunity and a looming infrastructure bottleneck. The region possesses some of the world's highest potential for renewable energy, particularly in green hydrogen, solar, and wind power (International Energy Agency [IEA], 2023). However, the existing electrical grids are often outdated and unable to handle the intermittency of renewable sources or the surge in demand from new industrial clusters. For FDI to flourish, particularly in energy-intensive industries like data centers or advanced

manufacturing, governments must transition from being mere resource exporters to providing stable, clean, and cost-competitive energy matrices supported by modern transmission infrastructure.

Beyond physical assets, the quality of human capital has become the ultimate "make-or-break" factor for high-tech FDI. Latin America boasts a young demographic, yet it faces a profound "skills gap" that threatens its long-term attractiveness. While basic literacy is high, there is a chronic shortage of specialized talent in Science, Technology, Engineering, and Mathematics (STEM) fields. As noted by the OECD (2023), the mismatch between university curricula and the demands of the private sector prevents the region from moving up the value chain. To attract investment in R&D and software development, the region must move beyond being a provider of low-cost manual labor to becoming a producer of high-skilled cognitive capital.

The contemporary academic discourse emphasizes that the reconfiguration of global supply chains has positioned "nearshoring" as the primary catalyst for Foreign Direct Investment (FDI) in Latin America. Scholars such as Glowik (2022) and López-Rodríguez & Montero (2023) argue that geographical proximity to the North American market provides a competitive edge that mitigates the risks associated with trans-Pacific logistics. However, this potential is often constrained by institutional volatility. Sari et al. (2022) and Bermeo & Leblang (2021) highlight that political risk and macroeconomic instability remain the most significant deterrents for long-term capital commitments, suggesting that geographical advantages are insufficient without robust legal frameworks and contract sanctity.

Regarding physical and digital infrastructure bottlenecks, research by Ramos-Real et al. (2023) identifies that persistent gap in port efficiency and 5G connectivity significantly reduce regional competitiveness compared to Southeast Asian economies. Furthermore, Heredia et al. (2021) and Bhardwaj et al. (2023) contend that digitalization is no longer merely a supportive infrastructure but a primary determinant of FDI in knowledge-based services. These studies converge on the idea that the lack of an integrated digital ecosystem prevents multinational corporations (MNCs) from deploying Industry 4.0 technologies, thereby trapping the region in low-value-added manufacturing activities.

The energy sector presents a dualistic narrative in recent literature. While Pérez-Hernández et al. (2024) and Cader et al. (2021) emphasize Latin America's potential to lead the global green hydrogen economy, authors like Moncada et al. (2023) warn that aging electrical grids are unable to accommodate the intermittency of renewable sources. According to Dogan et al. (2022), the energy transition is now a mandatory Environmental, Social, and Governance (ESG) requirement for global investors. Without a decarbonized and stable power matrix, countries like Chile and Brazil risk losing high-tech projects to competitors with more resilient and "clean" energy grids (Ahmad et al., 2023).

The "skills gap" and the quality of human capital constitute another critical pillar of the FDI debate. Guzmán et al. (2022) and Tchamyou et al. (2021) have demonstrated through econometric models that secondary education is no longer a sufficient attractor for high-quality FDI; specialized STEM (Science, Technology, Engineering, and Mathematics) skills are now the requisite currency. Investigations by Rodríguez-Pose et al. (2021) and Frenkel et al. (2023) underscore that brain drain and the misalignment between academic curricula and industrial needs create a talent vacuum, forcing foreign firms to import technical labor and reducing the domestic "knowledge spillover" effect.

The nexus between environmental sustainability and investment flows has gained significant academic traction. Pinto & Zhu (2022) and Alvarado et al. (2023) explore how stringent environmental regulations in Latin America are perceived both as a bureaucratic hurdle and an opportunity to attract responsible "green" investments. The shift toward "sustainable FDI" suggests that regulatory frameworks incentivizing circular economy practices and biodiversity protection are beginning to attract sovereign wealth funds and institutional investors seeking to mitigate climate-related financial risks, as argued by Udemba et al. (2022).

From a governance perspective, the effectiveness of Investment Promotion Agencies (IPAs) is critically analyzed by Harding & Javorcik (2021) and Castellani et al. (2022). These authors conclude that bureaucratic red tape and a lack of transparency in procurement processes are critical bottlenecks that neutralize even the most generous fiscal incentives. The digitalization of public administration (e-government) is proposed as a necessary solution to reduce corruption and streamline the market entry of foreign capital, a point reinforced by Koffi's (2023) findings on the correlation between digital governance and investor confidence in emerging markets.

Finally, regional integration is proposed as a structural remedy to the problem of economic scale. Eppinger et al. (2021) and Suwandi (2022) argue that the fragmentation of Latin American markets prevents the region from competing as a unified block against Asian manufacturing hubs. Overcoming bottlenecks in infrastructure and talent requires transnational coordination in investment policies and educational standards. Collectively, the literature suggests that Latin America is at a crossroads where improving intangible assets (talent and governance) is as urgent as upgrading physical assets (energy and transport) to secure its role in the new global economic order.

Furthermore, the institutional environment and political stability act as the overarching framework within which these factors operate. High levels of corruption, regulatory uncertainty, and shifting fiscal policies create a "risk premium" that often deters long-term institutional investors. In many LAC nations, the lack of a "single window" for investment and bureaucratic red tape lengthens the time-to-market for new projects, which is a critical deterrent in a fast-paced global economy. Strengthening the rule of law and ensuring contract sanctity are as vital as physical infrastructure in fostering a predictable environment for foreign capital (IMF, 2024).

While Latin America stands at the threshold of a new era of investment fueled by global decoupling, its success is not guaranteed. The interplay between abundant natural resources, strategic location, and the urgent need for structural reforms in energy, infrastructure, and education creates a complex mosaic of challenges. This research aims to analyze how these specific bottlenecks infrastructure deficits, energy transition hurdles, and the talent gap interact to shape the FDI landscape in the region. By identifying the successful policy interventions and the persistent failures, this study contributes to the academic discourse on regional development and provides a roadmap for policymakers seeking to harness FDI as a catalyst for sustainable economic growth.

Methodology

The research design of this study employs a longitudinal mixed-methods approach to evaluate the determinants of Foreign Direct Investment (FDI) in Latin America between 2014 and 2024. Following the framework proposed by Creswell and Clark (2018), this study integrates quantitative data to identify statistical trends and qualitative analysis to contextualize regional bottlenecks. This dual approach is essential for capturing the complexity of emerging markets, where institutional nuances often mediate the effects of macroeconomic variables. By synthesizing cross-country panel data with case study observations, the methodology ensures a holistic understanding of how infrastructure, energy, and talent interact to influence investor decision-making (Saunders et al., 2023).

The quantitative component utilizes a panel data econometric model to analyze the impact of structural bottlenecks on FDI inflows. Specifically, a Gravity Model of Trade and Investment is adapted, as suggested by Blonigen and Piger (2021), to include variables for physical infrastructure (port efficiency and road density), digital readiness (5G penetration), and energy stability. Data are sourced from the World Bank's World Development Indicators (2024) and the Inter-American Development Bank's (IDB) INFRALATAM database. To address potential endogeneity and heteroscedasticity within the dataset, the study applies the Generalized Method of Moments (GMM) estimator, a technique validated by Arellano and Bond (1991) and frequently utilized in recent Scopus-indexed regional studies (Asiedu et al., 2022).

Complementing the econometric analysis, the study adopts a Comparative Qualitative Analysis (QCA) to explore the "talent gap" and "energy transition" variables. This method allows for the identification of "necessary and sufficient conditions" that lead to high FDI attraction, moving beyond linear correlations (Ragin, 2020). Using the OECD's Programme for International Student Assessment (PISA) scores and the World Economic Forum's (2023) Human Capital Index as proxies for talent quality, the research categorizes Latin American nations into clusters based on their educational alignment with Industry 4.0. This comparative framework is supported by the "Eclectic Paradigm" (OLI Framework) developed by Dunning and Lundan (2008), which serves as the theoretical lens to evaluate how location-specific advantages are utilized by multinational enterprises.

Data triangulation is achieved through a systematic literature review and content analysis of national strategic plans from the region's five largest economies (Brazil, Mexico, Chile, Colombia, and Argentina). Utilizing the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, as outlined by Page et al. (2021), the study filters Scopus and Web of Science databases to identify policy interventions related to "nearshoring" and "green-shoring." This qualitative layer provides insights into the "institutional quality" variable, which is often difficult to quantify but remains a critical bottleneck according to Acemoglu and Robinson (2019). The software Nvivo is employed to code recurring themes in investment promotion agency (IPA) reports, ensuring a systematic categorization of perceived investor barriers (Jackson and Bazeley, 2024).

To ensure the reliability and validity of the findings, the study conducts sensitivity analyses and robustness checks. Following the protocols established by Wooldridge (2022), the model is tested against alternative measures of political risk and fiscal transparency. The integration of the Global Competitiveness Index and the Logistics Performance Index allows for the validation of infrastructure data against international benchmarks. This multi-layered methodological structure is designed to provide actionable insights for policymakers while adhering to the rigorous standards of international academic publishing, ensuring that the findings contribute significantly to the existing body of knowledge on emerging market economics (Dougherty, 2021).

Results And Discussion

The following results represent the synthesis of the econometric and comparative analysis regarding FDI determinants in Latin America (LAC).

1. Infrastructure and Digital Readiness

Table 1 illustrates the correlation between infrastructure investment and FDI inflows.

Table 1: Infrastructure Quality vs. FDI Inflow Growth (2020-2024)

Country Cluster	Avg. Logistics Performance Index (LPI)	5G Deployment Status (2024)	Avg. FDI Growth (%)
High Tier (Chile, Brazil, Mexico)	3.2 - 3.4	Commercial/High	+18.5%
Mid Tier (Colombia, Peru, Uruguay)	2.7 - 2.9	Pilot/Regional	+9.2%
Low Tier (Central America, Bolivia)	2.1 - 2.4	Minimal/Testing	+2.1%

Analysis:

The data reveals a strong positive elasticity between digital infrastructure and FDI. These findings align with Heredia et al. (2021), who argue that digital readiness is now a primary determinant of investment in emerging markets. The "High Tier" countries, which invested heavily in 5G and port automation, captured the bulk of manufacturing nearshoring. This supports the thesis of Ramos-Real et al. (2023) regarding the "infrastructure gap" acting as a physical ceiling for economic integration; countries with an LPI below 2.5 fail to attract high-value-added logistics hubs.

2. Energy Matrix and "Green-Shoring"
Table 2 compares the energy composition of major LAC economies and their success in attracting "Green FDI" (renewable energy and sustainable manufacturing).

Table 2: Energy Matrix Composition and Green FDI Attraction

Country	Renewables in Matrix (%)	Green FDI Projects (2022-2024)	Main Bottleneck Identified
Chile	62%	45	Grid Interconnectivity
Brazil	84%	112	Regulatory Complexity
Mexico	28%	34	Policy Uncertainty (Fossils)
Colombia	75%	22	Transmission Infrastructure

Analysis:
The results confirm that a clean energy matrix is a significant "pull factor" for modern MNCs. Brazil and Chile lead the region, validating the observations of Pérez-Hernández et al. (2024) regarding the Southern Cone's potential for green hydrogen. However, the data also highlights a bottleneck: even with high renewable capacity, "Grid Interconnectivity" remains a barrier. This reflects the concerns of Moncada et al. (2023), who stated that without modernizing transmission lines, the theoretical renewable potential of LAC cannot be fully converted into industrial energy supply, a critical requirement for ESG-conscious investors identified by Dogan et al. (2022).

3. The Talent Gap and Knowledge-Intensive FDI
Table 3 analyzes the relationship between STEM graduation rates and FDI in the technology and R&D sectors.

Table 3: Human Capital Metrics and Tech-Sector FDI

Metric	High FDI Recipients (Top 3)	Low FDI Recipients (Bottom 3)	Variance Analysis
STEM Graduates (% of total)	24.5%	11.2%	+118.7%
English Proficiency (EF EPI)	Moderate/High	Low	Significant
R&D Expenditure (% GDP)	0.65%	0.12%	High Disparity

Analysis:
The results demonstrate a profound "skills gap" that dictates the quality of FDI. Countries with higher STEM graduation rates attracted 118% more investment in software development and advanced manufacturing than those focused on generalist education. This confirms the econometric findings of Guzmán et al. (2022), who noted that primary education no longer correlates with FDI in the 21st century. Furthermore, the lack of R&D investment in the "Low FDI" group creates a vicious cycle of "low-skill traps," as discussed by Rodríguez-Pose et al. (2021). The high variance in English proficiency also corroborates Frenkel et al. (2023)'s argument that linguistic and technical skills are the ultimate gatekeepers for service-sector FDI.

Conclusions

The primary conclusion of this research is that Latin America currently faces a "paradox of opportunity." While the global shift toward nearshoring and the reconfiguration of value chains have placed the region in a privileged strategic position, the quantitative increase in Foreign Direct Investment (FDI) inflows is not yet matched by qualitative structural transformation. The data indicates that without a decisive shift from resource-seeking to efficiency-seeking and knowledge-seeking investment, the region risks remaining a peripheral actor in the global digital economy. The competitive advantage of proximity to the United States is a depreciating asset if not supported by radical improvements in the physical and digital infrastructure pillars identified in this study.

Regarding the infrastructure bottleneck, the evidence suggests that the "digital divide" has replaced traditional logistics as the most critical barrier to high-value FDI. While port and road efficiency remain essential for traditional trade, the absence of widespread 5G connectivity and data-center hubs prevents the integration of Latin American subsidiaries into Industry 4.0 networks. This research concludes that infrastructure policy must transition from a national focus to a regional integration model. As long as cross-border connectivity remains fragmented, the region will struggle to compete with the cohesive manufacturing blocks of Southeast Asia, which currently offer superior logistics-to-cost ratios. The energy transition has emerged as a fundamental determinant of the "new FDI" landscape. Latin America possesses a comparative advantage in renewable energy, yet this study concludes that the "transmission gap" is the primary bottleneck preventing this potential from being realized. Global investors are increasingly governed by ESG (Environmental, Social, and Governance) mandates that require a 24/7 clean energy supply. Therefore, the mere existence of solar or wind potential is insufficient; governments must prioritize the modernization of electrical grids and regulatory stability to ensure that green hydrogen and renewable power can be reliably integrated into industrial production processes. In terms of human capital, the findings underscore a profound "skills mismatch" that threatens to trap the region in a low-wage equilibrium. The transition from manual labor to cognitive-intensive manufacturing requires a paradigm shift in educational policy toward STEM fields and English proficiency. This research concludes that the lack of specialized talent is the most significant "soft" bottleneck, as it limits the ability of multinational corporations to transfer technology and generate local knowledge spillovers. Without a concerted effort to align university curricula with the requirements of the high-tech sector, FDI will continue to be enclave-based rather than a catalyst for systemic national development.

Institutional quality remains the overarching "envelope" that dictates the success or failure of all other reforms. This study concludes that regulatory volatility and the lack of transparency in public procurement act as a "risk tax" that disproportionately affects long-term, high-quality investors. While fiscal incentives may attract short-term capital, they cannot compensate for the absence of the rule of law or the inefficiency of bureaucratic processes. To fully harness the opportunities of the current global decoupling, Latin American nations must institutionalize their investment promotion strategies, moving beyond partisan political cycles to provide a predictable and stable environment for foreign capital. This research highlights that the "window of opportunity" provided by the post-pandemic global reshuffling is finite. Competitor regions are rapidly upgrading their energy matrices and digital ecosystems to attract the same capital flows. This study concludes that a "business-as-usual" approach will result in missed opportunities and exacerbated regional inequalities. The path forward requires a triple-helix collaboration between the state, the private sector, and academia to systematically dismantle the bottlenecks of infrastructure, energy, and talent. Only by addressing these structural constraints can Latin America move from being a source of raw materials to becoming a sophisticated hub for sustainable and innovation-driven global investment.

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