Harnessing intellectual property for development: Opportunities and challenges for Latin America and the Caribbean

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Foreword

Innovation plays a central role in structural transformation, productivity growth, and long-term economic development. A well-functioning and balanced intellectual property (IP) system can incentivise creativity, facilitate knowledge diffusion, and help firms and institutions appropriate returns from innovative activity.

Over the past decade, studies have demonstrated that industries that are using patents and other IP rights intensively form the backbone of European economies, driving a disproportionate share of GDP, high-quality employment, and external trade. Further research has underscored the transformative power of IP at the microeconomic level: for universities, research institutions, small and medium-sized enterprises (SMEs), and dynamic start-ups, patents and trademarks serve as vital instruments for securing risk finance, accelerating growth, and navigating competitive markets.

For Latin America and the Caribbean (LAC), harnessing this dynamic is more complex and context dependent. The region faces persistent productivity gaps and limited productive diversification. To address these challenges, it needs to translate knowledge and research capabilities into broad-based economic upgrading. In this setting, patent systems are instrumental to strike the right balance between incentives for innovation and technology diffusion in order to support production transformation. Achieving this will require aligning IP frameworks with wider productive development policies, as well as strengthening the capabilities needed to make them effective.

Recognising the imperative to equip policymakers with robust, region-specific evidence, the EPO and the Economic Commission for Latin America and the Caribbean (ECLAC) have collaborated with a simple goal of bringing the policy discussion on IPR closer.

This partnership bridges the EPO's expertise in patent data analytics with ECLAC's production data and work on productive development. It also builds on the successful collaboration initiated by the EPO and five Latin American IP offices (Brazil, Chile, Colombia, Mexico, Peru) at the occasion of a study on digital agriculture published in September 2025.

The joint study offers new evidence on the relationship between patent and trade mark protection and economic activity in nine countries of Latin America and the Caribbean. By linking IP rights and economic data at a highly disaggregated level, it provides an up-close view of how patents and trademarks connect to economic performance, particularly within the manufacturing sector. The study also helps distinguish between local innovation activity and foreign technological presence.

The central message of the joint study is that IP policy cannot operate in isolation. To unlock its full economic benefit, and to minimize frictions, IP must be integrated into broader productive development policies. The strategic advantages of IP are most fully realised when supported by strong research capabilities, effective technology transfer mechanisms, access to scale-up finance, deep university-industry linkages and broader policies aimed at production transformation.

This study is designed to serve as a resource for decision-makers, business leaders, and researchers alike. It is our shared hope that the insights provided herein will elevate IP awareness, foster stronger regional cooperation, and inspire evidence-based policies that empower Latin America and the Caribbean countries to harness the power of innovation for productive and sustainable development.

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Executive summary

The countries of Latin America and the Caribbean (LAC) face complex development challenges, characterised by a low capacity for growth and structural productivity gaps (ECLAC, 2024a; ECLAC, 2025). Addressing this productivity imperative through productive development policy aimed at diversification, technological sophistication and positive structural change is central to the region's economic agenda and critical for tapping regional potential for innovation, sustainable and productive development. The manufacturing sector occupies a central place in this process due to its historically demonstrated role as a locus for dynamic increasing returns, capability-building, technological diffusion and dense intersectoral linkages. Although the region has experienced shifts in its productive structure over the past half century – notably a decline in manufacturing value added as a share of gross domestic product (GDP) – manufacturing remains a critical engine for sustained economic catch-up and the development of industries capable of competing in international value chains.

In a region where research and development (R&D) investment remains comparatively low and is financed primarily by the public sector and executed in academia, intellectual property rights (IPR) can support innovation and bring new technologies to the market, especially when complementary capabilities are in place. Because almost all patent applications filed in the LAC region target the manufacturing sector, patenting activity provides a reliable signal of both domestic technological capabilities and cross-border knowledge flows. While IP matters across the wider economy, this study focuses on manufacturing because it covers most patenting activity in LAC and offers the most comparable cross-country data on employment, value added, wages and trade.

By examining how patents and trade marks are distributed across manufacturing industries, this study connects IP utilisation directly with core economic outcomes, including employment, value added, wages and trade performance. Ultimately, applying a patent lens clarifies the distinction between local innovation, foreign technological presence and the region's position in global networks, identifying the region's underlying potential for innovation and technology-led development.

Recognising the need to co-ordinate productive development policy[1] and innovation policy, the European Patent Office (EPO), with its specialised knowledge of patent data and analytics, and the Economic Commission for Latin America and the Caribbean (ECLAC), with expertise in regional macroeconomic and productive development policies, have partnered to investigate and provide evidence on the role of IPR in the region's economic development. Drawing on a novel and comprehensive range of IP and economic data collected and merged across nine different countries, this study assesses the economic impact of manufacturing industries and their exposure to innovation and IP. It offers evidence at country and regional levels, making it possible to derive relevant policy insights at the same level while also comparing specific national patterns against the regional benchmark.

1 ECLAC tends to refer to productive development policy rather than industrial policy because the former better reflects its current approach. It covers a broader set of sectors, not only manufacturing, it places more weight on governance, coordination, and implementation, and it relies on a wider mix of policy instruments than the more traditional view of industrial policy (see Salazar-Xirinachs and Llinás, 2023).

Key message 1: IPR-intensive industries show disproportionate value added and wage premiums in LAC manufacturing

Out of 136 manufacturing classes analysed across nine LAC countries,[2] 44 are IPR-intensive (31 patent-intensive, 24 trade mark-intensive and 11 intensive in both). Despite their modest employment footprint, these industries deliver outsized economic value and offer significantly higher wages than non-IPR-intensive manufacturing sectors.

During the period 2016-2020, IPR-intensive manufacturing industries employed roughly 1.68 million workers (12.4% of formal manufacturing employment) and generated 13.0% of manufacturing value added (over USD 68.2 billion). This productivity advantage translates directly to the workforce: workers in IPR-intensive industries earned a 32.1% wage premium over their peers in non-IPR sectors, an advantage that surges to 56.2% in purely patent-intensive industries.

Figure E1

Economic contribution of IPR-intensive manufacturing industries in nine LAC countries (2016-2020 averages)

IPR-intensive category	Employment (absolute)	Share of total employment	Value added (USD million)	Share of total value added	Wage per employee (USD)	Wage premium	Value added per employee (USD)	Value added per employee premium
Patent intensity	961 426	7.1%	42 971	8.2%	18 396	56.2%	44 695	16.0%
Trade mark intensity	1 107 530	8.2%	42 518	8.1%	14 385	22.1%	38 390	-0.4%
All IPR-intensive	1 679 116	12.4%	68 240	13.0%	15 563	32.1%	40 641	5.4%

Source: ECLAC, EPO

2 Based on ISIC Rev.4. Due to data availability, this study focuses on Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Mexico, Peru and Uruguay (LAC9) for most of the analysis linking IPR to economic outcome variables.

Key message 2: Patent-intensive industries-intensive industries are associated with higher labour productivity

Patent intensity is correlated with economic performance across manufacturing classes. While trade mark intensity shows near-zero correlation with productivity and wages, patent intensity positively and significantly correlates with higher wage intensity regionally (LAC9).

At the country level, this strong, statistically significant relationship with both domestic labour productivity and wage premiums is primarily concentrated in Brazil, Chile, Ecuador and Mexico. Only in Argentina does patent intensity show a significant negative correlation with wage intensity.

Figure E2

Correlation of patent and trade mark intensity with labour productivity and wage intensity by LAC country

Source: ECLAC, EPO

Note: Numbers display correlation coefficients between variables. Significance levels: *** p < 0.01; ** p < 0.05; * p < 0.1.

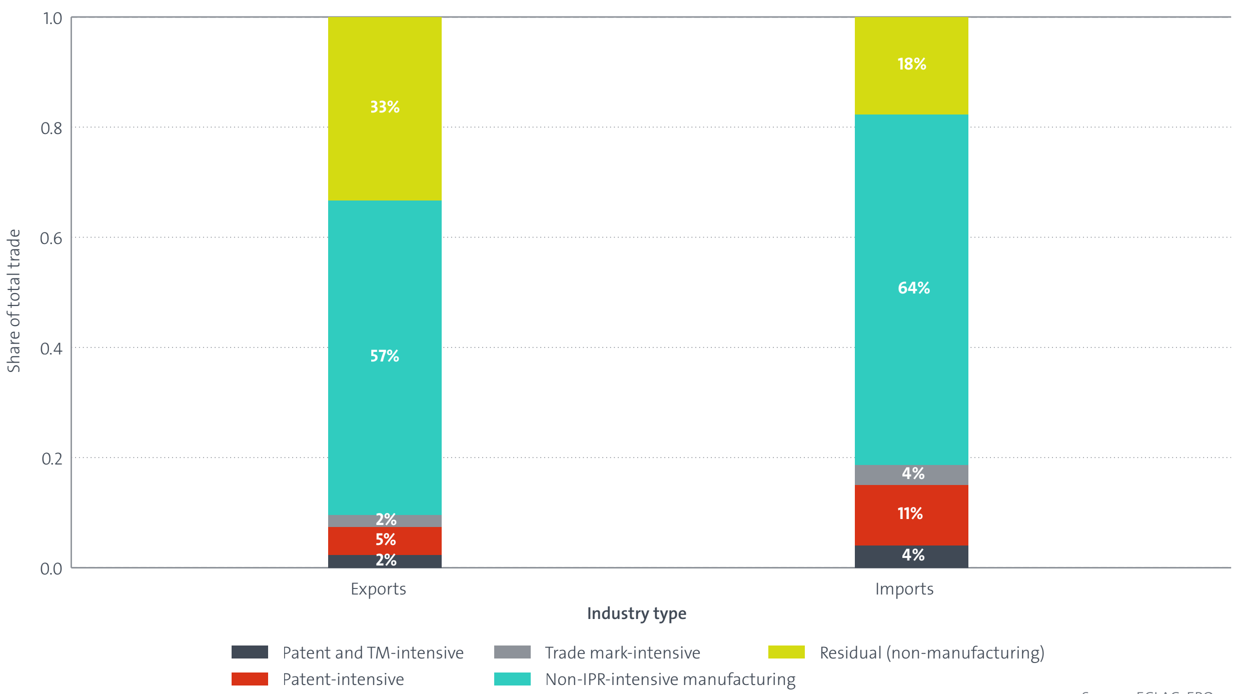
Key message 3: LAC is a net importer in IPR-intensive manufacturing

Manufacturing represents two-thirds of regional goods exports and over 80% of goods imports (2016-2020). However, IPR-intensive industries generate only 9% of regional exports, while manufacturing accounts for 57%. On the import side, this dynamic is reversed: IPR-intensive industries make up 19% of total imports, with patent-intensive sectors alone accounting for 15%.

This structural imbalance is confirmed by correlation analysis across all nine LAC countries, which shows that patent intensity correlates positively with both export and import intensities, but its correlation with import intensity is systematically and significantly stronger. Ultimately, the region relies heavily on imported IPR-intensive goods while exporting primarily non-IPR-intensive products. This physical trade imbalance is consistent with the region's financial flows associated with intellectual property.

Figure E3

Composition of LAC9 trade by industry type: exports vs. imports



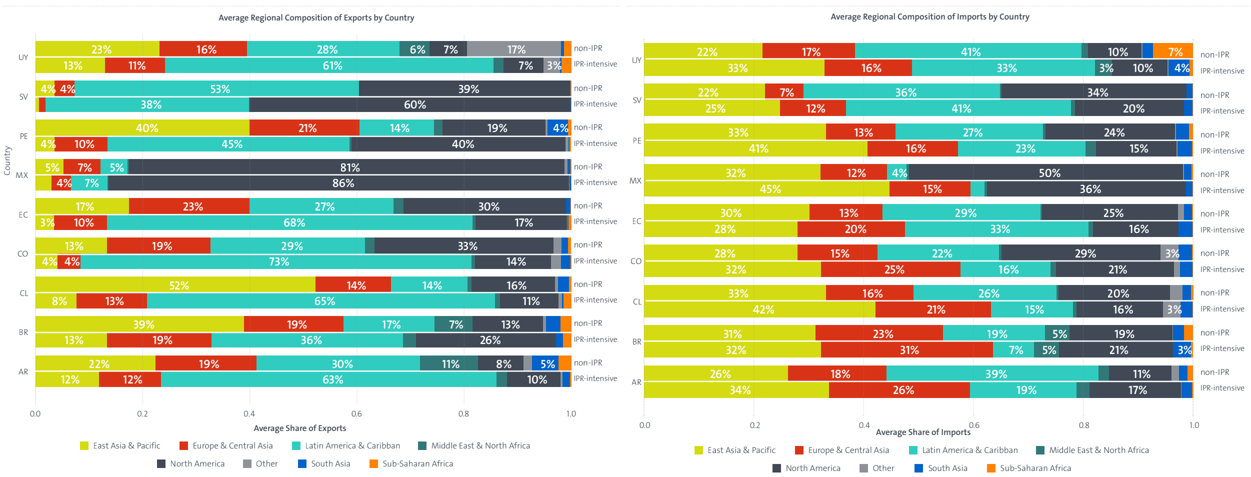
Source: ECLAC, EPO

Geographic trade flows divide the LAC region into distinct profiles. Mexico functions as a highly integrated near-shored assembly node: it relies heavily on East Asia for imports into IPR-intensive industries (45%), and exports 86% of its output in IPR-intensive industries almost exclusively to North America. In contrast, South American economies display other structural asymmetries in their geographic trade flows. Across Brazil, Argentina, Chile and Peru there is a deep reliance on the East Asia and Pacific region and Europe for imports in IPR-intensive sectors, while exports to these areas remain overwhelmingly concentrated in non-IPR sectors. This indicates South America successfully exports primary-processed, non-IPR dependent goods globally, but remains structurally dependent on foreign hubs for advanced proprietary technologies.

While aggregate LAC data suggest intra-regional trade is relatively low, this is heavily distorted by Mexico's trade volume with North America. When isolating South American nations, the Latin American market emerges as the single most vital destination for their IPR-intensive manufacturing output. Colombia directs 73% of its exports in IPR-intensive manufacturing to regional neighbours. In stark contrast, intra-regional trade is much less significant in non-IPR-intensive industries. This suggests that South America's non-IPR sectors are globally integrated, whereas its IPR-intensive industries (like basic chemicals, plastics and pharmaceuticals) rely on the localised demand, geographic proximity and regulatory alignment provided by the Latin American market.

Figure E4

Regional composition of trade by LAC country: IPR-intensive vs. non-IPR-intensive sectors



Source: ECLAC, EPO

Note: The IPR category includes trade flows from trade mark-intensive, patent-intensive and jointly IPR-intensive industries.
The non-IPR-intensive category combines manufacturing only industries and residual (non-manufacturing) industries.

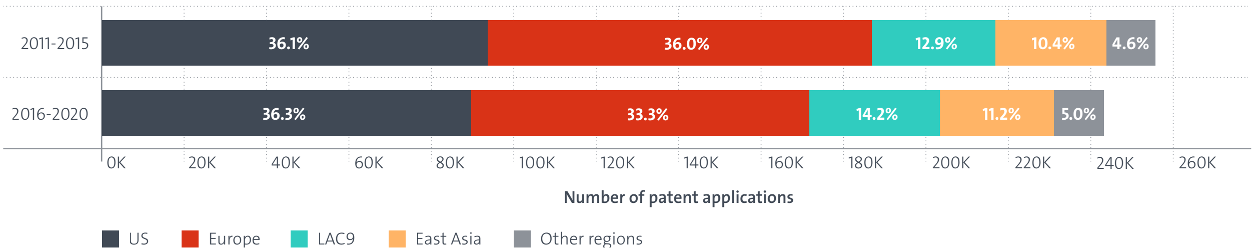
Key message 4: Latin America is a destination for foreign innovation

Latin America functions primarily as a destination for protecting inventions generated abroad, mirroring the trade dynamics of the region's reliance on imports in IPR-intensive sectors. Between 2011 and 2020, over 500 000 patent applications were filed across the nine LAC countries. More than 85% of these originated from outside the region, specifically from the USA (36.2%) and Europe (34.7%). By contrast, domestic LAC applicants accounted for only 13.5% of all filings, while East Asia (primarily Japan, P.R.China and the Republic of Korea) contributed approximately 10.8%.

Comparing the periods 2011-2015 and 2016-2020 reveals a changing landscape of patent origins. Total foreign filings dropped due to declining demand for protection from the USA (-4.5%) and Europe (-11.9%). Simultaneously, patenting activity from local LAC applicants increased by 4.8%, raising their overall share from 12.9% to 14.2%—a trend largely driven by domestic filings from Brazil. East Asia's overall volume remained stable, but underwent a major compositional shift: applications from Japan declined by 21.2%, while filings from China surged by nearly 80%.

Figure E5

Breakdown of patent applications in LAC by applicant origin (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

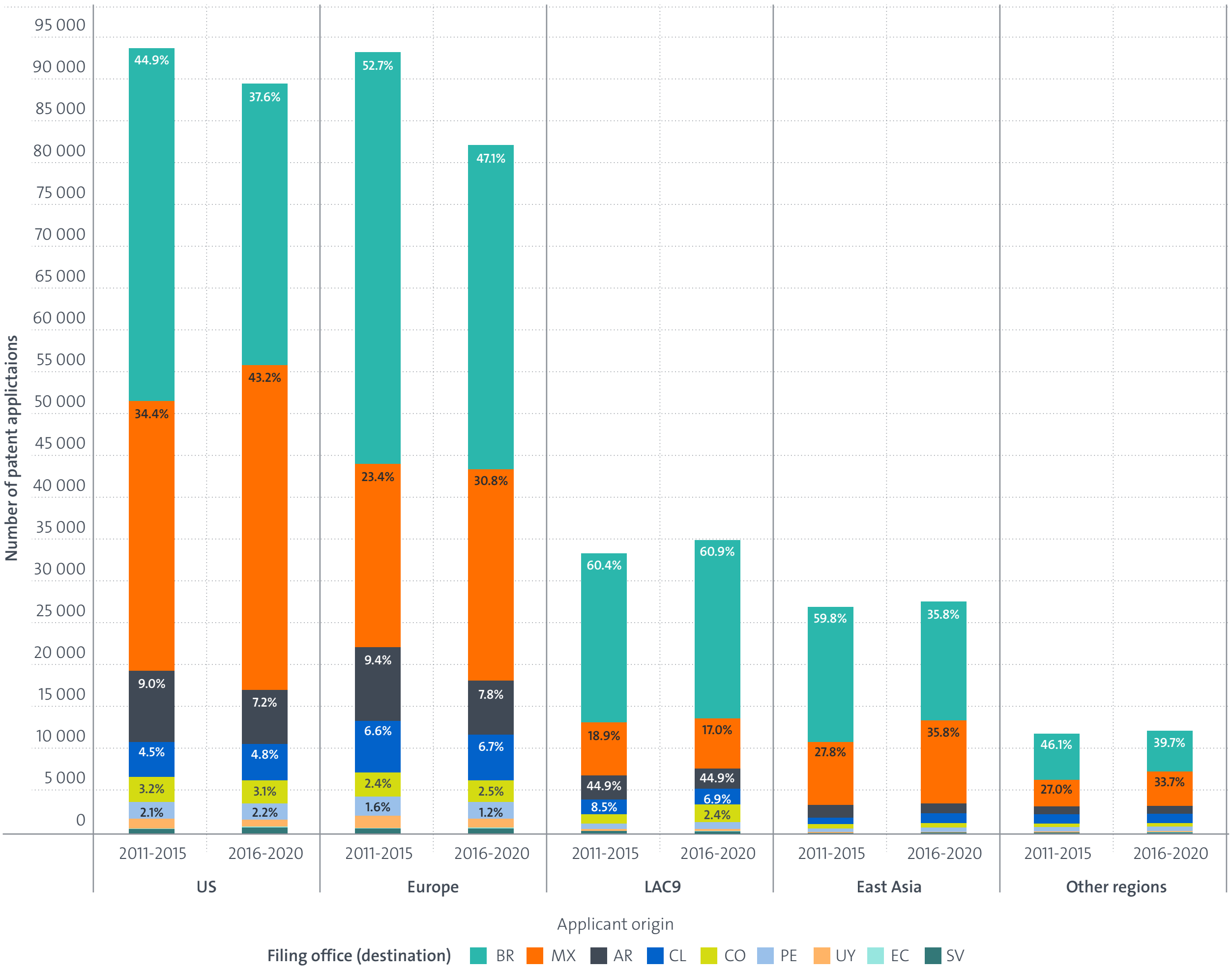
Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

Foreign and domestic demand for patent protection is not evenly distributed but heavily centralised in the region's two largest economies. Over the decade, Brazil accounted for 48.4% of all filings, and Mexico captured 30.6%. Together, these two countries host nearly four out of every five patent applications in the region. Argentina follows at a considerable distance (7.9%), ahead of Chile (5.6%) and Colombia (3.3%).

However, destination preferences shifted between the two periods: Mexico has grown in importance as a filing destination, while Brazil's overall share has diminished, an effect driven particularly by changing filing behaviour among US and European applicants.

Figure E6

Patent applications in LAC by applicant origin and filing destination (2011-2015 vs. 2016-2020)



Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

Source: ECLAC, EPO

Key finding 5: LAC research institutions drive patenting in patent-intensive sectors

Within LAC9, public research institutions—like universities and national labs—are the primary drivers of patenting towards IPR-intensive industries. Across both periods, these institutions directed roughly half of their patenting activity toward patent-intensive manufacturing (51.8% in 2011-2015, shifting to 49.9% in 2016-2020). The critical role of LAC universities and public research organisations (PROs) is also reflected in their growing share of overall domestic patenting.

Filings by universities and PROs (Research institutions) rose from 22.4% to 29.1% over the two periods. In contrast, domestic private companies and individual inventors predominantly focus on non-patent-intensive sectors, indicating that domestic corporate innovation remains geared toward traditional, less complex manufacturing, leaving the public sector to generate more foundational innovations. The share of private companies among domestic patent filings is remarkably low and fell from 32.1% in 2011-2015 to just 25.9% in 2016-2020, underscoring a possible structural weakness in corporate R&D commercialisation.

Figure E7

Composition of patent applications in LAC by origin, applicant and industry type (2011-2015 vs. 2016-2020)

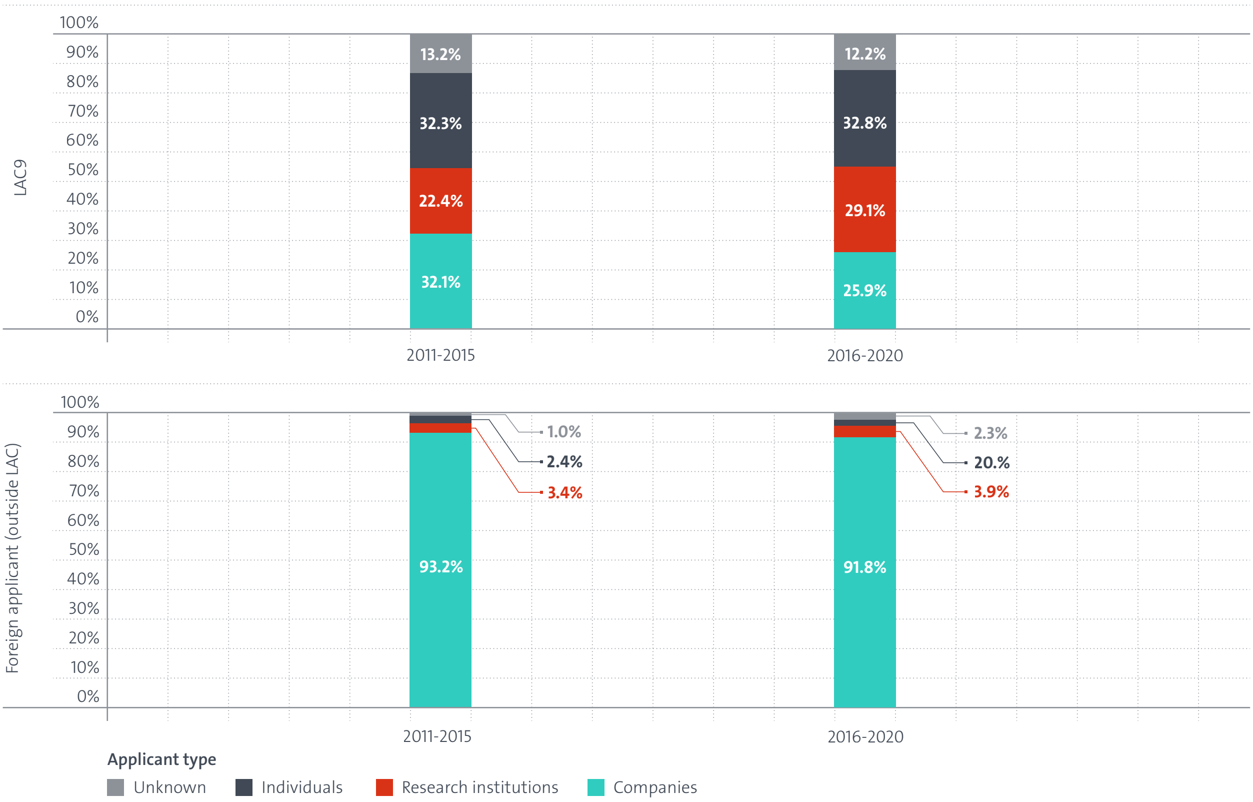
Source: ECLAC, EPO

Foreign applicants exhibit a structurally different filing pattern compared to domestic entities. Among patent filings from foreign applicants, the contribution to patent-intensive sectors is significantly higher across all actor types. For instance, foreign research institutions directed 62.2% of their filings to patent-intensive manufacturing in 2011-2015, rising to 67.2% in 2016-2020.

Crucially, this high concentration is especially pronounced for foreign private companies, which dominate the total volume of external filings. These consistently allocate their largest share of patenting activity to patent-intensive industries, underscoring the gap between local industrial capabilities and imported corporate technology.

Figure E8

Composition of patent applications in LAC by applicant type and origin (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

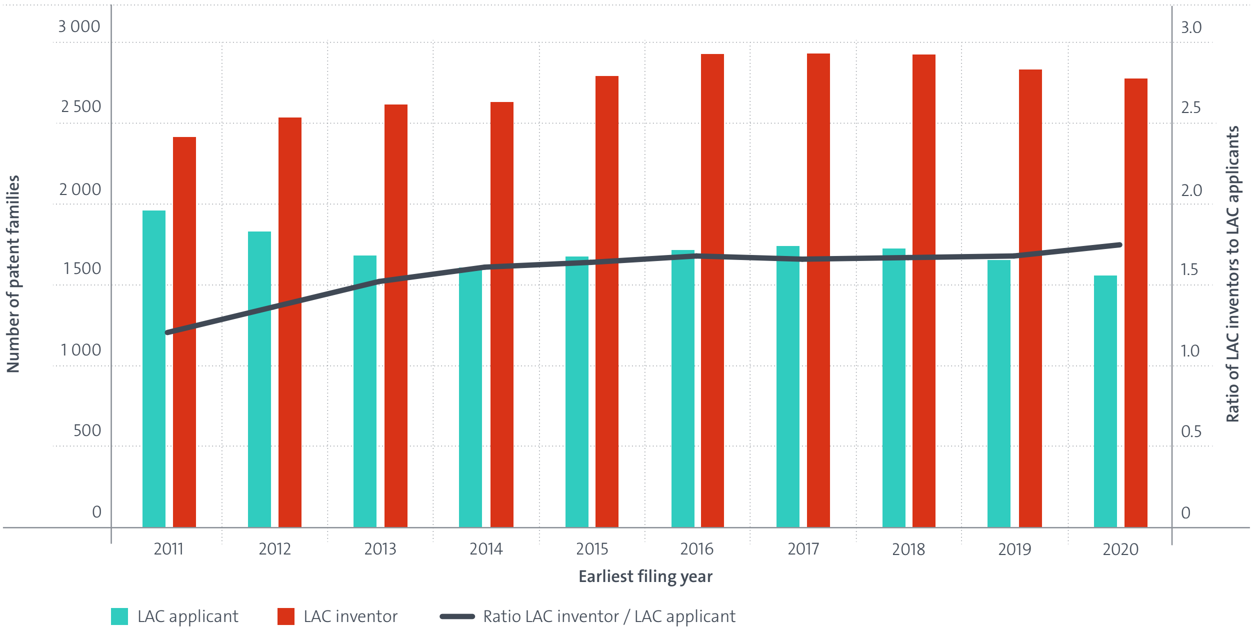
Key finding 6: The gap between LAC inventorship and ownership of patent families with global impact is expanding, especially in ICT

A comparison between the number of patent families targeting foreign markets featuring a LAC inventor versus those with a LAC applicant reveals a significant and widening gap. The absolute volume of patent families with contributions from LAC inventors is substantially larger than those owned by domestic applicants, indicating that LAC-based talent generate a much larger global technological impact than local institutions can capture. Furthermore, the trajectories of these two metrics have diverged over the last decade.

Consequently, the ratio of LAC-invented to LAC-applicant patent families with patent filings outside LAC has grown steadily, from 1.2 in 2011 to 1.8 in 2020. This rising ratio indicates an increasing structural dynamic across almost all LAC9 countries; LAC-based researchers are successfully integrated into international innovation ecosystems, but the resulting IPR are captured by foreign entities.

Figure E9

Volume of patent families targeting foreign markets with LAC inventors vs. LAC applicants (2011-2020)



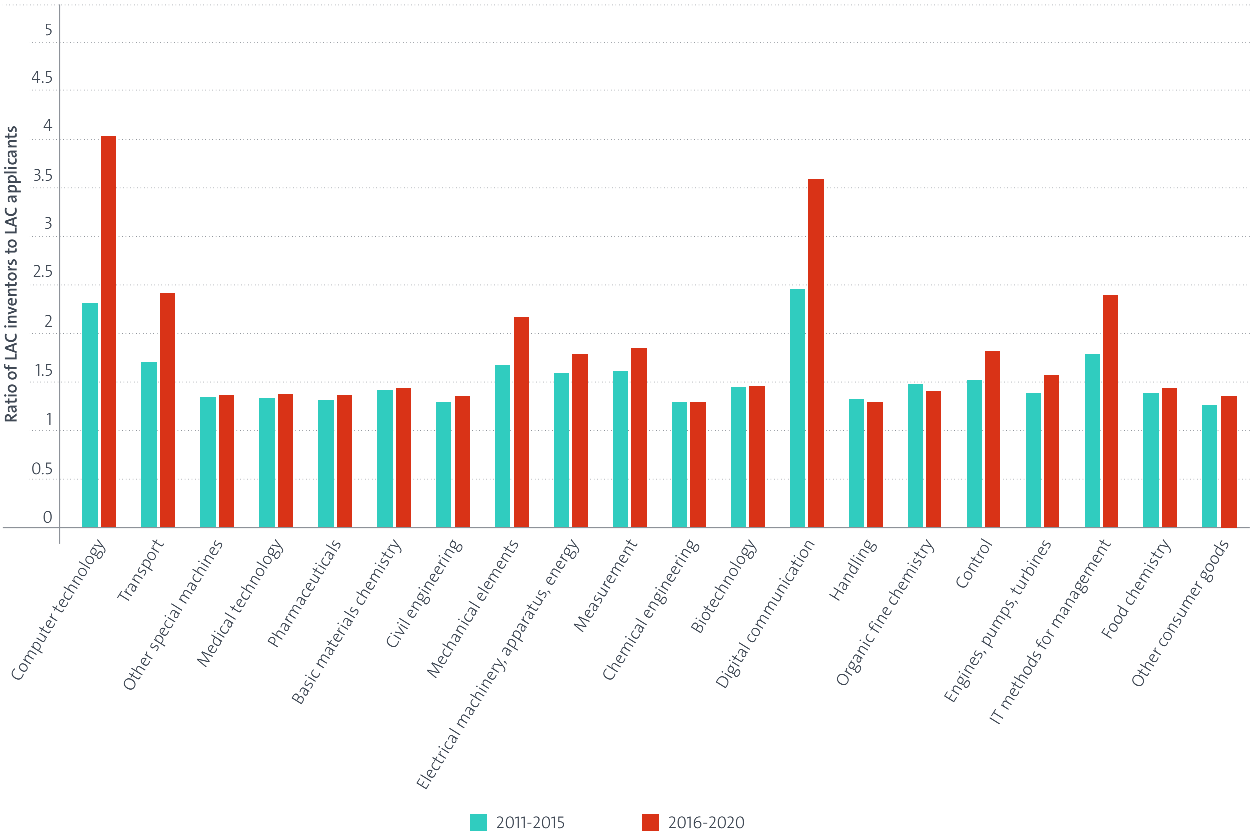
Source: ECLAC, EPO

Analysing this inventor-to-applicant ratio across technology fields exposes stark sector-specific disparities. While traditional industrial sectors (such as other special machines, pharmaceuticals and civil engineering) maintain relatively low and stable ratios (between 1.3 and 1.4), ICT fields exhibit a profound disconnect. By the 2016-2020 period, the ratios for computer technology and digital communication surged to over 4 and 3.6 respectively.

This means that for every foreign patent family in computer technology owned by a LAC entity, there are more than four families generated by LAC researchers but owned by foreign corporations. A similar, though less pronounced, pattern is also visible in transport, where the ratio increased to 2.42 in the later period, largely driven by patent families with inventors based in Mexico's deeply integrated automotive supply chain.

Figure E10

Ratio of LAC-invented to LAC-owned patent families targeting foreign markets by top technology field (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

Note: Technology fields are sorted by number of patent families targeting foreign markets. Only the top 20 technology fields are shown.

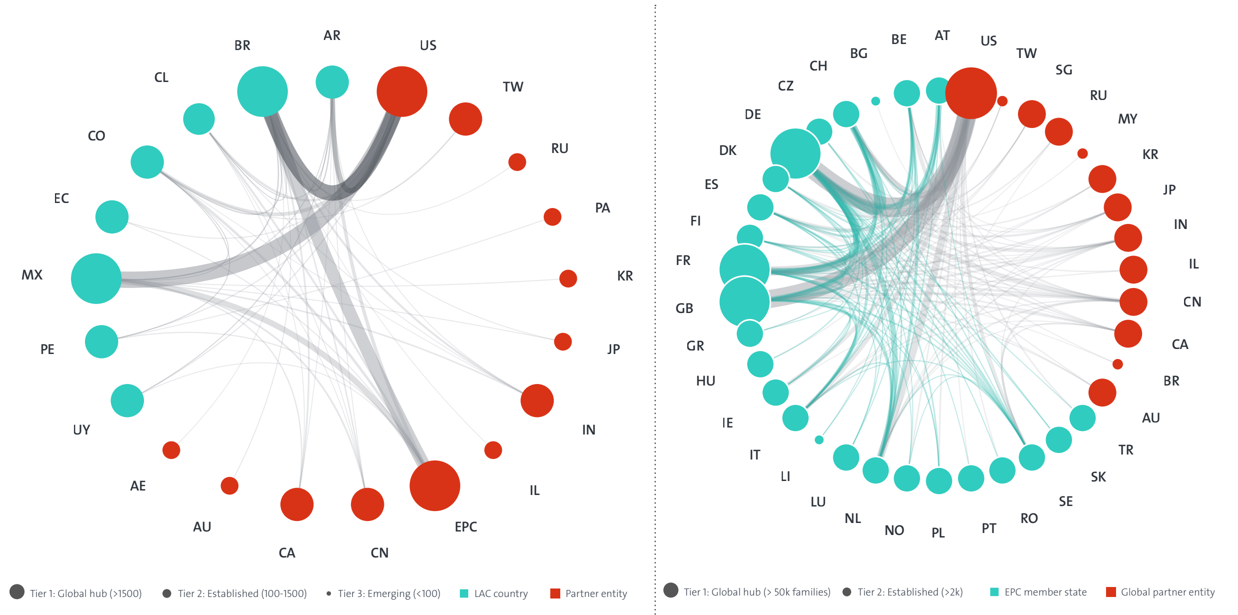
Key finding 7: LAC inventor networks are highly fragmented and dependent on extra-regional hubs

Evaluating co-inventorship networks—created by linking the countries of all inventors within a single patent family between 2015 and 2020—reveals a profound structural dependency on extra-regional partners. The USA acts as the dominant collaborative hub for almost every LAC nation, with Europe serving as the secondary global pole. Strikingly, despite geographic proximity and shared trade agreements, LAC inventors rarely co-invent with their neighbours.

This stands in stark contrast to the highly integrated European innovation network, which features a massive, self-sustaining intra-regional core where countries collaborate multilaterally. In the LAC region, domestic R&D ecosystems remain structurally disconnected from one another, functioning primarily as peripheral extensions of foreign innovation hubs.

Figure E11

Global co-inventorship network for LAC countries (left) and for European countries (right), 2015-2020



Source: ECLAC, EPO

Note: The thickness of the lines connecting two countries represents the volume of collaboration (number of patent families) between that specific pair. The size of the nodes represents the total cumulative collaboration (the sum of total patent families) of that country across the entire dataset.

The technological focus of LAC co-inventorship aligns directly with the region's physical trade imbalances. For example, the massive Mexico-USA collaboration is overwhelmingly concentrated in electrical machinery and transport, reflecting Mexico's role as a near-shored assembly node for North American automotive and electronic value chains.

Conversely, R&D links between South America and Europe place a heavy emphasis on pharmaceuticals and biotechnology, corroborating earlier findings that Europe is the primary supplier of advanced healthcare technologies to the region. Meanwhile, although LAC relies heavily on East Asia for importing complex digital goods, joint knowledge creation remains marginal, indicating this relationship is strictly commercial rather than collaborative.

Conclusions and policy perspective

Intellectual property matters for development in Latin America and the Caribbean, but in a nuanced way. IPR-intensive manufacturing industries account for a modest but economically significant share of the region's productive structure: about 12.4% of manufacturing employment and 13.0% of manufacturing value added, and they display a substantial wage premium relative to other manufacturing activities. Patent-intensive segments (as opposed to trade mark-intensive segments) stand out in particular, suggesting that some forms of IP are more closely associated with productivity, value added and higher-quality employment than others.

At the same time, the region remains much more a consumer than a producer of IPR-intensive goods. IPR-intensive industries account for only 9% of exports, compared with 19% of imports, while patenting activity remains overwhelmingly driven by foreign applicants and internationally extended patent families. Key elements of a local knowledge base are already present in the region, including academic innovation in industry-relevant domains and a significant pool of inventors in digital technologies, providing opportunities for regional economic development. However, they remain fragmented within the region, with closer ties to the innovation networks in the USA and Europe. This points to a pattern in which IP is economically relevant in the region, but still only weakly connected to domestic capability formation, local ownership of knowledge and deeper forms of productive upgrading.

The main policy implication is that IP policy should be treated as part of productive development policy, not a self-contained legal domain. Stronger protection alone is unlikely to deliver much upgrading if innovation systems remain weak. What matters is whether countries have the domestic conditions that make IP economically productive: engineering skills, R&D capacity, university-firm linkages, scale-up finance, standards and quality infrastructure, and supplier-development capabilities. This broader perspective is consistent with ECLAC's wider diagnosis that the region's main development constraints lie in weak productivity growth, limited structural transformation and fragmented innovation capabilities (ECLAC, 2025).

Policy should be differentiated by the maturity of the innovation system and consider sector and firm specific gaps from the technological frontier. In countries with incipient systems, the priority is to build basic capabilities and connect imported technology to learning, adaptation and supplier development. In countries with intermediate systems, the central challenge is to move from fragmented support measures toward a more coherent mix that links research, innovation finance, commercialisation, technology transfer and productive priorities. In countries with advanced systems, the priority is to use IP more strategically to deepen domestic participation in science-based sectors, support diversification into adjacent technologies, and strengthen the region's position in higher-value segments of trade and innovation networks. The maturity logic should be understood as cumulative; more advanced systems should also consolidate the foundations required at earlier stages.

One critical lever lies in leveraging public research. LAC already possesses an important base of domestic patent applications originating from universities and other public research institutions. Policy must ensure that such technologies can be efficiently transferred from the laboratory to the market. This transition requires a dual approach: building robust commercialisation and technology transfer capabilities within the innovation ecosystem, while simultaneously enhancing the technological absorption capacity of domestic industry so that local firms are actually equipped to adopt, scale and profit from these innovations.

The study also points to a second, related policy challenge: the region is not only underrepresented in the ownership of internationally protected inventions, but often participates in their creation without capturing a proportional share of the resulting intellectual assets. This suggests that an important part of the region's scientific and technical capabilities is being harnessed through extra-regional firms and innovation networks. The policy response should not be to weaken international integration, but rather to improve the region's capacity to anchor more of the resulting value locally.

That requires stronger translational infrastructure, better financing for early-stage commercialisation and scale-up, more effective interfaces between universities and firms, and policy instruments that support domestic co-development, co-ownership, licensing and firm formation in areas where capabilities already exist.

A further priority is to make firms more aware of IP systems and better able to use them. In many cases, the issue is not only limited innovation, but also limited knowledge of how IP works, why it matters, and how it can be accessed. Policy should therefore focus on awareness, guidance and simpler access, especially for small and medium-sized enterprises.

Finally, regional integration should play a more explicit role in innovation strategy. For many countries the Latin American market is an important outlet for IPR-intensive manufacturing, yet intra-regional trade and innovation connectivity remain weak. Stronger regional co-operation in standards, regulation, public procurement, technology transfer and research collaboration could help firms scale within the region and reduce the gap between local innovation efforts and the economic use of IP.

1. Introduction

1.1. The productivity imperative

The countries of Latin America and the Caribbean (LAC) face three mutually reinforcing development traps: a low capacity for growth, high inequality with low social mobility, and weak institutional capacities and governance (ECLAC, 2024a; ECLAC, 2025). The first is reflected in chronically low productivity, insufficient investment and weak structural transformation. In the last decade, growth averaged 0.9% year on year, lower than the infamous “lost decade”. Labour productivity in the region has fallen back after gains between 1990 and 2013, indeed, the region’s productivity fell below the world average for the first time in 2017. A large part of the problem seems structural. In 2023, average labour productivity in LAC was only 29.7% of the European Union level, and a disproportionate share of employment remains concentrated in low-productivity sectors. Informality remains predominant, with nearly 47% of employment coming from the informal sector (ECLAC, 2024b). Still, the region is not without assets: strong productive clusters exist in several tradable sectors, along with growing dynamism in modern services exports and a relatively favourable position in renewable electricity generation. Nonetheless, productivity is at the centre of the region’s growth agenda, and hinges on the development and growth of industries capable of sustaining competition in international value chains.

Against this backdrop, productive development policies[3] seek to raise productivity and growth capacity through diversification, sophistication and positive structural transformation. This, however, requires deliberate policy choices. It requires coordination between state and private sector actors. Innovation is a key medium-term driver of growth in the process, but must be accompanied by an innovation – adjacent activities related to technology diffusion and the spread of capabilities across firms, sectors and territories. This is especially true in a region where productivity gaps remain large both within and between sectors, across firm size, and over territories. With some exceptions, weak science, technology and innovation systems are the norm. Research and development spending is near 0.6% of GDP, well below EU and other developed country averages, and that spending is largely public, while developed country R&D is largely private. Intellectual property rights (IPR) are critical frameworks for supporting innovation and key tools for bringing innovation from the lab to the market.

This study connects key IPR and innovation variables with economic outcomes in Latin America and the Caribbean. The remainder of this chapter introduces manufacturing as a key sector of interest in development and discusses the importance of innovation and IPR to this process.

3 ECLAC defines productive development policies as horizontal or targeted public interventions aimed at increasing productive sophistication and diversification, accelerating learning and capability-building, and promoting virtuous structural change as a route to higher productivity and more productive, inclusive, and sustainable growth (see Salazar-Xirinachs and Llinás, 2023.). The region is not starting from zero. Many countries now explicitly recognize the need for productive development policies. For example, Brazil launched Nova Indústria Brasil in 2024, Mexico presented Plan México in 2025, Chile developed an interministerial Programa de Desarrollo Productivo Sostenible, and Colombia has advanced both a reindustrialisation policy and mission-oriented innovation policies.

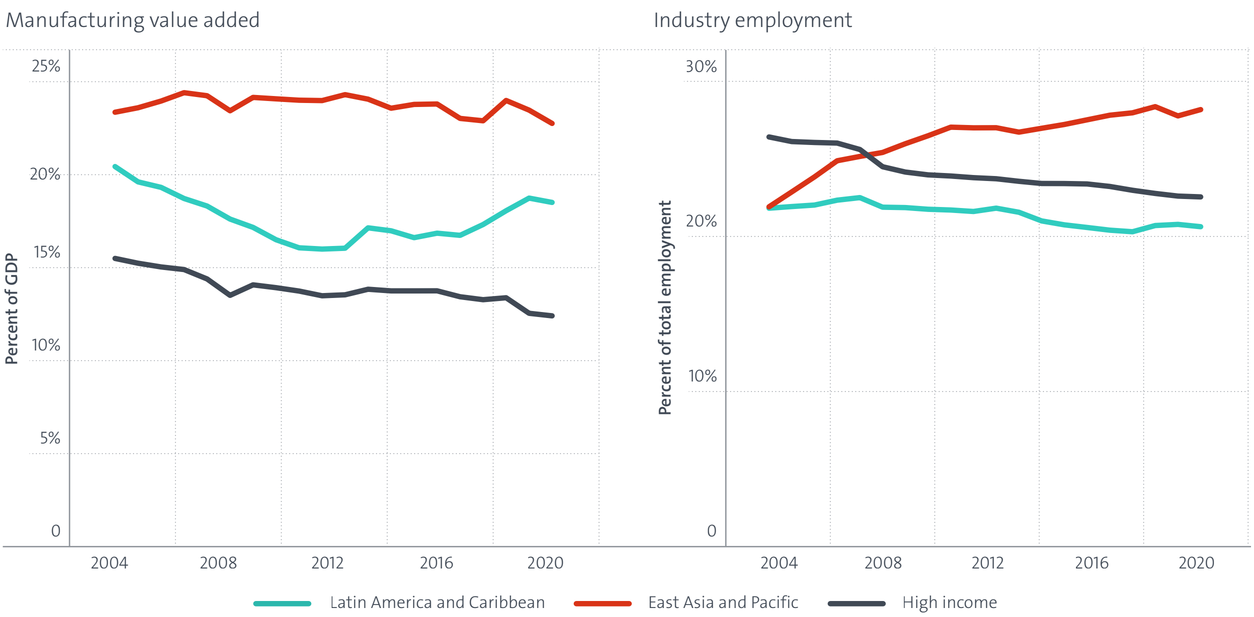
1.2. Manufacturing as a development motor

Manufacturing has occupied a central place in development economics because it combines several features that make it unusually conducive to sustained growth and structural transformation. It is a locus of dynamic increasing returns, learning by doing, technological diffusion and strong backward and forward linkages to the rest of the economy (Kaldor, 1967).

Its expansion can therefore raise productivity within the sector itself and, through demand and supply linkages, stimulate productivity growth elsewhere. Manufacturing also produces tradable goods, which allows growth to be less tightly constrained by domestic demand and offers a path toward export diversification and foreign exchange generation. More recent work has reinforced these arguments by showing that manufacturing exhibits unusually strong convergence properties across countries, making it a potentially powerful escalator for middle to late development (Rodrik, 2013).[4] [5]

Figure 1

Manufacturing value added and industry employment in selected world regions, 2004-2020



Source: ECLAC, EPO

Note: The figure uses World Bank aggregate series for Latin America and the Caribbean, East Asia and Pacific, and high income economies, restricted to the common period available in both indicators. Manufacturing value added is measured as a percentage of GDP. Industry employment is measured as a percentage of total employment and includes mining and quarrying, manufacturing, construction and utilities; it is therefore not directly comparable to manufacturing value added alone. The two series are used here to illustrate broad patterns of structural transformation rather than to infer manufacturing productivity directly. Employment data are based on modelled ILO estimates reported in the World Development Indicators.

4 In addition to manufacturing, some modern service activities, especially tradable, knowledge-intensive and digitally enabled services, increasingly display characteristics once associated primarily with manufacturing: tradability, scope for scale, organisational learning and relatively rapid productivity growth. Recent evidence also suggests some service subsectors in developing regions can satisfy Kaldor-type relationships. Indeed, the set of potentially transformative sectors has widened. Even so, manufacturing remains distinctive because of its capability-building potential, dense intersectoral linkages, and historically demonstrated role in broad-based structural change (Rodrik, 2025; Di Meglio and Gallego, 2022). The focus on manufacturing in this report is both practical (because of data availability) and due to the importance of manufacturing for innovation and development; this does not indicate that other sectors or areas, like modern services, are unimportant.

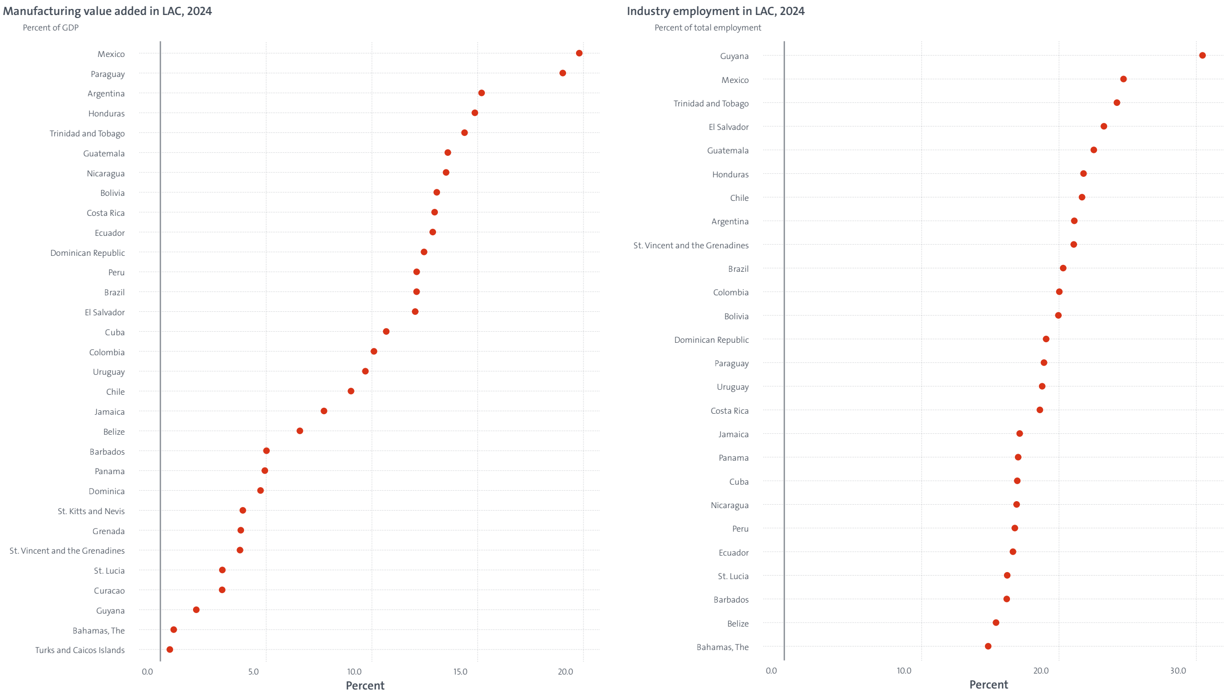
5 This more nuanced position is captured well by the recent empirical literature on manufacturing and growth. Szirmai and Verspagen (2015) argue that manufacturing remains positively associated with growth in developing countries, but that it has become a more difficult route to development than in earlier decades, especially after 1990. Haraguchi, Cheng and Smeets (2017) similarly conclude that manufacturing has not lost its developmental relevance, even if the global environment has become less favourable and the space for late industrialisation more demanding. This is close to the right framing for LAC: manufacturing may no longer deliver automatic catch-up, but where it is deep, diversified and technologically dynamic, it still matters disproportionately for productivity growth, export capacity and the quality of structural transformation.

At the aggregate level, manufacturing is a key source of both employment and value added in Latin America and the Caribbean. However, the region experienced a marked decline in manufacturing value added as a share of GDP from the 1980s to the early-to-mid 2010s, followed by only a partial recovery thereafter. By 2024, the region remained clearly below its 2004 level and well below East Asia and the Pacific throughout the period. The employment picture is somewhat different. The share of total employment in industry in Latin America and the Caribbean remains largely flat, with only a mild decline over the period, whereas East Asia and the Pacific recorded a clear upward movement and high income economies trended downward.

The country-level figures show substantial heterogeneity underneath this regional pattern. In 2024, manufacturing value added as a share of GDP was highest in Mexico and Paraguay, with Argentina and Honduras also located in the upper part of the distribution. At the other extreme, a large number of Caribbean economies registered low manufacturing shares, reflecting productive structures centred more on services, tourism, logistics or extractive activities than industrial transformation. Regional averages may therefore conceal the extent to which industrial capabilities in Latin America and the Caribbean are concentrated in a limited subset of countries.

Figure 2

Share of manufacturing value added and industry employment in LAC countries, 2024



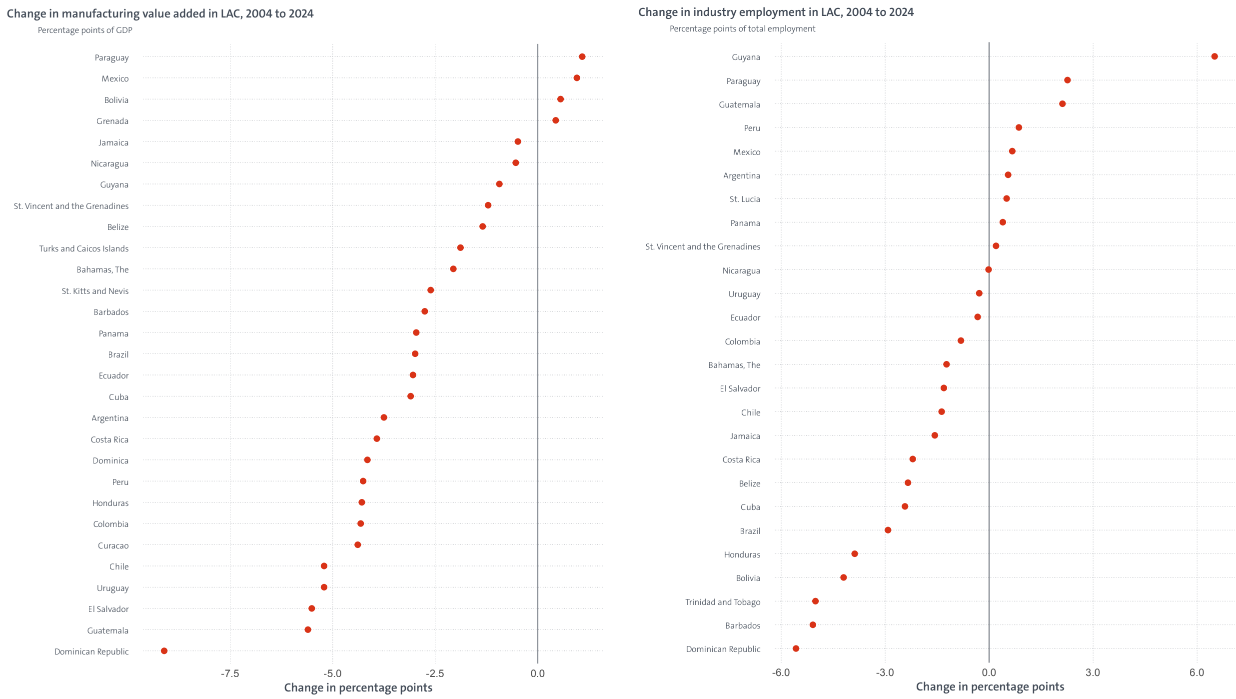
Source: ECLAC, EPO

The country trends show declining manufacturing value added in most countries in the region between 2004 and 2024, often by several percentage points of GDP. Only a small group registered clear gains, notably Paraguay and Mexico, with more modest positive changes in a few others. In that sense, the dominant regional pattern is one of widespread erosion in manufacturing weight.

This trend that has motivated the literature on premature deindustrialisation, where manufacturing peaks earlier and at lower income levels than in the historical experience of today's advanced economies (Rodrik, 2016).

Figure 3

Change in manufacturing value added and industry employment in LAC countries: 2024 vs. 2004



Source: ECLAC, EPO

Manufacturing remains an important component of the productive structure of Latin America and the Caribbean. It accounts for almost all patent applications in the region, and can be a significant motor of growth, productivity improvement and structural transformation.

Even so, the regional evidence suggests that manufacturing in LAC remains concentrated in a relatively small number of countries and, within them, often in a limited set of sectors. Broad-based experiences in which manufacturing has operated as a sustained engine of development have been comparatively scarce.

For that reason, and also because manufacturing data are more available (via the BADECON database), more granular and more comparable across countries and over time, this study focuses on manufacturing, and specifically the role of innovation in manufacturing for development.

1.3. IPRs and their function in the economy

Legal protection of intellectual property encourages individuals and organisations to be creative and innovative by granting them exclusive legal rights to the fruits of their work. By restricting access to intellectual creations during the period of protection, IP systems typically strike a trade-off between the short-term welfare of consumers and the longer-term benefits of sustaining investment in innovation and creativity. IP rights reconcile two central imperatives of modern economies: progress, through stimulating intellectual creation, and efficiency, through ensuring diffusion and access (Johnson, 2023).

This section introduces the two forms of IPRs studied in this report: patents and trade marks. It also briefly presents other IPRs, such as registered designs, copyright, geographical indications (GIs) and plant variety rights (PVRs). It specifies relevant subject-matter, the criteria that need to be met to gain protection, the principal rights conferred, and the economic rationale behind each IPR.

What is patent protection?

Patent protection is available for inventions that aim to offer new solutions to technical problems. To be patentable, inventions must be new, non-obvious (i.e. include an inventive step) and industrially applicable. The novelty requirement means that, at the filing date, the invention must not be known to the public anywhere. To satisfy the inventive step requirement, the invention must not be obvious to a person who is skilled in the field concerned. Finally, the invention must be susceptible of industrial application. Only patents granted by a patent authority are fully valid and enforceable. Patent authorities examine patent applications and ensure that the invention satisfies all legal requirements for patenting. Once granted, the patent confers on its owner the right to prevent any other entity from commercially exploiting the invention. This exclusive right is only granted for a limited time period. Typically, patent protection lasts 20 years from the date of the application, subject to the payment of renewal fees. It is also limited in space, as the exclusionary power of patents can only be enforced within the jurisdiction of the granting state.

There are two main ways in which patent rights promote the progress of technology, innovation and social welfare: they create incentives to innovate, and they promote the dissemination and valorisation of new knowledge.[6]

Patents drive innovation by creating a private reward for innovation in the form of the applicant’s exclusive right to use or sell the patented invention (“reward function”). Innovation ultimately generates new knowledge, which rival firms could potentially exploit at little or no cost if it were not protected, thus reducing inventors’ rewards to such an extent that it would no longer be worthwhile for them to innovate in the first place. Exclusive legal rights to inventions in the form of patents help limit this risk by granting temporary exclusivity to the patent owners, allowing them to charge prices above what a fully competitive market would produce if the inventions were available to all.

The “contract function” describes the second main way in which patents can promote innovation: they grant inventors exclusive rights to a given invention in exchange for the disclosure of information on the underlying technical solution. The public availability of patent documents in national and international patent offices facilitates the dissemination of technical information, which can then be used by others to develop other novel solutions, creating additional gains for society. The combination of disclosure and legal exclusivity also enables contractual arrangements (such as licences or R&D co-operation agreements) for the exploitation of patented inventions.

6 There is a rich body of economic literature dedicated to patents (see e.g. Hall and Harhoff, 2012 for a complete overview). This literature discusses the economic functions performed by patents, and aims to assess their actual impact on the economy. It also explores the various ways in which patents are used across sectors and countries, and the economic impact of the legal design of patent systems.

What is trade mark protection?

A trade mark (TM) is a distinctive sign that identifies certain goods or services as those provided by a specific person or organisation and distinguishes them from those of other organisations. TMs are intended to reduce information and transaction costs in the marketplace by allowing customers to identify the nature and quality of goods and services before purchase. Among the most common signs eligible for TM protection are words, pictures, stylised words, logos, a colour or colour combination, a shape, a sound or some combination of those signs. Generally, a sign must fulfil the requirements of distinctiveness to serve as a TM. Distinctiveness means that consumers can recognise the sign as a TM and distinguish it from other TMs in the same field. If a TM is likely to deceive the public as to the nature, quality or any other characteristics of the goods and services to which it refers, it does not qualify for registration.

TMs can be protected on the basis of either registration through a trade mark office (i.e. registered TMs) or, in some countries, through their actual use in the marketplace (i.e. unregistered TMs). Registering TMs is not compulsory in all countries, but it makes it easier to enforce associated legal rights.[7] A registered TM owner has the exclusive right to use that TM on the goods and services in the product classes for which it has been registered, and to prevent others from exploiting, in the same fields, any sign that is identical or similar to it. The term of protection of a registered TM is typically ten years, but it can be renewed indefinitely for successive periods (typically, ten years each), subject to payment of fees.

The economic rationale underlying the protection of TMs has its roots in economic theories of information and reputation.

Competing products available in the market may differ from one another in terms of several characteristics and attributes. This difference is not necessarily a problem if consumers can obtain all the relevant information about these products at no cost and evaluate them appropriately to guide their purchase decisions. However, that is typically not the case. A product's characteristics are often difficult or impossible for consumers to observe until they have actually purchased the product. A brand protected by a TM acts as signal that a given product is of the consistent quality that the consumer associates with that brand.

The legal protection of TMs provides an incentive to develop and maintain distinguishing product features and create information about them for the benefit of market transparency. Creating this information and building up the reputation that the TM conveys is likely to require significant investments in product quality, service and advertising. In the absence of legal protection, and given the limited costs of imitating a competitor's TM, there would be insufficient incentive to incur such quality investments.

7 To enforce the rights associated with an unregistered TM, proprietors must normally produce factual evidence to prove they have an established TM that has acquired a reputation in the mind of the public.

Table 1

Main characteristics of the different types of IPRs

IPR	Patents	Trade marks
Subject-matter	Inventions (solutions to technical problems)	Distinctive signs that identify certain goods or services and distinguish them from those of other businesses
Requirements for protection	Novelty; inventive step (non-obviousness); industrial applicability	Distinctiveness
Acquisition of right	Examination by the patent office, followed by grant and validation	For registered TMs, examination by the IP office. For unregistered TMs, use in commerce
Conferred rights	Exclusive right to make, use and sell the patented invention	Exclusive right to use the TM in trade
Duration	Typically 20 years from filing, subject to payment of annual renewal fees	For registered TMs, commonly ten years from filing, but can be renewed indefinitely, on payment of fees, for successive periods

Other intellectual property rights

While patents and trade marks are two of the most frequently used types of intellectual property rights, other categories of IP rights are available to protect different forms of intellectual creations (EPO-EUIPO, 2026).

Design protection[8] covers the visual appearance of a product, part of a product and/or its ornamentation. A product can be any industrial or handicraft item, including packaging, graphic symbols and typefaces. In other words, a design covers the appearance of a product, but cannot protect its functions, which fall under the regime of patent protection. The requirements that must be satisfied to register a design include that it must be new and have an individual character. It is new if no identical design has been made available to the public by the filing date. It has an individual character if the overall impression it produces on an informed user signifies that it differs from any previous designs. Industrial design protection is usually granted pursuant to a procedure for its registration (registered design). Under certain laws, however, design rights may also be automatically acquired by disclosing the design in a document or product (unregistered design). Like TMs, registered designs provide more comprehensive cover than their unregistered counterparts. Registered design owners have exclusive rights to use the design and can prevent any third parties from using it.

The economic case for design registration builds primarily on the idea of promoting innovation. The production of new designs is a creative activity, requiring significant investments of time, skills and labour. If no exclusive rights were available, any party could replicate a creative design and use it to directly compete with the original creator. Providing a legal mechanism to protect new designs should ultimately enhance investments in design production and creative work.

Copyright gives right-holders exclusive rights to authorise or prohibit the use (e.g. reproduction, distribution, adaptation or translation) of their content (e.g. films, programmes, etc.). It is important to note that copyright is applicable only to the expression of ideas, not to the ideas themselves. In general, copyright registration is not required. Protection is granted automatically from the moment a work is created. In this respect, copyright differs significantly from other IPRs. A non-exhaustive list of works that are protected under all copyright laws typically includes literary works, musical, photographic, cinematographic and artistic works, maps and technical drawings, and computer programs and databases.

8 In this report, the term “design” is to be understood to mean “registered design”.

The most important economic rights usually granted to creators, performers, producers and broadcasters under most copyright regimes include rights of reproduction and fixation, as well as rights of communication, distribution, rental, broadcasting and resale depending on the type of copyrighted works. The general economic objective of the system is to ensure appropriate remuneration for creators and other right-holders (so a socially optimal level of creative activity is guaranteed), while at the same time providing broad public access to creative works and making it possible for other creators to build upon prior works.

A **geographical indication** (GI) is a name which identifies a product to link it to a specific geographical location or origin (e.g. place, region or country). The use of a GI may act as certification that a product has certain qualities, is made according to traditional methods or enjoys a certain reputation due to its geographical origin. GIs are mainly used in the agriculture, food and beverage sectors.

GIs are very prominent and economically significant across LAC. Most countries in the region have established robust legal frameworks to protect products that derive their value from their specific origin, traditional knowledge, and local climate. Their connection with the territory and the strict product manufacturing controls in place often lead to vertical integration in the different sectors involved in producing GI goods, starting with farmers and continuing to manufacturers and even wholesalers and retailers.

In terms of their economic function, GIs and TMs both have the basic function of addressing information asymmetries between sellers and buyers and helping consumers to lower their search costs by certifying a product's origin and the manufacturing methods used to make it. This is reflected in the fact that consumers are often prepared to pay a price premium for GI products.[9]

Another difference between GIs and other IPRs is that while TMs, designs, patents, PVRs and copyright are usually applied for and owned by private entities (mostly individual companies), GIs are typically applied for and managed by producer associations in the relevant geographical area. The GI can then be used by all individual producers located in that area and complying with a product specification, including defined production methods.

Plant variety rights (PVRs) or plant breeder's rights are an independent form of intellectual property right tailored to protect new plant varieties (Article 27(3)(b) of the Agreement on Trade-Related Aspects of Intellectual Property Rights or TRIPS) and a rapidly evolving part of the IP landscape in LAC. The economic rationale for PVRs is similar to that for patents: to incentivise innovation while at the same time promoting the diffusion of knowledge across the economy. In 2022, the EUIPO and CPVO published a joint study on the contribution of the Community Plant Variety Rights (CPVR) system to the economy and the environment in the EU.

A plant variety is a plant grouping within a single botanical taxon of the lowest known rank, which can be defined by the expression of the characteristics resulting from a given genotype or combination of genotypes, distinguished from any other plant grouping by the expression of at least one of the said characteristics and considered to be a unit with regard to its suitability for being propagated unchanged.

The international legal framework for the protection of PVRs is provided by the International Convention for the Protection of New Varieties of Plants (the UPOV Convention). For a PVR to be granted, it is necessary to first file an application for examination before a national or regional designated authority. The candidate variety must then fulfil the technical criteria of distinctness, uniformity and stability (known as the "DUS" criteria). It must also be new and bear a suitable denomination. These criteria are tested in a formal, substantive and technical examination.

A comparison of the main characteristics of registered designs, copyright, GIs and PVRs is provided in Annex 1

9 See EUIPO (2016).

IPRs and productive development

Economic theory offers a useful lens through which to understand how patent systems shape innovation and, ultimately, productive development. In neoclassical theory, technological progress appeared as the exogenous "Solow residual", highlighting its central yet unexplained contribution to growth (Solow, 1956). Endogenous growth models (Romer, 1990; Barro and Sala-i-Martin, 1995) later internalised innovation as the outcome of incentives, human capital and institutions, providing an analytical entry point to view IPRs as policy tools that actively shape technological progress rather than merely reflecting it. The Schumpeterian approach (Aghion and Howitt, 1992) added that the expectation of monopoly rents (partly determined by the strength of protection) drives innovation through creative destruction. These frameworks make clear that the design of IPR systems has a direct impact on the dynamics of long-run growth through innovation and knowledge diffusion.

The international dimension of patent policy is where the need for context-sensitive institutional design is most apparent. The TRIPS Agreement, concluded as part of the WTO in 1994, represented a landmark step toward the harmonisation of global intellectual property standards, establishing minimum levels of protection that all WTO members are required to implement. Its main purpose was to support trade, investment and technology flows across borders by providing a more predictable and enforceable international IP environment. However, the evidence on its impact is mixed and remains debated, with ongoing discussions about complementary policies and the conditions of benefits realisation. The historical experience of today's industrialised economies suggests the relationship between IPR strength and innovative development is shaped by sequencing and complementary conditions rather than protection levels alone.

One of the most cited potential benefits of stronger IP protection in an international context is that it supports technology transfers and productivity gains through foreign direct investment (FDI). Multinationals are more willing to transfer technologies and commit to longer-term investments in markets where their innovations are protected, and there is evidence that TRIPS compliance has served as a credible signal of institutional readiness for developing countries seeking to attract investment (Awokuse and Yin, 2010; Yang and Maskus, 2009; Park and Lippoldt, 2008). The developmental impact of this investment, however, is not automatic.

The positive relationship between IP protection and FDI appears to be stronger for advanced economies than developing ones, and weaker still for the least developed countries. Investment also tends to concentrate in sectors with limited potential for deep technological learning, which means the productive development gains from stronger protection depend heavily on the broader policy environment, including industrial and education policies.

Trade follows a similar pattern. Stronger patent protection tends to increase the volume of technology-intensive exports flowing into developing country markets, as foreign firms gain greater confidence that their innovations will not be copied, and there is evidence that TRIPS-driven reforms have expanded these flows (Maskus and Penubarti, 1995; Smith, 1999). The aggregate picture, however, conceals important variations: trade gains appear concentrated in middle-income countries with existing industrial capacity, while for the least developed countries the effects on actual flows are modest at best (Ivus, 2010). Stronger protection simultaneously enables firms to segment markets across borders and restrict parallel imports, keeping prices elevated and limiting access to essential goods, a tension that is particularly acute for pharmaceuticals and agricultural inputs, and one of the most politically charged questions in international IP governance.

The benefits of IP protection appear conditional rather than automatic, and that the key variable is not the strength of protection in itself but the capacity to make use of it. Strong IPR frameworks generate technology transfer and productive development gains most effectively when accompanied by sufficient absorption capacity, that is the skills, institutional infrastructure and domestic R&D investment to allow local firms to build on the knowledge that the patent system discloses (Cohen and Levinthal, 1990; Bell and Pavitt, 1993; Lall, 2003). Where these conditions are in place, patent disclosure can serve as a genuine channel for knowledge diffusion; where they are absent, the benefits of protection are harder to realise and the costs in terms of access and market concentration are harder to justify. The implication for policymakers is that IP reform and innovation policy need to be designed together; strengthening patent protection without investing in the complementary capabilities that make it productive is unlikely to deliver the development outcomes the system promises.

1.4. About this study

This report builds on a growing body of empirical research analysing the economic role of IPRs, particularly the contribution of IPR-intensive industries to economic performance. Over the past decade, studies by the EPO and the EUIPO have developed a robust methodology to identify industries with above-average use of IP rights per employee and measure their contribution to employment, value added, wages and trade. A similar approach has subsequently been used by several other intellectual property offices around the world (including the USPTO) to produce other localised studies. These studies consistently find that IPR-intensive industries generate a disproportionate share of economic output and are closely associated with higher productivity and stronger export performance.

The present work relates in particular to recent efforts to apply this approach at a national level in several Latin America countries in the framework of the IPKey project (EUIPO, 2022-2024). The evidence produced in these localised studies indicates that, while IPR-intensive industries also play an important role in the region, their contribution differs structurally from that observed in advanced economies. The region also shows a more limited presence of such industries in exports and a greater reliance on foreign intellectual property.

The present study focuses on manufacturing industries in the LAC region with a view to assessing their economic impact and exposure to innovation and IP at the local, regional and global level. Using a new methodology combining patent and trade mark data, it examines how these IP right are distributed across manufacturing industries, identifies the industries that use these rights most intensively, and relates those patterns to employment, value added, wages and trade performance. It also uses patent data to distinguish more clearly between local innovation, foreign technological presence and the region's position in global knowledge flows.

The resulting analysis provides a comprehensive assessment of the role of IPRs in the region's productive structure. The study combines the data resources available to ECLAC and the EPO to cover a set of nine countries representative of the LAC region. In line with the approach adopted by the EPO and the EUIPO for Europe (see EPO and EUIPO (2026) for the most recent analysis), it prioritises insights and evidence at the level of the entire LAC region, making it possible to identify specific national patterns against the regional benchmark. Importantly, the study treats IPR not as an end in itself, but as part of a broader productive development question: whether IP systems in the region are supporting innovation, technology transfer, diffusion and local value creation in activities that matter for growth and productive transformation.

The report is structured as follows. Chapter 2 identifies IPR-intensive industries and evaluates their economic contribution. Chapter 3 examines trade patterns, highlighting structural imbalances in IPR-intensive sectors. Chapter 4 analyses innovation through a patent-based lens, focusing on the origin of inventions and the region's integration into global innovation networks. Chapter 5 concludes and provides a policy perspective.

Case study:
Air pollution capture and cleaning technology

Company	Ecol-Air
Founded	2019
Headquarters	Girardota, Colombia
No. of employees	20
Solutions	Advanced direct air capture technology to remove pollutants directly from the air
Patents	US10781291B2; US12186703B2

"While we can create incredible solutions for the planet, health and people, scaling our projects and turning them into businesses is what gives our inventions a real future. We can't stop at just having an idea; we need to develop it further."

Mariana Pérez, Founder, Ecol-Air

Air pollution is a major global health challenge. According to the World Health Organization, 99% of the world's population lives in places where air quality does not meet recommended guidelines, and the combined effects of outdoor and household pollution contribute to an estimated 6.7 million premature deaths every year. Average particulate pollution levels have risen steadily, with measurable effects on public health and life expectancy. Inventor Mariana Pérez co-founded Ecol-Air, a company that has developed a biomimetic system designed to capture and process atmospheric pollutants. The company's FIVA technology removes carbon dioxide, nitrogen dioxide, sulphur dioxide and fine particulate matter (PM2.5 and PM10) directly from the air. Rather than storing these pollutants, the system converts them into biodegradable polymers that can be reused in industrial applications, including packaging, tiles and paving materials.

From school project to industrial-scale innovation

At the age of eight, Pérez noticed how rainwater washed soot and residue from her father's car, much of it produced by exhaust emissions. This led her to imagine a device that could use liquid to capture pollutants from the air. With encouragement from her father, who later became a co-founder, she began developing early prototypes using household materials.

These initial models were presented at school science fairs, where they received recognition and helped attract early support. Over time, the concept evolved as Pérez continued refining the technology during her teenage years and later at university, where she studied veterinary medicine and zoology. Her academic focus on animals and ecosystems reinforced her interest in biomimicry and influenced the final design of Ecol-Air's systems.

The FIVA device is modelled loosely on the respiratory system. It uses mechanical structures analogous to bronchioles and alveoli to maximise contact between air and solvent, improving filtration efficiency. Pérez describes the process as being inspired by the way blood circulates through veins, with a solvent flowing continuously through the system to absorb pollutants.

Tailored to real-world needs

FIVA is designed to be adaptable to different environments. While the external structure remains consistent, the internal chemical formulation is adjusted according to the specific emissions profile of a factory or location. Once pollutants are captured in the solvent, they are neutralised using a basic agent and processed through a system known as LAMEP (Load Absorption and Material Environmental Processing). This step converts the compounds into biodegradable polymers that can be reintegrated into manufacturing processes.

Mariana Pérez

The system can be installed directly on industrial chimneys or deployed as a stand-alone unit in areas with high pollution levels. Routine maintenance and solvent replacement are required to maintain performance. Depending on the pollutant type, reported efficiency rates range from approximately 75% to 96%.

A deliberate path to market

Introducing a new pollution control technology to industrial clients proved challenging. Many companies were hesitant to adopt an untested system. In response, Pérez chose to install the equipment at no cost in 2022, allowing potential customers to evaluate its performance in real operating conditions. This approach helped secure the company's first long-term clients. Industrial partners now include Sumicol-Corona, Incolmotos Yamaha and Comercipol. Ecol-Air currently operates ten units at Yamaha facilities, with additional installations underway at Sumicol.

The company also works with academic partners such as Forestpa, exploring how machine-based air treatment can complement forest-based carbon absorption strategies.

An early eye on IP

Intellectual property has played a foundational role in Ecol-Air's development. Pérez's introduction to IP came during her secondary education at Francisco Restrepo Molina High School, an institution known for encouraging student-led research and innovation. Alongside this school environment, she regularly took part in science fairs and competitions, where early prototypes received recognition. These fairs were not only motivational, they also introduced her to professionals who helped her understand the importance of protecting her ideas and exposed her to Colombia's public patent support ecosystem.

Rendering of EcolAir

Aged 16, Pérez began participating in government funded programmes designed to help young entrepreneurs secure patents. These initiatives covered essential costs such as attorney fees and administrative filings with the national patent office. Among the programmes she joined was Colombia's Brigada de Patentes, a well known national scheme that finances patent applications for innovative projects with environmental or technological impact. The fairs she attended continued to play a decisive role in her journey. After winning an award at the Parque Explora fair, where she presented a more advanced prototype, she was sent to the USA to compete in an international contest. There, her work caught the attention of Colombian investors Juan David Aristizábal and Leandro Contreras, who provided funding to scale the invention and later became cofounders of EcolAir.

This early institutional support, combined with mentorship from professionals she met through fairs and programmes, deepened her interest in intellectual property, eventually leading her to take specialised classes with IP attorneys to better understand the system.

Pérez filed her first patent application at 18, a process that later resulted in the grant of US10781291B2, covering a biodegradable polymer and its preparation process. Ecol-Air's portfolio has grown to include US12186703B2, which covers both the pollutant capture and neutralisation system. For Pérez, IP represents far more than legal protection; it is a strategic tool that enables commercial partnerships, secures investment and supports the company's long-term growth.

Scaling operations

In 2023 Ecol-Air opened what it describes as Latin America's first air treatment plant using its proprietary technology, located in Girardota. The facility is designed to process around 70 tonnes of air per day, with an estimated efficiency of 82%. A second plant was brought on line five months later. The company plans to launch the Air Innovation Center in Barbosa, Antioquia, increasing treatment capacity to 497 tonnes of air per day. In addition to its industrial function, the centre will include educational programmes focused on environmental awareness and air quality.

Pérez has relocated to the USA to oversee international expansion and now serves as project manager. Ecol-Air operates under a rental and service-based business model and works with REECOD, a polymer-processing partner that incorporates Ecol-Air materials into consumer products sold through retailers including Home Depot.

Towards sustainable urban environments

For Pérez, Ecol-Air's work is focused on creating practical systems that can be deployed at scale and integrated into existing industrial infrastructure. She is also active in promoting greater participation by women in science and engineering, often sharing her experiences with younger audiences. As investment in carbon capture and sustainable materials continues to grow, Ecol-Air is positioning its technology as one option among a broader set of tools for addressing urban air pollution.

2. Opportunities afforded in IPR-intensive industries

This chapter presents the main results of an analysis of the IPR landscape—specifically patents and trade marks—within the manufacturing sector of nine LAC countries (Argentina, Brazil, Chile, Colombia, Ecuador, El Salvador, Uruguay, Peru and Mexico). The analysis aims to identify IPR-intensive industries at the regional level and calculate their contribution to the nine economies based on different economic indicators.

2.1. The use of patents and trade marks in the manufacturing sector

Patents and trade marks were selected for this study because they are the most comprehensive and economically significant IP rights utilised within the manufacturing sector, and data on patents and trade marks are more widely available and comparable. An industry is defined as "IPR-intensive" in the LAC region if its number of IPR filings per employee exceeds the employment-weighted average of IPR filings per employee across all manufacturing industries utilising that specific IP right.

Methodology and data

Industries were classified as patent-intensive or trade mark-intensive based on calculated intensity indices, which normalise patent and trade mark filings by industry employment data. The analysis covers the manufacturing classes under the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev.4) for the period 2016-2020. Data inputs consist of economic data for the period 2016-2020, the source of which is a unique granular dataset of economic surveys harmonised by the UN-ECLAC Statistics Division called BADECON (ECLAC, 2023), as well as patent filings and trade mark registrations corresponding to this same period across the nine countries.[10]

A fundamental challenge in IPR analysis is that patent and trade mark databases use their own classification systems—the International Patent Classification (IPC) for patents and the Nice Classification for trade marks—which do not directly align with standard economic and industrial classifications like ISIC Rev.4. To resolve this, concordance tables were used to map IP applications to corresponding economic sectors. For this study, we applied the "Algorithmic Links with Probabilities" (ALP) concordance methodology developed by Lybbert and Zolas (2014). The ALP approach uses text analysis and keyword extraction to probabilistically match the technical and descriptive texts within the IPC and Nice classification systems to the industry descriptions found in ISIC Rev.4.

To strictly isolate the manufacturing sector, a targeted crosswalk was applied to the ALP concordance, filtering out service industries. In cases where patent applications or trade mark registrations were assigned to multiple IPC or Nice classes, the applications were distributed as equal fractional counts across all associated classes before the concordance was applied. This fractional counting method ensures that no data or industry coverage are lost and preserves the integrity of the full dataset. Following this concordance process, over 90% of total patent applications and 47% of total trade mark registrations within the dataset were successfully mapped to the manufacturing sector.

2.1.1. IPR-intensive industries

Based on the calculated intensity indices for the 2016-2020 period, a distinct subset of the manufacturing sector within the countries analysed demonstrates high reliance on intellectual property rights. Of the 136 manufacturing industry classes defined by ISIC Rev.4, 44 industries (32.4%) were identified as IPR-intensive. This indicates that approximately one in every three manufacturing industries in the region utilises patents, trade marks, or both at an intensity above the employment-weighted average.

10 Data on international trade mark registrations and procedural data was provided by the EUIPO.

Table 2

Distribution of manufacturing industries by IPR intensity

IPR Category	Number of industries	% of manufacturing industries
Patent-intensive only	20	14.7%
Patent and trade mark-intensive	11	8.1%
Trademark-intensive only	13	9.6%
Total IPR-intensive	**44**	**32.4%**
Non-IPR-intensive	92	67.6%
Total manufacturing industries	**136**	**100%**

A total of 31 manufacturing classes meet the threshold for patent intensity. Of these, 20 industries (14.7% of the total manufacturing sector) are exclusively patent-intensive. Table 3 shows the list of the 15 industries with the largest number of assigned patent applications, while Table 4 displays the 15 most patent-intensive industries.

Manufacture of pharmaceuticals, medicinal chemical and botanical products is by far the industry with the largest number of patent applications, followed, at a very large distance, by manufacture of communication equipment. However, manufacture of optical instruments and photographic equipment, followed by manufacture of watches and clocks are the industries with the highest patent intensity.

Table 3

Industries with the highest number of patent applications in LAC, 2016-2020

ISIC	ISIC description	IPR-intensive	Patent applications in LAC 2016-2020
2 100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	patent, trade mark	10 600
2 630	Manufacture of communication equipment	patent	2 180
2 013	Manufacture of plastics in primary forms	patent	1 956
2 620	Manufacture of computers and peripheral equipment	patent, trade mark	1 751
2 011	Manufacture of basic chemicals	n	1 597
2 021	Manufacture of pesticides and other agrochemical products	patent	1 356
2 220	Manufacture of plastics products	n	864
2 670	Manufacture of optical instruments and photographic equipment	patent, trade mark	859
2 410	Manufacture of basic iron and steel	n	849
3 250	Manufacture of medical and dental instruments and supplies	patent	792
2 640	Manufacture of consumer electronics	patent	723
1 701	Manufacture of pulp, paper and paperboard	n	713
2 811	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	n	623
2 651	Manufacture of measuring, testing, navigating and control equipment	patent	611
2 814	Manufacture of bearings, gears, gearing and driving elements	patent	595

Table 4

Top 15 most patent-intensive industries

ISIC	ISIC description	Patent intensity (patent applications per thousand employees)
2 670	Manufacture of optical instruments and photographic equipment	0.14
2 652	Manufacture of watches and clocks	0.11
2 013	Manufacture of plastics in primary forms	0.05
2 815	Manufacture of ovens, furnaces and furnace burners	0.04
2 814	Manufacture of bearings, gears, gearing and driving elements	0.04
2 100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.04
2 822	Manufacture of metal-forming machinery and machine tools	0.04
3 230	Manufacture of sports goods	0.04
3 220	Manufacture of musical instruments	0.04
2 021	Manufacture of pesticides and other agrochemical products	0.03
3 012	Building of pleasure and sporting boats	0.03
2 660	Manufacture of irradiation, electromedical and electrotherapeutic equipment	0.03
2 630	Manufacture of communication equipment	0.03
2 620	Manufacture of computers and peripheral equipment	0.03
2 826	Manufacture of machinery for textile, apparel and leather production	0.02

A total of 24 industries qualify as trade mark-intensive. Of these, 13 (9.6% of the sector) are exclusively trade mark-intensive. Manufacture of pharmaceuticals, medicinal chemical and botanical products is also the industry with the most trade mark registrations. Manufacture of computers and peripheral equipment and finishing of textiles follow at places two and three.

However, the most trade mark-intensive industries are manufacture of musical instruments and manufacture of magnetic and optical media. Notably, 11 industries (8.1% of the sector) are intensive in both patents and trade marks. This intersection highlights sectors with complex IP strategies.

Table 5

Top 15 industries with the highest number of trade mark registrations in LAC, 2016-2020

ISIC	ISIC description	IPR-intensive	Number of TM registrations in LAC 2016-2020
2 100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	patent, trade mark	21 836
2 620	Manufacture of computers and peripheral equipment	patent, trade mark	16 615
1 313	Finishing of textiles	trade mark	16 543
2 023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	trade mark	13 245
1 811	Printing	trade mark	8 753
1 030	Processing and preserving of fruit and vegetables	no	7 985
1 101	Distilling, rectifying and blending of spirits	trade mark	6 884
1 079	Manufacture of other food products n.e.c.	trade mark	6 176
2 011	Manufacture of basic chemicals	no	4 882
1 071	Manufacture of bakery products	no	4 216
1 010	Processing and preserving of meat	no	3 402
1 511	Tanning and dressing of leather; dressing and dyeing of fur	trade mark	2 979
3 100	Manufacture of furniture	no	2 951
3 240	Manufacture of games and toys	trade mark	2 524
1 512	Manufacture of luggage, handbags and the like, saddlery and harness	trade mark	2 403

Table 6

Top 15 most TM-intensive industries in LAC, 2016-2020

ISIC	ISIC description	TM intensity
3 220	Manufacture of musical instruments	0.51
2 680	Manufacture of magnetic and optical media	0.39
1 101	Distilling, rectifying and blending of spirits	0.37
2 660	Manufacture of irradiation, electromedical and electrotherapeutic equipment	0.29
2 620	Manufacture of computers and peripheral equipment	0.24
3 211	Manufacture of jewellery and related articles	0.21
3 230	Manufacture of sports goods	0.21
1 313	Finishing of textiles	0.20
3 012	Building of pleasure and sporting boats	0.17
3 240	Manufacture of games and toys	0.17
1 512	Manufacture of luggage, handbags and the like, saddlery and harness	0.13
1 393	Manufacture of carpets and rugs	0.12
2 822	Manufacture of metal-forming machinery and machine tools	0.11
2 670	Manufacture of optical instruments and photographic equipment	0.09
1 811	Printing	0.08

2.2. Impact of IPR-intensive manufacturing industries on LAC economies

This section analyses the economic footprint of IPR-intensive manufacturing industries across the nine countries. By quantifying their aggregate contribution to employment, value added and wages within the manufacturing sector, we provide insights into their structural characteristics and economic impact.

As established in the methodology, the identification of IPR-intensive industries is determined at the regional level and applied uniformly to all sample nations to ensure cross-country comparability. Data reflect averages for the period 2016-2020.

2.2.1. Regional analysis

Table 7

Contribution of IPR-intensive industries to employment, value added and wages in the manufacturing sector in LAC

IPR-intensive category	**Employment**[11] (absolute)	**Share in total employment** (%)
Patent-intensive	961 426	7.1%
TM-intensive	1 107 530	8.2%
IPR-intensive	1 679 116	12.4%

Category	**Value added**[12] (USD million)	**Share in total** (%)
Patent-intensive	42 971	8.2%
TM-intensive	42 518	8.1%
All IPR-intensive	68 240	13.0%

Category	**Value added per employee** (USD)	**Value added per employee premium**
Patent-intensive	44 695	16.0%
TM-intensive	38 390	-0.4%
All IPR-intensive	40 641	5.4%

Category	**Wage per employee**[13] (USD per year)	**Wage premium**
Patent-intensive	18 396	56.2%
TM-intensive	14 385	22.1%
All IPR-intensive	15 563	32.1%

11 Employment: zero values treated as missing (dropped from the average); if a country ISIC has only zero across all years, it is dropped as well; regional total per ISIC is the sum of averages of all nine countries.

12 Negative values treated as missing and dropped. Regional total per ISIC = the sum of the averages of all nine countries.

13 Average wage bills are computed over observed years only, zero values are treated as missing and excluded from the calculation. We take the average wage bill/average employment to get the average wage per worker for the IPR and non IPR-intensive industries. Countries with no data for an ISIC are automatically excluded.

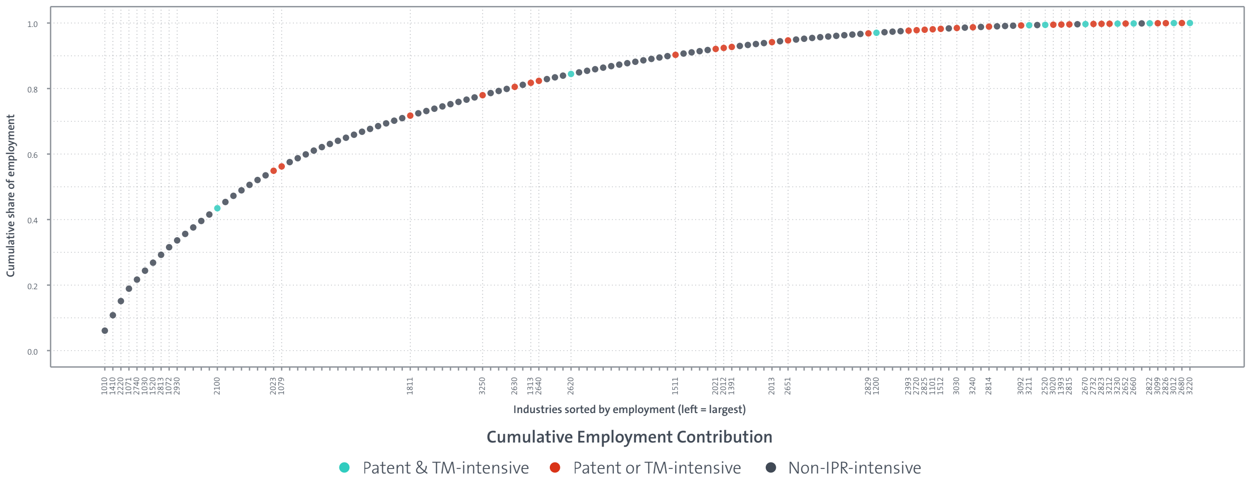
Employment

During the period 2016-2020, IPR-intensive manufacturing industries employed approximately 1.68 million workers across the region, representing 12.4% of total formal manufacturing employment. When disaggregated by IP right, trade mark-intensive activities accounted for a slightly larger share of jobs (8.2%) than patent-intensive activities (7.1%). Interestingly, none of the IPR-intensive industries are among the top employers in LAC.

In general, IPR-intensive industries tend to be smaller in terms of employment. The largest individual IPR-intensive industry by employment is manufacture of pharmaceuticals, medicinal chemical and botanical products – an industry intensive in both patents and trade marks.

Figure 4

Contribution to employment by industry type



Source: ECLAC, EPO

Note: Top ten industries by employment at the aggregate level are: 1010 Processing and preserving of meat; 1410 Manufacture of wearing apparel, except fur apparel; 2220 Manufacture of plastics products; 1071 Manufacture of bakery products; 2740 Manufacture of electric lighting equipment; 1030 Processing and preserving of fruit and vegetables; 1520 Manufacture of footwear; 2813 Manufacture of other pumps, compressors, taps and valves; 1072 Manufacture of sugar; 2930 Manufacture of parts and accessories for motor vehicles

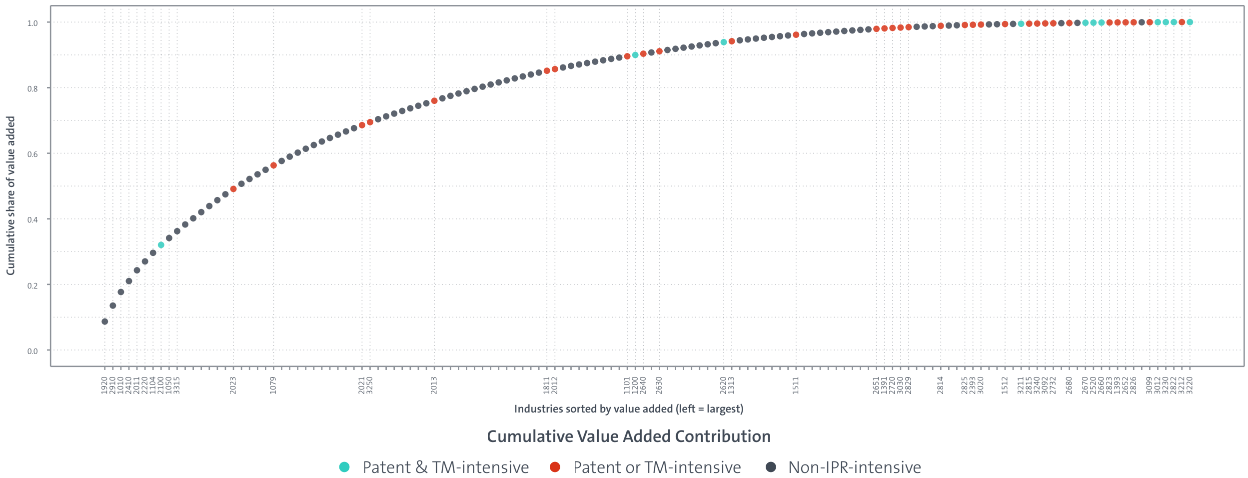
Value added

While IPR-intensive industries account for a relatively modest 12.4% of total manufacturing employment, they generate a proportionately larger share of economic output, contributing 13.0% (over USD 68.2 billion) of the sector's total value added. This disparity between employment share and value added share suggests that IPR-intensive industries exhibit higher baseline labour productivity compared to non-IPR-intensive manufacturing sectors.

The industry with the highest value added contribution is also manufacture of pharmaceuticals, which is among the top ten industries in LAC's manufacturing sector in terms of value added. While overall value generation in LAC manufacturing is anchored by massive capital-intensive heavy industries like motor vehicles, basic chemicals and iron and steel, the profile of patent-intensive industries is markedly different. As the data show, patent intensity is highest in specialised precision engineering (such as optical and electromedical instruments), digital technology (communication and computer equipment), and advanced chemically-driven processes (pharmaceuticals and agrochemicals) (see Table 3).

Figure 5

Contribution to value added by industry type



Source: ECLAC, EPO

Note: The top ten industries by value added at the aggregate level are: 1920 Manufacture of refined petroleum products; 2910 Manufacture of motor vehicles; 1010 Processing and preserving of meat; 2410 Manufacture of basic iron and steel; 2011 Manufacture of basic chemicals; 2220 Manufacture of plastics products; 1104 Manufacture of soft drinks; production of mineral waters and other bottled waters; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products; 1050 Manufacture of dairy products; 3315 Repair of transport equipment, except motor vehicles

Wage bill

The higher productivity observed in the value added data translates directly into labour market outcomes. Between 2016 and 2020, workers in IPR-intensive industries earned an average annual wage of USD 15 563, representing a 32.1% wage premium over the USD 11 780 average earned in non-IPR-intensive industries. The premium was significantly higher in patent-intensive industries (56.2%) than in trade mark-intensive industries (22.1%) on the regional level.

2.2.2. Country level analysis

This section examines the contribution of IPR-intensive industries to employment and value added within each specific country's manufacturing sector. As established in the methodology, IPR-intensive industries were identified at the regional level. This study assumes that if an industry is structurally IPR-intensive at the regional level, it maintains that intrinsic characteristic across all countries analysed, allowing standardised cross-country comparability.

To provide accurate macroeconomic context, the importance of IPR-intensive industries must be evaluated relative to the overall size of each country's manufacturing sector. Therefore Table 8 below integrates macroeconomic data detailing the share of total manufacturing value added (VA) as a percentage of GDP. Summary tables for each country are provided in Table 11 in the Annex.

Table 8

Value added and employment share of IPR-intensive industries by country, 2016-2020 average

Country	Manufacturing VA as % of GDP	Share of VA from IPR-intensive industries (%)	Share of employment in IPR-intensive industries (%)
Mexico	~20.0%	7.9%	10.3%
Argentina	~16.0%	12.6%	11.8%
Ecuador	~13.0%	11.2%	10.4%
Brazil	~13.0%	16.0%	13.3%
Peru	~12.5%	12.5%	11.7%
El Salvador	~12.5%	No data available	19.2%
Colombia	~11.0%	22.7%	21.3%
Uruguay	~9.5%	21.1%	17.4%
Chile	~9.5%	16.0%	10.3%

The data reveal that the role of IPR-intensive industries depends heavily on national industrial structures and specialisation patterns. However, a consistent trend emerges across the region: in nearly all countries analysed (with the notable exception of Mexico), the contribution of IPR-intensive industries to manufacturing value added exceeds their contribution to employment.

This indicates above-average labour productivity in those countries, confirming that IPR-intensive industries generate more economic value per worker than non-IPR-intensive sectors within the same national economy. By analysing the size of the manufacturing sector relative to the importance of IPR-intensive industries within it, three distinct country profiles emerge:

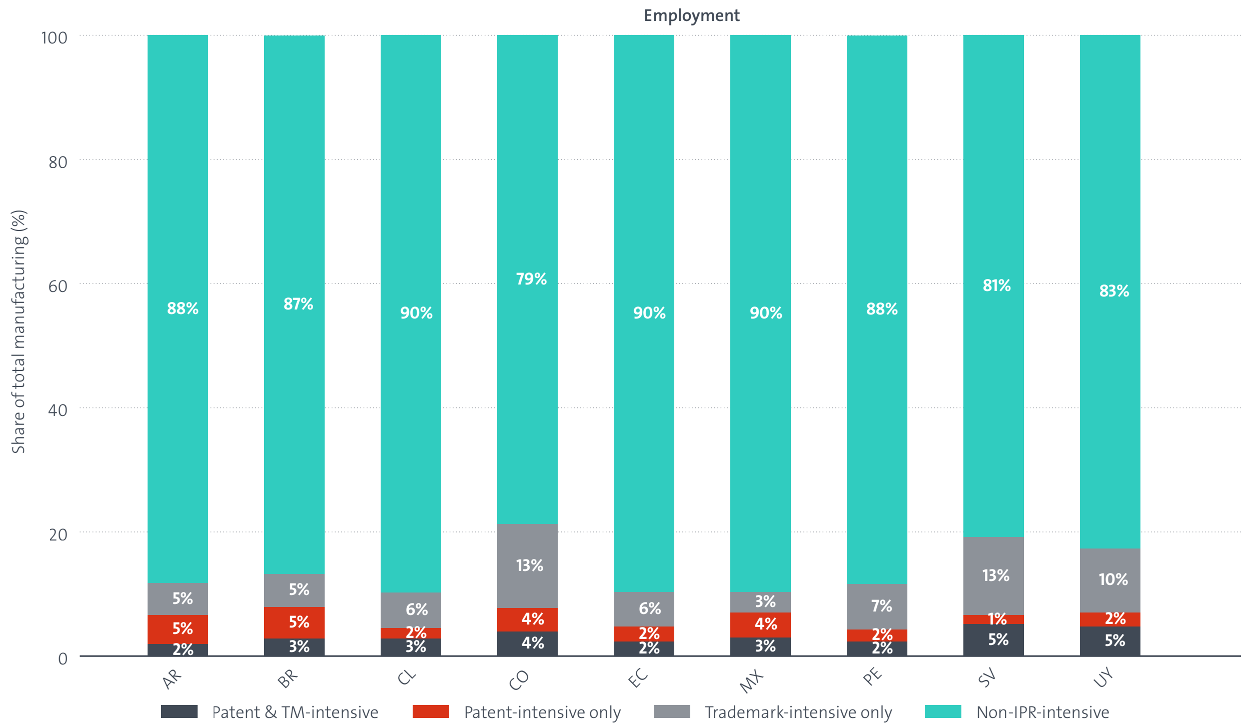
1. **High overall manufacturing footprint, low contributions of IPR-intensive industries** (the "Assembly Hub" profile)
   Mexico stands out as a unique case. It possesses the largest manufacturing sector relative to GDP of the countries analysed (approximately 20%). However, it records the lowest share of value added originating from IPR-intensive industries (7.9%), and it is the only country where the employment share of these industries outpaces their value added share. From an economic perspective, this reflects Mexico's deep integration into North American global value chains as an assembly hub

2. **Moderate/large manufacturing footprint, moderate IPR intensity** (the "Diversified Industrial" profile): Countries like Argentina and Brazil fall into this category. They possess substantial manufacturing sectors (representing roughly 16% and 13% of GDP respectively). Within those sectors, IPR-intensive industries make a robust and proportional contribution, accounting for roughly 12% to 16% of manufacturing value added and 12% to 13% of employment. This suggests a relatively diversified industrial base with mature, formalised sectors (such as automotive, chemicals and agribusiness) that actively utilise intellectual property.

3. **Smaller manufacturing footprint, high share of IPR-intensive industries** (the "Specialised/Niche" profile): Conversely, Colombia and Uruguay have relatively smaller manufacturing sectors (hovering around 10-11% of GDP), yet, they show the highest relative contributions from IPR-intensive industries, with value added shares exceeding 20% in both countries. This indicates that while their broader manufacturing base is small, the manufacturing that does take place is highly formalised, specialised, and disproportionately reliant on IPR to remain competitive.

Figure 6

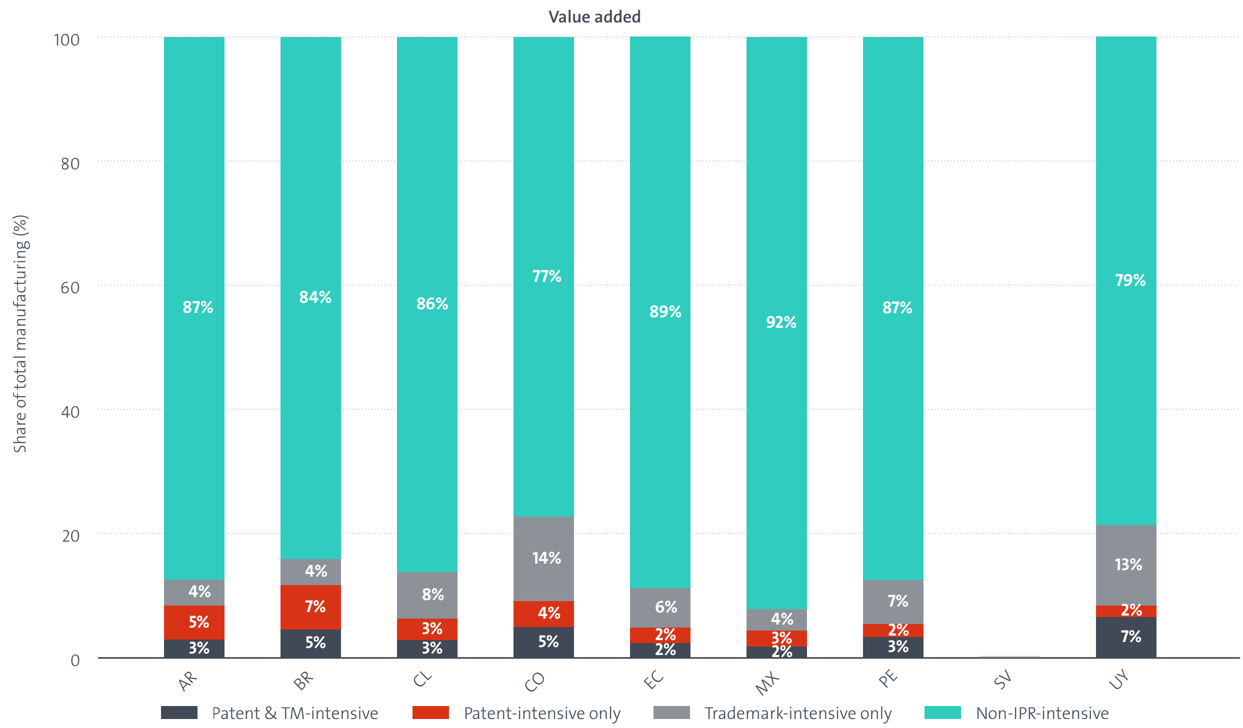
Share of employment by industry type and country



Source: ECLAC, EPO

Figure 7

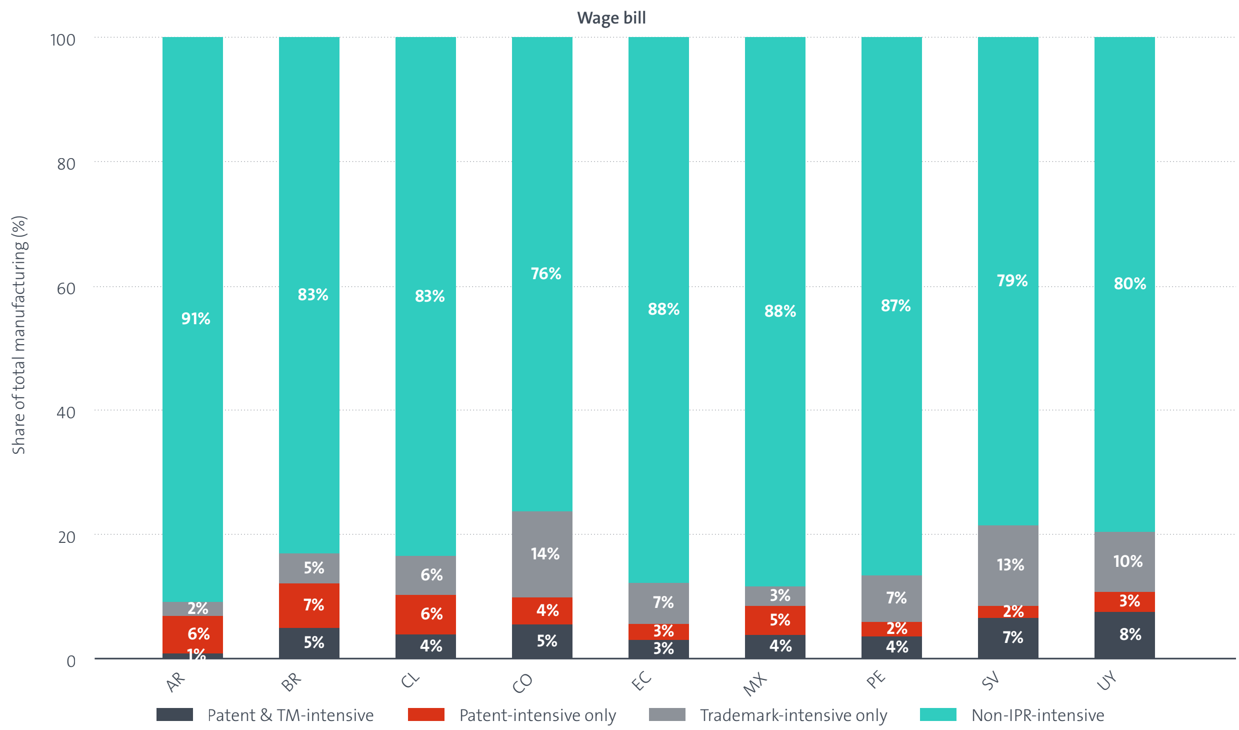
Share of value added by industry type and country



Source: ECLAC, EPO

Figure 8

Share of salaries by industry type and country



Source: ECLAC, EPO

2.2.3. IPR intensity and economic performance: a correlation analysis

Having identified the scope of IPR-intensive industries across the region, this section explores how intellectual property intensity (separated by patents and trade marks) correlates with core economic performance indicators: labour productivity and wage intensity. By analysing these correlations at both the aggregate regional level and the individual country level, we can observe the extent to which IP utilisation translates into measurable economic outcomes.

At the aggregate regional level, patent intensity displays a positive and highly significant correlation with wage intensity. The correlation with labour productivity is positive but lacks statistical significance at the regional level. This indicates that, on average across the region, industries with higher patent intensity are associated with higher wages. The correlation between trade mark intensity and labour productivity and wage intensity are near zero and lack statistical significance at the regional level.

Figure 9

Correlation of patent and trade mark intensity with labour productivity and wage intensity by country

Source: ECLAC, EPO

Note: Numbers display correlation coefficients between variables. Significance levels: *** p < 0.01; ** p < 0.05; * p < 0.1.
IPR intensities by ISIC class are calculated at the regional level, while impact intensities by ISIC class are calculated at the country level.

On the country level, the correlations between patent intensity and labour productivity and wage intensity are positive and statistically significant for Brazil, Chile, Ecuador and Mexico. Conversely, in Peru, and Colombia, the correlations with productivity are positive, but not statistically insignificant. In Argentina, the correlation with wage intensity is notably negative and significant.

Trade mark intensity does not show a statistically significant positive correlation with labour productivity or wage intensity in any of the nine countries analysed. In Peru there is a statistically significant negative correlation with wage intensity (-0.18**). Across the other nations, the coefficients for both productivity and wages are predominately negative but statistically insignificant.

3. A closer look at trade: the imbalance in IPR-intensive industries

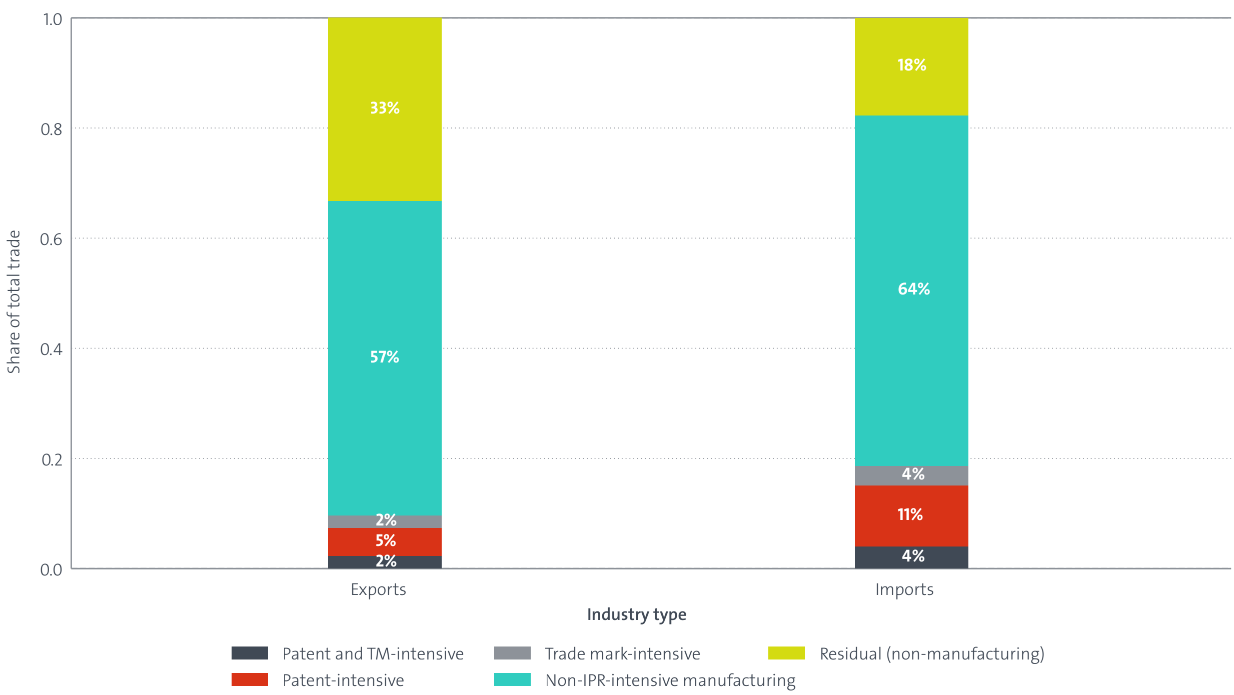
Previous economic studies of IPR-intensive industries in the EU and the USA have documented that sectors utilising IP rights intensively contribute the largest share to those regions' total trade flows, both imports and exports (EPO and EUIPO, 2026). This section investigates the trade dynamics of patent- and trade mark-intensive manufacturing industries in Latin America, revealing a markedly different structural pattern.

3.1. Contributions to trade from IPR-intensive industries

The analysis relies on five-year aggregate averages from 2016 to 2020 across the nine LAC countries. Trade flows are grouped by industrial classification and regional IPR intensity. As noted above, the manufacturing sector as a whole dominates the region's trade, accounting for 66% of total export value and an even larger 83% of total import value, revealing a higher importance for imports than for exports. However, disaggregating these flows by IPR intensity reveals a clear structural imbalance in how the LAC region engages with the global innovation economy.

Figure 10

Average trade structure by region (exports vs. imports)



Source: ECLAC, EPO

Note: Totals correspond to aggregate export and import values for the nine countries under analysis. Trade mark-intensive industries comprise 24 ISIC classes, patent-intensive industries 31 classes, and industries intensive in both trade marks, and patents 11 classes. Manufacturing only includes the ISIC Rev. 4 classes belonging to Section C (Divisions 10-33) not intensive in any IP rights. All remaining ISIC classes outside manufacturing are grouped under Residual.

IPR-intensive sectors account for a relatively small share of LAC exports. According to the average trade structure, just 9% of total regional exports originate from IPR-intensive manufacturing industries. This breaks down to 5% originating from patent-intensive sectors, 2% from trade mark-only sectors, and 2% from industries jointly intensive in both patents and trade marks. The vast majority of the region's manufacturing exports (57% of total trade) stem from non-IPR-intensive industries.

In stark contrast, LAC imports show a much stronger reliance on output from IPR-intensive sectors. Goods originating from these industries represent 19% of total imports, more than double their share on the export side. Imports from patent-intensive industries alone account for 11% of total imports, while output from jointly intensive and trade mark-only sectors accounts for 4% each.

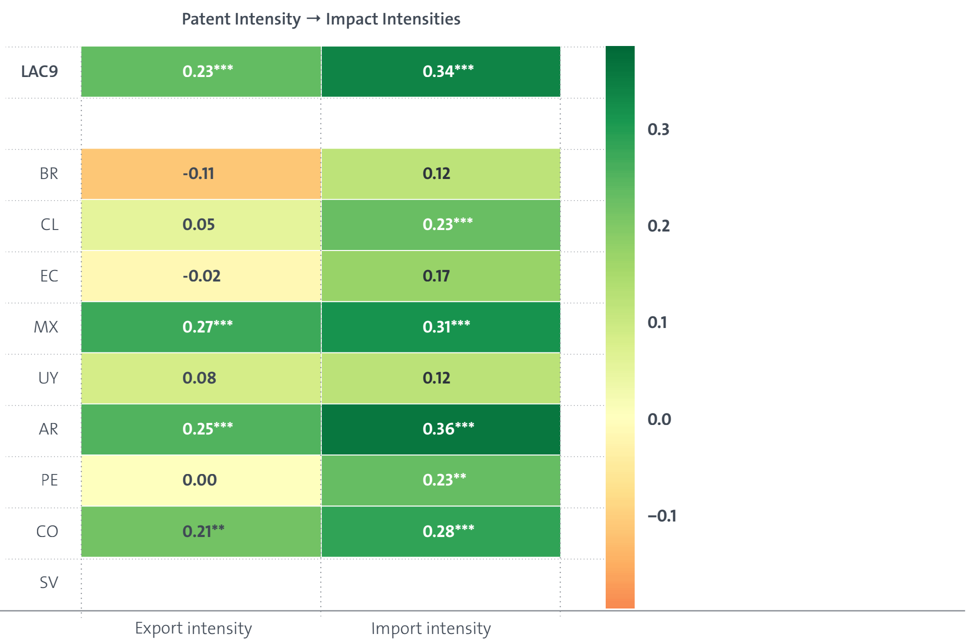
This shows a reliance of LAC economies on imported output from IPR-intensive sectors and reflects a structural pattern of dependency on foreign innovation and a limited domestic capacity to generate and export output from IP-rich industries.

These trade figures corroborate with the findings from the patent analysis in the next chapter, which highlights the disproportionately large share of foreign patent filings in the region compared to domestic filings. Ultimately, the data underscore that LAC currently participates in the global economy primarily as a consumer of innovation rather than a producer. This is also reflected in a strongly negative balance of payments for the use of IP in all nine countries, as will be shown further below.

A correlation analysis between the IPR intensity of an industry (separated by patents and trade marks) with export intensity and import intensity confirms these findings at regional level and for most of the nine countries. At the aggregate regional level, patent and trade mark intensity displays a positive and highly significant correlation with both import intensity and export intensity. This indicates that, on average across the region, industries with higher IPR intensity are associated with higher volumes of international trade.

Figure 11

Impact of patent-intensive industries on trade by country

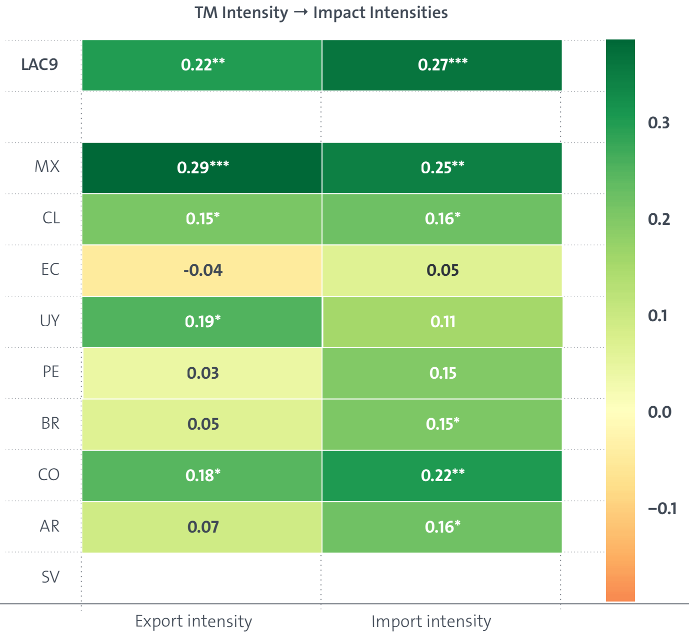


Source: ECLAC, EPO

Note: IPR intensities by ISIC class are calculated at the regional level, while impact intensities by ISIC class are calculated at the country level.
Numbers display correlation coefficients between variables. Significance levels: *** p < 0.01; ** p < 0.05; * p < 0.1.

Figure 12

Impact of trade mark-intensive industries on trade by country



Source: ECLAC, EPO

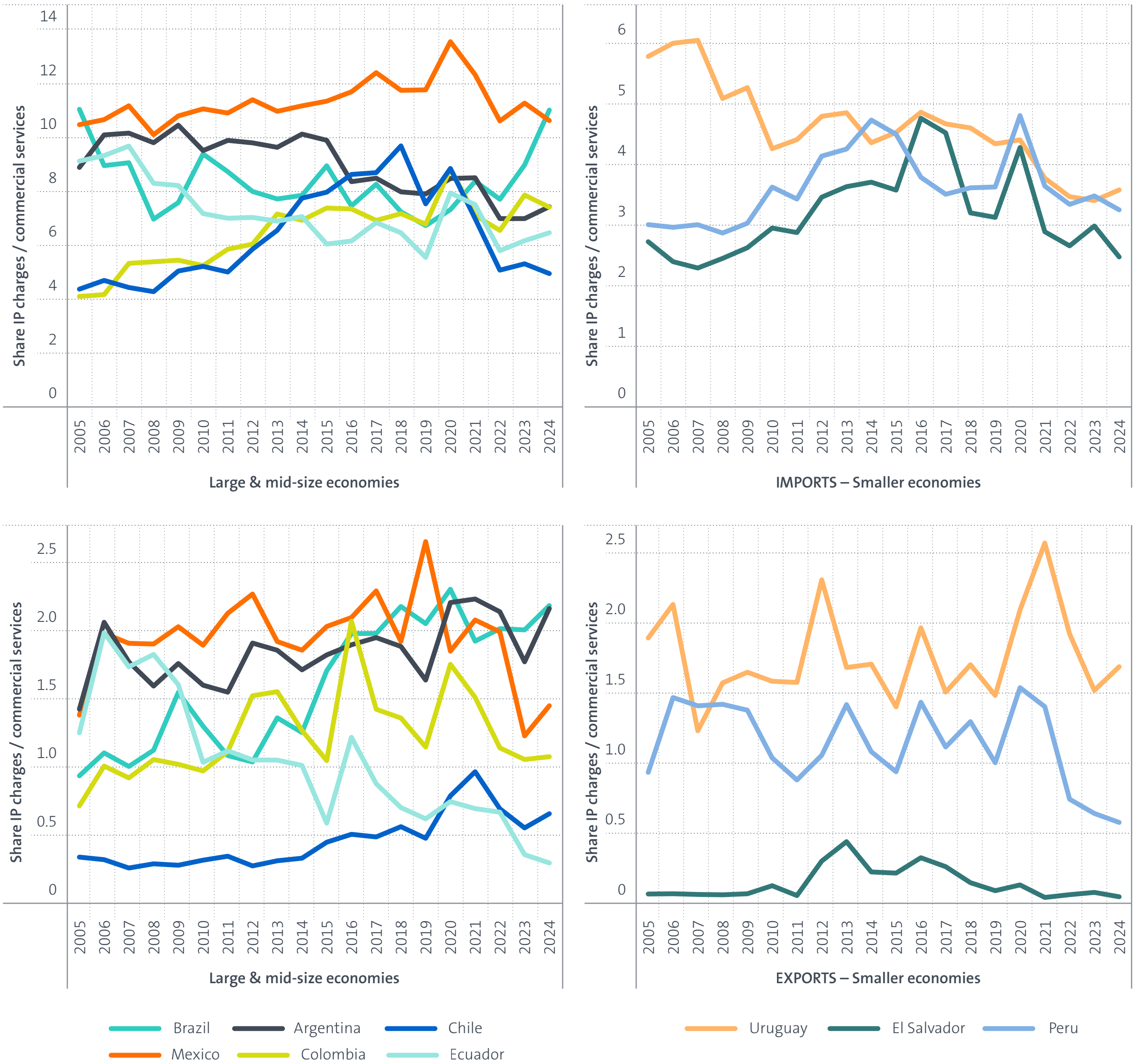
Note: IP intensities by ISIC class are calculated at the regional level, while impact intensities by ISIC class are calculated at the country level. Numbers display correlation coefficients between variables. Significance levels: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

However, on the country level we observe more diverse statistical relationships. The relationship between patent intensity and import intensity is the most consistent country-level indicator. It is positive and statistically significant for Argentina, Mexico, Colombia, Chile and Peru. Export intensity correlations are only positive and significant in Mexico, Argentina and Colombia and close to zero for other countries.

Similar to the regional trend, trade mark intensity correlates positively with trade variables in several countries. The correlation with export intensity is positive and statistically significant in a subset of nations, specifically Mexico, Uruguay, Colombia and Chile. For import intensity, positive and significant correlations are observed across a slightly broader group, including Mexico, Colombia, Argentina, Chile and Brazil.

Figure 13

Share of IP charges in commercial services trade, by economy size (imports vs. exports)



Source: ECLAC, EPO

Note: Data are from the share of charges for the use of intellectual property n.i.e. (see here for definition) (Extended Balance of Payments classification, EBOPS 2010) in commercial services, that is, the proportion of total commercial services exports or imports accounted for by IP charges. Values are expressed as a percentage of total commercial services in each direction (exports and imports). In addition to aggregate exports and imports, the WTO-OECD Balanced Trade in Services Dataset (BaTiS) also provides the partner breakdown of "Charges for the use of intellectual property n.i.e." for both services exports and services imports.

Overall, the data indicate that at both the regional and country levels, higher trade mark intensity and higher patent intensity are consistently and significantly associated with higher import intensity. For export intensity, positive and significant correlation is observed only for some countries, while for other countries no statistically significant relationship can be observed.

The physical trade imbalance is consistent with the region's financial flows associated with intellectual property. To examine these flows, this analysis incorporates balance of payments data from the World Development Indicators (WDI), sourced originally from the International Monetary Fund (IMF). The data track two key indicators: IP payments and IP receipts, which measure the charges residents pay abroad and receive from non-residents, respectively, for the use of proprietary rights. These rights cover patents, trade marks, copyrights, industrial designs, trade secrets, franchises, and licenses to reproduce or distribute intellectual property.

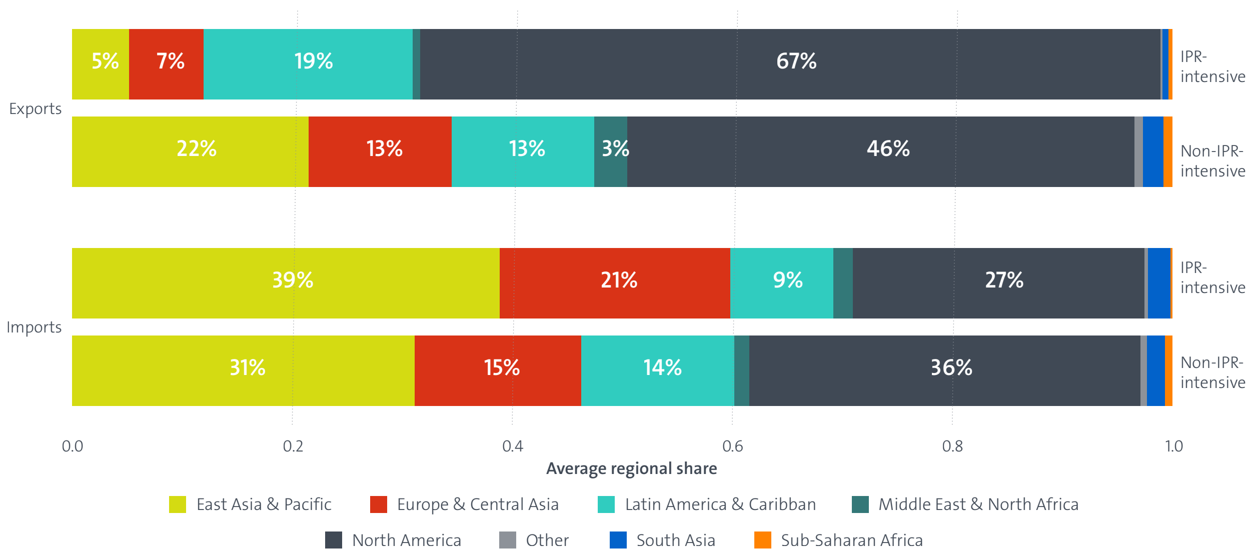
As demonstrated by these indicators, all nine LAC countries operate as net payers for intellectual property. The reliance on importing IPR-intensive goods aligns with substantial outward IP royalty payments, which in 2024 reached approximately USD 9.8 billion in Brazil and USD 6.4 billion in Mexico (see Annex 3). Simultaneously, using data from BaTiS to measure IP charges as a proportion of total commercial services, the region's capacity to monetise domestic innovation remains demonstrably limited. Across all countries analysed, IP receipts consistently account for less than 2.5% of total commercial services exports.

3.2. Geographical distribution of trade in IPR-intensive and non-IPR-intensive industries

Disaggregating LAC's trade from IPR-intensive and non-IPR-intensive sectors by partner region further illuminates the structural nature of this dependency. By comparing the geographic flows of output from IPR-intensive manufacturing industries against non-IPR-intensive manufacturing industries, a clear picture emerges of LAC's peripheral and asymmetric integration into global value chains.

Figure 14

Average regional composition of trade (IPR-intensive vs. non-IPR-intensive industries)



Source: ECLAC, EPO

Note: These shares are obtained by regrouping the categories from the previous analysis into two aggregates. The IPR-intensive category includes trade flows from trade mark-intensive, patent-intensive and jointly IPR-intensive industries. The non-IPR-intensive category combines manufacturing-only industries and residual (non-manufacturing) industries.

On the export side, trade originating from IPR-intensive manufacturing industries is highly concentrated in a single geographic market. North America receives 67% of the region's IPR-intensive manufacturing exports. This concentration is largely driven by specific industrial linkages, such as Mexico's automotive and electronics manufacturing sectors. In contrast, exports from these same IPR-intensive industries to other major global markets remain low, with East Asia and Pacific accounting for just 5% and Europe and Central Asia accounting for 7%.

Conversely, exports from non-IPR-intensive manufacturing industries display a more distributed geographic footprint. While North America remains the largest destination for these goods, its share is lower at 46%. Simultaneously, non-IPR-intensive manufacturing exports to East Asia and Pacific (22%) and Europe and Central Asia (13%) are notably higher than their IPR-intensive counterparts. This divergence reflects Latin America's established role in exporting different types of manufactured goods, such as primary-processed or resource-based manufacturing, to diverse global markets, while its IPR-intensive manufacturing exports remain regionally focused on North America.

The import structure is much more equally distributed across global regions and reveals where Latin American manufacturing sectors source their inputs and capital goods. For IPR-intensive manufacturing industries, the largest share of imports originates from East Asia and Pacific (39%), followed by North America (27%) and Europe and Central Asia (21%).

The data indicate a notable asymmetry in trade flows with Europe and East Asia within the IPR-intensive manufacturing segment. For instance, while Europe supplies 21% of LAC's IPR-intensive manufacturing imports, it receives only 7% of the region's exports in thris category. Similarly, East Asia supplies 39% but receives only 5%. This indicates that the LAC manufacturing sector relies heavily on these two regions for IPR-intensive manufactured inputs, components, and technologies. The import structure for non-IPR intensive manufacturing follows a slightly different distribution. North America serves as the primary source for non-IPR-intensive manufactured imports (36%), followed closely by East Asia and Pacific (31%), while the share from Europe and Central Asia is smaller (15%).

Finally, the data show that intra-regional trade (within Latin America and the Caribbean) accounts for a relatively minor share of total manufacturing trade. For IPR-intensive manufacturing, 19% of exports and 9% of imports are traded within the region. In the non-IPR-intensive manufac-turing segment, intra-regional trade accounts for 13% of exports and 14% of imports. Overall, this indicates that the Latin American manufacturing sector (both IPR-intensive and non-IPR-intensive) is more deeply integrated with external global markets than it is within the region. However, the aggregated numbers are heavily influenced by Mexico's trade activity and the picture looks different at the individual country level, as will be discussed further below.

3.3. Composition of IPR-intensive trade flows by trade partner

The following analysis further details LAC's IPR-intensive trade flows by major partner region (North America, Europe and Central Asia, East Asia and Pacific, and Intra-regional) disaggregated by ISIC manufacturing industry class. This breakdown reveals the distinct roles the LAC manufacturing sector plays within different global supply networks.

a. North America

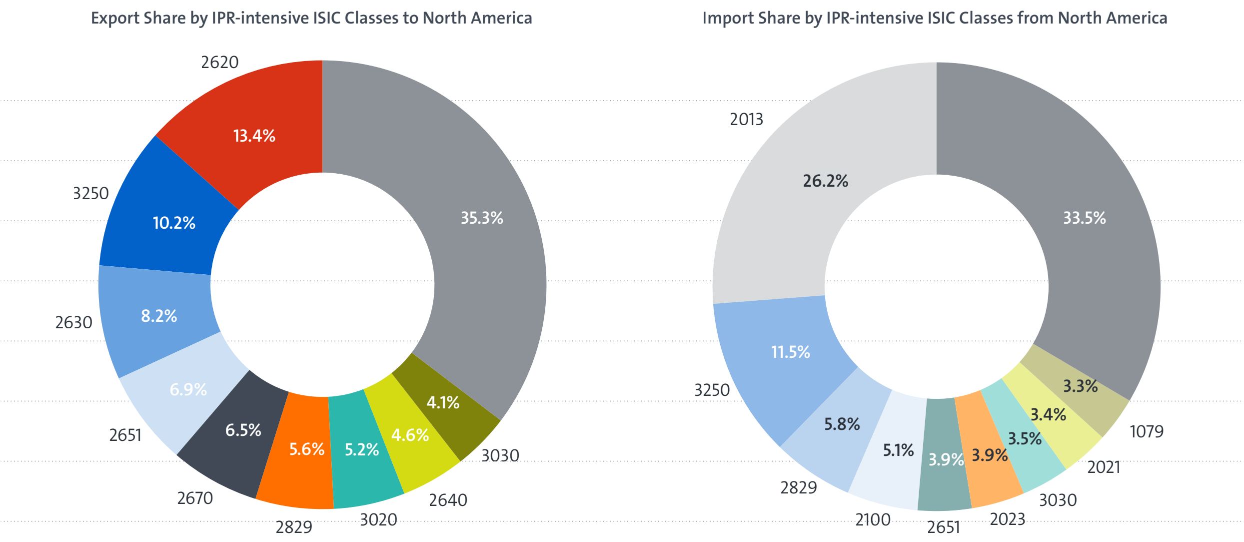
Trade flows with North America exhibit significant concentration, particularly in specific high-precision and technology-intensive sectors.

The top ten IPR-intensive manufacturing ISIC classes account for approximately 65% of exports to North America. Key export categories include computers and peripheral equipment (ISIC 2620: 13.4%) and medical and dental instruments (ISIC 3250: 10.2%). A further 28% of these exports are distributed among other high-precision segments, including communication equipment (ISIC 2630), optical instruments (ISIC 2670), and special-purpose machinery (ISIC 2829).

On the import side, LAC's IPR-intensive purchases from North America are also concentrated. The largest import category is plastics in primary forms (ISIC 2013), comprising 26.2% of the total. Medical and dental instruments (ISIC 3250) account for 11.5%, while pharmaceutical products (ISIC 2100), soaps and personal care items (ISIC 2023, 2021), and specialised machinery (ISIC 2829) constitute the next largest shares.

Figure 15

Trade of IPR-intensive industries with North America



Top Export ISICs

- Manuf. of computers and peripheral equipment
- Manuf. of medical and dental instruments and supplies
- Manuf. of communication equipment
- Manuf. of measuring, testing, navigating and control equipment
- Manuf. of optical instruments and photographic equipment
- Manuf. of other special-purpose machinery n.e.c.
- Manuf. of railway locomotives and rolling stock
- Manuf. of consumer electronics
- Manuf. of air and spacecraft and related machinery
- Other

Top Imort ISICs

- Manuf. of plastics in primary forms
- Manuf. of medical and dental instruments and supplies
- Manuf. of other special-purpose machinery n.e.c.
- Manuf. of pharmaceuticals, medicinal chemical and botanical products
- Manuf. of measuring, testing, navigating and control equipment
- Manuf. of soap and detergents, cleaning and polishing preparations, pertumes and toilet preparations
- Manuf. of air and spacecraft and related machinery
- Manuf. of pesticides and other agrochemical products
- Manuf. of other food products n.e.c.
- Other

Source: ECLAC, EPO

A notable characteristic of the trade relationship with North America is the presence of the same product categories (e.g. medical instruments, ISIC 3250) in both import and export flows. This pattern is indicative of two-way, intra-industry trade within vertically integrated supply chains, where Latin American facilities may import intermediate components and export assembled goods, or vice versa, within the same technological sector.

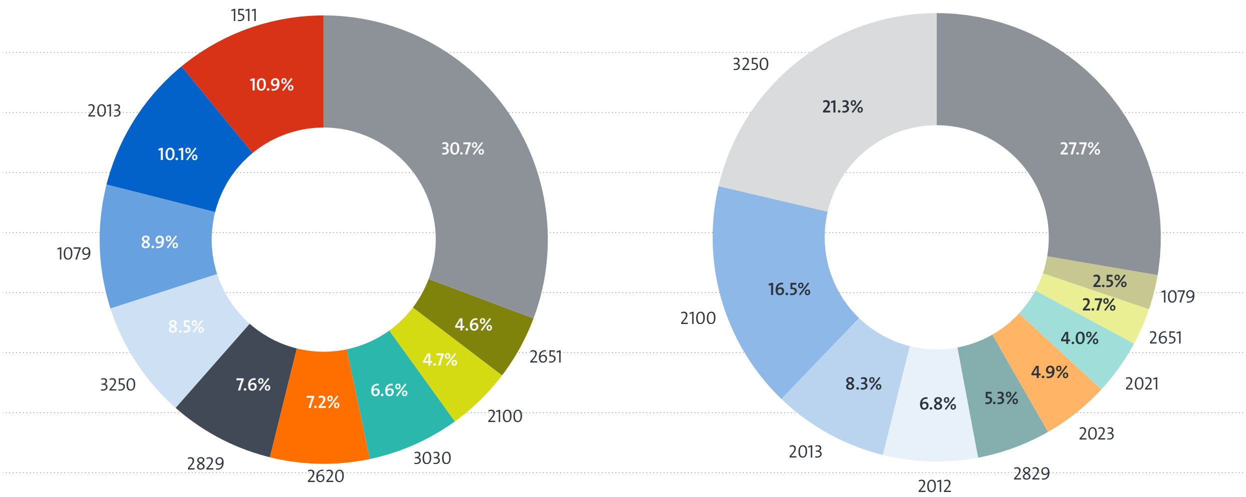
b. Europe and Central Asia

The composition of trade with Europe and Central Asia shows a divergence between the technological complexity of LAC exports versus imports.

Figure 16

Trade of IPR-intensive industries with Europe and Central Asia

Export Share by IPR-intensive ISIC Classes to Europe and Central Asia | **Import Share by IPR-intensive ISIC Classes from Europe and Central Asia**



Top Export ISICs
- Tanning and dressing of leather; dressing and dyeing of fur
- Manuf. of plastics in primary forms
- Manuf. of other food products n.e.C.
- Manuf. of medical and dental instruments and supplies
- Manuf. of other special-purpose machinery n.e.c.
- Manuf. of computers and peripheral equipment
- Manuf. of air and spacecraft and related machinery
- Manuf. of pharmaceuticals, medicinal chemical and botanical products
- Manuf. of measuring, testing, navigating and control equipment
- Other

Top Imort ISICs
- Manuf. of medical and dental instruments and supplies
- Manuf. of pharmaceuticals, medicinal chemical and botanical products
- Manuf. of plastics in primary forms
- Manuf. of fertilisers and nitrogen compounds
- Manuf. of other special-purpose machinery n.e.c.
- Manuf. of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- Manuf. of pesticides and other agrochemical products
- Manuf. of measuring, testing, navigating and control equipment
- Manuf. of other food products n.e.C.
- Other

Source: ECLAC, EPO

Leading IPR-intensive exports to Europe are primarily found in basic materials and lower-tech processing sectors. The top categories are leather tanning and dressing (ISIC 1511: 10.9%) and plastics in primary forms (ISIC 2013: 10.1%). More advanced manufacturing categories, such as special-purpose machinery (ISIC 2829), computers (ISIC 2620), and medical devices (ISIC 3250), account for smaller shares, each ranging between 7% and 9%.

Conversely, imports from Europe are heavily concentrated in highly regulated, research-intensive life science sectors. Medical instruments and supplies (ISIC 3250) represent the largest import category at 21.3%, closely followed by pharmaceuticals (ISIC 2100) at 16.5%. Plastics (ISIC 2013) contribute 8.3%, with special-purpose machinery and chemicals making up smaller portions.

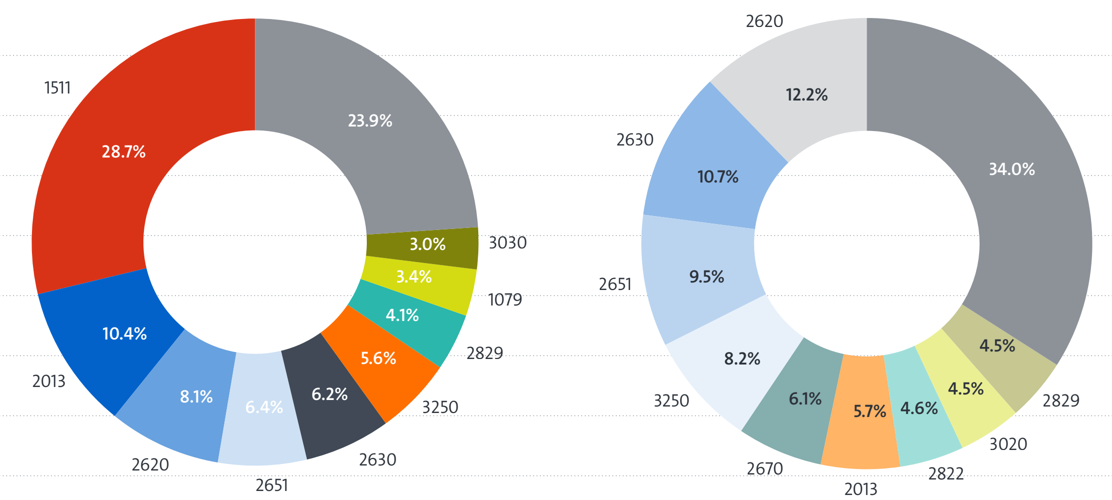
The import structure underscores Europe's position as a primary supplier of advanced healthcare technologies (pharmaceuticals and medical devices) to Latin America and the Caribbean, industries typically characterised by high R&D expenditures and strong IP protection.

c. East Asia and Pacific

The trade structure with East Asia and Pacific displays the sharpest asymmetry in technological content between exports and imports.

Figure 17

Trade of IPR-intensive industries with the East Asia and Pacific region



Top Export ISICs

- Tanning and dressing of leather; dressing and dyeing of fur
- Manuf. of plastics in primary forms
- Manuf. of computers and peripheral equipment
- Manuf. of measuring, testing, navigating and control equipment
- Manuf. of communication equipment
- Manuf. of medical and dental instruments and supplies
- Manuf. of other special-purpose machinery n.e.c.
- Manuf. of other food products n.e.c.
- Manuf. of air and spacecraft and related machinery
- Other

Top Imort ISICs

- Manuf. of computers and peripheral equipment
- Manuf. of communication equipment
- Manuf. of measuring, testing, navigating and control equipment
- Manuf. of medical and dental instruments and supplies
- Manuf. of optical instruments and photographic equipment
- Manuf. of plastics in primary forms
- Manuf. of metal-forming machinery and machine tools
- Manuf. of railway locomotives and rolling stock
- Manuf. of other special-purpose machinery n.e.c.
- Other

Source: ECLAC, EPO

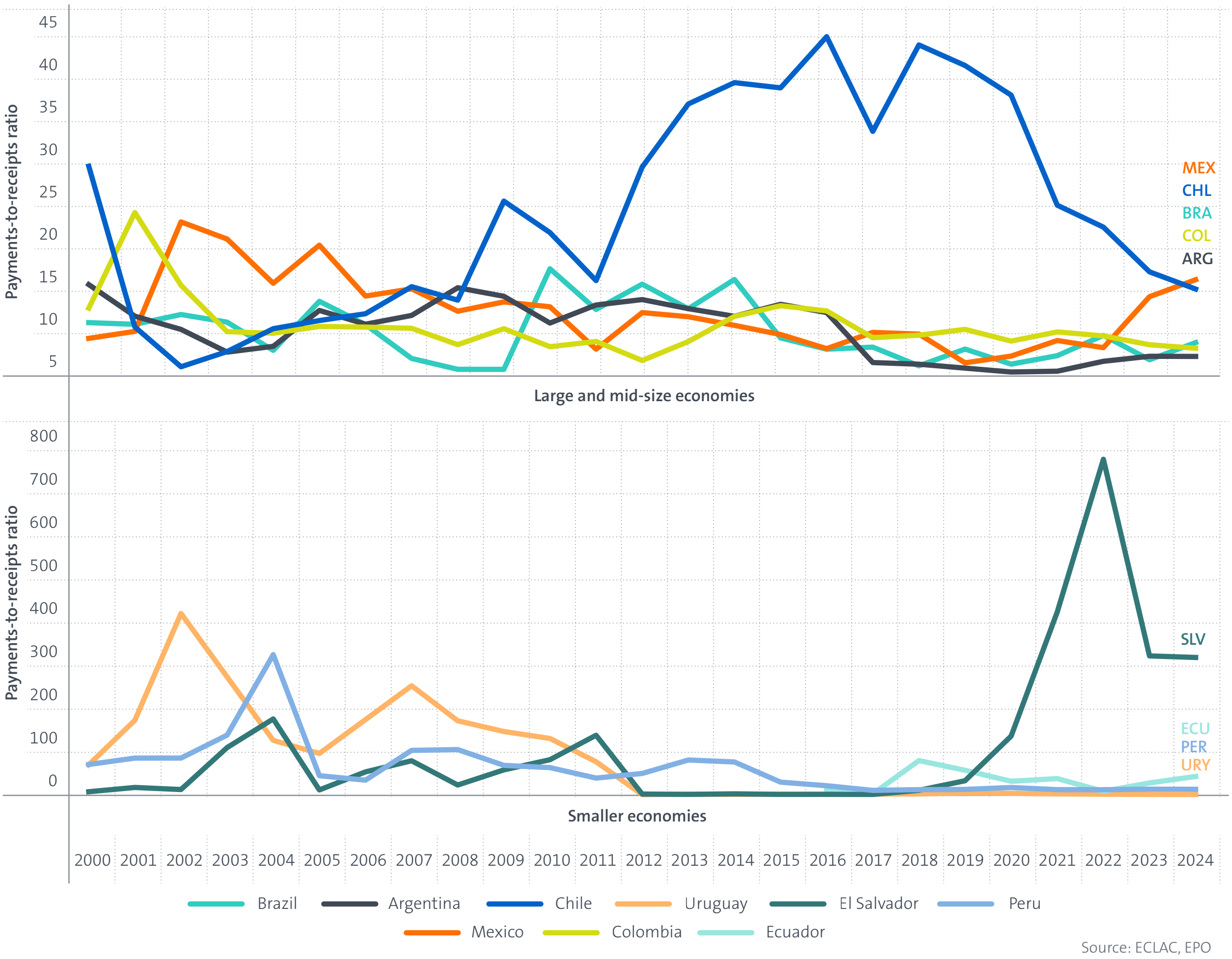
On the export side, Latin American and the Caribbean IPR-intensive trade to East Asia is dominated by basic materials. The leather tanning and dressing sector (ISIC 1511) alone constitutes 28.7% of IPR-intensive exports, followed by plastics in primary forms (ISIC 2013) at 10.4%. More technologically advanced sectors, such as computers (ISIC 2620) and medical instruments (ISIC 3250), represent minor shares of 8.1% and 6.2% respectively.

In contrast, LAC's IPR-intensive imports from East Asia are strongly centralised in advanced industrial and digital technologies. Computers (ISIC 2620) lead the import basket at 12.2%, followed by communication equipment (ISIC 2630: 10.7%), medical technologies (ISIC 3250: 8.2%), and measuring/control instruments (ISIC 2651: 9.5%).

Unlike the North American relationship, trade in IPR-intensive indsutries with East Asia exhibits limited intra-industry overlap (Figure 18). The structural composition reflects a reliance on East Asia for digital and precision capital goods, which are paid for primarily through the export of lower-complexity, natural resource-derived manufacturing. Furthermore, the consistent importation of these proprietary, advanced technologies from East Asia, alongside research-intensive life science imports from Europe, corresponds with the sustained IP royalty payments recorded in the region's aggregate balance of payments. This dynamic illustrates how the structural requirement for foreign-developed capital goods and medical technologies translates directly into financial outflows for IP use.

Figure 18

Payments-to-receipts ratio for IP charges, by economy size



Source: ECLAC, EPO

Note: Data come from the World Development Indicators (WDI). The graph uses two indicators: IP payments (BM.GSR.ROYL.CD) and IP receipts (BX.GSR.ROYL.CD), which measure, respectively, the charges residents pay abroad and the charges they receive from non-residents for the use of proprietary rights such as patents, trade marks, copyrights, industrial designs, trade secrets, franchises and licenses to reproduce or distribute intellectual property. Both indicators are reported in current US dollars and are sourced from the Balance of Payments Statistics Yearbook and data files of the IMF. They form part of the goods and services account of the balance of payments and capture cross-border flows linked to intellectual property use. The ratio of payments to receipts is calculated independently for each country and year.

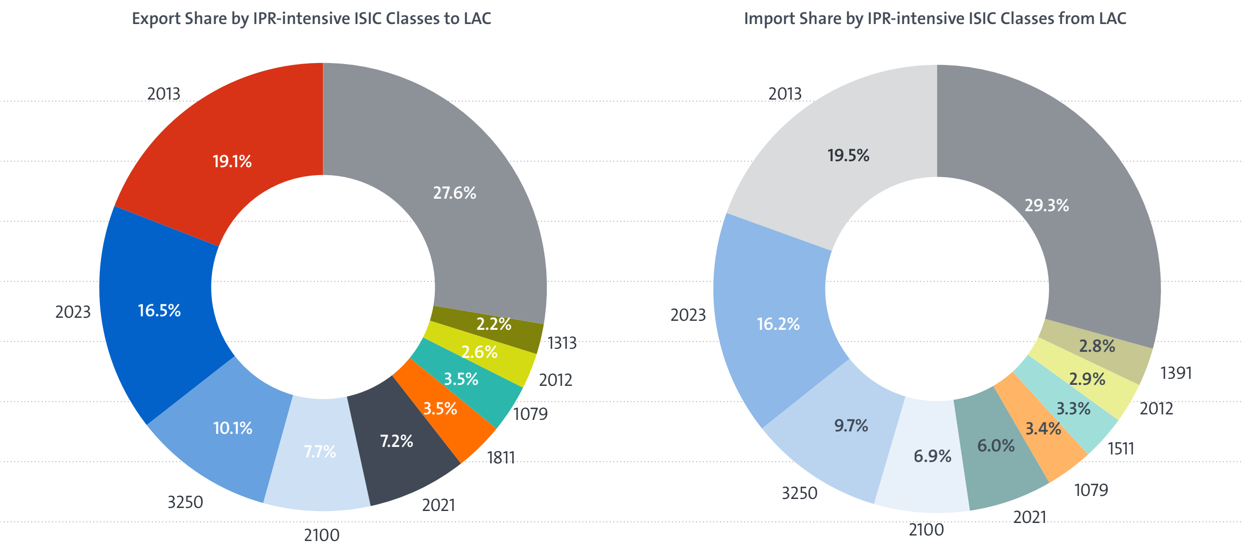
d. Intra-regional trade

Intra-regional trade (within Latin America and the Caribbean) displays a different composition, characterised by a more balanced exchange of intermediate industrial goods and consumer products.

The export structure is led by plastics in primary forms (ISIC 2013: 19.1%), soaps, detergents, and personal care products (ISIC 2023: 16.5%), and medical instruments (ISIC 3250: 10.1%). Pharmaceuticals (ISIC 2100) account for 7.7%, with pesticides and fertilisers also present in the top tiers.

Figure 19

Trade of IPR-intensive industries within the LAC region



Top Export ISICs

- Manuf. of plastics in primary forms
- Manuf. of soap and detergents, cleaning and polishing preparations, pertumes and toilet preparations
- Manuf. of medical and dental instruments and supplies
- Manuf. of pharmaceuticals, medicinal chemical and botanical products
- Manuf. of pesticides and other agrochemical products
- Printing
- Manuf. of other food products n.e.c.
- Manuf. of fertilisers and nitrogen compounds
- Finishing of textiles
- Other

Top Import ISICs

- Manuf. of plastics in primary forms
- Manuf. of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- Manuf. of medical and dental instruments and supplies
- Manuf. of pharmaceuticals, medicinal chemical and botanical products
- Manuf. of pesticides and other agrochemical products
- Manuf. of other food products n.e.C.
- Tanning and dressing of leather; dressing and dyeing of fur
- Manuf. of fertilisers and nitrogen compounds
- Manuf. of knitted and crocheted fabrics
- Other

Source: ECLAC, EPO

The import structure is nearly a mirror image of export composition. The top import categories are plastics (ISIC 2013: 19.5%), soaps and personal care goods (ISIC 2023: 16.2%), medical devices (ISIC 3250: 9.7%) and pharmaceuticals (ISIC 2100: 6.9%).

The high degree of similarity between intra-regional exports and imports indicates a regional market that primarily trades essential intermediate inputs (like plastics and chemicals) and formulated consumer goods (like soaps and basic pharmaceuticals) across neighbouring borders.

3.4. Country-level trade analysis

Analysing the composition of trade at individual country level reveals distinct structural patterns that correlate with the overall size and specialisation of a country's economy. Across the nine countries, significant variation exists in the intensity, geographic destination and overall weight of IPR-intensive industries within national trade flows. The overall composition of imports and exports demonstrates how heavily each nation relies on IPR-intensive manufacturing versus non-IPR-intensive manufacturing and primary (residual) sectors.

Across all nine countries, non-manufacturing (residual) and non-IPR-intensive manufacturing sectors constitute the vast majority of export volumes. However, the relative weight of IPR-intensive exports varies considerably:

Highest IPR-intensity exporters: El Salvador (SV) and Colombia (CO) exhibit the highest relative shares of exports originating from IPR-intensive industries (27% and 23% of total exports respectively). In El Salvador this is heavily driven by patent-intensive exports (16%), while in Colombia, patent-intensive industries account for 12%.

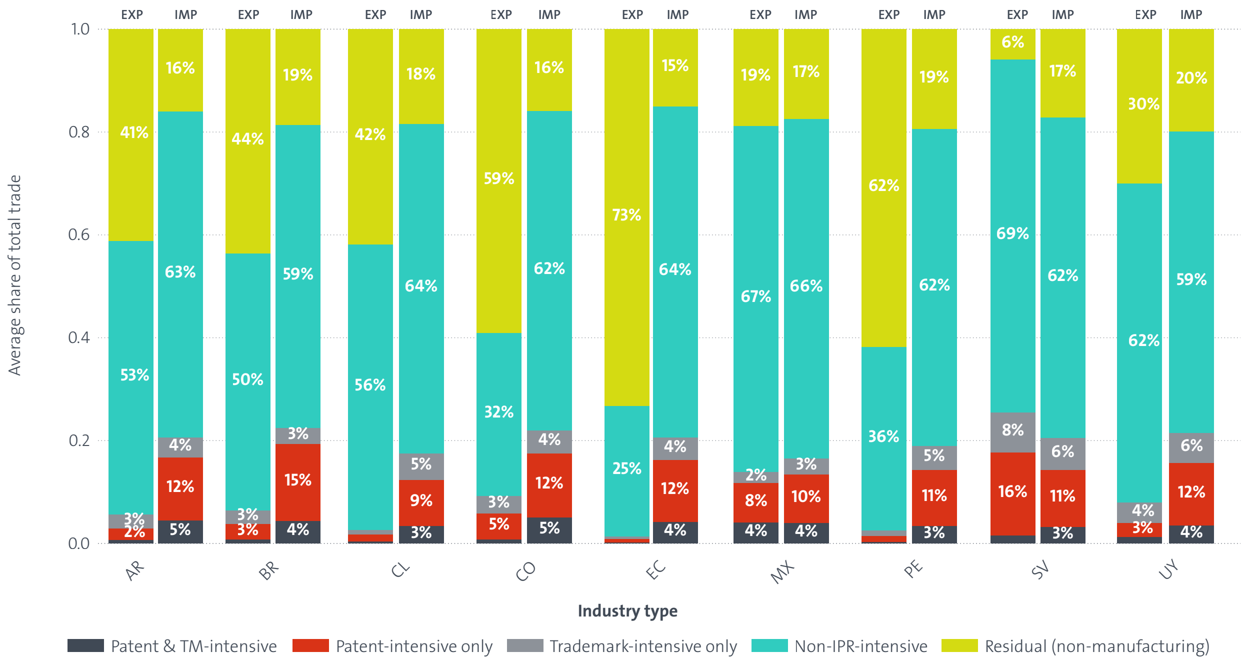
Moderate IPR-intensity exporters: countries with some of the region's largest formal manufacturing bases, such as Brazil, Mexico and Argentina, see IPR-intensive exports accounting for a more moderate portion of their overall export baskets (between 10% and 14%). In Mexico, despite a massive 67% share of non-IPR manufacturing exports, IPR-intensive exports only make up 14% of the total.

Resource-intensive exporters: nations structurally oriented toward primary agriculture or raw material extraction, such as Chile, Ecuador and Peru, show the lowest engagement in IPR-intensive export trade. In these countries, IPR-intensive sectors account for only 4% to 5% of total exports, while non-manufacturing residual sectors (like mining and raw agriculture) often comprise over 40% to 70% of their export base. This lower engagement in proprietary industrial output corresponds with the low baseline of IP royalty receipts observed in these countries' individual balance of payments (See Annex 3).

On the import side, reliance on output from IPR-intensive industries is structurally higher and more uniform across the region. For most countries, IPR-intensive goods make up roughly 20% to 26% of total imports. Brazil and Argentina show the highest relative shares, with IPR-intensive industries accounting for 22% and 21% of total imports respectively, largely driven by patent-intensive products (15% in Brazil and 12% in Argentina). This widespread reliance underscores a shared regional requirement to import complex capital goods, chemical inputs and specialised technologies to sustain domestic economic activity. This distribution reflects the economic size divide identified in the IP commercial trade data. Larger economies like Brazil, Mexico and Argentina show a higher and more stable proportion of IP charges within their total services imports (typically between 4% and 10%), corresponding to the operational demands of their extensive domestic manufacturing bases. In contrast, smaller economies exhibit lower proportional shares of IP in total services imports but experience significantly higher volatility in their historical payment-to-receipt ratios (See Figures 15 and 20).

Figure 20

Average trade structure by country (exports and imports, five-year average)



Source: ECLAC, EPO

The geographic destination and origin of trade flows distinguish the nine LAC countries into distinct trading profiles. Disaggregating these flows into IPR-intensive versus non-IPR-intensive manufacturing reveals that these geographic dependencies are heavily influenced by the technological complexity of the goods being traded.

Mexico and El Salvador demonstrate a high concentration of trade with North America, but this reliance differs notably between IPR-intensive and non-IPR-intensive sectors. For Mexico, 86% of all IPR-intensive manufacturing exports are destined for North America, a concentration even higher than its non-IPR-intensive exports to the same region (81%). El Salvador shows a similar pattern, with 60% of its IPR-intensive exports directed to North America, compared to 39% for non-IPR-intensive goods.

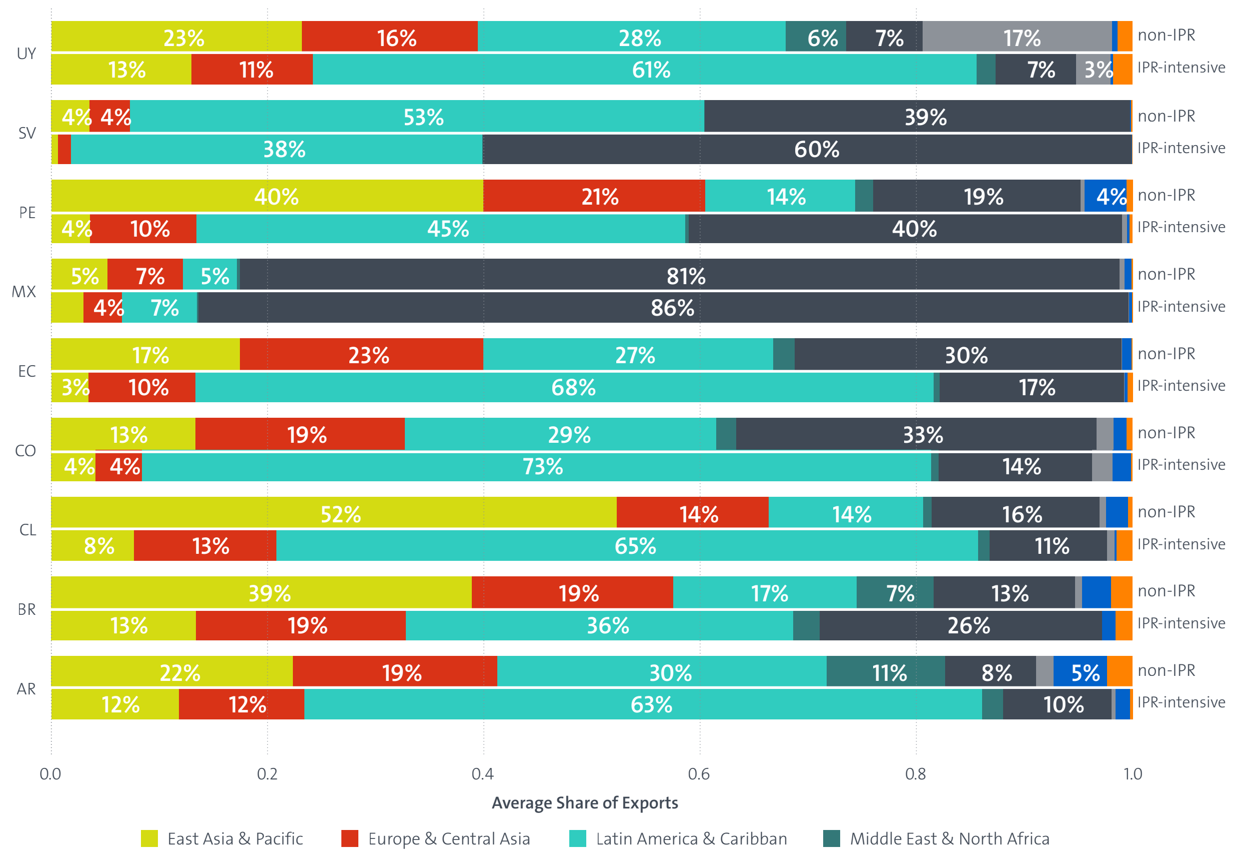
On the import side, however, both countries show a reverse asymmetry. While Mexico sources 50% of its non-IPR-intensive manufacturing imports from North America, it sources only 36% of its IPR-intensive imports from there, relying heavily on East Asia and Pacific (45%) for IPR-intensive capital goods and inputs. This structure indicates that these countries function as highly integrated, nearshored assembly nodes: they import IPR-intensive components heavily from Asia, process them, and re-export the final IPR-intensive and non-IPR-intensive output primarily to North America.

In contrast, South American nations exhibit a more distributed geographic footprint, characterised by deep structural asymmetries between where they buy goods and where they sell them. Across Brazil, Argentina, Chile and Peru there is a structural reliance on the East Asia and Pacific region and Europe and Central Asia for IPR-intensive imports. For example, Chile sources 42% of its IPR-intensive imports from East Asia and 21% from Europe (a total of 63%), compared to just 16% from North America. This reliance on Asian and European high-tech imports is consistently higher for IPR-intensive goods than for non-IPR-intensive manufacturing imports across these economies.

In contrast, these same South American countries are highly successful at exporting from non-IPR-intensive manufacturing industries globally. For instance, while Brazil exports only 13% of goods in IPR-intensive industries to East Asia and Pacific, it exports 39% of its goods in non-IPR-intensive manufacturing industries to that region. Similarly, Chile exports 52% of its non-IPR-intensive manufacturing to East Asia, but only 8% of its goods from IPR-intensive industries.

Figure 21

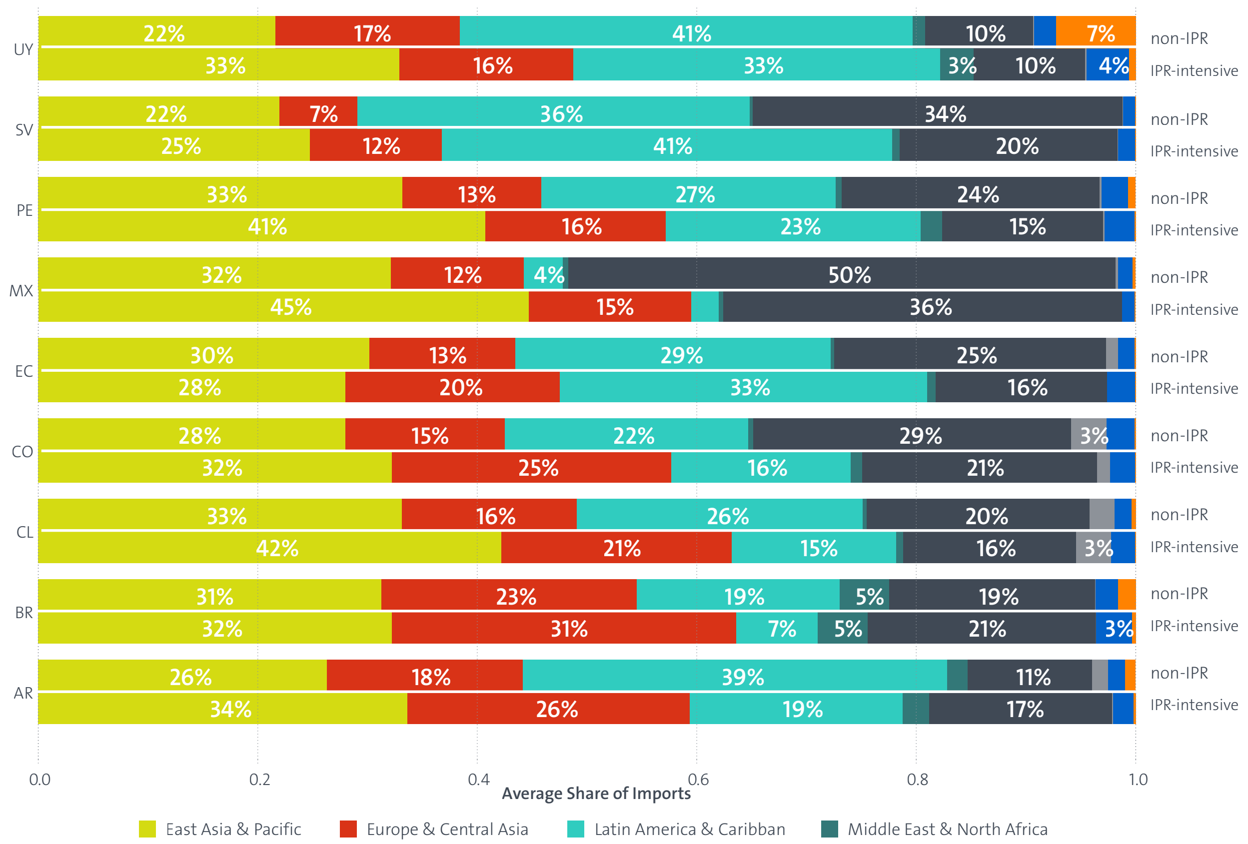
Average regional composition of exports by country



Source: ECLAC, EPO

Figure 22

Average regional composition of imports by country



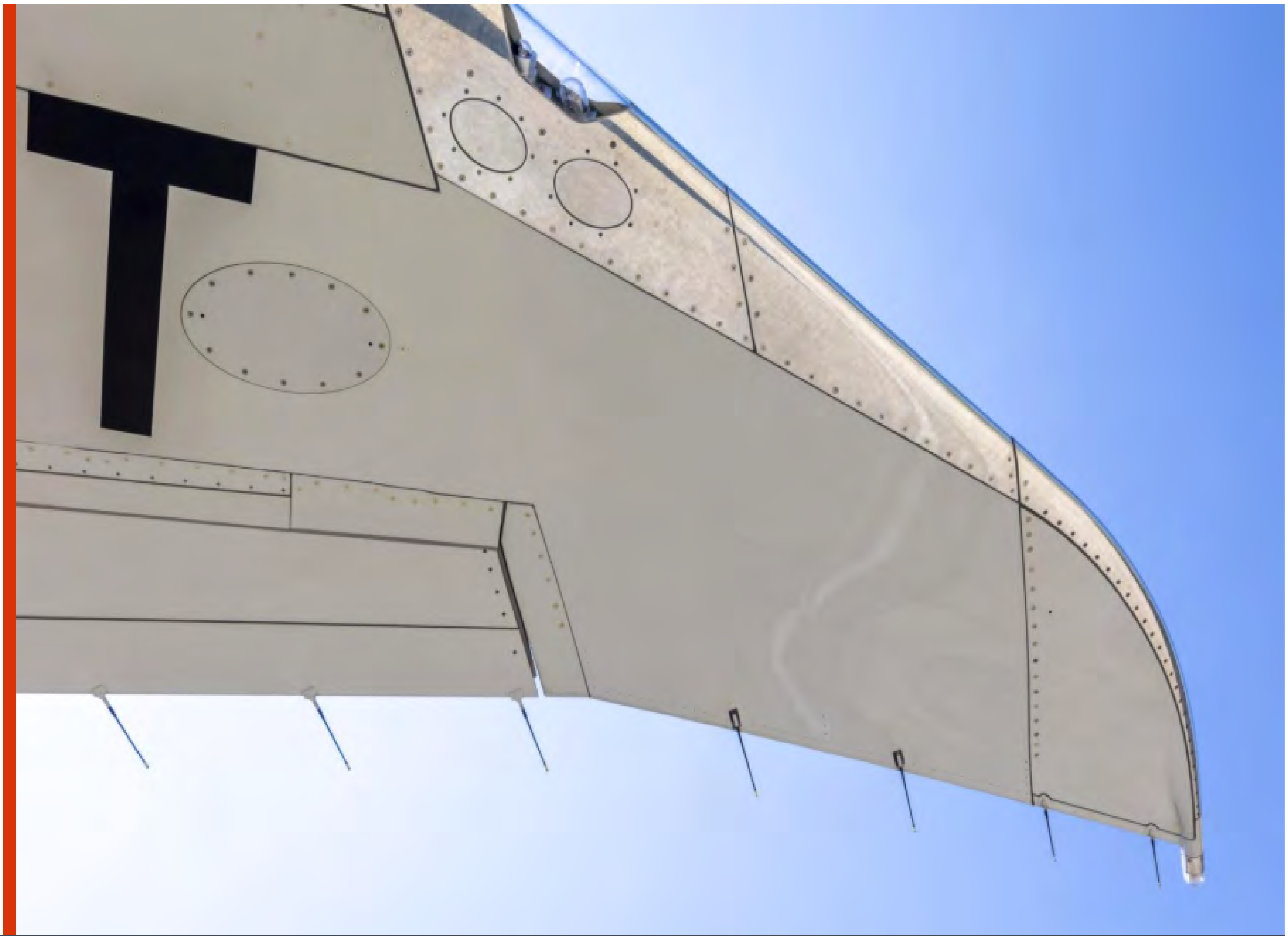
Source: ECLAC, EPO

An examination of intra-regional trade (flows occurring strictly between Latin American and the Caribbean countries) reveals how different segments of the manufacturing sector depend on regional neighbours. While aggregate regional averages suggest that intra-regional trade is uniformly low across all sectors (19% of IPR-intensive exports and 13% of non-IPR-intensive exports), a country-level breakdown demonstrates that this aggregate figure is heavily distorted by the sheer volume of Mexico's trade with North America. Removing this distortion reveals that for most South American nations the regional market is highly significant, particularly for their IPR-intensive manufacturing output.

For the majority of the countries analysed, the Latin American market is the single most important destination for their IPR-intensive manufacturing exports. This reliance is pronounced across South America: Colombia sends 73% of its IPR-intensive exports to regional neighbours, Ecuador sends 68%, Chile sends 65%, Argentina sends 63%, Uruguay sends 61% and Peru sends 45%. Even Brazil, the largest economy in South America, directs 36% of its IPR-intensive exports intra-regionally, matching its export share to North America. This indicates that while these countries struggle to achieve global competitiveness in exporting IPR-intensive goods to high-tech hubs like Asia or Europe, they are successfully leveraging these innovation-driven industries to serve regional demand.

For most South American nations, intra-regional trade is structurally more significant for IPR-intensive industries than for non-IPR-intensive manufacturing. For example, in Chile 65% of IPR-intensive exports are intra-regional, while only 14% of non-IPR-intensive exports stay within Latin America (the vast majority, 52%, are exported to East Asia).This consistent divergence highlights a distinct structural reality. Non-IPR-intensive manufacturing in South America (often comprising primary-processed goods, agricultural products and raw materials) is highly integrated into global markets. Conversely, the output of South America's IPR-intensive manufacturing sectors (such as basic chemicals, plastics, regional pharmaceuticals and consumer goods) relies heavily on the localised demand, regulatory alignment and geographic proximity provided by the Latin American market.

On the import side, intra-regional reliance is lower across the board but follows a similar technological split. South American countries source a smaller share of their IPR-intensive imports from within the region (e.g. Brazil at 7%, Chile at 15% and Colombia at 16%) due to their structural dependency on East Asia and Europe for advanced technologies and capital goods. However, for non-IPR-intensive manufacturing imports the regional reliance increases slightly (e.g. Brazil at 19%, Chile at 26% and Colombia at 22%).



Case study:
Quieter jets with lower CO_2 emissions

Partners	Embraer and the University of São Paulo
Location	Brazil
Solutions	Aerodynamic and aeroacoustics technology to reduce aircraft noise and fuel consumption
Patents	EP2137066B1, EP3676172B1, EP3676173B1

"In aeronautics or aerospace, you cannot advance the industry unless you invest in research and especially Technology Readiness Level (TRL) development."

Fernando Catalano, Director, São Carlos School of Engineering, University of São Paulo

Aircraft noise has long been a challenge for the aviation industry, not only as a source of disruption for communities living near airports but also as a public health concern. Millions of people worldwide are exposed to elevated noise levels, which research has associated with sleep disturbance, cardiovascular disease, cognitive impairment and increased risks of early mortality. At the same time, aviation remains a significant contributor to global carbon emissions and faces growing pressure to reduce its environmental impact while aligning with international targets for netzero emissions by 2050.

Brazilian inventors Fernando Catalano and Micael Carmo led research and engineering efforts that informed the design of Embraer's new generation of regional jets. Their work contributed to aircraft with noise footprints up to 68% smaller than earlier models, fuel consumption reduced by around 9% and CO_2 emissions per passenger lowered by as much as 25%.

In search of silence

Catalano and Carmo began their collaboration during the Brazilian Silent Aircraft Programme, launched in the early 2000s as Embraer sought to meet the increasingly stringent noise regulations of the International Civil Aviation Organization (ICAO). The programme brought together more than 200 researchers from universities and research centres, supported by funding from Embraer, the Brazilian Innovation Agency (FINEP) and the São Paulo Research Foundation (FAPESP).

Catalano, a professor of aerodynamics and now Dean of the São Carlos School of Engineering at the University of São Paulo, had spent decades researching aeroacoustics, drag reduction and aerodynamic performance. He also served as Brazil's independent expert on aviation noise at the ICAO. Carmo, meanwhile, developed his career at Embraer, rising to become Senior Manager for Interiors, Noise and Vibration in the Chief Engineer's Office. As a specialist in aeroacoustics and aerodynamic noise reduction, he led research programmes, certification campaigns and engineering activities dedicated to reducing aircraft noise.

Instilling a culture of research

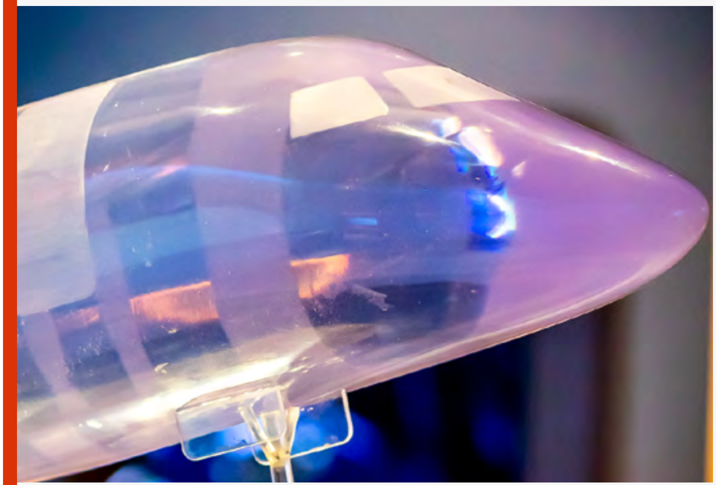
Embraer built a series of internal programmes addressing noise and aeroacoustics, including the Sound Quality, External Noise and Aeroacoustic Wind Tunnel initiatives. These co-ordinated programmes provided a systematic framework for identifying noise reduction opportunities, generating experimental data, maturing promising concepts and ultimately translating them into patentable solutions. Rather than treating invention as a standalone effort, the company invested in the capabilities needed for continuous discovery: dedicated aeroacoustics research lines, multidisciplinary teams that brought specialists together, and substantial funding for wind tunnel facilities, test rigs, microphone arrays and other experimental infrastructure. This investment enabled a structured progression from theory and simulation to small-scale models, and finally to full-scale ground and flight tests.

Fernando Catalano, Director, São Carlos School of Engineering, University of São Paulo

Engineering the E2 jets

The resulting innovations addressed several primary sources of aerodynamic noise and drag. The team developed a mechanism to fully seal slat tracks, reducing the tonal noise generated during takeoff and landing. The fuselage was refined through the use of smaller antennas and external fittings, while extended wings and raked wingtips helped to lower drag and improve efficiency. Landinggear doors were introduced to reduce turbulence, and the tail was redesigned to be 26% smaller than in prior models, contributing to weight reduction and improved stability.

Further reductions in noise were achieved through the integration of Pratt & Whitney geared turbofan engines, which operate with lower fan speeds and therefore generate less noise at the source. Combined, these measures delivered substantial noise reductions without compromising aerodynamic performance, reliability or operating economics – a balance that had historically proven difficult to achieve.



Protecting and translating innovation

Intellectual property played a central role in translating the collaboration between Fernando Catalano, Micael Carmo and Embraer into deployable technology. The field of aeroacoustics is highly competitive and identifying solutions that are both novel and patentable requires careful navigation of prior art. Developing protectable inventions in this area also depends on extensive validation to ensure technical robustness and clear differentiation from existing designs. Embraer adopted a targeted patenting approach, filing applications first in Brazil to establish priority for its aerodynamic noise reduction seal. The company then advanced its applications through the PCT route for its slat noise abatement technologies before securing protection via the EPO for these inventions.

For Carmo, patents represented the point at which research outcomes could be confidently integrated into certified aircraft. Each invention was supported by modelling, wind tunnel tests and flight trials, providing Embraer with the legal and technical certainty required for commercial deployment.

Under the collaboration framework, Embraer assumed responsibility for filing and maintaining the patents, including the associated costs, while revenues generated through third-party use or licensing are shared equally with the university. Within the academic context, this arrangement reflects a broader shift toward recognising patents as a legitimate research output alongside scientific publications, while removing the financial and administrative burden of patenting from the university.

Clear frameworks for confidentiality, ownership and revenue sharing enabled close co-operation between industry and academia, ensuring that commercially sensitive knowledge was protected while allowing research to be translated into industrial practice. In this way, patents functioned not only as legal instruments, but also as effective mechanisms for moving long-term research from the laboratory into operational aircraft.

When research takes flight

What began as wind tunnel experiments and computational simulations was ultimately incorporated into aircraft now in service. Embraer's E2 family, including the E190E2 and E195E2, integrates the noise and efficiencyfocused solutions developed by Catalano and Carmo's teams. These aircraft have been adopted by airlines such as KLM Cityhopper, Helvetic Airways, Avelo Airlines and Luxair. To date, more than 300 E2 jets have been ordered worldwide.

For communities near airports, reduced noise exposure offers measurable qualityoflife benefits. Airlines, meanwhile, benefit from lower fuel consumption and emissions, as well as compliance with tightening regulatory standards. In an industry increasingly shaped by noise charges and environmental constraints, these performance improvements have direct economic implications. Embraer reported revenues of €5.9 billion in 2024, with market demand indicating continued interest in more efficient regional aircraft.

Looking ahead, Catalano points to sustainable aviation fuels as a critical next step, noting that significant advances in fuel chemistry will be required. Carmo highlights the potential role of new aircraft configurations and electrification, suggesting that further reductions in noise and emissions will depend on changes not only in aerodynamics and structures but also in propulsion and energy systems.

4. Patent lens on innovation in Latin America and the Caribbean

This chapter utilises data on patent applications from the Worldwide Patent Statistical Database (PATSTAT) to monitor and analyse innovation activity across the LAC region. Due to data coverage parameters within PATSTAT, the temporal scope of this analysis focuses specifically on patent applications in the nine countries in focus filed between 2011 and 2020, although earlier trends are also presented where possible. By examining patent data from multiple dimensions, the section provides a comprehensive overview of the region's technological landscape.

The analysis first investigates patent filing activity within the region, with a specific focus on the primary technical fields of innovation, the geographic origin of applications (domestic vs. foreign) and the destination markets targeted by LAC-based applicants outside the region to assess the international impact of domestic innovation. Where the data permit, specific attention is given to patent applications explicitly related to the patent-intensive manufacturing industries identified in the preceding chapters, linking the region's broader innovation trends directly to its industrial and economic structures.

4.1. The LAC patent landscape

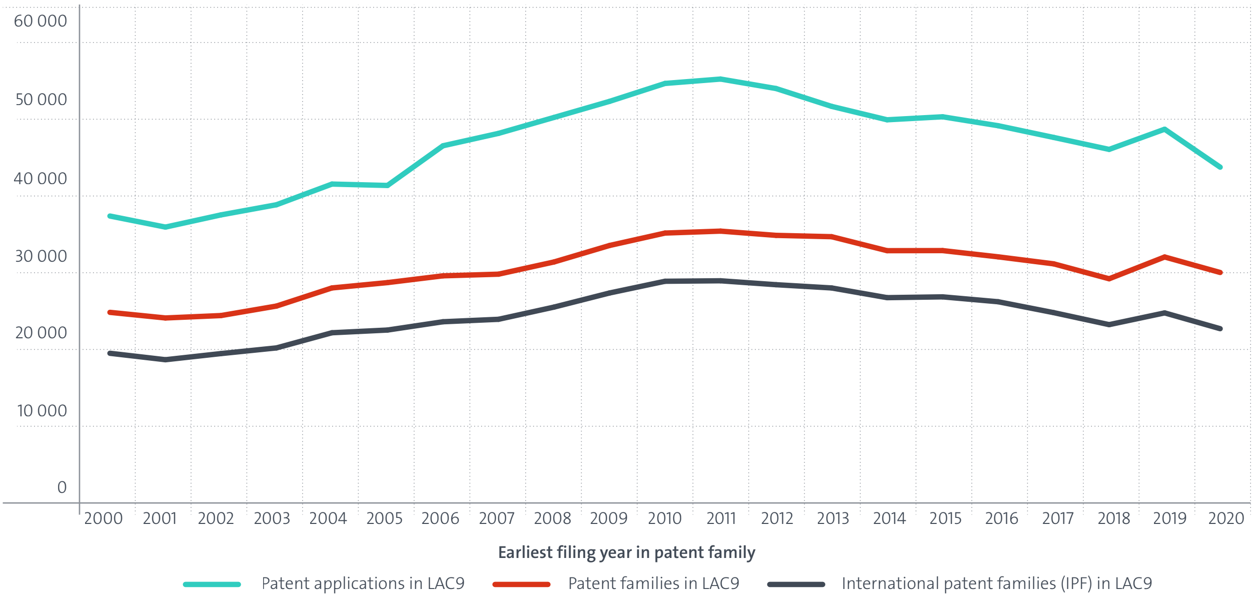
The PATSTAT data show that patenting activity in the nine countries under study is substantial in absolute terms, but its trajectory over the past two decades has been far from linear. Across the period 2000–2020, inventors and applicants filed almost one million patent applications in the nine countries. These applications correspond to roughly 640 000 unique patent families, each family representing a distinct invention. On average, each unique invention was protected in about one and a half of the nine LAC jurisdictions (1.54). This average family size within the region indicates that many inventions are only protected in a single LAC country, while a smaller subset is strategically extended to multiple markets.

A large majority of these inventions are international patent families (IPFs). Around 511 000 families (close to 80% of the total) are IPFs; these are defined as patent families with filings in at least two different patent jurisdictions worldwide– a regional one (such as the EPO) or an international patent filing through the PCT route. In patent statistics, this measure is often used as a filter for more valuable inventions. It identifies inventions that applicants consider sufficiently important to justify the higher costs and procedural complexity of international protection, aiming to satisfy patentability criteria in different jurisdictions. Using IPFs therefore makes cross-country comparisons more robust and helps focus the analysis on inventions with higher expected economic and technological relevance.

Figure 23 plots the change in these three indicators (total patent applications, patent families and IPFs) for earliest filing years between 2000 and 2020. All three measures increased steadily from the early 2000s and reached their peak around 2011. The annual number of patent applications rose from around 36 000 in 2001 to more than 55 500 in 2011, an increase of roughly 55%. Over the same period, patent families increased from about 24 000 to almost 35 500, a rise of around 48%, and IPFs grew the fastest from roughly 18 500 in 2001 to almost 29 000 in 2011, an increase of about 57%. After 2011 a gradual decline sets in across all three indicators showing a general slowdown in patenting activity. By 2020 the annual number of patent applications had fallen to just under 44 000, around 20% below the 2011 peak. Patent families decreased more slowly, to approximately 30 000, a reduction of about 15.5% compared to 2011; IPFs declined to roughly 22 600, which is about 22% less than their peak value in 2011.

Figure 23

Patent applications, patent families and IPFs filed in LAC countries by earliest filing year within the patent family, 2000-2020



Source: ECLAC, EPO

To put the patenting activity of the nine LAC countries into a global perspective, we use three complementary indicators based on IPFs (see Figure 24). Each captures a different dimension of how the region relates to global innovation trends:

1. **Share of global IPFs with patent filings in at least one LAC country**
   This measures how often important inventions, wherever they originate, are protected in LAC. It can be interpreted as an indication of the region's relevance as a target market or manufacturing location for high-value technologies.

2. **Within IPFs with a patent filing in LAC, the share that have at least one LAC applicant**
   This measures how much of the IPFs protected in *LAC* is actually owned by applicants from the region. It gives indication of the domestic vs. foreign ownership structure among important inventions protected in LAC markets.

3. **Share of all IPFs worldwide that list a LAC applicant (regardless of filing destination)**
   This measures the contribution of LAC-based applicants to the global stock of internationally protected inventions. It serves as an indicator of the region's overall weight as a source of IPFs in global high-value innovation.

The first indicator (share of global IPFs protected in LAC) fluctuates around 9% over the first decade observed. In the early 2000s, roughly one in ten IPFs worldwide included at least one filing in a LAC office. This share remained broadly in the range between 8% and 10% through to the early 2010s, with modest variation. In more recent years it has declined, falling below 6% in 2020. Overall, this pattern suggests that the LAC region has been a relevant, but not primary, destination for the international protection of high-value inventions. The recent downward movement implies that, while the overall number of global IPFs has been constantly increasing over the years, LAC's weight as a destination market for IPFs has almost halved from over 10% in 2009 to below 6% in 2020.

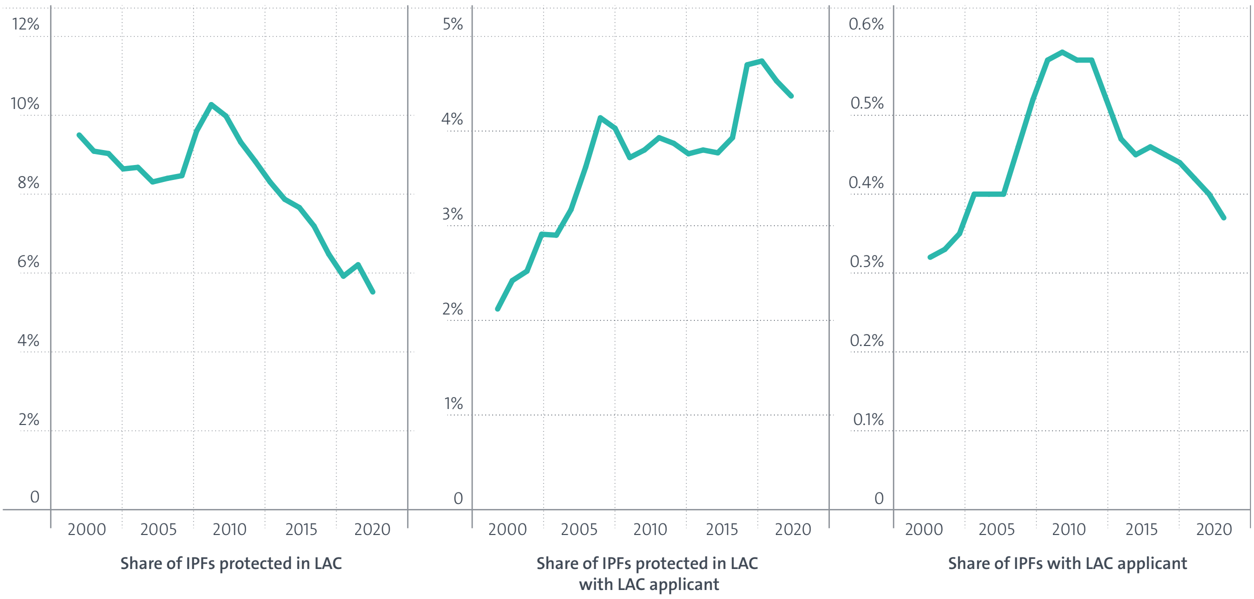
The second indicator narrows the focus to those IPFs that include at least one filing in a LAC country and asks what proportion of these have a LAC applicant.

The number of IPFs with a LAC applicant and a patent filing in one of the nine LAC countries increased from just over 400 in 2000 to over 1 000 in 2008 and remained around that level until 2020. In relative terms, the proportion rose from around 2-2.5% in the early 2000s to roughly 4.5% in more recent years. This represents a gradual increase in the importance of regional origin of IPFs protected in LAC, but largely due to a decrease in IPFs protected in the LAC region stemming from foreign applicants, which still represent the vast majority of IPFs with protection in LAC.

The third indicator extends the perspective to the global level and measures the share of all IPFs worldwide that have a LAC applicant, regardless of where protection for the invention has been sought. This share has remained low over time, increasing from around 0.3% in 2000 to just under 0.6% in 2009, and going back to around 0.35% in 2020. This confirms that the LAC region is substantially more important as a destination for IPFs than as a source of them.

Figure 24

Latin America's role in global IPFs by earliest filings years, 2000-2020



Source: ECLAC, EPO

Taken together, the three indicators show that LAC plays a noticeable but limited role in the global IPF landscape. For much of the period, roughly one in ten IPFs included protection in at least one of the nine LAC countries, although this share has declined in more recent years.

At the same time, applicants from the region account for only a very small share of all IPFs worldwide; their presence has grown somewhat among the IPFs that are actually protected in LAC, but remains modest in global terms.

Figure 25

Distribution of patent applications by country for filing years 2011-2020

Source: ECLAC, EPO

In a next step, we examine the distribution and characteristics of the more than 500 000 patent applications filed in the nine LAC countries between 2011 and 2020. The purpose of this analysis is to identify where within the region patenting activity is concentrated, how this concentration has evolved over time, and how it relates to the broader economic structures described in the previous chapter.

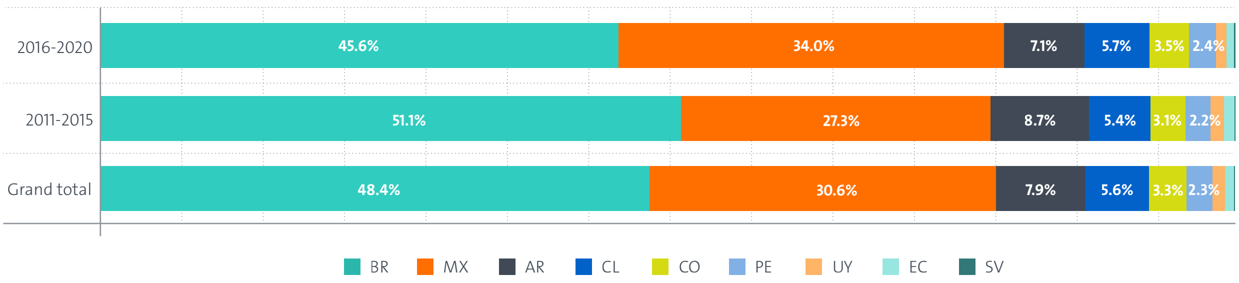
Between 2011 and 2020, more than half a million patent applications were filed across the nine LAC countries (Figure 25). The distribution of this activity is highly concentrated. Over the entire period, Brazil accounts for about 48.4% of all filings, while Mexico represents 30.6%. Taken together, these two jurisdictions host almost four out of every five patent applications in the region.

Argentina follows at a considerable distance with 7.9%, ahead of Chile (5.6%) and Colombia (3.3%), while the remaining four countries each account for only a small fraction of total filings.

The time breakdown in Figure 26 shows that this concentration has been relatively stable, but not static. In 2011-2015, Brazil's share was higher, at around 51.1%, while Mexico stood at 27.3%. In the more recent period 2016-2020, Brazil's share declined to 45.6%, whereas Mexico rose to 34.0%. The shares of Argentina, Chile and Colombia also changed only moderately over time, suggesting that, despite some rebalancing between Brazil and Mexico, the regional patent landscape continues to be dominated by these two largest economies.

Figure 26

Share of total patent applications in LAC by application authority, filing years 2011-2020



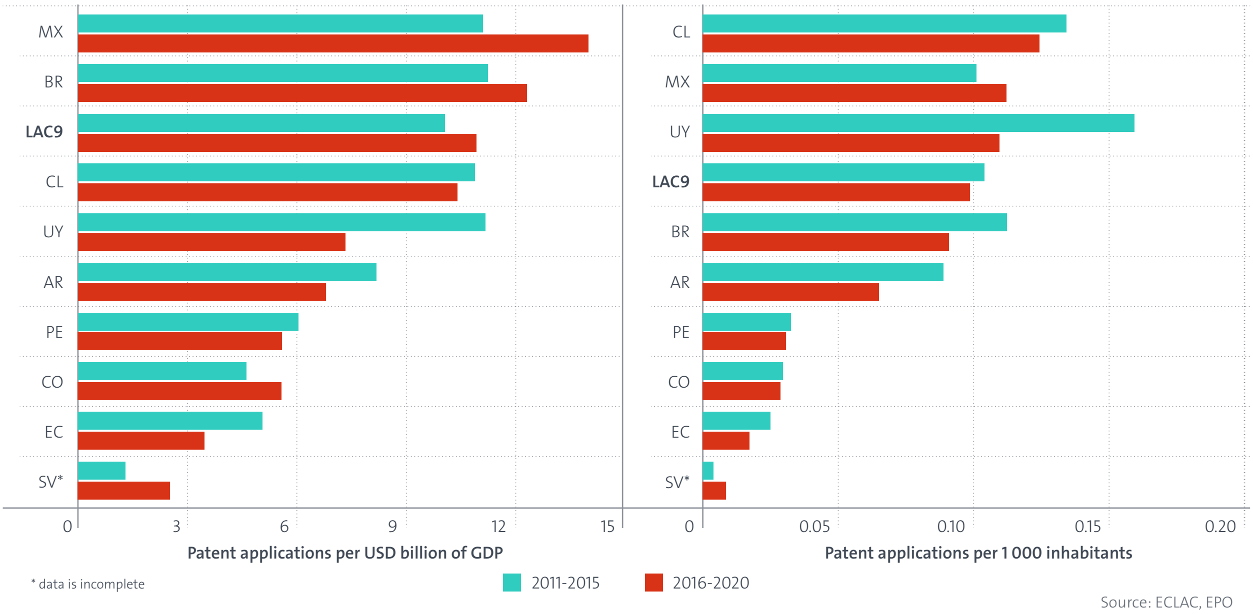
Source: ECLAC, EPO

Once we control for country size, the distribution of patenting activity becomes more nuanced. When filings are related to the economic size of each country in the respective period, smaller and medium-sized economies move up in the ranking (Figure 27). In 2011-2015, Uruguay, Brazil, Mexico and Chile showed equally high intensities, all around 11 patent applications per billion US dollars of GDP, above the LAC average of about 10. At the regional level, the LAC average rose moderately between the two periods 2011-2015 and 2016-2020, suggesting a small improvement in patenting relative to aggregate GDP.

This was driven by Brazil and especially Mexico recording an increase in patenting per unit of GDP; however, it was partially due to a decrease in the economic output in these countries between the two periods. Other countries, with the exceptions of Colombia and El Salvador, exhibit lower intensities.

Figure 27

Patent applications per current USD billion of GDP and per 1 000 inhabitants in LAC and individual countries (2011-2015 vs. 2016-2020)



Note: GDP and population data from World Bank, World Development Indicators.

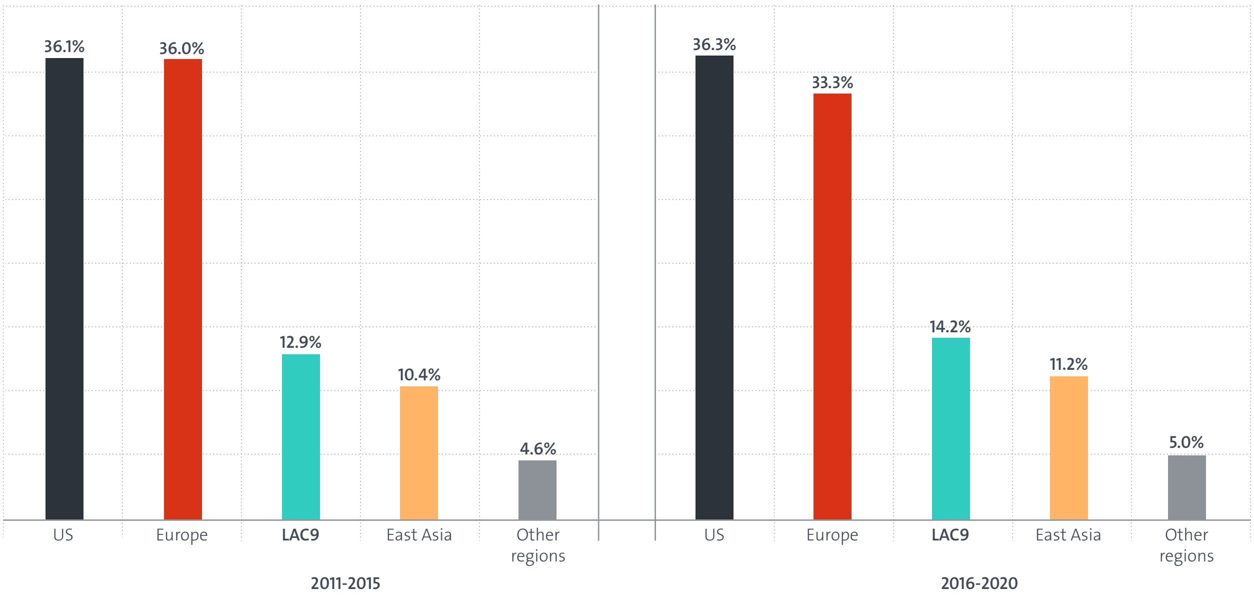
Normalising by population produces a similar, but not identical, pattern. In 2011-2015 Uruguay displayed the highest patenting rates per capita, followed by Chile and Brazil. In 2016-2020 per capita intensity declined in all three countries, with Uruguay showing the strongest decrease. Mexico was the only country with an increase in per capita intensity, placing it second behind Chile in the most recent period. The Andean countries (Peru, Colombia and Ecuador) and El Salvador remain at low levels of patenting activity in relation to their economic and demographic size, with only minor changes over time.

Examining the geographic origin of the over 500 000 patent applications filed in the LAC9 countries between 2011 and 2020 reveals a strong reliance on foreign technology (Figure 28).

Over this period, more than 70% of all filings originated from just two regions: the USA and Europe. Domestic innovation accounted for a much smaller share, with approximately 13.5% of applications coming from LAC9 applicants. East Asia (led by Japan, P.R. China and the Republic of Korea) was the fourth-largest source. However, the distribution shifted between the 2011-2015 and 2016-2020 periods. While the USA and Europe initially held equal shares (around 36%), the European share later declined to 33.3%, whereas the US share remained stable. Simultaneously, the share of applications originating from LAC applicants increased from 12.9% to 14.2%, and East Asia's share grew from 10.4% to 11.2%. This modest strengthening of the domestic patenting footprint and slight diversification of foreign sources does not alter the fundamental structure: Latin America and the Caribbean primarily serves as a destination for protecting inventions generated abroad. This aligns with the trade dynamics from the previous chapter, which highlighted the region's reliance on imported IPR-intensive goods.

Figure 28

Patent applications in LAC by applicant origin (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

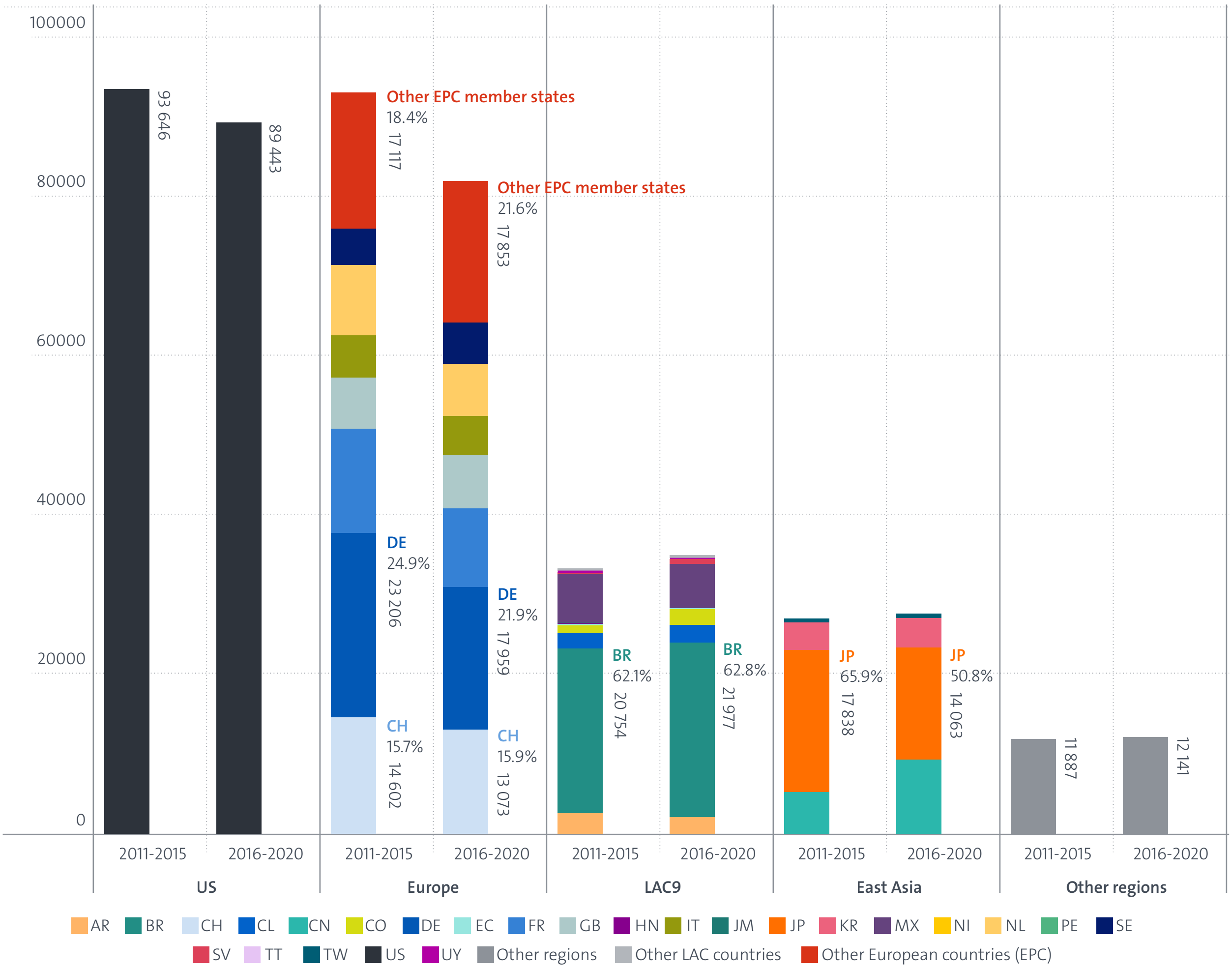
Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

While relative shares indicate a slight diversification in the sources of LAC9 patent filings, analysing the absolute volume of applications in Figure 29 details a general decline in total regional filings driven primarily by traditional Northern partners. Between the 2011-2015 and 2016-2020 periods, applications originating from the USA dropped from 93 646 to 89 443. The contraction from Europe was even more pronounced, with overall filings decreasing from over 93 000 to approximately 82 000. This reduction occurred across most major European source countries, including Germany (dropping from 23 206 to 17 959), Switzerland (14 602 to 13 073) and France (13 166 to 9 895). The United Kingdom and Sweden were notable exceptions within Europe, recording volume increases from 6 377 to 6 651 and 4 563 to 5 153 respectively.

Within East Asia, the absolute figures show a significant internal compositional shift, while the overall volume remained relatively stable. Applications from Japan declined notably from 17 838 to 14 063, while filings from China nearly doubled, increasing from 5 128 to 9 227. Concurrently, the importance of domestic innovation grew, as patent filings originating from LAC9 applicants increased in absolute terms. This regional growth was primarily driven by Brazilian applicants, whose filings rose from 20 754 to 21 977, as well as increases from smaller bases like Colombia (1 015 to 1 972) and Chile (1 898 to 2 196). In contrast, applications originating from Mexico decreased from 6 224 in the first period to 5 587 in the second.

Figure 29

Patent applications in LAC9 by applicant origin over time



Source: ECLAC, EPO

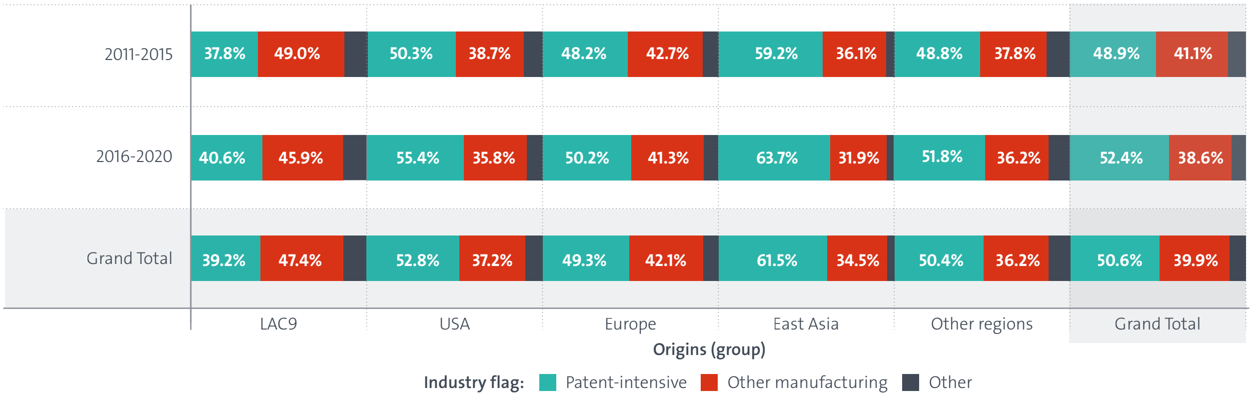
Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

However, the reliance on foreign technology remains strong within the high-value manufacturing segments, a trend that has strengthened over time (Figure 30). When breaking down applications by industry, the data show that foreign filings are increasingly concentrated in patent-intensive manufacturing. Between the 2011-2015 and 2016-2020 periods, the share of applications directed toward these advanced industries grew across all major foreign origins: for US applicants, the share rose from 50.3% to 55.4%; for European applicants, from 48.2% to 50.5%; and for East Asian applicants, it jumped from 59.2% to a striking 63.7%.

In contrast, the innovation profile of LAC-based applicants remains less specialised in these advanced sectors. While domestic filings in patent-intensive manufacturing also saw a modest increase over time (from 37.8% to 40.6%), the largest share of domestic filings (45.9% in the recent period) still relates to non-patent-intensive "Other manufacturing" category.

Figure 30

Share of patent applications in LAC9 by industry category and applicant origin (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

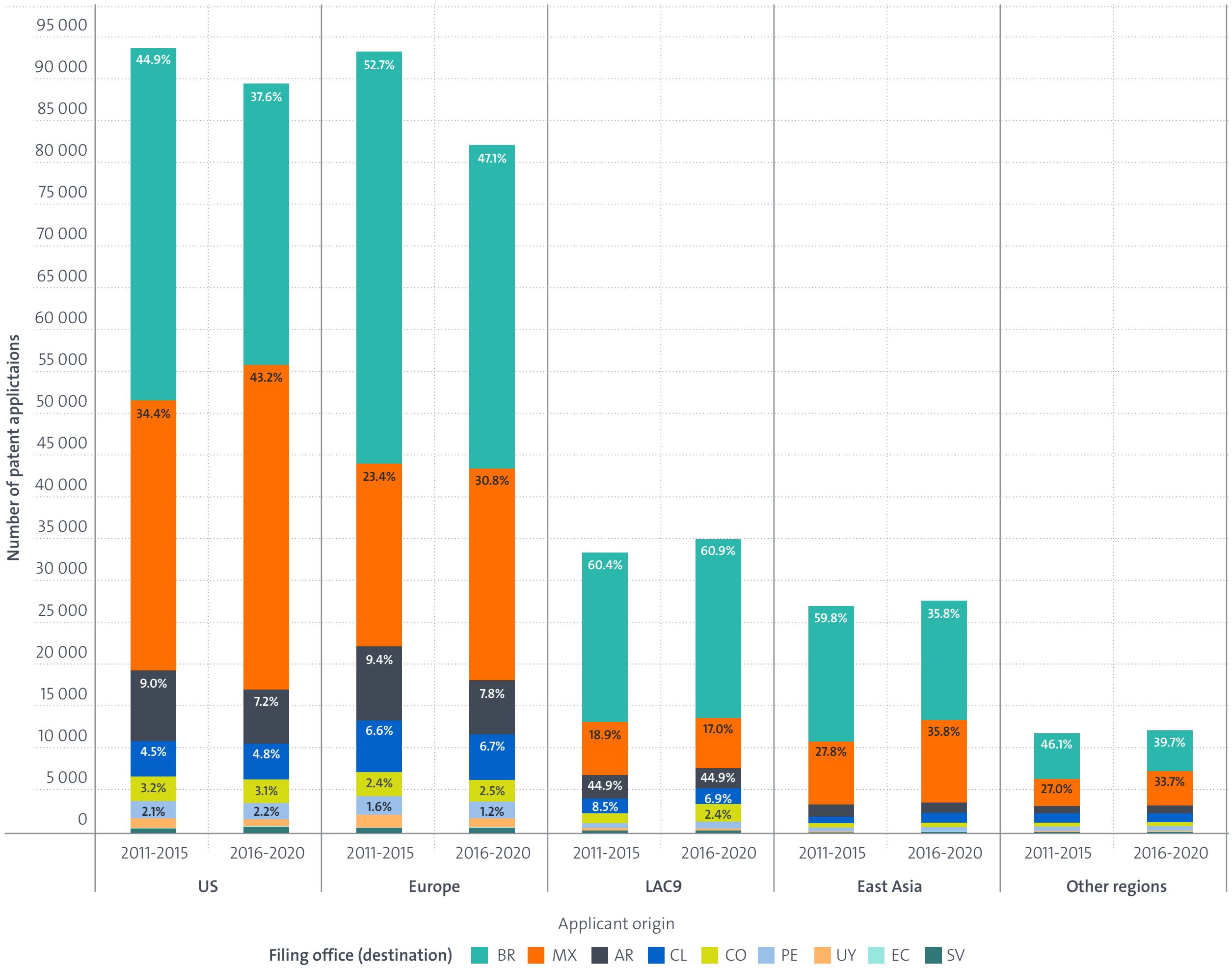
Looking at where these foreign and domestic inventions are actually filed within the LAC region, Figure 31 reveals distinct strategic priorities that have evolved noticeably over the past decade. Foreign applicants target the largest markets, with a growing focus on Mexico. The distribution of foreign filings mirrors the region's overall economic weight, but a clear geographic shift occurred between the two periods. Over the two periods, applicants from Europe, East Asia and the USA all reduced their share of filings in Brazil while simultaneously increasing their focus on Mexico. For European applicants, filings in Brazil dropped from 52.7% to 47.1%, while Mexico's share grew from 23.4% to 30.8%. This pivot is most striking among US applicants: in the first period, Brazil was their primary destination (44.9%), but by 2016-2020 Mexico had overtaken Brazil to capture the largest share of US regional filings (43.3% vs. 37.6%).

In contrast to the shifting foreign footprint, the filing destinations of domestic (LAC9) applicants remained highly stable over time.

Brazil continued to overwhelmingly dominate as the primary home and target market, absorbing approximately 60% of all intra-regional filings across both periods, while Mexico's share slightly contracted to 17.0%. Furthermore, smaller economies like Argentina (around 8%), Chile and Colombia continued to capture a noticeably higher share of domestic filings than they do from foreign applicants. While these data confirm Brazil's relative leadership within Latin America and the Caribbean, recent external studies highlight that this localised dynamic also exposes a lack of deeper innovation connectivity across the region. Although Brazil absorbs the vast majority of intra-regional patenting, the most active Brazilian innovators actually bypass their Latin American neighbours when expanding abroad, as will be shown in the next chapter. Analysis of Brazilian patent families by INPI Brazil reveals that 81% extend protection directly to major global markets outside the region (such as the USA, Europe, China, and Japan) (see replace with INPI (2025) and Conegundes and Alvarez (2025) for details).

Figure 31

Patent applications in LAC by applicant origin and filing destination (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

The high and growing concentration of foreign patents in patent-intensive manufacturing, coupled with the distinct geographic shift of US and Asian filings toward Mexico, perfectly reflects the profile documented in the previous chapter. As global supply chains (particularly in automotive and electronics) have increasingly nearshored to Mexico to serve the North American market, foreign technology owners have followed suit, ensuring their IP is protected in their primary manufacturing hub. Conversely, the domestic patenting footprint (characterised by a lower concentration in patent-intensive manufacturing and a highly stable filing strategy anchored in South America) mirrors the findings that Latin America's own IPR-intensive exports struggle to achieve global competitiveness. Ultimately, the patent data over the last decade confirm a structural reality: the LAC region remains primarily a consumer and assembly node for foreign innovation, deeply integrated into external value chains, rather than a globally competitive producer of its own technology.

The patterns of foreign reliance and asymmetric integration observed in previous sections are also reflected in the technological composition of patent filings shown in Figure 32. Analysing the distribution of patent applications by major technological sector (and more granular fields) provides insight into the specific types of innovation being protected in the LAC region.

At the aggregated sector level, patenting activity in the LAC9 countries is dominated by two broad WIPO sectors: Chemistry and Mechanical Engineering. Between 2011 and 2020, the Chemistry sector alone accounted for roughly half of all filings. Notably, this concentration has intensified over time, with the overall share of Chemistry-related patents increasing from 47.8% in 2011-2015 to 51.5% in 2016-2020. Mechanical Engineering remained the second-most important sector, holding stable at approximately 26% across both periods. The dominance of the Chemistry sector is heavily driven by foreign applicants, particularly those from Europe and the USA. For European applicants, Chemistry constituted 55.9% of their total filings in the region during the 2016-2020 period (up from 52.6% previously). For US applicants the share grew similarly, from 48.8% to 52.5%. In contrast, applicants from East Asia show a very different profile, characterised by a much stronger focus on Electrical Engineering (34.0% in 2016-2020) and Mechanical Engineering, while their share in chemistry dropped to 45.3%. The technological profile of LAC-based applicants is less concentrated. While Chemistry is still their largest sector (growing from 37.0% to 42.1%), domestic inventors exhibit a relatively higher share of filings in Mechanical Engineering (over 30%) and instruments (nearly 20%) compared to their foreign counterparts.

Figure 32

Share of patent applications in LAC9 by WIPO technology sector and applicant origin (2011-2015 vs. 2016-2020)

Source: ECLAC, EPO

Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

Examining the data at a more granular technology field level provides further clarity on the specific drivers within these broad sectors. The growth in the broad Chemistry sector is primarily driven by Pharmaceuticals. At the aggregate level, Pharmaceuticals is the single largest specific field, and its share increased significantly from, 16.1% in 2011-2015 to 20.0% in 2016-2020. This surge is almost entirely fuelled by foreign applicants: Pharmaceuticals accounted for 23.7% of all US filings, 20.2% of European filings and 19.4% of East Asian filings in the recent period. In contrast, for domestic LAC applicants, Pharmaceuticals accounted for less than 10% of filings. For domestic LAC9 applicants, the largest specific technology field in 2016-2020 was Other Special Machines (10.9%), which includes agricultural, food processing and mining machinery.

This aligns closely with the region's structural economic strengths in primary and resource-based manufacturing. The second most prominent field for domestic applicants was Pharmaceuticals (9.4%), followed by Medical Technology (8.5%) and Civil Engineering (7.7%). Interestingly, foreign applicants (especially from the USA and Europe) showed significant concentrations in Biotechnology and Organic Fine Chemistry, fields where domestic LAC presence is comparatively lower. The granular data also highlight East Asia's highly specialised footprint, driven overwhelmingly by Digital Communication (17.6%) and Audio-Visual Technology (6.8%).

The technology profile confirms that Latin America functions primarily as a destination market for the life sciences and chemical innovations (Pharmaceuticals, Biotechnology, Organic Fine Chemistry) of the USA and Europe, and the digital/electronic technologies of East Asia. Domestic patenting, while slowly increasing its share in life sciences/chemistry, remains structurally anchored in mechanical and civil engineering.

The prominence of fields like Other Special Machines and Civil Engineering among local applicants is tailored to the region's traditional economic base, directly supporting its resource-extractive industries, agro-industrial processing and domestic infrastructure development.

Figure 33

Top 15 WIPO technology fields of patent applications in LAC9 by applicant origin (2011-2015 vs. 2016-2020)

Source: ECLAC, EPO

Note: East Asia (CN, JP, KR, TW); Europe (EPO member states).

The PATSTAT database provides further context on the nature of innovation in the LAC region by categorising applicants into distinct types: private companies, research institutions (such as universities and public laboratories), and individual inventors. Analysing these profiles reveals a stark structural difference between the innovation ecosystems of domestic and foreign applicants as shown in Figure 34.

Patent filings originating from outside the region are almost exclusively driven by private sector enterprises. Across the entire period 2011-2020, private companies accounted for roughly 91.8% to 93.2% of all filings originating from the USA, Europe, East Asia and other regions. The share of public research and universities among these foreign filings remains very marginal (between 3.4% and 3.9%), and individual inventors account for an equally negligible share. This confirms that foreign technology flowing into Latin America—particularly the patent-intensive chemical and digital technologies discussed in previous sections—is highly commercialised and deeply embedded in corporate global value chains.

In sharp contrast, the profile of LAC9 domestic applicants is highly fragmented and structurally reliant on non-corporate actors. Private companies account for a remarkably low share of domestic patenting, and that share has been shrinking: it fell from 32.1% in 2011-2015 to just 25.9% in 2016-2020. Simultaneously, the public sector and research institutions play an outsized and growing role in domestic innovation. Filings by universities and public research bodies increased significantly, rising from 22.4% in the first period to 29.1% in the most recent. As a result, public research now accounts for a larger share of domestic patenting than the private corporate sector. Furthermore, individual inventors make up roughly one-third of all domestic filings (around 32% in both periods), a share vastly higher than seen in any other global region.

Figure 34

Share of patent applications in LAC9 by applicant type and origin (2011-2015 vs. 2016-2020)

Source: ECLAC, EPO

Disaggregating patent applications into patent-intensive manufacturing, other manufacturing, and non-manufacturing ("other") sectors demonstrates distinct technological roles for domestic and foreign innovators across private companies, public research institutions and individual inventors (Figure 35). Within the LAC9 region, public research institutions are the primary domestic drivers of high-value, patent-intensive technologies. During both periods analysed, research institutions devoted roughly half of their patenting activity directly to patent-intensive manufacturing (51.8% in 2011-2015, shifting slightly to 49.9% in 2016-2020).

This solidifies the critical role of universities and public labs in generating foundational high-tech innovations within the region. In contrast, domestic private companies and individual inventors in LAC9 focus their efforts predominantly on the "other manufacturing" sector (non-patent-intensive). For LAC9 companies, this share grew from 52.6% to 54.2% across the two periods, while for individual inventors, it hovered around 50-52%. This indicates that domestic corporate and individual innovation remains largely geared toward traditional, less technologically complex manufacturing processes

Figure 35

Share of patent applications in LAC9 by industry category, applicant type and origin (2011-2015 vs. 2016-2020)

Source: ECLAC, EPO

The behaviour of foreign applicants presents a structurally different pattern across all applicant types. While earlier findings established that foreign applications as a whole are highly concentrated in patent-intensive sectors, the breakdown by applicant type shows that this drive is virtually universal among external actors. Even though foreign individual inventors and research institutions represent a very small fraction of total incoming applications, their filings are highly skewed toward patent-intensive manufacturing.

Most notably, foreign research institutions directed 62.2% of their filings to patent-intensive sectors in 2011-2015, a figure that surged to 67.2% in the period 2016-2020. Foreign companies, which dominate the total volume of external filings, also allocate the largest share of their patenting activity to these high-value sectors, further cementing the gap between local industrial capabilities and imported corporate technology.

4.2. Global integration of Latin American and Caribbean R&D

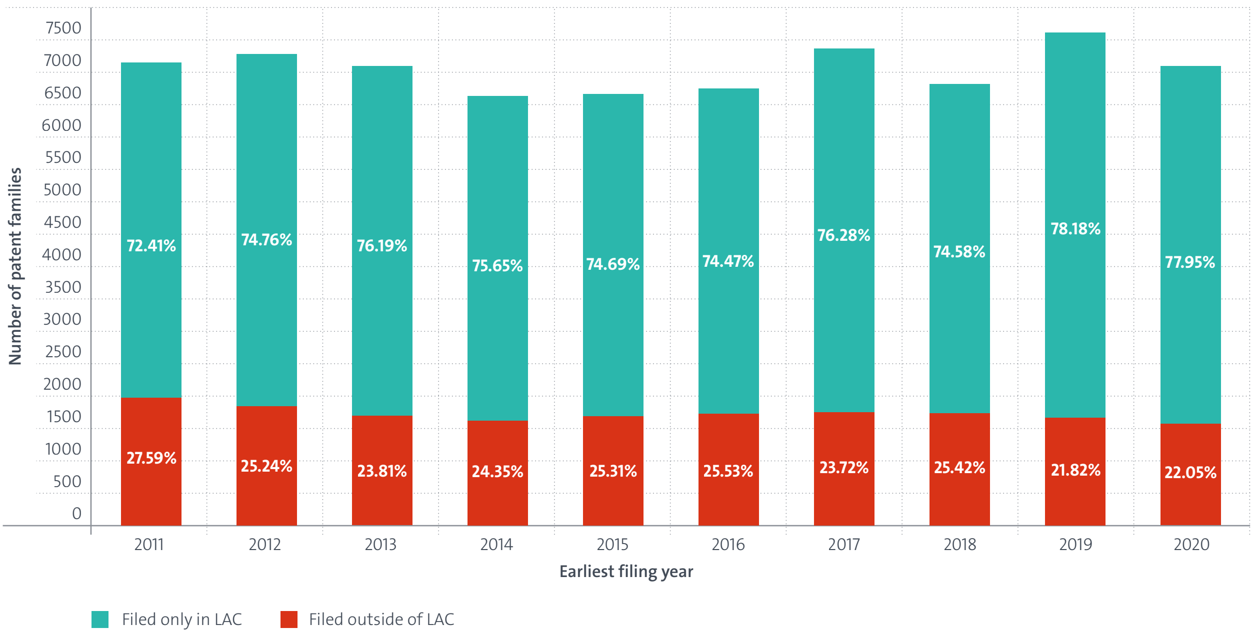
4.2.1. Patent protection of LAC inventions abroad

A critical indicator of a region's integration in the global innovation economy is its capacity not only to invent, but also to protect those inventions in foreign markets.

In this section, the analysis shifts from incoming patent filings to outward intellectual property strategies by examining all patent families generated between 2011 and 2020 that feature at least one inventor or applicant from the LAC9 region. Specifically, we analyse the propensity of these domestic innovators to seek protection internationally in national, regional or international patent offices outside the region.

Figure 36

Patent families with a LAC applicant, totals and share of patent families with international and foreign patent filings



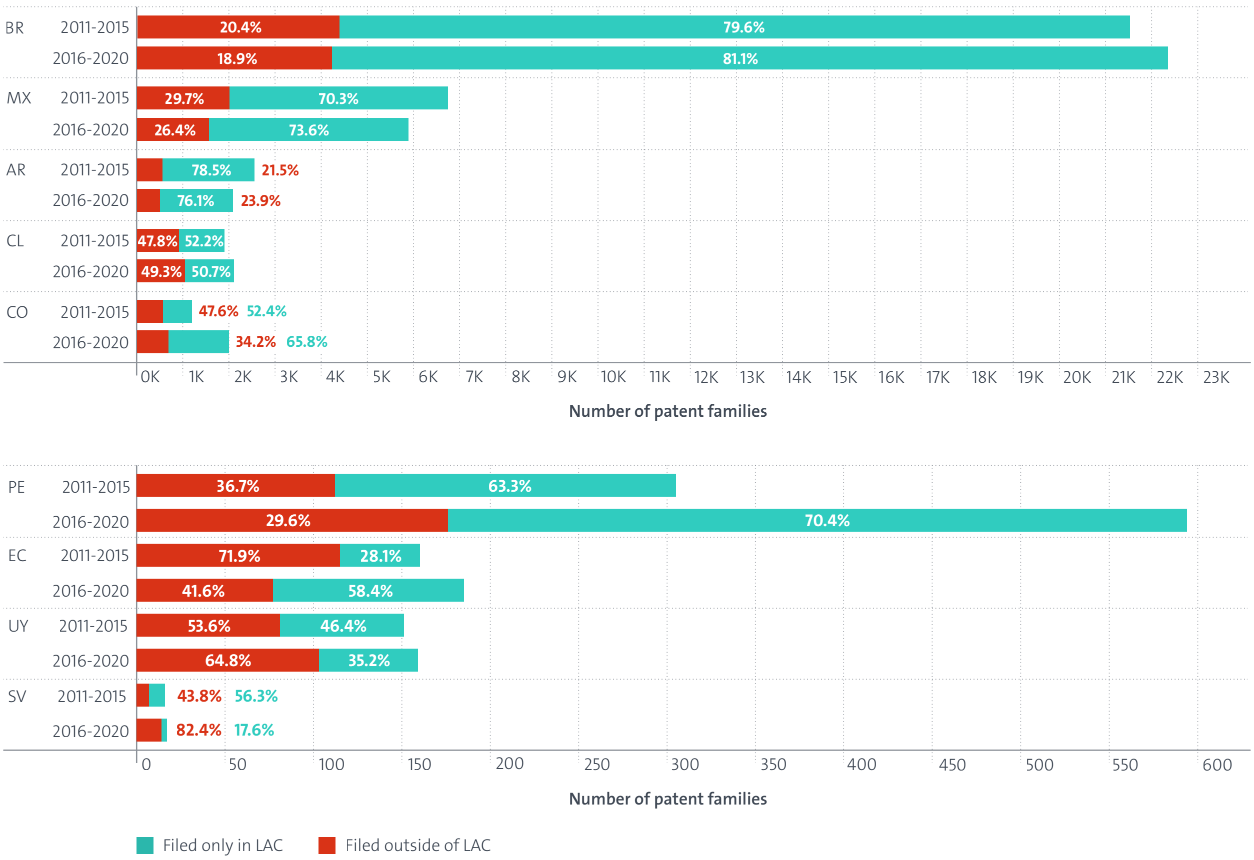
Source: ECLAC, EPO

The data indicate that the absolute volume of patent families featuring at least one LAC applicant remained relatively stable over the decade, at approximately 7 000 distinct families per year (Figure 36). A majority of these inventions were protected exclusively within the LAC jurisdictions. Between 2011 and 2020, fewer than 25% of LAC-originated patent families included members filed in foreign jurisdictions. Over this period, the share of internationalisation decreased. In 2011, 27.6% of LAC patent families sought protection abroad, corresponding to almost 2 000 patent families; by 2020 this figure had declined to 22.1%, or closer to 1 500 patent families.

When looking at the different regions and countries worldwide, we see that most of LAC applicants filed in the USA, followed by Europe and China; 2011 saw the largest number of patent families being protected in other regions, which saw a decline until 2013 before stabilising and holding steady despite significant increases in patent filings in the respective offices by applicants from other countries.

Figure 37

LAC first applicant patent families by applicant country and destination, 2011-2020



Source: ECLAC, EPO

The propensity to protect inventions in foreign markets varies significantly by country of origin, both in absolute volume and across the two time periods analysed (Figure 37). Brazil generates the largest absolute number of patent families in the region. However, it consistently exhibits the lowest share of internationalisation among the major LAC economies. Between the two periods the country's total domestic filings increased, while its absolute volume of international filings decreased, causing its internationalisation rate to drop from 20.4% to 18.9%. Mexico, the second-largest source of patent families, experienced an overall decline in patent output across both domestic and international categories. Its rate of international protection dropped from 29.7% in the first period to 26.4% in the second. Argentina exhibited a similar trend of declining overall volumes, though its proportion of international filings increased marginally from 21.5% to 23.9%.

The data indicate an inverse relationship between the total volume of patent families produced by a country and its share of patent families with foreign filings. Countries with smaller absolute volumes demonstrate a higher share of inventions protected outside the LAC region. Chile maintained stable volumes across both periods, protecting nearly half of its inventions internationally (47.8% in the first period, 49.3% in the second).

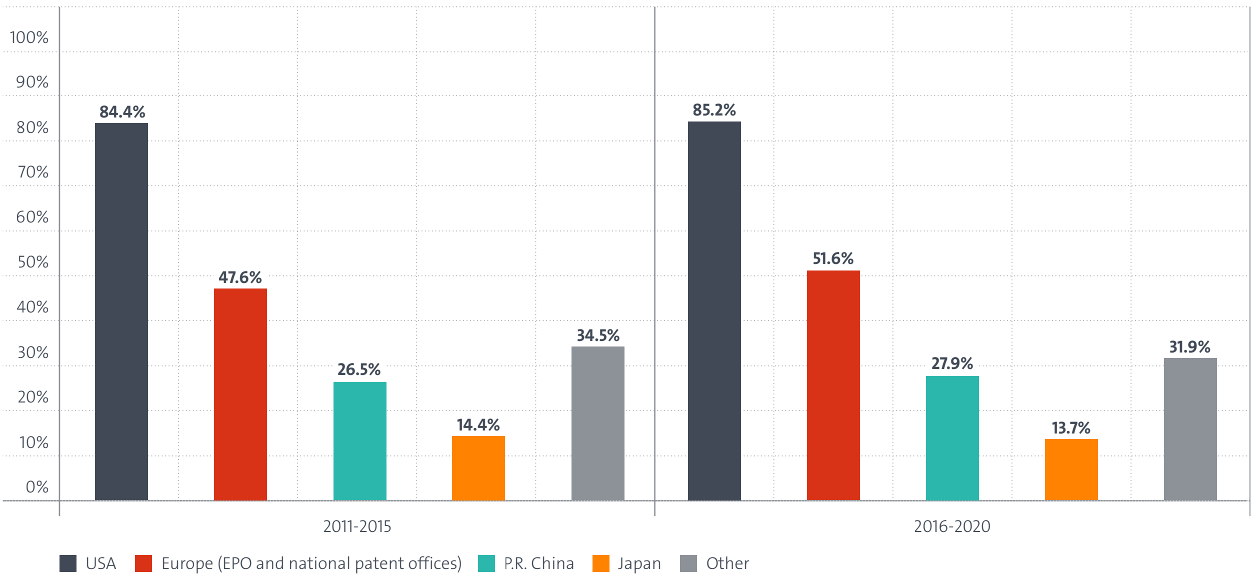
Colombia showed significant absolute growth in both domestic and foreign filings between the two periods, though faster domestic growth caused its international share to decrease from 47.6% to 34.2%. In contrast, innovators in Ecuador and Uruguay filed the majority of their patent families in foreign jurisdictions during the period 2016-2020 (41.6% and 64.8% respectively).

For patent families protected outside the LAC region, the geographic destinations are concentrated in specific global markets (Figure 38). Across both periods, the USA was the primary destination, accounting for approximately 85% of internationally protected LAC patent families. Europe was the second-most frequent destination (accounting for roughly 50%), followed by China (approximately 27%).

While the absolute number of internationally-oriented patent families with LAC applicants decreased between the two periods, the relative proportions among destination markets remained largely stable. The shares of patent families in Europe increased from 47.6% to 51.6%, and China increased slightly from 26.5% to 27.9% over the two periods. In contrast, the share of filings directed to Japan decreased from 14.4% to 13.7%, and filings to other global offices declined from 34.5% to 31.9%.

Figure 38

Patent families with LAC9 applicant by destination of protection, by earliest filing year



Source: ECLAC, EPO

To fully understand LAC's integration into the global innovation economy, it is necessary to examine not only who owns the IP (the applicants) but also who contributed to creating the invention (the inventors). This section provides a complementary perspective by analysing patent families with filings in foreign jurisdictions that feature at least one inventor from the LAC9 region. Because nearly all patent families with applications filed exclusively within LAC are both invented and owned locally, this analysis specifically isolates inventions protected outside LAC countries to assess the region's role in global R&D networks.

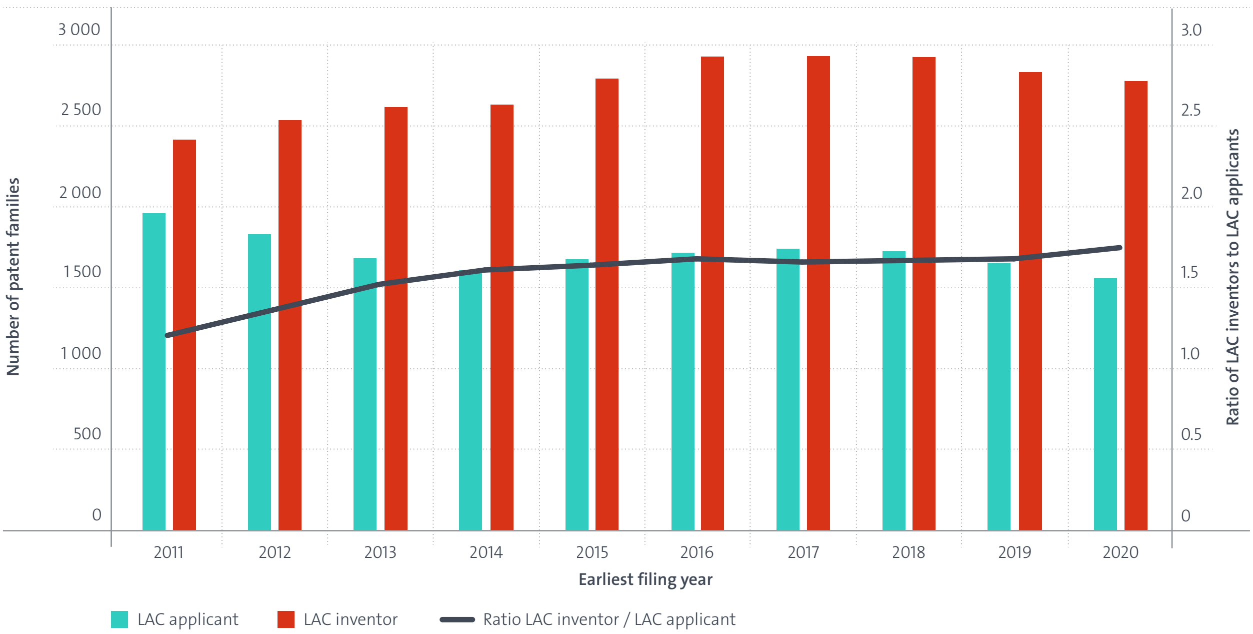
A comparison of the total number of foreign patent families featuring a LAC inventor with those owned by a LAC applicant reveals a significant and widening gap (Figure 39). The absolute number of foreign patent families with contributions from LAC inventors is substantially larger than the number of families owned by LAC applicants, indicating that LAC-based researchers generated a much larger global technological impact than domestic institutions.

Furthermore, the trajectory of these two metrics diverged over the decade analysed. While the number of patent families with LAC applicants stagnated or declined, the number of foreign patent families featuring LAC inventors grew from just over 2 400 in 2011 to a peak of roughly 2 900 in 2017, before plateauing.

Consequently, the ratio of LAC-invented to LAC-applicant foreign patent families rose steadily from 1.23 in 2011 to 1.78 in 2020. This rising ratio indicates an increasing structural dynamic where Latin American researchers are integrated into international R&D processes, but the resulting IP rights are ultimately captured by foreign entities.

Figure 39

Patent families with foreign applications involving LAC inventors and applicants



Source: ECLAC, EPO

This divergence between knowledge creation and IP ownership is present across almost all LAC9 countries, with the gap widening significantly in the latter half of the decade. When comparing the two periods, the ratio of invented-to-applicant foreign patent families increased across the major regional economies. Mexico and Argentina experienced the most pronounced shifts among large economies, with their ratios increasing from 1.68 and 1.88 respectively, to 2.36 in the recent period. Brazil's ratio also rose from, 1.42 to 1.63. Smaller economies like Ecuador and Peru exhibited similar increases. Conversely, Chile and Uruguay maintained relatively stable or declining ratios, indicating a closer alignment between domestic knowledge generation and domestic IP ownership in their international filings.

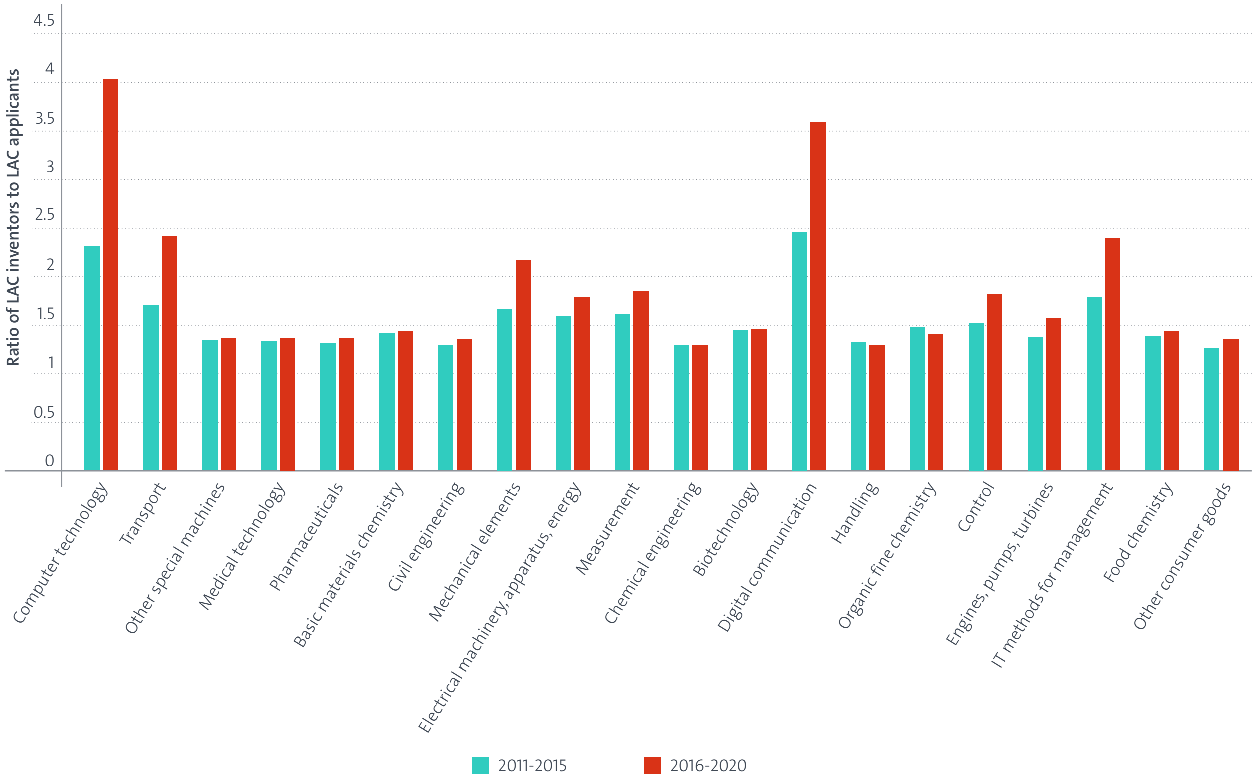
Analysing this inventor-to-applicant ratio across WIPO technology fields exposes stark sector-specific disparities, particularly in advanced digital technologies. While traditional industrial sectors such as Other Special Machines, Pharmaceuticals and Civil Engineering maintain relatively low and stable ratios (ranging between 1.29 and 1.37), Information and Communication Technology (ICT) fields exhibit a profound disconnect.

In the period 2011-2015, the ratio for Computer Technology stood at 2.32, and Digital Communication at 2.46. By the later period, these ratios surged to 4.04 and 3.60 respectively. This means that for every foreign patent family in computer technology owned by a LAC entity, there are more than four foreign patent families generated by LAC researchers but owned by foreign corporations. Similarly, IT Methods for Management saw its ratio jump from 1.79 to 2.40. This technological profile aligns directly with the earlier findings regarding physical trade and co-inventorship networks.

The data suggest that while Latin American engineers and software developers are highly active and globally integrated in cutting-edge digital innovation, domestic firms lack the capacity or capital to capture the resulting IP. A similar, though less pronounced, pattern is also visible in Transport, where the ratio increased to 2.42 in the later period, mostly due to patent families with inventors based in Mexico.

Figure 40

Ratio of patent families with foreign applications involving LAC inventors and applicants, by technology field (2011-2015 vs. 2016-2020)



Source: ECLAC, EPO

While analysing patent applications filed within the LAC region provides insights into the commercial attractiveness of local consumer markets, examining the normalised output of LAC inventors in foreign patent families offers a more precise measure of the region's structural integration into the global innovation ecosystem.

By adjusting the absolute number of internationally protected, LAC-invented patent families for economic output (GDP) and demographic size (population), a distinct distribution of innovative intensity emerges.

Figure 41

LAC inventors of patent families abroad per capita and USD billion of GDP

Source: ECLAC, EPO

When controlling for economic size, the regional LAC9 average grew from 0.43 foreign patent families per USD billion of GDP in 2011-2015 to 0.64 in 2016-2020. Chile emerges as the regional leader, increasing its intensity from 0.71 to 0.92. Brazil and Mexico—the absolute volume leaders—also demonstrated significant upward trends in their GDP-adjusted global innovation output, rising to 0.76 and 0.61 respectively. Colombia similarly showed strong relative growth, increasing from 0.44 to 0.67. This presents a notable contrast to the patterns observed in domestic patent filings. In local filings—which are driven by the necessity to protect products in large consumer markets—Brazil and Mexico led the GDP-adjusted rankings. However, in the context of global invention output, Chile's economy proves to be the most structurally oriented toward international R&D.

Normalising by population further underscores these structural differences. Chile again registers the highest per capita intensity, increasing to 0.013 foreign patent families per 1 000 inhabitants in the period 2016-2020. Uruguay ranks second (0.008), although, mirroring its trend in domestic filings, its per capita rate experienced a slight decline between the two periods. Brazil (0.0067) and Mexico (0.0059) perform slightly above the regional average of 0.0057. Peru, Ecuador, and El Salvador remain at the lower end of the spectrum.

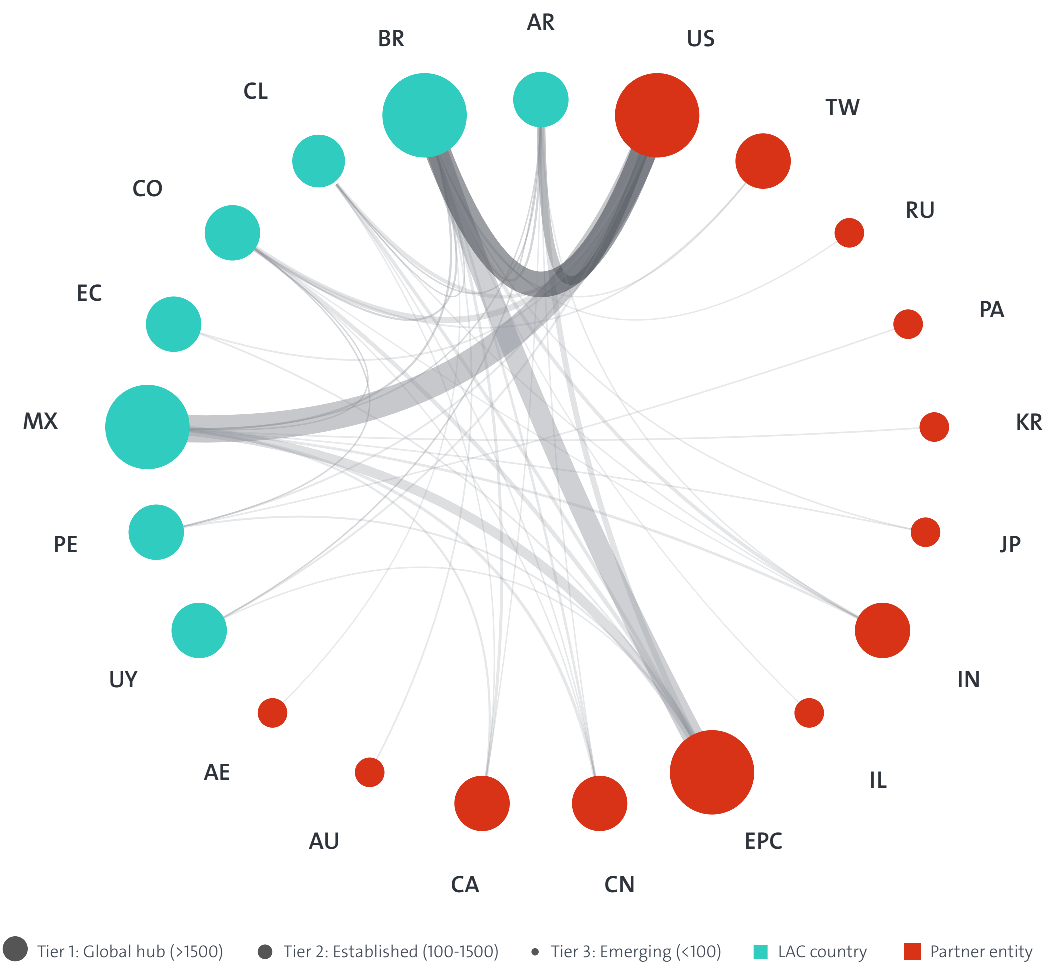
4.2.2. Co-inventorship networks

To evaluate how Latin American innovation ecosystems integrate with global research and development networks, it is necessary to examine the geographic distribution of inventors. Patent applications frequently feature multiple inventors across different countries, providing a proxy for cross-border knowledge flows and R&D collaboration. This analysis builds a co-inventorship network using patent family data from 2015 to 2020.

By linking the countries of all inventors within a single patent family—and consolidating European nations into a single "EU" node to simplify global mapping—the resulting network edges reflect the volume of shared patent families. This methodological approach exposes whether LAC countries operate as isolated entities, an integrated regional bloc, or peripheral extensions of global innovation hubs.

Figure 42

Global co-inventorship network for LAC9 countries, 2015-2020



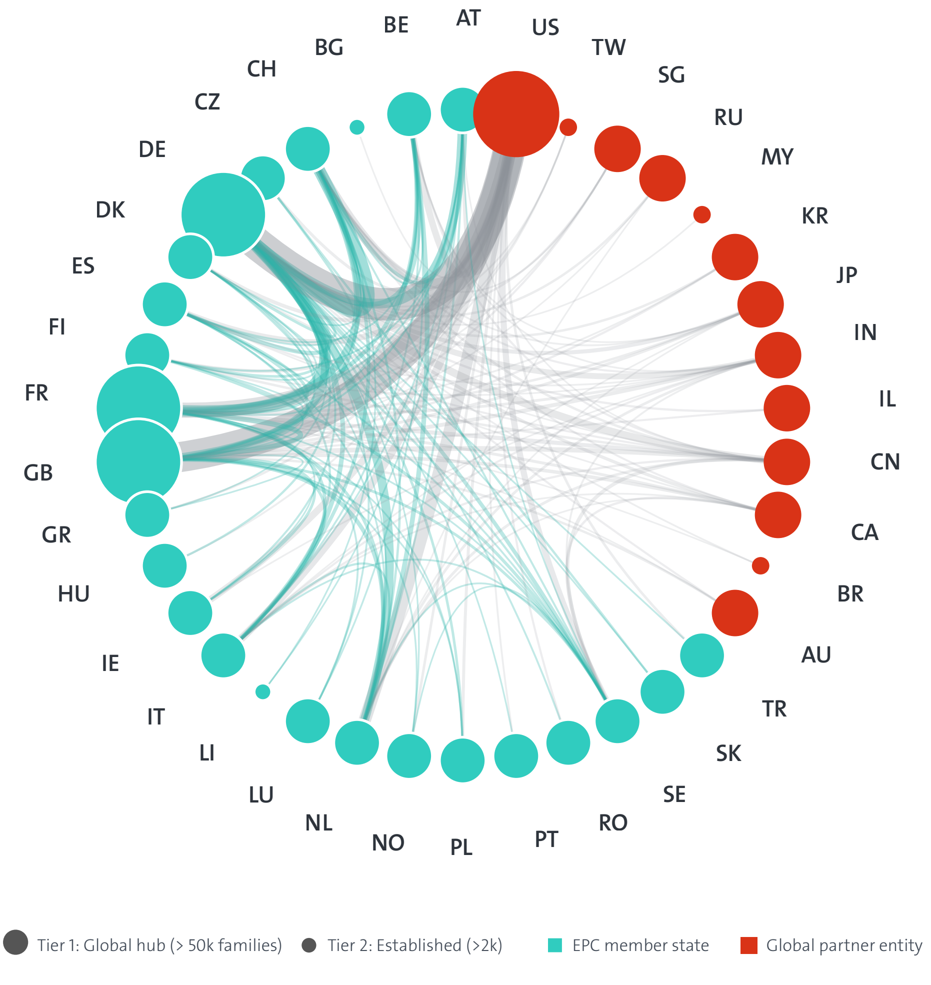
Source: ECLAC, EPO

Note: The LAC co-inventorship network was constructed using patent families filed between 2015 and 2020 that include at least one inventor residing in nine selected countries. The country of residence was identified for every inventor associated with these families, and, for each patent family, all unique country–country combinations were recorded as single links. This approach ensures that the network captures joint participation in inventive activity at the family level. The EPC member states are aggregated under a single "EPC" node to simplify the visualisation and highlight the main collaboration patterns. LAC countries are in dark blue, other countries light blue.

The aggregate network map of LAC co-inventorship reveals a profound structural dependency on extra-regional partners. The USA operates as the undisputed central node of the network, acting as the dominant collaborative partner for almost every nation analysed. Europe functions as the secondary global pole, maintaining strong but lower-volume ties with the region.

Figure 43

Global co-inventorship network for European countries, 2015-2020



Source: ECLAC, EPO

Note: The European co-inventorship network was constructed using patent families filed between 2015 and 2020 that include at least one inventor residing in an EPC member state. The counting procedure followed the same methodological approach applied to the LAC co-inventorship network. Due to the high density of the European patent ecosystem a threshold was set to include only pairs with at least 200 shared patent families, as lower thresholds resulted in a network too dispersed for meaningful interpretation.

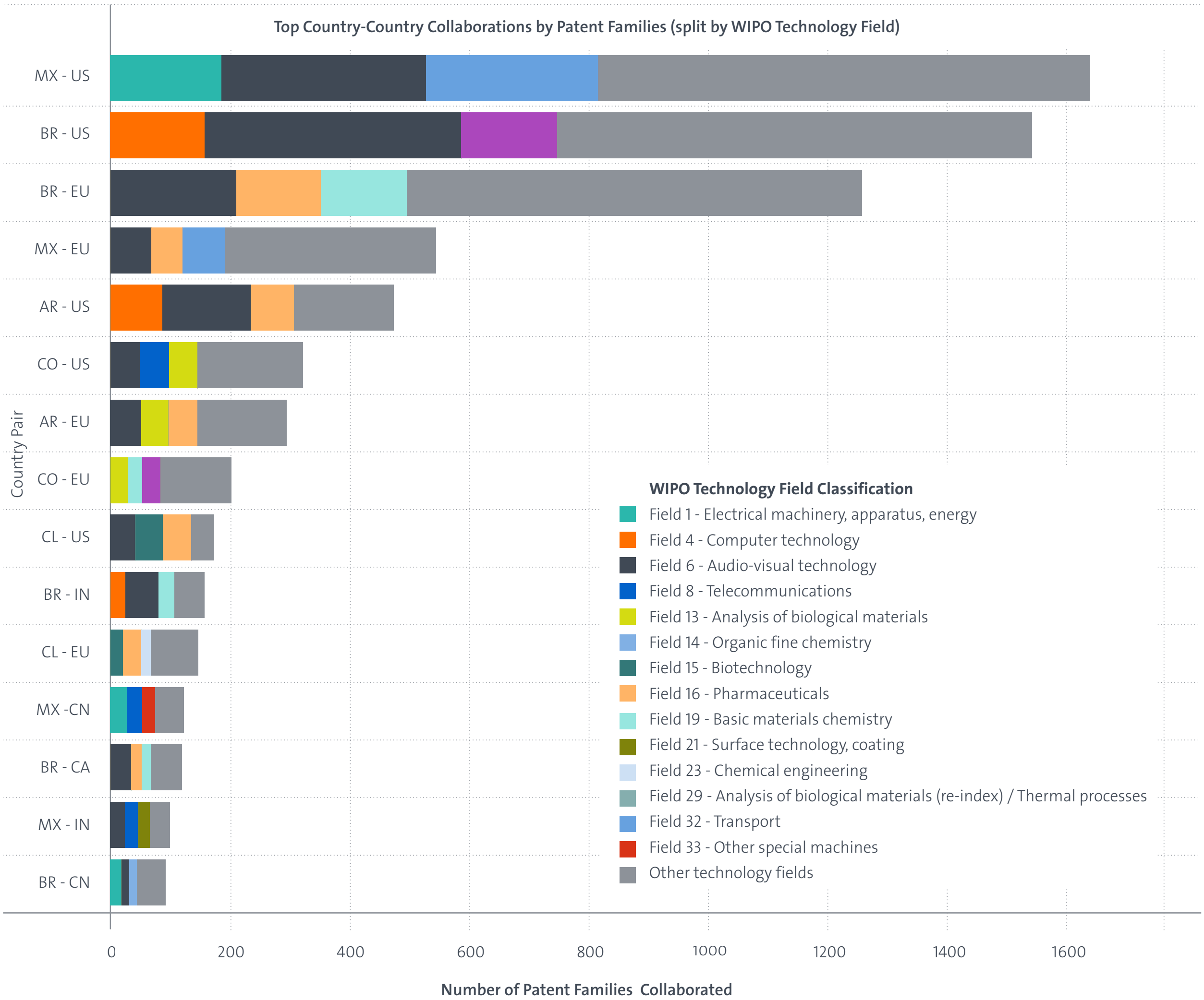
Despite geographic proximity and the existence of regional trade in manufactured goods, LAC inventors rarely co-invent with their neighbours. The connections linking LAC countries directly to one another are exceptionally thin or entirely missing. This indicates that LAC countries are individually tethered to northern innovation hubs, but their domestic R&D ecosystems remain structurally disconnected from each other.

The structural fragmentation of the Latin American innovation ecosystem becomes even more apparent when contrasted with a highly integrated region. A parallel mapping of the European co-inventorship network—capturing patent families involving at least one EPC member state over the same period—reveals a fundamentally different architecture.

Rather than relying on external hubs, the European network features a massive, interwoven intra-regional core consisting of countries like Germany, France, the United Kingdom and the Netherlands. In this model, member states collaborate multilaterally with one another to generate a self-sustaining regional R&D ecosystem, while external global partners (such as the USA or Asian nations) remain on the periphery. This stands in stark contrast to the LAC reality, where the region acts as the periphery to external hubs, lacking the internal cross-border collaboration.

Figure 44

Strongest collaboration nodes of LAC9 countries and distribution by technology field



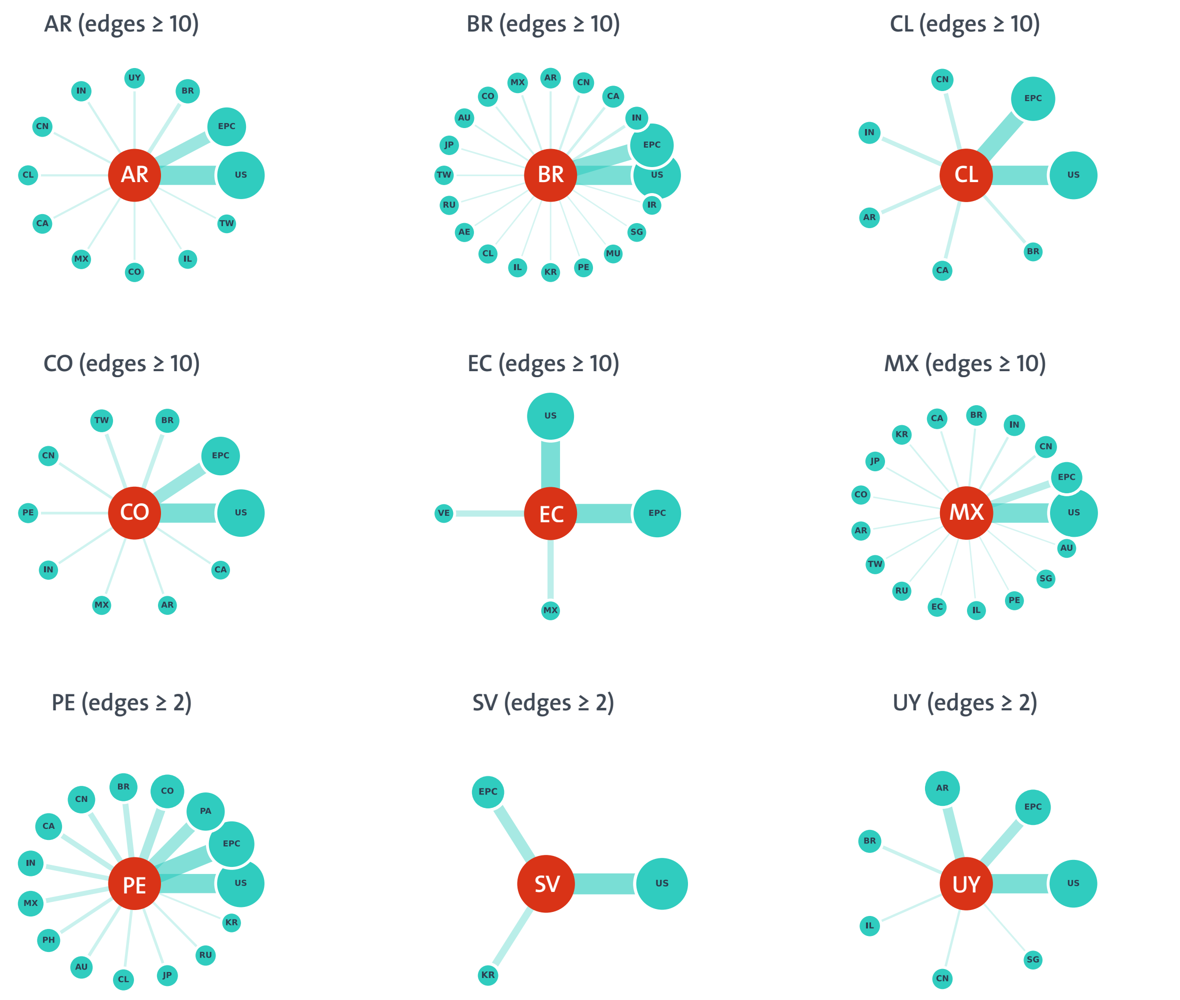
Source: ECLAC, EPO

Analysing the densest country-to-country collaborations by WIPO technology field reveals that LAC nations play distinct technological roles, depending on their global partner (Figure 44). These R&D specialisations align perfectly with the physical trade imbalances identified in Chapter 3. The highest-volume collaboration in the region is between Mexico and the USA. This relationship is overwhelmingly concentrated in Electrical Machinery, Apparatus, and Energy (Field 1), Audio-Visual Technology (Field 6), and Transport (Field 32). This engineering-heavy R&D integration mirrors Mexico's physical trade profile as a nearshored assembly node for North American electronics and automotive value chains. Brazil's collaboration with the USA exhibits a complementary focus on ICT and digital domains, particularly featuring Computer Technology (Field 4) and Audio-Visual Technology. Collaborations directed toward Europe show a distinctly different technological composition.

The robust Brazil-Europe and Argentina-Europe links place a much stronger emphasis on Pharmaceuticals (Field 16), Basic Materials Chemistry (Field 19) and Biotechnology (Field 15). This corroborates the earlier trade findings that Europe serves as the primary supplier of advanced healthcare and chemical technologies to South America. While previous trade data established that LAC relies heavily on East Asia for importing complex digital and capital goods, joint knowledge creation remains marginal. Collaborations like Mexico-China or Brazil-India exhibit very low volumes, This suggests that the LAC-Asia relationship is largely commercial, based on purchasing finished technology, rather than integrating into the innovation process.

Figure 45

Global co-inventorship network for each LAC9 country, 2015-2020



Source: ECLAC, EPO

Note: see Figure 42 for an explanation of the methodology used.

Disaggregating the network into individual country graphs highlights varying degrees of global integration across the region. Brazil and Mexico exhibit the most robust and globally diversified networks. Both countries maintain massive links to the USA and the EU, while also fostering secondary R&D relationships with Asian nations (such as China, Japan, South Korea and Taiwan), Canada and India. This reflects their status as the region's largest formal manufacturing and R&D bases. Mid-sized South American economies like Argentina, Colombia, Chile and Peru demonstrate a more balanced dual dependency.

While their networks are less expansive than Brazil's or Mexico's, their most significant inventive ties are split relatively evenly between the USA and Europe. Smaller economies display highly restricted collaborative footprints. El Salvador[14] and Ecuador, for example, show almost zero regional or diverse international integration, relying almost exclusively on the USA and the EU respectively for their co-inventorship activities.

14 Patent data for El Salvador is not complete, which may bias the results.

5. Conclusion and policy perspective

The evidence presented in this study suggests that IPR matter for development in Latin America and the Caribbean in a nuanced way. On the one hand, IPR fosters innovation and thus development. Indeed, IPR-intensive manufacturing industries make a meaningful contribution to the region's productive structure. They account for 12.4% of manufacturing employment and 13.0% of manufacturing value added, and they display a substantial wage premium relative to non-IPR-intensive industries. Patent-intensive segments stand out in particular, with the highest wage premium and a stronger association with value added and productivity. On the other hand, the existing approach to IPR does not seem to account for large gaps in patented innovation between LAC and other regions. LAC continues to import far more IPR-intensive goods than it exports, while patenting activity remains overwhelmingly driven by foreign applicants. Taken together, these patterns suggest that IP in the region is economically relevant, but only imperfectly connected to domestic capability formation, structural transformation and local value capture.

The main policy implication is therefore not that countries should pay less attention to IPR, nor that stronger protection is the central answer. Rather, IP policy should be treated as part of a broader productive development strategy. Stronger protection alone is unlikely to generate meaningful upgrading in settings where research capacity, engineering skills, university-firm linkages, scale-up finance, quality infrastructure, standards and supplier capabilities remain weak. In that sense, the economically relevant question is not whether an IP regime is stronger or weaker in formal terms, but whether the surrounding innovation system is capable of translating IP into learning, adaptation, commercialisation and productivity growth. This broader perspective is consistent with the wider diagnosis that development in the region continues to be constrained by weak productivity growth, limited structural transformation and fragmented innovation capabilities (ECLAC, 2025).

The evidence also suggests that policy should distinguish more clearly across sectors and forms of innovation. Patent-intensive segments deserve particular attention because they appear more strongly associated with wages, value added and productivity gains than trade mark-intensive segments alone.

At the same time, the patent data show a growing concentration of foreign and, increasingly, overall patenting in chemistry-related technologies, especially pharmaceuticals, biotechnology and related fields. These are sectors of genuine economic importance, but over-concentration also limits resilience and diversification. A stronger development strategy would therefore deepen capabilities where the region already has footholds while also broadening the technological base into adjacent areas, including engineering-based, digital, health-related and green technologies.

A further implication is that the region should distinguish more carefully between access to foreign technology and domestic ownership of knowledge. The current pattern suggests that foreign technologies, imported IPR-intensive goods and foreign patenting remain central to the region's production and trade structure. These linkages can be valuable, but without stronger local capability formation they tend to reinforce dependence rather than generate deep upgrading. The challenge is therefore not to reduce foreign technological presence, but to connect it more effectively to local engineering, supplier development, domestic research, collaborative innovation and forms of ownership that allow more value to remain in the region.

Cross-cutting recommendations

Across the region, IP policy should be repositioned as one instrument within a broader development strategy rather than as a self-contained legal domain. The central objective should be to strengthen the links between innovation, diffusion, commercialisation and structural transformation. In practical terms, this means embedding IP more firmly within industrial, trade, technology and productive development agendas, rather than treating patenting or legal modernisation as stand-alone goals.

A second cross-cutting priority is to focus less on the formal strength of IP regimes and more on the domestic conditions that make IP economically productive. In much of Latin America and the Caribbean, the most binding constraints lie in weak engineering capabilities, limited applied research capacity, shallow supplier bases, insufficient standards and metrology systems, weak university-firm interaction and scarce finance for scale-up and commercialisation.

IP rights can help firms and research institutions appropriate returns on innovation, but they do not substitute for the capabilities required to generate, adapt and diffuse technology.

A third priority is to strengthen the channels linking universities and public research organisations to productive sectors. The patent evidence suggests that domestic innovation in the region relies relatively more on individual inventors, universities and public institutions than on a deep industrial innovation base. That makes technology transfer offices, proof-of-concept mechanisms, collaborative research platforms, translational funding and shared advisory services especially important. The objective should not be to maximise patent counts in public institutions, but to increase the productive use of public knowledge.

A further cross-cutting priority is to expand the effective use of IP by firms, especially small and medium-sized enterprises and producers that do not currently see IP as relevant to their business decisions. In much of the region, the problem is not only limited innovation effort but also limited awareness of what different IP tools are for, when they are worth using, and how to access them at reasonable cost. This calls for practical support rather than abstract promotion: targeted outreach to firms in specific sectors; advisory services that help firms identify whether patents, trade marks, industrial designs, trade secrets or licensing are relevant to their activities; assistance with patent searches and freedom-to-operate checks; simpler and less costly filing procedures; and legal and technical support for contracts, licensing and collaboration with universities and public research organisations. The appropriate instruments will differ by level of maturity. In incipient systems, the priority is basic awareness, introductory advisory services, trade mark and branding support, and simple help with searches and filings. In intermediate systems, policy should place more weight on commercialisation support, licensing, proof-of-concept mechanisms, extension services, innovation vouchers and stronger institutional interfaces between firms and knowledge organisations. In more advanced systems, the focus should shift toward strategic IP management, international filing, co-development and co-ownership arrangements, technology licensing and more sophisticated support for firms seeking to enter science-based and higher-value activities.

Finally, regional integration should be treated more explicitly as part of an innovation strategy. For many countries, the Latin American market remains an important outlet for IPR-intensive manufacturing, while the data also show weak intra-regional innovation connectivity and strong dependence on extra-regional trade and innovation networks. Regional demand, standards, public procurement, regulatory coordination and cross-border innovation partnerships can therefore support scaling and diffusion in ways that national policy alone often cannot.

Recommendations for countries with incipient innovation systems[15]

For countries with incipient innovation systems, the priority should be capability building rather than legal maximalism. In these settings, the main obstacle is rarely the absence of formal protection as such. More often, it is the absence of the scientific, technical, productive and institutional capabilities needed to use IP meaningfully. Policy should therefore begin with the basics: awareness raising, technical training, engineering and applied research capacity, quality infrastructure, standards, supplier development and clear productive priorities.

These countries should also avoid trying to pursue overly broad innovation agendas. A more effective approach is to focus on a limited number of activities where there is already some productive base, local demand, or plausible potential for learning and diffusion. Within those areas, IP-related support can be useful when it is practical and selective: basic advisory services, assistance with patent searches and licensing, support for branding and trade marks, and simplified collaboration mechanisms between public institutions and firms.

Where imported technology and foreign firms play an important role, the objective should be to convert access into learning. Supplier-development programmes, technical extension, adaptation support and engineering problem-solving are likely to matter more than debates over stronger legal protection alone. At this stage, the key challenge is to create the basic conditions under which IP can become economically useful within the domestic innovation system.

15 Recommendations are presented according to innovation system maturity level, as in ECLAC, 2025.

Recommendations for countries with intermediate innovation systems

For countries with intermediate innovation systems, the main task is to move from fragmented support measures toward a more coherent policy mix. These countries often already have a range of institutions and instruments in place, but suffer from discontinuity, weak coordination and limited connection to productive priorities. The next step is to connect research support, innovation finance, entrepreneurship policies, standards, extension services, supplier development and IP-related services around clearer sectoral and technological objectives.

At this stage, policy should shift from supporting filings in isolation toward supporting commercialisation and diffusion. Proof-of-concept funding, translational research, collaborative platforms, licensing support, cluster initiatives, innovation vouchers and targeted public procurement can all help connect knowledge generation to productive use. This is also the stage at which stronger technology transfer offices and other institutional interfaces become more important, not as ends in themselves, but as mechanisms for reducing the gap between universities, public research organisations and firms.

Intermediate systems are also the most important space for diversification. Countries in this group should build on existing capabilities in established sectors, but they should also invest deliberately in adjacent technological areas. The concentration of patent activity in chemistry-related sectors highlights real strengths, but it also underscores the need to broaden the technological base. Investments in research infrastructure, human capital, entrepreneurial ecosystems and applied collaboration are therefore essential if innovation systems are to become more resilient and less narrowly specialised.

Recommendations for countries with advanced innovation systems

For countries with more advanced innovation systems, the priority is less about increasing IP activity in the aggregate and more about improving its quality, connectivity and developmental impact. These countries are better placed to use IP strategically as part of export upgrading, technological branching and international positioning. Patent family data, co-inventorship networks and other indicators of internationalisation should therefore be used more systematically to identify where domestic firms and institutions are building capabilities with global relevance.

A second priority is to strengthen domestic participation in science-based sectors where foreign actors continue to dominate. The evidence shows that foreign applicants remain especially concentrated in pharmaceuticals, biotechnology, medical technology and related chemistry-based activities, while domestic innovation tends to remain more engineering-oriented. More advanced systems in the region should seek to narrow this gap through stronger translational infrastructures, frontier skills, scale-up finance, advanced procurement and deeper research-industry collaboration.

More advanced systems should also take on a stronger regional role. At present, many of the region's strongest patenting and co-invention links are oriented toward the USA and Europe, with weaker intra-regional innovation connectivity. Countries with stronger innovation capabilities can help anchor regional platforms for joint research, standards alignment, technology transfer and industrial learning. In that sense, more advanced systems should not only pursue global integration, but also contribute more actively to regional capability formation.

Regional and external actor recommendations

At the regional level, a stronger integration agenda is needed for IPR-intensive sectors. This should go beyond trade liberalisation narrowly defined. In sectors such as medical devices, pharmaceuticals, selected chemicals and some engineering-based activities, harmonised standards, regulatory coordination, interoperable quality systems and coordinated public demand could help firms scale within the region before competing more broadly. The current trade pattern suggests that Latin America remains much more a consumer than a producer of IPR-intensive goods, but it also suggests that regional markets could play a more strategic role in supporting productive upgrading.

Regional co-operation is also needed to strengthen innovation connectivity. Shared patent intelligence, regional networks of technology transfer offices, common training platforms, model contracts, and collaborative research and testing infrastructures could lower fixed institutional costs, especially for smaller countries. This is particularly relevant in a region where domestic innovation often remains disconnected from regional production networks and where international collaboration is still concentrated around partners outside Latin America and the Caribbean.

For external actors, the implication is that support should focus less narrowly on legal reform and more consistently on capability formation. Development banks, international organisations and external partners can add more value by supporting applied research infrastructure, technical skills, standards and metrology, commercialisation capacity, scale-up finance, and cross-border innovation partnerships. In the context of Latin America and the Caribbean, the developmental returns to such support are likely to be higher than those of a narrow focus on formal strengthening of IP regimes alone.

Overall, the region would benefit from moving away from an undifferentiated debate over whether IP protection is stronger or weaker, and toward a more development-oriented question: under what conditions does IP contribute to learning, diffusion, trade upgrading and local value creation? The answer will differ across countries and sectors, but in general countries with weaker innovation systems need to build the foundations that make IP economically useful. Countries with stronger systems need to use IP more strategically in diversification, scaling and international positioning. And the region needs more integration, more institutional connectivity, and stronger bridges between knowledge production and productive transformation (ECLAC, 2025).

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6. Annex

6.1. Main characteristics of other types of IPR

Table 9

Main characteristics of other types of IPR

IPR	Designs	Copyright	Geographical indications	Plant variety rights
Subject-matter	Appearance of an article or product or parts of it and/or its ornamentation	Artistic, literary, dramatic, musical, photographic and cinematographic works; maps and technical drawings; computer programs and databases	Product originating in a particular geographical area whose quality or reputation is linked to its geographical environment or origin	Plant varieties
Requirements for protection	Novelty; individual character	Originality of the work, irrespective of its literary or artistic merit	Technical specifications justifying the special characteristics of the product and their link to the geographical area	Distinctness, uniformity, stability and novelty
Acquisition of right	For registered designs, examination by the IP office. For unregistered designs, automatically acquired by the act of disclosure	Automatic upon creation, but may require registration.	Examination by the national authority (depending on the country)	Examination by national examination authority, followed by grant
Conferred rights	Exclusive right to use the design and to prevent any third party from using it without the right-holders' consent	Reproduction, communication to the public, including making the work available to the public, distribution, rental, resale, translation, adaptation, public performance	Collective right. Exclusive rights to commercialise comparable products and prevent imitation, misuse or evocation	Exclusive right to commercialise the protected plant variety
Duration	For registered designs, the maximum varies between 10-25 years. (in successive five-year terms)	Most countries follow the lifetime plus 70 years standard for authors.	Indefinite; no need for renewal	For most plant varieties, 20-25 years

6.2. Data coverage

Table 10

Data coverage

Variable/country	AR	BR	CL	CO	EC	MX	PE	SV	UY
Industry coverage (avg)	98%	97%	99%	77%	62%	72%	86%	94%	56%
Employment, wages, value added	✓	✓	✓	✓	✓	✓	2016-18	No data on value added	2016-19
Number of establishments	No data	No data	✓	✓	✓	✓	2016-18	✓	2016-19
Gross output	No data	✓	✓	✓	✓	✓	2016-18	No data	2016-19
Hours worked	No data	No data	✓	No data	✓	✓	No data	✓	No data
Patent data	✓	✓	✓	✓	✓	✓	✓	Until 2020	✓
Trade mark data	✓	✓	✓	✓	No data	✓	✓	No data	✓

6.3. Contributions of IPR-intensive industries – country graphs

Table 11

Economic contribution of IPR-intensive manufacturing industries by LAC country (2016-2020)

Argentina

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	86 594	6.7%	8.4%	n/a
TM-intensive	91 645	7.0%	7.1%	n/a
IPR-intensive	152 913	11.8%	12.6%	n/a

Brazil

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	449 538	7.9%	11.8%	60.5%
TM-intensive	467 758	8.2%	8.8%	22.8%
All IPR-intensive	755 166	13.3%	16.0%	33.0%

Chile

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	21 698	4.6%	12.5%	142.5%
TM-intensive	40 757	8.6%	9.4%	27.5%
All IPR-intensive	48 884	10.3%	17.0%	72.9%

Colombia

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	47 533	7.8%	9.1%	30.5%
TM-intensive	106 184	17.4%	18.6%	14.7%
All IPR-intensive	129 562	21.3%	22.7%	15.2%

Ecuador

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	11 814	4.7%	4.9%	21.5%
TM-intensive	19 906	8.0%	8.8%	22.6%
All IPR-intensive	25 821	10.4%	11.2%	20.1%

Mexico

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	295 757	7.0%	4.3%	22.7%
TM-intensive	268 055	6.4%	5.3%	11.0%
All IPR-intensive	435 171	10.3%	7.9%	14.3%

Peru

IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	30 939	4.3%	5.4%	40.9%
TM-intensive	69 855	9.7%	10.5%	15.3%
All IPR-intensive	83 718	11.7%	12.5%	17.0%

El Salvador

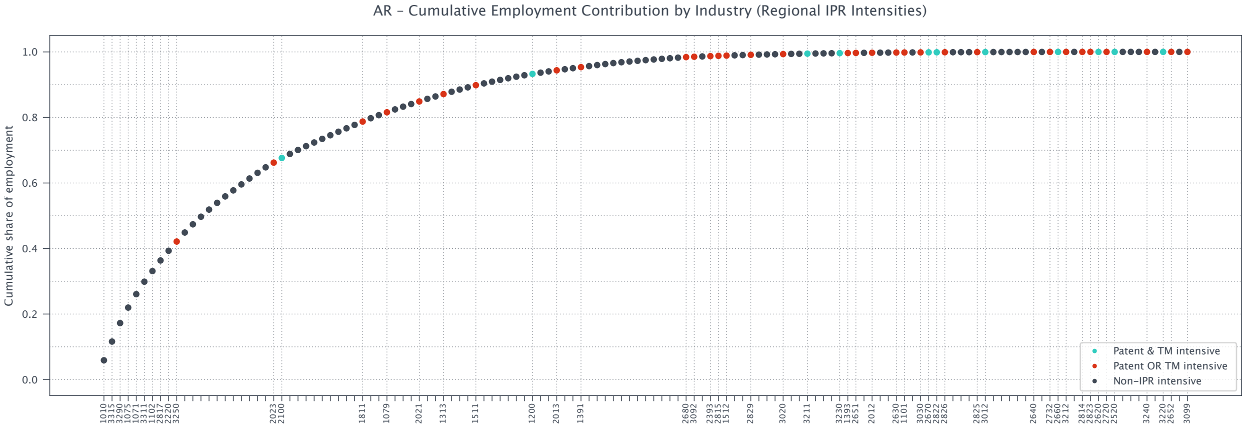
IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	10 937	6.6%	n/a	31.7%
TM-intensive	29 251	17.7%	n/a	13.8%
All IPR-intensive	31 624	19.2%	n/a	15.5%

Uruguay

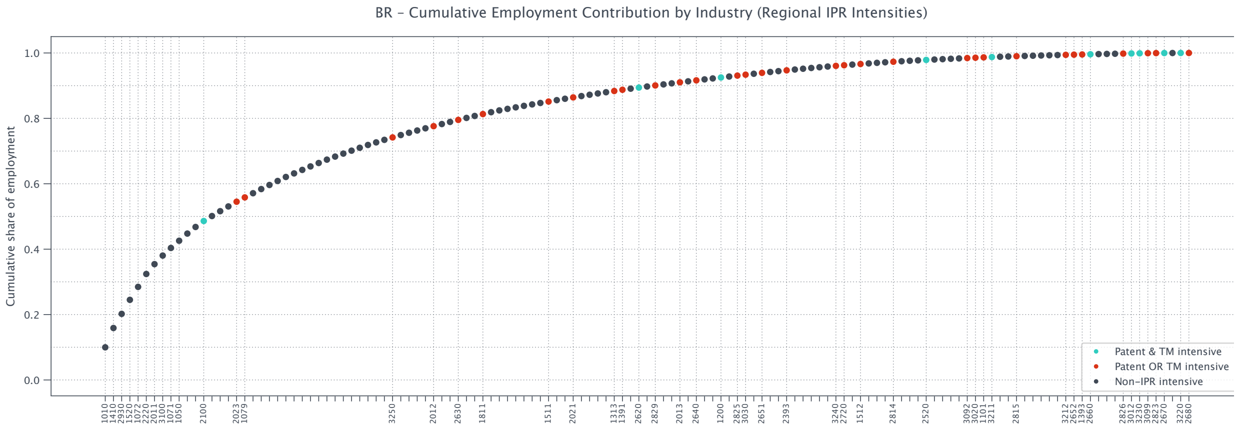
IPR-intensive category	Employment (absolute)	Share of total employment	Share of total value added	Wage premium
Patent-intensive	6 617	7.1%	8.4%	23.9%
TM-intensive	14 120	15.1%	19.3%	34.2%
All IPR-intensive	16 256	17.4%	21.1%	27.7%

Figure 46

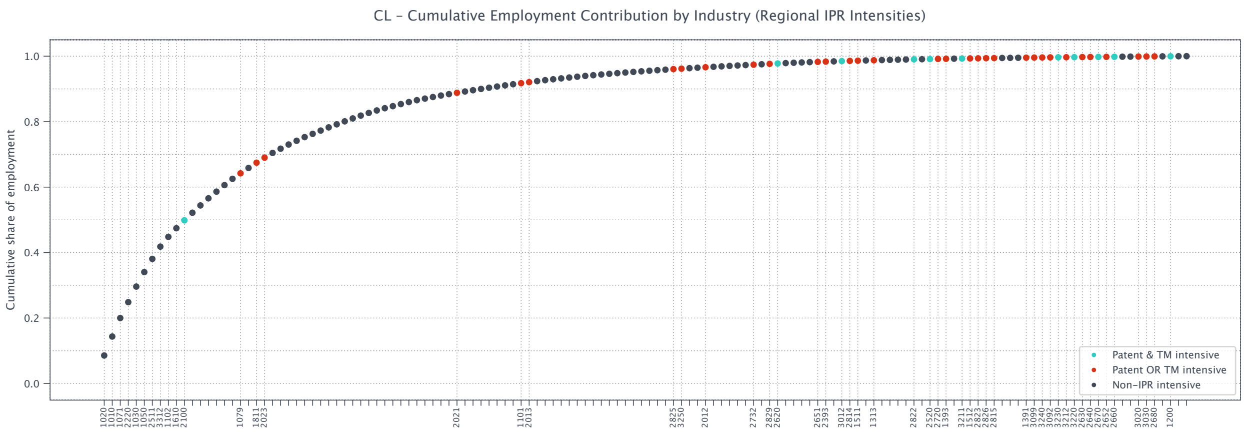
Cumulative employment by LAC country



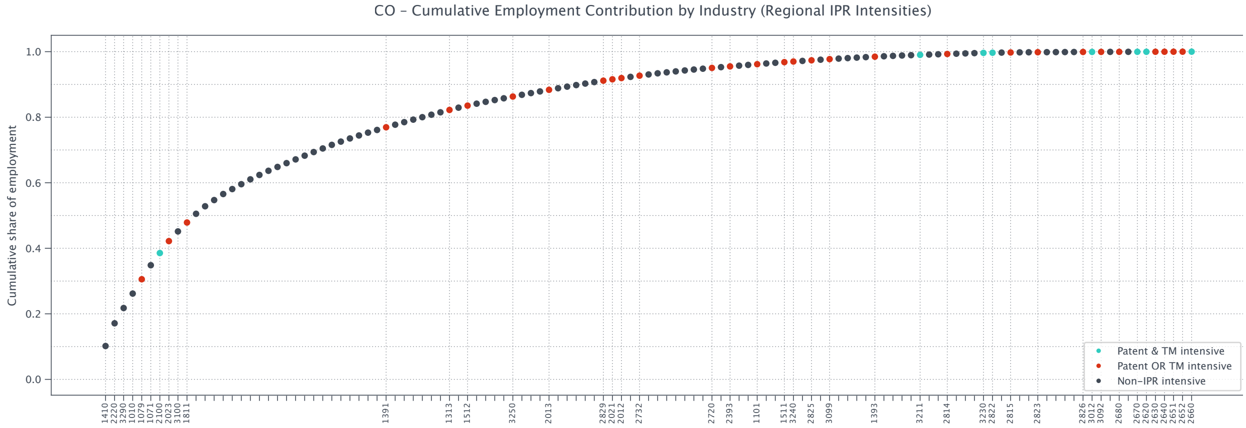
Note: The top ten industries by employment are: 1010 Processing and preserving of meat; 3315 Repair of transport equipment, except motor vehicles; 3290 Other manufacturing n.e.c.; 1075 Manufacture of prepared meals and dishes; 1071 Manufacture of bakery products; 3311 Repair of fabricated metal products; 1102 Manufacture of wines; 2817 Manufacture of office machinery and equipment (except computers and peripheral equipment); 2220 Manufacture of plastics products; 3250 Manufacture of medical and dental instruments and supplies



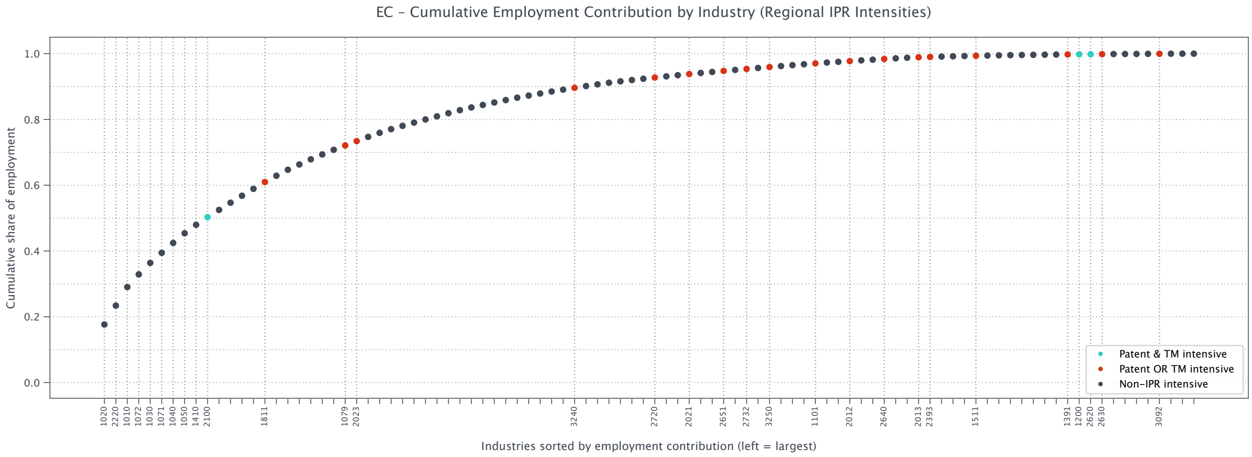
Note: The top ten industries by employment are: 1010 Processing and preserving of meat; 1410 Manufacture of wearing apparel, except fur apparel; 2930 Manufacture of parts and accessories for motor vehicles; 1520 Manufacture of footwear; 1072 Manufacture of sugar; 2220 Manufacture of plastics products; 2011 Manufacture of basic chemicals; 3100 Manufacture of furniture; 1071 Manufacture of bakery products; 1050 Manufacture of dairy products



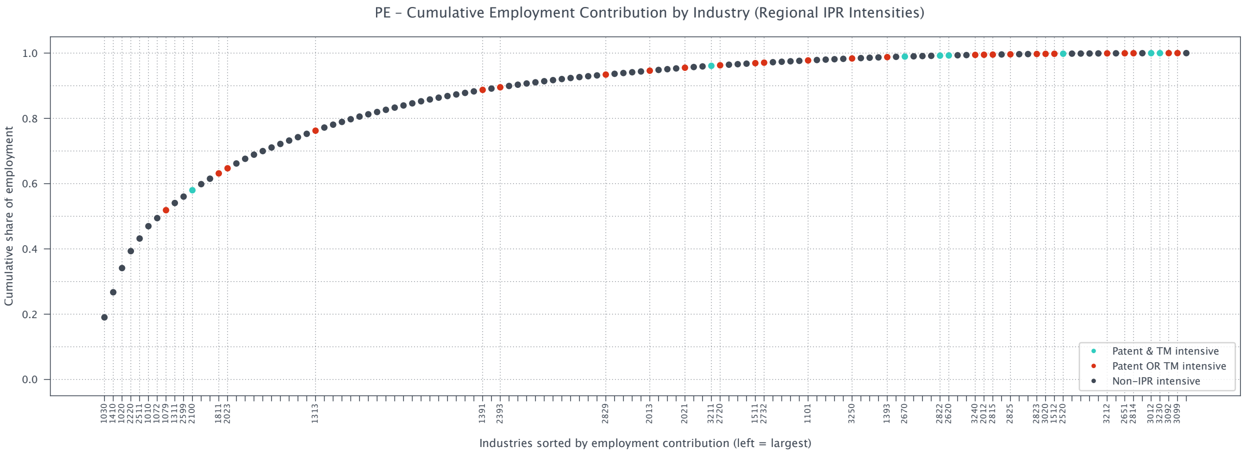
Note: The top ten industries by employment are: 1020 Processing and preserving of fish, crustaceans and molluscs; 1010 Processing and preserving of meat; 1071 Manufacture of bakery products; 2220 Manufacture of plastics products; 1030 Processing and preserving of fruit and vegetables; 1050 Manufacture of dairy products; 2511 Manufacture of structural metal products; 3312 Repair of machinery; 1102 Manufacture of wines; 1610 Sawmilling and planing of wood; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products



Note: The top ten industries by employment are: 1410 Manufacture of wearing apparel, except fur apparel; 2220 Manufacture of plastics products; 3290 Other manufacturing n.e.c.; 1010 Processing and preserving of meat; 1079 Manufacture of other food products n.e.c.; 1071 Manufacture of bakery products; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products; 2023 Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations 3100 Manufacture of furniture; 1811 Printing

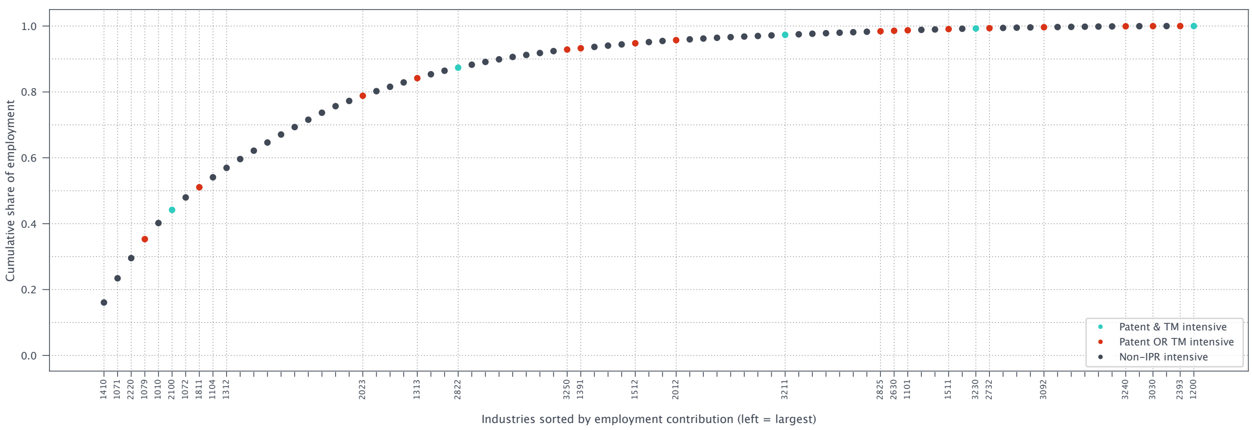


Note: The top ten industries by employment are: 1020 Processing and preserving of fish, crustaceans and molluscs; 2220 Manufacture of plastics products; 1010 Processing and preserving of meat; 1072 Manufacture of sugar; 1030 Processing and preserving of fruit and vegetables; 1071 Manufacture of bakery products; 1040 Manufacture of vegetable and animal oils and fats; 1050 Manufacture of dairy products; 1410 Manufacture of wearing apparel, except fur apparel; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products



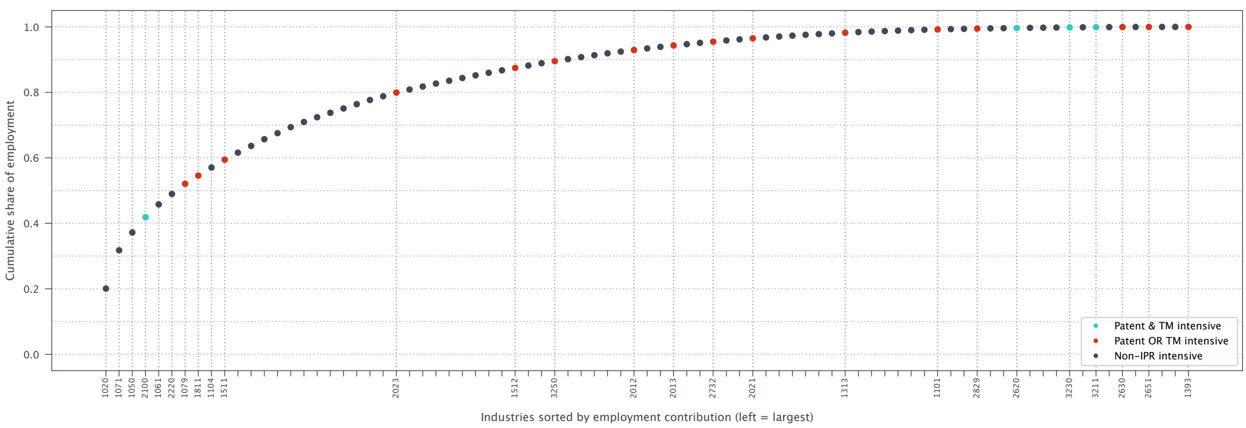
Note: The top ten industries by employment are: 1030 Processing and preserving of fruit and vegetables; 1410 Manufacture of wearing apparel, except fur apparel; 1020 Processing and preserving of fish, crustaceans and molluscs; 2220 Manufacture of plastics products; 2511 Manufacture of structural metal products; 1010 Processing and preserving of meat; 1072 Manufacture of sugar; 1079 Manufacture of other food products n.e.c.; 1311 Preparation and spinning of textile fibres; 2599 Manufacture of other fabricated metal products n.e.c.; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products

SV – Cumulative Employment Contribution by Industry (Regional IPR Intensities)



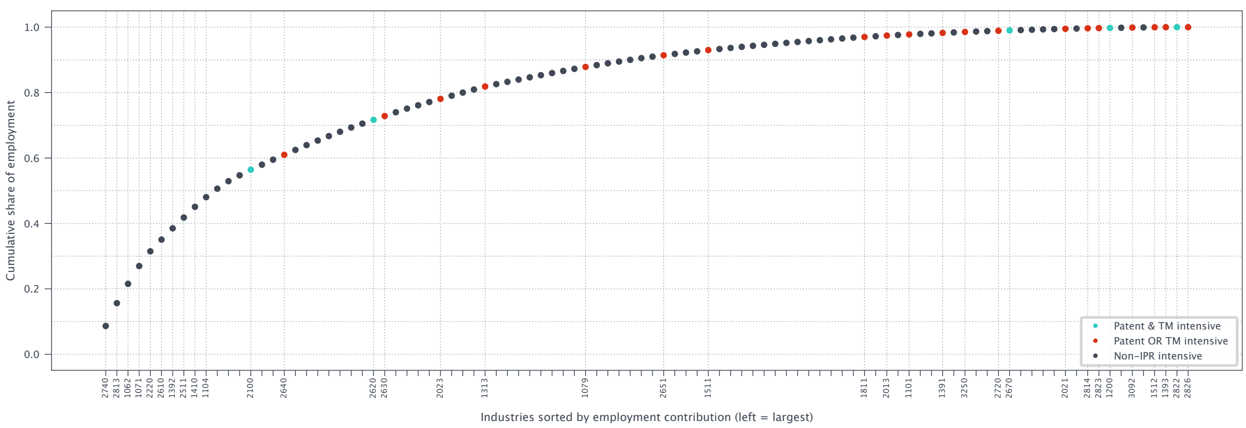
Note: The top ten industries by employment are: 1410 Manufacture of wearing apparel, except fur apparel; 1071 Manufacture of bakery products; 2220 Manufacture of plastics products; 1079 Manufacture of other food products n.e.c.; 1010 Processing and preserving of meat; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products; 1072 Manufacture of sugar; 181 Printing; 1104 Manufacture of soft drinks; production of mineral waters and other bottled waters; 1312 Weaving of textiles

UY – Cumulative Employment Contribution by Industry (Regional IPR Intensities)



Note: The top ten industries by employment are: 1020 Processing and preserving of fish, crustaceans and molluscs; 1071 Manufacture of bakery products; 1050 Manufacture of dairy products; 2100 Manufacture of pharmaceuticals, medicinal chemical and botanical products; 1061 Manufacture of grain mill products; 2220 Manufacture of plastics products; 1079 Manufacture of other food products n.e.c.; 1811 Printing; 1104 Manufacture of soft drinks; production of mineral waters and other bottled waters; 1511 Tanning and dressing of leather; dressing and dyeing of fur

MX – Cumulative Employment Contribution by Industry (Regional IPR Intensities)

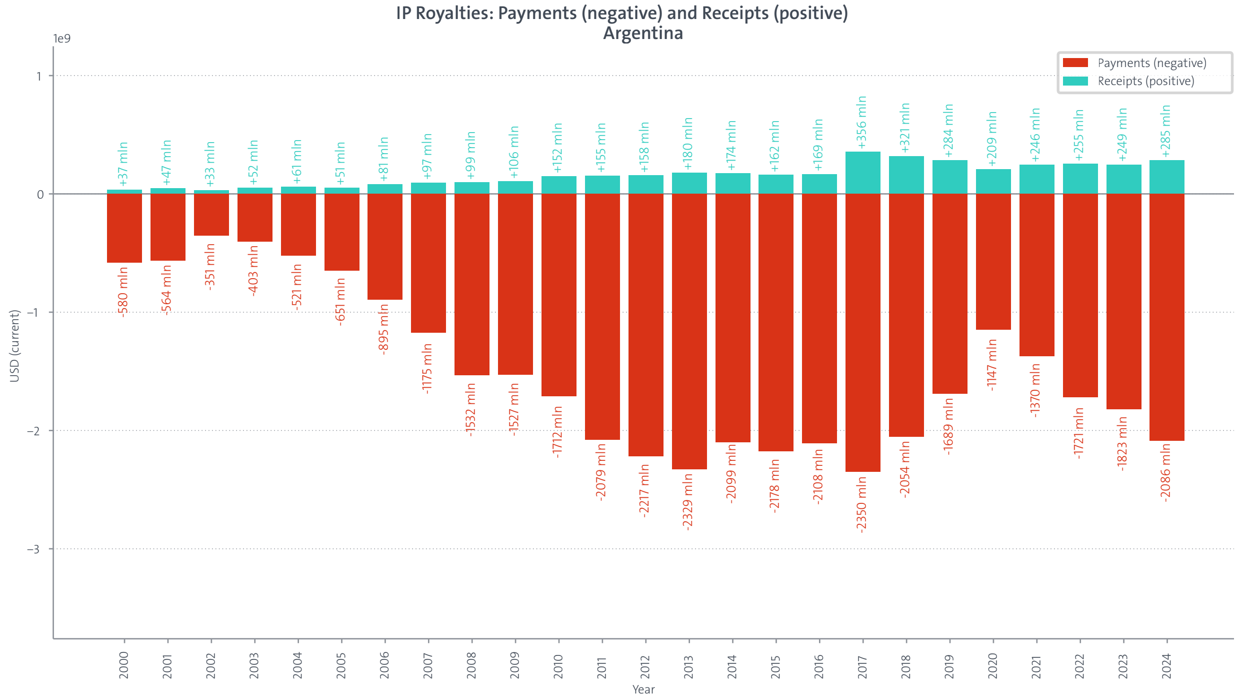


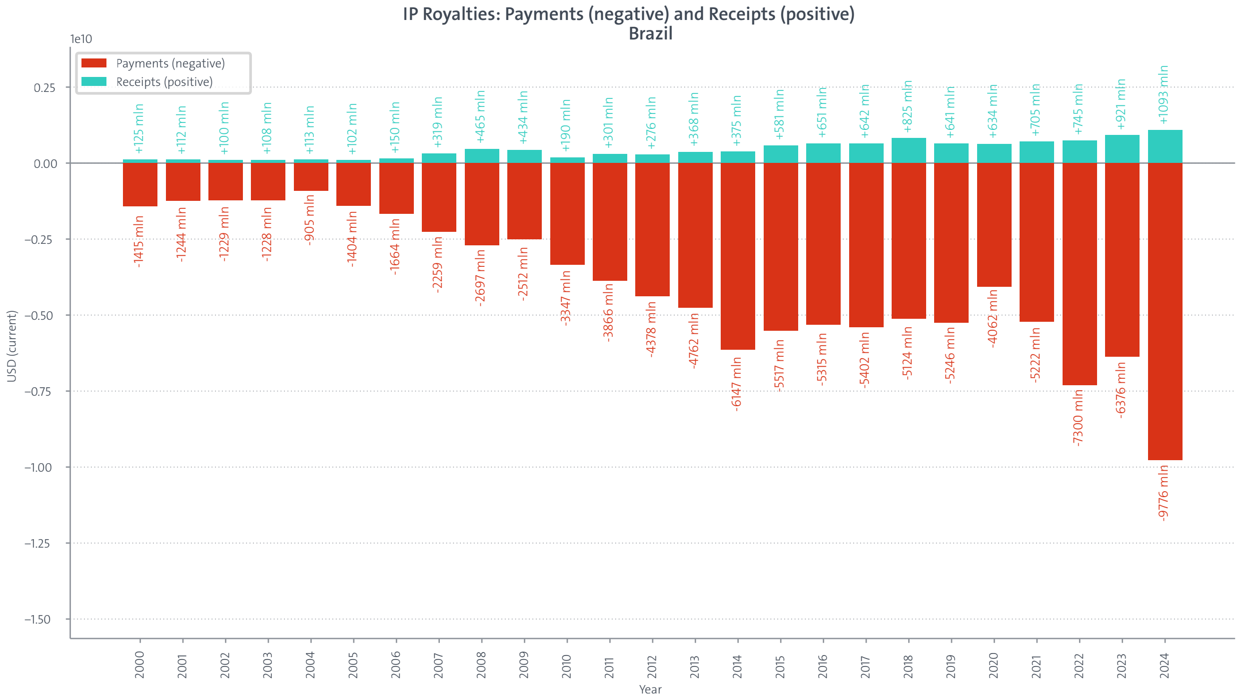
Note: The top ten industries by employment are: 2740 Manufacture of electric lighting equipment; 2813 Manufacture of other pumps, compressors, taps and valves; 1062 Manufacture of starches and starch products; 1071 Manufacture of bakery products; 2220 Manufacture of plastics products; 2610 Manufacture of electronic components; 1392 Manufacture of made-up textile articles, except apparel; 2511 Manufacture of structural metal products 1410 Manufacture of wearing apparel, except fur apparel; 1104 Manufacture of soft drinks; production of mineral waters and other bottled waters

6.4. IP payments and receipts (BoP) – WDI data, country graphs

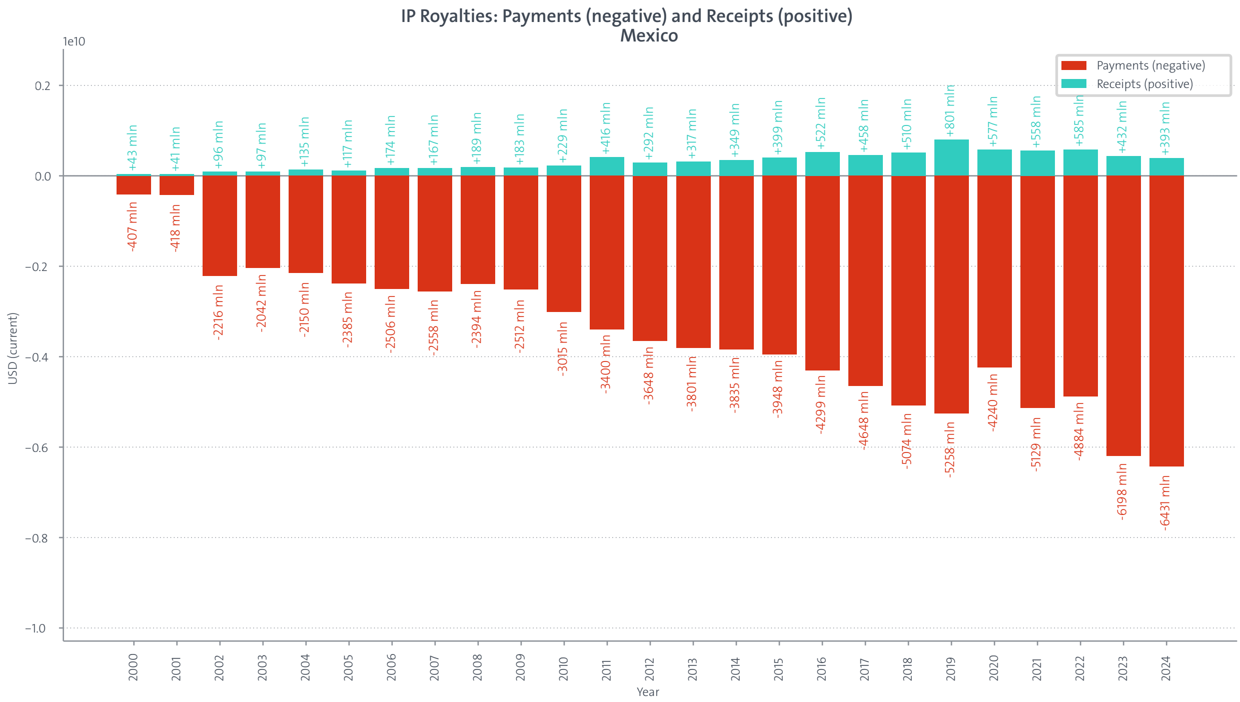
Figure 47

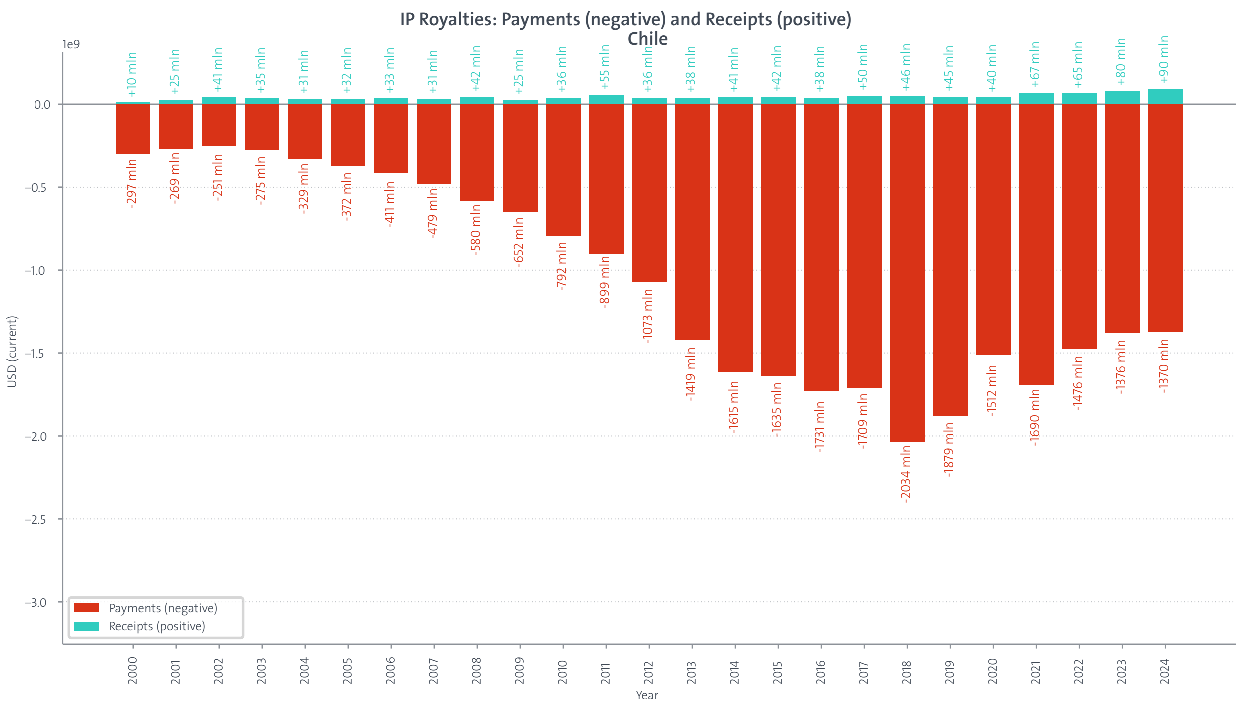
IP payments and receipts by LAC country



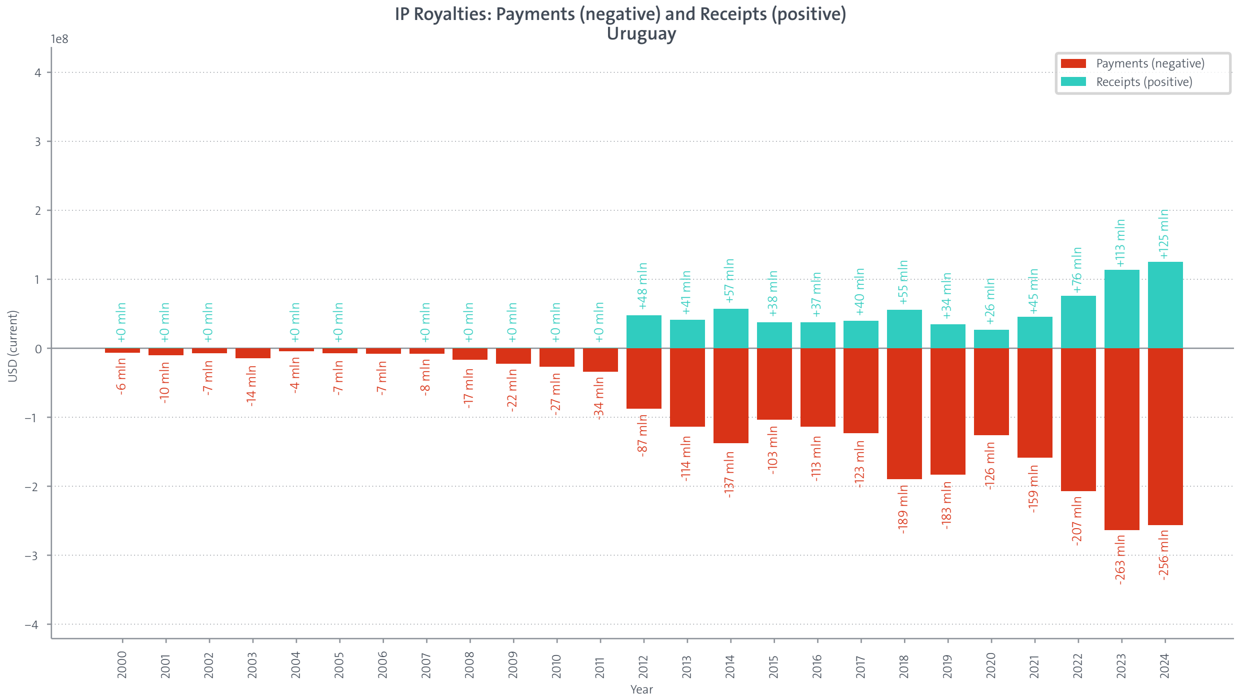


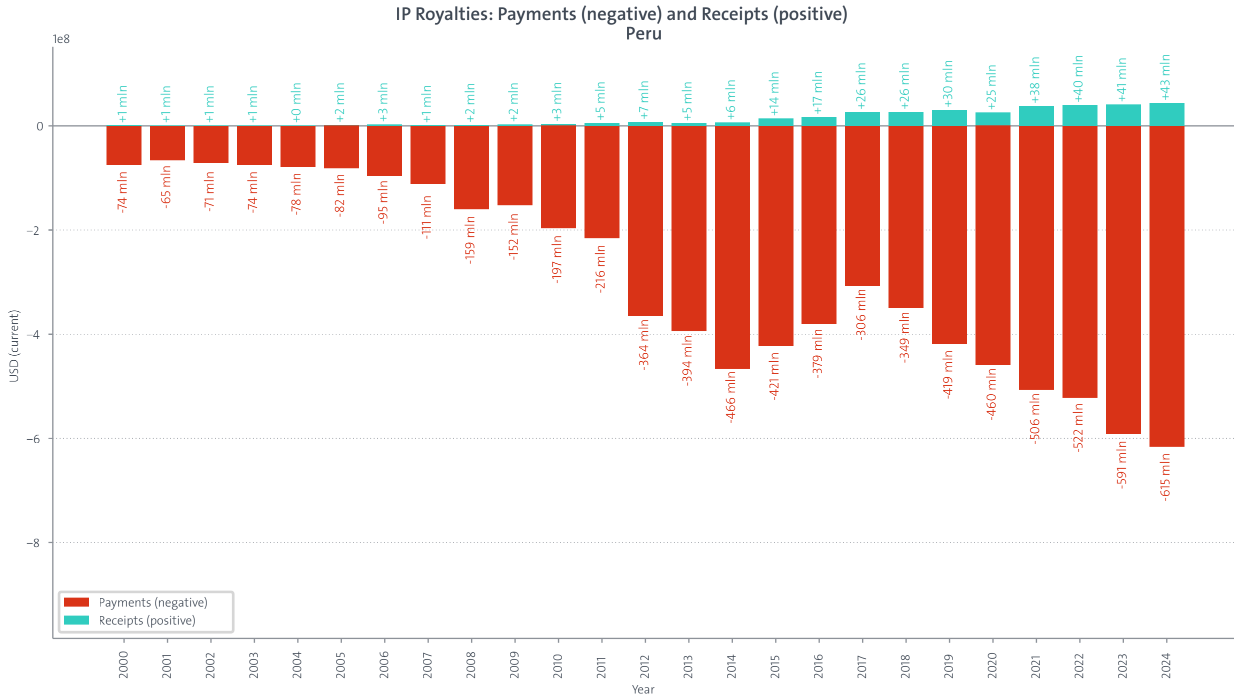
Source: ECLAC, EPO



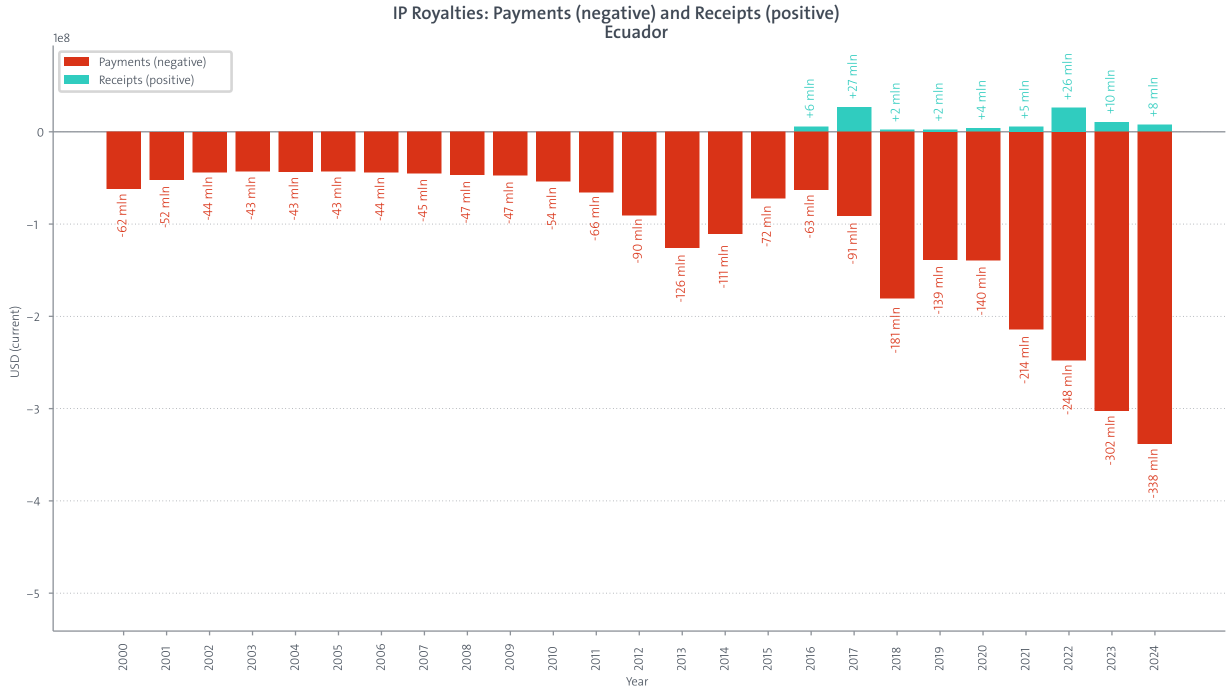


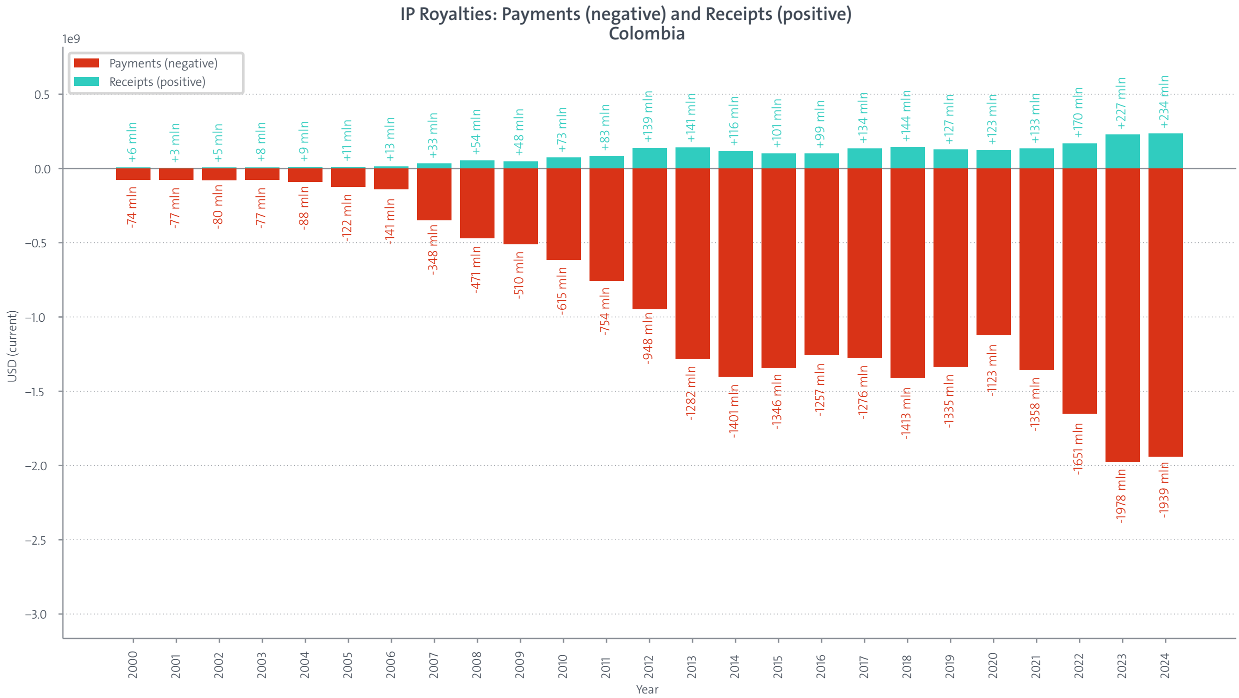
Source: ECLAC, EPO



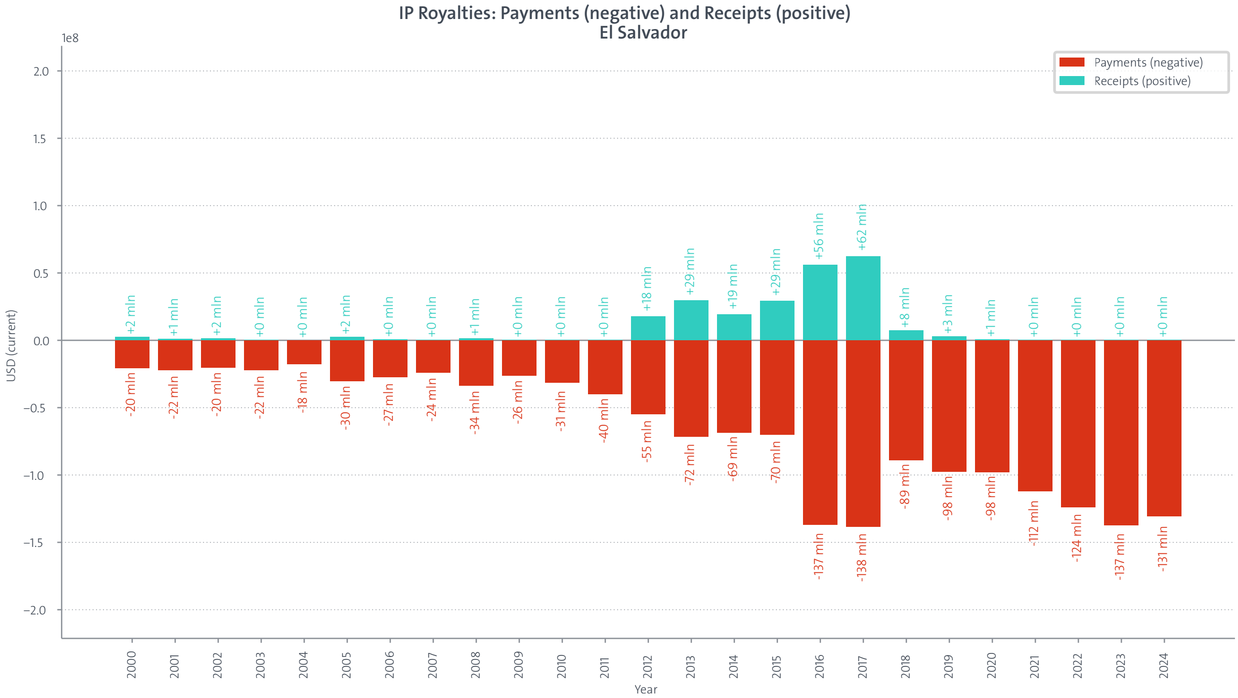


Source: ECLAC, EPO





Source: ECLAC, EPO



Source: ECLAC, EPO

6.5. Patent data coverage in PATSTAT for LAC countries

Figure 48

PASTAT and WIPO data coverage comparison, application filing 2000-2023

Source: ECLAC, EPO

6.6. Full list of IPR-intensive industries

Table 12

Patent-intensive industries

ISIC	ISIC description	Patent intensity
2 670	Manufacture of optical instruments and photographic equipment	0.14
2 652	Manufacture of watches and clocks	0.11
2 013	Manufacture of plastics in primary forms	0.05
2 815	Manufacture of ovens, furnaces and furnace burners	0.04
2 814	Manufacture of bearings, gears, gearing and driving elements	0.04
2 100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.04
2 822	Manufacture of metal-forming machinery and machine tools	0.04
3 230	Manufacture of sports goods	0.04
3 220	Manufacture of musical instruments	0.04
2 021	Manufacture of pesticides and other agrochemical products	0.03
3 012	Building of pleasure and sporting boats	0.03
2 660	Manufacture of irradiation, electromedical and electrotherapeutic equipment	0.03
2 630	Manufacture of communication equipment	0.03
2 620	Manufacture of computers and peripheral equipment	0.03
2 826	Manufacture of machinery for textile, apparel and leather production	0.02
3 020	Manufacture of railway locomotives and rolling stock	0.02
2 720	Manufacture of batteries and accumulators	0.02
3 030	Manufacture of air and spacecraft and related machinery	0.02
2 651	Manufacture of measuring, testing, navigating and control equipment	0.02
2 012	Manufacture of fertilisers and nitrogen compounds	0.01
3 211	Manufacture of jewellery and related articles	0.01
1 200	Manufacture of tobacco products	0.01
3 092	Manufacture of bicycles and invalid carriages	0.01
1 391	Manufacture of knitted and crocheted fabrics	0.01
2 393	Manufacture of other porcelain and ceramic products	0.01
2 732	Manufacture of other electronic and electric wires and cables	0.01
3 099	Manufacture of other transport equipment n.e.c.	0.01
2 640	Manufacture of consumer electronics	0.01
3 250	Manufacture of medical and dental instruments and supplies	0.01
2 823	Manufacture of machinery for metallurgy	0.01
2 520	Manufacture of weapons and ammunition	0.01

Table 13

Trade mark-intensive industries

ISIC	ISIC description	TM intensity
3 220	Manufacture of musical instruments	0.51
2 680	Manufacture of magnetic and optical media	0.39
1 101	Distilling, rectifying and blending of spirits	0.37
2 660	Manufacture of irradiation, electromedical and electrotherapeutic equipment	0.29
2 620	Manufacture of computers and peripheral equipment	0.24
3 211	Manufacture of jewellery and related articles	0.21
3 230	Manufacture of sports goods	0.21
1 313	Finishing of textiles	0.20
3 012	Building of pleasure and sporting boats	0.17
3 240	Manufacture of games and toys	0.17
1 512	Manufacture of luggage, handbags and the like, saddlery and harness	0.13
1 393	Manufacture of carpets and rugs	0.12
2 822	Manufacture of metal-forming machinery and machine tools	0.11
2 670	Manufacture of optical instruments and photographic equipment	0.09
1 811	Printing	0.08
2 100	Manufacture of pharmaceuticals, medicinal chemical and botanical products	0.08
3 212	Manufacture of imitation jewellery and related articles	0.08
2 023	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	0.07
1 511	Tanning and dressing of leather; dressing and dyeing of fur	0.06
2 520	Manufacture of weapons and ammunition	0.05
1 200	Manufacture of tobacco products	0.05
2 829	Manufacture of other special-purpose machinery n.e.c.	0.04
2 825	Manufacture of machinery for food, beverage and tobacco processing	0.04
1 079	Manufacture of other food products n.e.c.	0.03

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