Climate risks for Latin America and the Caribbean

Are banks ready for the green transition?

European Investment Bank | Global

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Introduction

Latin America and the Caribbean are increasingly experiencing the effects of climate change. Caribbean countries are the most exposed in the world to acute climate events, while the impacts of climate change are ever more visible in both Central and South America. No country is immune to climate change, with some risks now at "code red" level for all of humanity (IPCC, 2022), but some areas are more exposed than others. Climate change is disproportionally affecting countries in hot areas (with heat significantly reducing the productivity of labour), small island states exposed to storms and rising sea levels, and countries where climate-sensitive sectors (especially agriculture) play a large role in the economy. Moreover, in the case of low- and middle-income economies, governments and firms are generally less able to invest in adaptation and mitigation measures to reduce and protect against the effects of climate change. The combination of higher exposure to climate events and lower adaptation and mitigation capacity leaves some countries especially vulnerable.

Latin American and Caribbean countries are already paying a high price for climate change, despite contributing less than 5% of global CO_2 emissions. 2022 and the first half of 2023 alone have brought wildfires in Argentina, Chile and the Pantanal region; as well as heavy flooding in Guatemala, Peru, Bolivia, Colombia, Trinidad and Tobago, Venezuela, Honduras, Brazil, Paraguay and Ecuador; affecting 5 million people and causing over 1 000 deaths. This period has also been marked by droughts in Argentina, Uruguay, Honduras and Brazil, which are heavily reliant on agriculture. The droughts experienced in South America since 2019 are some of the worst in recent decades in terms of both extent and duration. Over the same period, tropical cyclones have hit several Central American and Caribbean countries, including Costa Rica, Guatemala, Belize and Honduras, impacting 5.8 million people (Centre for Research on the Epidemiology of Disasters, 2021).

Over the past two decades, the countries in the region have experienced as many as 1 350 natural disasters attributable to the climate, affecting more than 170 million people and causing almost 30 000 deaths. The economic damage associated with these events is estimated at over $170 billion.[1] Moreover, extreme weather events in the region are associated with an increase in the fiscal deficit of 0.8-1.1% of gross domestic product (GDP) (Delgado et al., 2021) and have various broader implications for economic and political stability.[2] Looking back further, natural disasters have tripled in frequency since the 1970s, while their costs have risen from $7.4 billion to more than $100 billion in the 2010s (Cavallo et al., 2020; Galindo et al., 2022).

Caribbean small island states are, in particular, disproportionately hard hit by extreme weather events, which are becoming both more frequent and more damaging. Of the ten countries worldwide that suffered the largest average losses per unit of GDP (in %) between 2000 and 2019, seven are Caribbean countries: Dominica (placing first), Grenada (third), The Bahamas (fourth), Puerto Rico (fifth), Antigua and Barbuda (seventh), Belize (eighth) and Haiti (tenth). Dominica, Haiti, Grenada and The Bahamas are also among the top ten countries in the world by average fatalities per 100 000 inhabitants (Germanwatch, 2021). There is no shortage of extreme weather events to list in recent years in the Caribbean, but hurricanes have historically been the natural disasters with the highest estimated economic losses. Hurricane Ian in September 2022 caused approximately $100 billion in damage (Statista, 2022).[3] The 2017 Atlantic hurricane season is considered to have been the third most destructive on record, with 17 named storms, ten hurricanes and six major hurricanes. Two of them, Hurricane Maria (total losses estimated at $69 billion) and Hurricane Irma, were both Category 5 events, the most intense on the scale (Statista, 2022). Tropical Cyclone Eta in 2020 was also particularly damaging.

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1 Despite usefully providing an estimated dimension of the different climate phenomena, such data — derived from the Emergency Events Database (EM-DAT) — are largely underestimated (Centre for Research on the Epidemiology of Disasters, 2021; Jones et al., 2022) due to the underrepresentation of some climate events. This pertains in particular to information on monetary damages, and especially for lower-income countries. Moreover, these estimates are related only to first-round direct impacts, without taking into account possible second-round effects.

2 Exposure to physical climate risk can have negative implications for sovereign debt (Zenios, 2022), the cost of debt (Cevik, Tovar Jalles, 2020; Mallucci, 2020; Kling et al., 2018; Buhr et al., 2018), sovereign ratings (Standard & Poor's, 2015; Klusakab et al., 2021; Revoltella et al., 2022), fiscal sustainability (Agarwala et al., 2021), financial stability (Liu et al., 2021; Bolton et al., 2020), international trade and even political stability (Moody's Investors Service , 2016; Fitch, 2022; Volz et al., 2020). The potential impact is more evident for some small countries and those with lower capacity to bear climate change costs (Mejia, 2016; Nordhaus, 2010), but even more advanced countries are not immune to debt sustainability concerns related to climate events (Gagliardi et al., 2022).

3 This estimate includes damage in part of the Southeast United States (Florida and the Carolinas).

The damage caused by extreme and acute events represents only part of the impact of climate change in Latin America and the Caribbean. The costs related to chronic risk, connected with the gradual impact of global warming, are also relevant here. We estimate that chronic risk represents between one-third and 80% of the total physical impacts of climate change in the region, depending on the country. Caribbean countries, for example, are more exposed to acute risks, while hot Latin American countries are more affected by chronic risks. Last, but certainly not least, climate risk is also related to transition risk, which stems from policies aimed at achieving a lower-carbon economy (e.g. phasing out local coal industries).

In this paper, we start by analysing climate risks in Latin America and the Caribbean following the methodology developed by Ferrazzi et al.[4] We then expand the analysis to understand what these risks imply for the financial sector. We focus on banks, as they represent the bulk of financial intermediation in the region. The banking sector is directly affected by country-level climate risks (physical and transition risk), but the magnitude of these risks is also affected by their exposure to different economic sectors. A bank in a country with low climate risk might be highly exposed if its loan portfolio is mostly directed to high-risk sectors. Similarly, climate risk in a bank in a high-risk country might be relatively well mitigated if its exposure is concentrated in lower-risk sectors.

Are banks in Latin America and the Caribbean capable of mobilising much-needed resources for the green transition? Are they well positioned to respond to climate risks while preserving financial sector stability and providing access to finance for private sector enterprises? These are some of the questions that we try to answer in this work.

We conclude by analysing how climate-related flows to Latin America and the Caribbean compare with other regions, and the role that multilateral development banks and international financial institutions can play in filling gaps, fostering resilience and greening the financial sector. Throughout the analysis, the broader region is split into three sub-regions: Central America, South America and the Caribbean.[5]

Climate risks in Latin America and the Caribbean: A growing challenge

To assess climate risk at country level, the European Investment Bank has developed a methodology to map both physical and transition risks at country level. These risks are reflected in the EIB climate risk country scores (Ferrazzi et al., 2021) and the detailed results for Latin America and the Caribbean are shown in Appendix 1. To build the physical risk component of our climate risk assessment, we estimate the impact of climate events in gross domestic product terms (in other words, in terms of a percentage of the size of each economy) for a short-to-medium time horizon (five to ten years). The total physical risk — both acute and chronic — is given by the sum of the damage deriving from natural disasters ("acute" events such as storms, floods, droughts, etc.), production losses in agriculture (Chen et al., 2015; FAO, 2017; Feyen et al., 2019; Moody's Investors Service, 2019), the impact of sea level rise (for countries and cities exposed to the sea; Diaz, 2016), the impact on infrastructure (World Bank, 2016), the impact of heat on labour productivity (labour productivity is seriously affected when temperatures are high; Woetzel et al., 2020) and the effects of water scarcity (water is a relevant component for both agricultural production and industry; World Bank, 2016).

4 Ferrazzi et al. (2021) developed climate risk country scores — a sort of climate rating at country level — for physical and transition risk for over 180 countries, taking into account their adaptation and mitigation capacity. See Appendix 1 for the methodology.

5 Central America: Costa Rica, Guatemala, Honduras, Mexico, Nicaragua and Panama. South America: Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Paraguay, Peru and Uruguay. Latin America includes both Central and South America. The Caribbean (excludes overseas territories): Antigua and Barbuda, The Bahamas, Belize, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago.

Physical risk

According to the EIB climate risk country scores for physical risk, sub-Saharan Africa, the Middle East and North Africa, the Caribbean, and Pacific Island states are the most exposed to climate change worldwide. These areas, considering both acute and chronic physical risk[6], are between 2.5 and 3 times more affected than the world average, despite contributing less than 5% of global CO_2 emissions.[7] Europe and the Commonwealth of Independent States, despite being heavily affected by climate change in absolute terms, appear to be relatively better protected.[8] Figure 1 gives an overview at the global level, comparing the countries of Latin America and the Caribbean to other areas of the world, and breaking down the total impact by each factor. Acute risk — related to the damage and natural hazards component (caused by storms, hurricanes, fires, droughts, floods, etc.) — is more relevant for small island states. Chronic risks — which have to do with gradual, long-term changes due to the climate, including the impact on agriculture, sea level rise, infrastructure, labour productivity and water scarcity — are more significant for Africa and the Middle East.

Caribbean countries appear to be among those most affected by the impacts of climate change worldwide, and are specifically the most affected in terms of damage deriving from acute risk (from storms and hurricanes, for instance). Despite accounting for just 0.2% of world GDP (and 0.4% of total CO_2 emissions, or 0.2% if calculated in cumulative terms), Caribbean countries account for 10 times more in terms of the monetary cost of damage stemming from the climate, and 20 times more in terms of the number of climate events. We also estimate that for almost all the countries in the Caribbean, the cost of damage and losses deriving from climate change exceeds 1% of GDP per year. During the last two decades, ten Caribbean countries (out of the 17 under analysis) have experienced an average yearly impact due to climate of more than 2% of GDP. The cumulative effects over many years can be very significant. Five Caribbean nations figure among the top 20 globally in terms of fatalities per capita, and eight are among the top 20 countries in terms of economic losses as a share of GDP during the last two decades (World Bank, 2022).

Central and South America are also significantly affected, in line with the world average. South American states are more exposed to the impacts of climate change on agriculture. In addition to the damage to physical infrastructure (agricultural machinery, irrigation systems, livestock shelters, etc.), farmers incur losses related to lower crop yields (Chen et al., 2015; FAO, 2017; Feyen et al., 2019; Moody's Investors Service, 2019). South American states such as Guyana, Bolivia, Paraguay and Ecuador have a high share of their economy devoted to agriculture (close to or exceeding 10% of GDP), and this share is non-negligible in the bigger states as well (between 5% and 10% of GDP in Brazil, Argentina and Colombia). While Central American countries suffer more damage deriving from acute risks (storms, floods, etc.), they are also exposed to agriculture — especially Nicaragua, Honduras and Guatemala (with agriculture representing 10% of GDP or more). The gradual change in climate is also placing infrastructure under higher strain (World Bank, 2016). This effect is highly relevant for Central and South America. Less relevant, according to the EIB climate risk country scores, is the impact on labour productivity in the five- to ten-year horizon, although it is expected to be very significant in the longer term. When temperatures exceed 29 to 30 degrees Celsius, the productivity of labour for outdoor activities is increasingly affected (Woetzel et al., 2020). Water scarcity is less relevant than the other sources of physical climate risk in Central and South America, as water is available in most places and does not represent a constraint on economic production.

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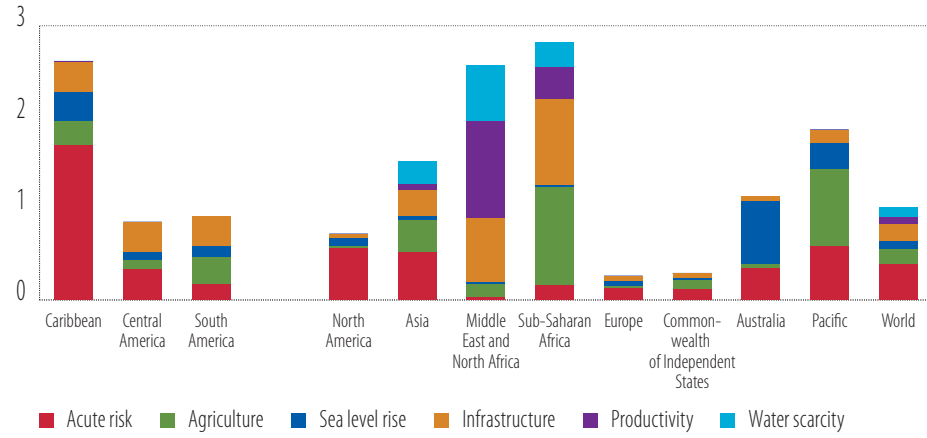
6 Physical risk can be acute, if deriving from extreme weather events and hazards: e.g. floods, landslides, extreme temperatures, storms and hurricanes, droughts or wildfires; or chronic, if related to a more gradual effect of global warming: e.g. gradual rise in sea level, lower crop yields or lower productivity due to higher temperatures. Transition risk is generated by the actions taken to move towards a lower-carbon economy, and stems from climate policies that can impact business. Transition risk can also derive from technological change, a shift in consumer preferences or litigation. See Appendix 1 for more details.

7 CO_2 emissions data show that Latin American countries contributed 4.7% of global CO_2 emissions in 2021 (0.4% for the Caribbean, 1.4% for Central America, 2.8% for South America) and 4.8% in cumulative terms (since 1970; 0.2% for the Caribbean, 1.5% for Central America, 3% for South America), according to EDGAR — the Emissions Database for Global Atmospheric Research managed by the Joint Research Centre of the European Commission (see Crippa et al., 2022).

8 Relative to the size of each economy (i.e. impact on the country's GDP), and relative to the other countries (ranked by the size of the economic impact of climate change). Thus, the assessment is not in absolute terms, but depends on the positions of other countries.

Figure 1

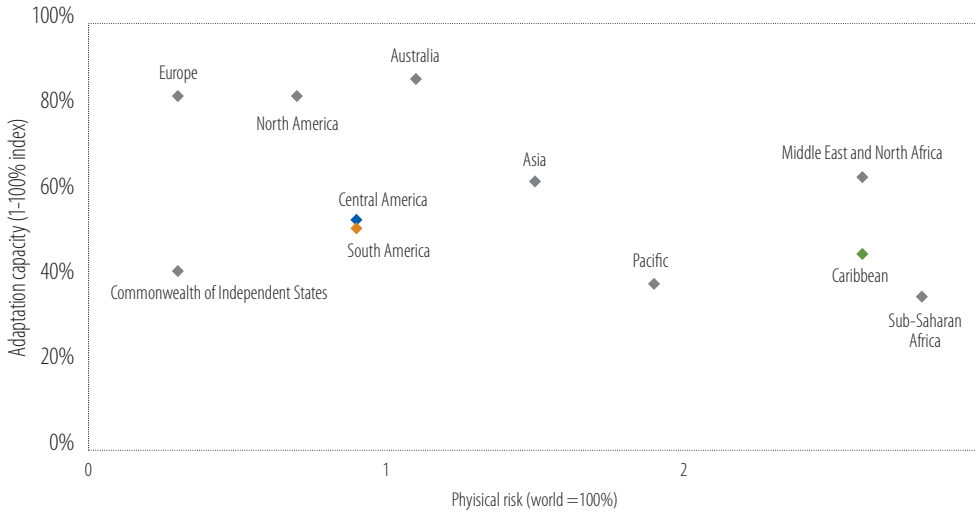
Economic impact of physical risk in the world, by component[9] (world average = 1)



Source: EIB climate risk country scores. Note: World average is calculated as weighted average (weighted by the economic dimension of a country, i.e. nominal GDP) and is by construction equal to 1.

Figure 2

Physical risk (before adaptation, X axis) and adaptation capacity (index, Y axis) in the world[9]



Source: EIB climate risk country scores. Adaptation capacity is an index that can go from 0% (low adaptation capacity) to 100% (high adaptation capacity). Physical risk is gauged as prior to adaptation, with world average set equal to 1 (as in the previous chart).

Not only are Caribbean, Pacific and sub-Saharan African countries subject to impacts from dramatic climate change, but they also have limited adaptation capacity.[10] Many of the countries most exposed to the direct physical impacts of climate change are also among those least able to invest in adaptation (bottom-right part of Figure 2). Hence, they face the double jeopardy of high exposure to physical risk and

9 In the charts and in the text in this section, the following country aggregation has been used. Caribbean: Anguilla, Antigua and Barbuda, Barbados, Aruba, Cayman Islands, Grenada, Haiti, Jamaica, Curaçao, Saint Kitts and Nevis, Dominican Republic, Dominica, Saint Vincent and the Grenadines, The Bahamas, Trinidad and Tobago, Virgin Islands (British), Saint Martin, Saint Lucia, Cuba, Puerto Rico. Central America: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Belize, Panama. South America: Argentina, Bolivia, Brazil, Chile, Guyana, Colombia, Ecuador, Paraguay, Peru, Suriname, Uruguay, Venezuela.

10 Adaptation capacity is the ability of a system to moderate any potential damage deriving from climate change or to cope with the consequences. Examples of adaptation investments: disaster preparedness, large-scale coastal protection or stormwater management infrastructure, protection from rivers and floods, water storage, reinforcing and renovating buildings, etc. Mitigation capacity refers to actions to reduce greenhouse gas emissions (produce energy in a greener way, etc.). In short, mitigation attends to the causes of climate change, while adaptation addresses its impacts.

lower adaptation capacity (Feyen et al., 2019). High levels of public debt and weak domestic revenue sources hinder timely investment in adaptation. Some adaptation investments are largely public in nature and may be motivated by the need to avoid costs stemming from physical damage. Moreover, poor-quality housing and infrastructure amplify the human and economic impact of natural disasters. Europe, North America and Australia are less exposed to physical risks and have a greater capacity to invest in adaptation (top-right part of Figure 2). Central and South America have high exposure — similar to the world average — but do not have the same adaptation capacity as the richest countries, according to the EIB climate risk country scores.

Transition risk

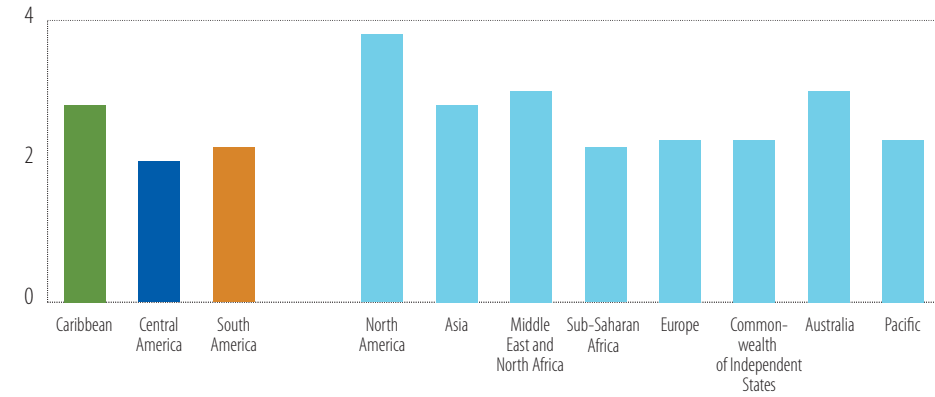
Latin American and Caribbean countries face significant transition risks, but they are relatively less exposed compared to other regions of the world. Transition risks stem from the changes to our systems needed to transition towards a lower-carbon economy. They can be triggered by climate policies and affect businesses through, for instance, higher energy costs from carbon taxation or emissions cap schemes, or reduction in the market value of stranded emissions-intensive assets (Bos and Gupta, 2019). In this sense, some sectors of the economy, like those exposed to fossil fuels and those with higher emissions, may face big shifts in asset values or higher costs of doing business. The EIB's transition risk scores for countries are based on five main building blocks: (1) the level of emissions, (2) the exposure of the economy to fossil fuels; and the level of mitigation, which is built on (3) energy efficiency; (4) the deployment of renewable energy and (5) country preparedness (for more details on the methodology, see Appendix 1). The EIB transition risk country scores paint a rather different picture from the physical risk scores. It is the high-income countries — which consume a large share of the world's resources, generate significant emissions, and are most responsible for global warming — that generally face higher risks from the transition to a low-carbon world economy.

North America and Europe appear to be the most exposed to transition risk, but Caribbean countries also face high transition risk, according to the EIB climate risk country scores. As shown by Figure 3, Central America and South America have lower scores (i.e. lower transition risk) due to their lower emissions (compared to other countries) and relatively good mitigation (especially renewable energy).

One-third of the transition risk in Latin America and the Caribbean comes from the need to reduce greenhouse gas emissions, according to the EIB climate risk country scores. This is slightly less than in other parts of the world, as wealthier countries tend to be more exposed (see Figure 3). Another 25% stems from the need to deploy renewable energy (hydro, solar, wind, etc.) at sufficient scale. Several Latin American and Caribbean countries are fossil fuel exporters: Trinidad and Tobago, Suriname and Ecuador are the most dependent on fossil fuels (in terms of fossil fuel rents as a percentage of GDP, for instance), but Mexico, Argentina, Brazil, Bolivia, Colombia, Peru, Venezuela and Suriname are also reliant on revenues from fossil fuels. Governments across the region subsidised fossil fuel consumption by an estimated $115 billion in 2020. Taking into account explicit and implicit subsidies, subsidy amounts reached around 5-6% of GDP in 2020 (Parry et al., 2021). Not only are subsidies costly for governments, but they also create a perverse incentive to overconsume fossil fuel and underinvest in renewable energy. Tourism-dependent Caribbean islands may be exposed to a different source of transition risk in the medium-to-long run: the reduced appetite for/feasibility of carbon-intensive long-haul flights and distant travels may hit remote destinations in particular.[11]

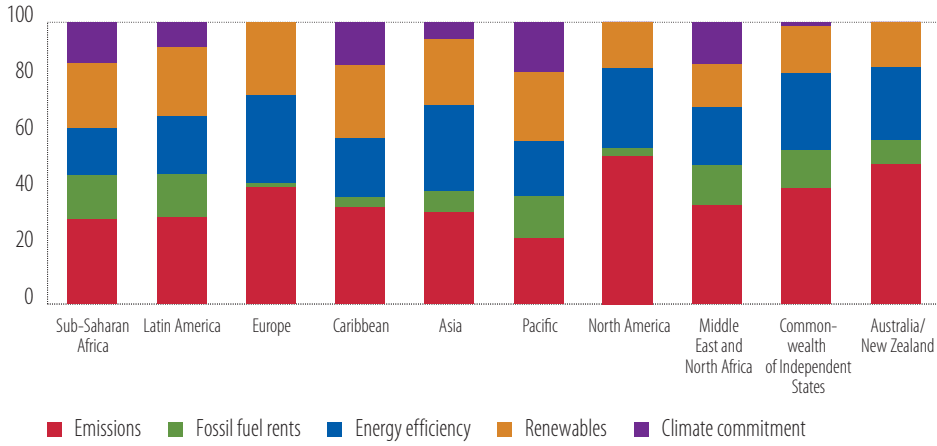
11 International tourism receipts reach 70% of total exports in some Caribbean countries, while they represent 3% and 5.5% on average in Central and South America, respectively.

Figure 3
Transition risk in the world[9]



Source: EIB climate risk country scores. Note: 1 = low transition risk, 5 = high transition risk.

Figure 4
Contribution of the main components to the overall transition risk score (% on total)



Source: EIB climate risk country scores.
Note: The scores are weighted by the countries' GDPs.

Banking sectors: Are they well placed to cope with climate risks and finance the green transition?

The economies of Latin America and the Caribbean are facing a complex juncture. In 2023 and 2024, the main risks stem from adverse terms of trade effects for oil and commodity exporters, higher inflation, tightening financing conditions and the sizeable risk of a global economic recession (and particularly in the United States, the region's main trading partner). After the strong post-pandemic rebound, when GDP growth reached 7.2% in 2021, the Russian war in Ukraine has hit the region with shocks to inflation and economic growth. The International Monetary Fund (IMF, 2023a) estimates that the region's growth is set to decline from 3.9% in 2022 to 1.7% in 2023 — versus a global average of 3.4% in 2022 and 2.3% in 2023, and lower than the average for emerging and developing economies (Figure 5). A modest rebound to 3.0% is expected in 2024 as financial conditions ease, although prices of exported commodities are already sinking and growth in global trading partners is expected to weaken.

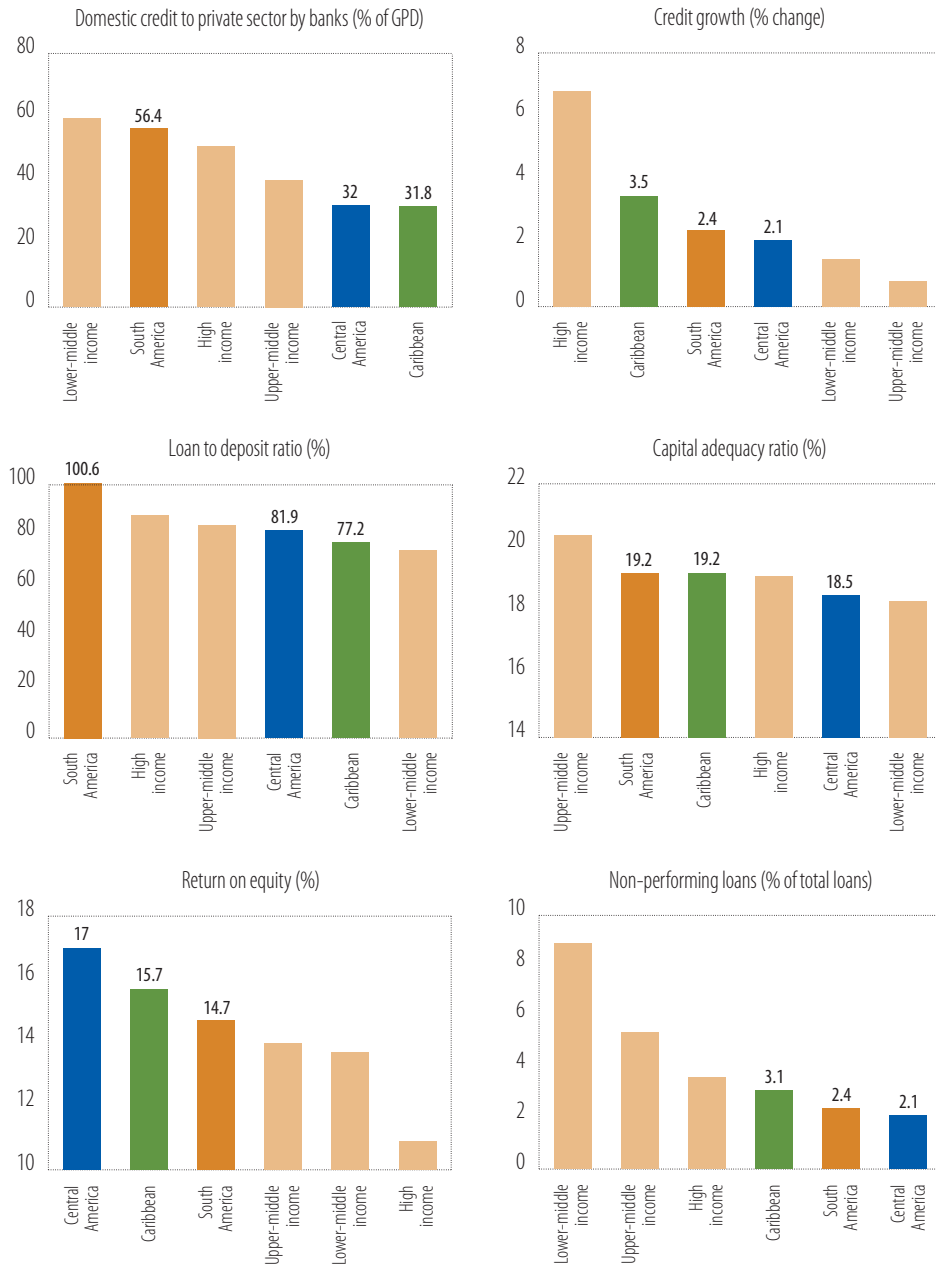
Figure 5
Real GDP growth (%)

Source: *IMF World Economic Outlook April 2023.*
Note: *These are GDP (2022) weighted averages per region. For the countries considered in each region, see footnote 3.*

Against the backdrop of multiple economic shocks, financial sectors have remained remarkably sound and profitable, but there are notable differences across countries and financial depth remains low compared to income peers (Figure 6). Over the last decade, most countries in Latin America and the Caribbean have avoided major banking crisis. Policy support and loan forbearance during the pandemic helped avert deterioration in asset quality, and proactive macroprudential supervision kept capital ratios at healthy levels. Furthermore, despite the ongoing economic slowdown, higher interest rates are now also supporting bank profitability. Nevertheless, despite this relatively benign aggregate picture, there are significant differences across countries, and the soundness of banking sectors in most countries is being maintained at the cost of slower credit growth. Financial depth is substantially below the average for middle or high-income countries, limiting future growth and the investment sorely needed for climate transition. In the next sections, we analyse the banking sectors of the three sub-regions in greater detail.

Figure 6

Overview of banking sector fundamentals across each sub-region and relevant income level



Source: *IMF (2022), IMF (2023a), IMF (2023b), EIB banking industry risk model. Author's calculations.*

Note: *(1) Income averages were calculated by the simple average for each variable using the set of countries within each income level category included in the World Bank's income level classification, and for which data were available. Latin American and Caribbean countries are excluded from income averages. For the domestic bank credit to the private sector (% of GDP), a total of 56 countries were included across the three income levels; for credit growth, 39; for the loan to deposit ratio, 114; and for capital adequacy ratio, return on equity and non-performing loans, 88. (2) The credit growth variable is expressed in real terms, as it has been netted out of the inflation component by using consumer price index data.*

Central America

Central America is largely dominated by Mexico, whose GDP accounts for close to 80% of the region. On average, Central America has well-capitalised and profitable financial systems, with important differences between countries. As of December 2022, the average capital adequacy ratio for the region was around 19% of risk-weighted assets. Although a healthy average, this figure is heavily influenced by Mexico, where the capital adequacy ratio is almost identical, while the other countries in the region have lower ratios. The lowest levels are in El Salvador, Panama and Honduras (all below 15%). Looking ahead, despite potential pressures on bank capitalisation, capital ratios are expected to remain relatively stable across the region due to the macroprudential regulatory measures in place. The average return on equity in Central America stands at 17%, higher than the level registered for middle-income countries in general. However, this average masks significant differences across countries. Honduras' and Guatemala's banking sectors are more profitable (with a return on equity higher than 20%) and Nicaragua's and Costa Rica's are less profitable (10% or less). Asset quality remains sound, with non-performing loan (NPL) ratios below 3% across all countries. Credit growth in real terms averaged low, at 2.1% in 2022, less than the 9-5% registered by middle-income countries. The average credit to GDP ratio in Central America is still low, at 32% (the same as Mexico), significantly lower than the 40-60% registered by middle-income countries. Still, some countries register a higher credit penetration, such as Panama (80% of GDP) and Honduras (67%).

South America

Most countries in the region benefit from robust and well-capitalised financial systems, and the region's banking sector has so far proved resilient to recent shocks. As of December 2022, the average capital adequacy ratio for the region is around a healthy 19% of risk-weighted assets. The lowest levels are in Bolivia (12.9%) and Peru (14.5%). The highest levels are in Argentina (29.6%) and Colombia (18.9%). Looking ahead, despite potential pressures on bank capitalisation, capital ratios are expected to remain relatively stable across the region. This reflects the implementation and phase-in of Basel III capital standards in Chile, Colombia and Peru, along with the generally complete implementation of most of these standards by regulators in Argentina and Brazil. In a deteriorating growth environment, the banking sector is at risk of negative spillovers from losses among corporates and small and medium-sized businesses. This would only be partially balanced by improvements in banking regulation and supervisory frameworks. Asset quality could deteriorate if the macroeconomic backdrop worsens, which could lead to a rise in non-performing loans that would have negative effects on the profitability of banks in the region. NPL ratios tend to be low on average (2.5% of total banking assets) and range from a minimum of just 1.2% in Chile to 4.1% in Peru. Credit growth to the private sector remains low in the region, with an average of 2.4% in real terms in 2022 — lagging the region's real GDP growth by 2 percentage points and that of high-income countries by 4-5 percentage points. The average credit to GDP ratio in South America is still modest, at 56.4% as of 2022. However, this ranges from high levels in Chile, Bolivia and Brazil (83%, 76% and 71.8% of GDP, respectively) to low levels in Argentina and Uruguay (10.7% and 26% of GDP, respectively).

The Caribbean

Soundness indicators suggest resilience to external shocks, but asset quality is a source of concern in some countries. As of December 2022, the capital adequacy ratio for the region stood at a healthy 19% of risk-weighted assets. The lowest levels are in Jamaica (still a safe 14.3%) and Grenada (14.8%). The highest levels are in The Bahamas (28%), Saint Vincent and the Grenadines (23%) and Haiti (21.7%). Profitability is high, driven by the largest countries. Apart from Suriname, banks' return on equity is highest (21%) in the two largest countries, the Dominican Republic and Haiti, such that the GDP-weighted average return on equity is a robust 16% for the region. However, the simple, unweighted average is a much lower 6%, which reflects large negative values in Saint Kitts and Nevis and in Dominica (-33% and -14%, respectively), and more modest values (between 2.9% and 4.4%) in other smaller countries like

Belize, Guyana, and Saint Vincent and the Grenadines. Asset quality also varies widely across countries, and non-performing loans range from a mere 1% in the Dominican Republic to 22% in Saint Kitts and Nevis. They tend to be on the high side in other countries that share the Eastern Caribbean Currency Unit (ECCU), like Dominica and Saint Lucia (both 14%). When GDP-weighted, the average NPL ratio in the region is just 3%, while the unweighted average increases to 8%.

There remains a great deal of heterogeneity in terms of banking systems, but on average financial depth in the region is low. Domestic credit to the private sector in 2022 ranged from 8% in poverty-ridden Haiti to 84% in Barbados and, although the majority of countries surpass upper-middle income peers, only a few are above high-income peers. In particular, the Dominican Republic, despite being the most diverse and dynamic economy in the region, scores fourth lowest in the region, with a modest 27%. Credit growth remained negative in Haiti as well as in most of the small countries, as these are still trying to recover from the recent pandemic and the current high inflationary environment. Suriname is a special case, as the country is trying to recover from a deep crisis that began in 2016 and led to a sovereign default during the pandemic.

Banking sector exposure to climate risk in Latin America and the Caribbean

Methodology

The approach we use to assess climate risks in the banking sector rests on two pillars: (1) each bank's vulnerability to climate risks via their portfolio exposure to various sectors of the economy, and (2) the climate risks of the country where the bank is operating. By doing so, we aim to gain a better understanding of the magnitude of the climate challenge for banks in the region and their capacity to preserve financial stability. Moving forward, financial sectors will need to become more resilient to the impacts of climate change, whether by diversifying their portfolios or by ensuring provisions against sudden events that could affect their asset quality. This in turn will ensure macroeconomic stability and adequate access to finance for private sector investment. Throughout the analysis, we distinguish between physical and transition risks.

Following the methodology developed in the forthcoming EIB Finance in Africa 2023[12], as a first step we look at banks' lending portfolios, which are underpinned by three components:

1. **Lending to non-financial corporations (NFCs) by sector of activity.** We break down banks' lending exposure to eight sub-sectors of economic activity. Under the scope of this analysis we considered, whenever available, the following sub-sectors: (1) agriculture; (2) mining; (3) tourism; (4) manufacturing and industry; (5) trade; (6) services; (7) real estate and construction; (8) other.[13]
2. **Lending to households.** As a second step, we add data on lending to households — which can encompass anything from consumption to credit cards or mortgages (depending on the country's definition).
3. **Sovereign exposures.** We consider banks' sovereign debt holdings by country.

An important departure from the methodology developed in Finance in Africa (2023) is the specific focus on tourism, which is relevant for our sample of countries, and particularly those in the Caribbean. There, the tourism sector makes an important contribution to both GDP and overall employment, which is reflected in Table 1.

12 This is a first attempt at understanding to what extent and via which channels the banking sector is exposed to physical and transition climate risks. The methodology employed is a work in progress, and this preliminary version may be enhanced in future works published by the EIB.

13 For example: Agriculture includes fishing and forestry; mining includes quarrying; services include information and communications, arts and performances, teaching, and healthcare, among others; other includes transport, deposit and storage, and utilities, among others.

Table 1
Share of employment in tourism, as percentage of total employment, 2022

Country	Share	Country	Share
Antigua and Barbuda	91	Belize	40
Saint Lucia	70	Jamaica	27
Saint Kitts and Nevis	60	Aruba	25
Grenada	53	Dominican Republic	17
The Bahamas	47	Trinidad and Tobago	9
Saint Vincent and the Grenadines	41		

Source: *World Tourism and Travel Council's 2023 Annual Research: Key Highlights.*
Note: *Only the Caribbean countries which are part of the below analysis are included in the table.*

On average across the countries in our sample, banks have 44% of their exposure to the corporate sector, 28% to the household sector and 28% to the sovereign, with significant distinctions across countries — as will be shown in greater detail.

Table 2
Climate risk levels for the NFC loan book by sector of activity and by risk type

	Agriculture	Mining	Tourism	Manufacturing and industry	Trade	Services	Real estate and construction	Other
Physical	High	High	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Transition	Medium-Low	High	High	Medium-High	Medium-Low	Medium-Low	Medium-High	Medium-High

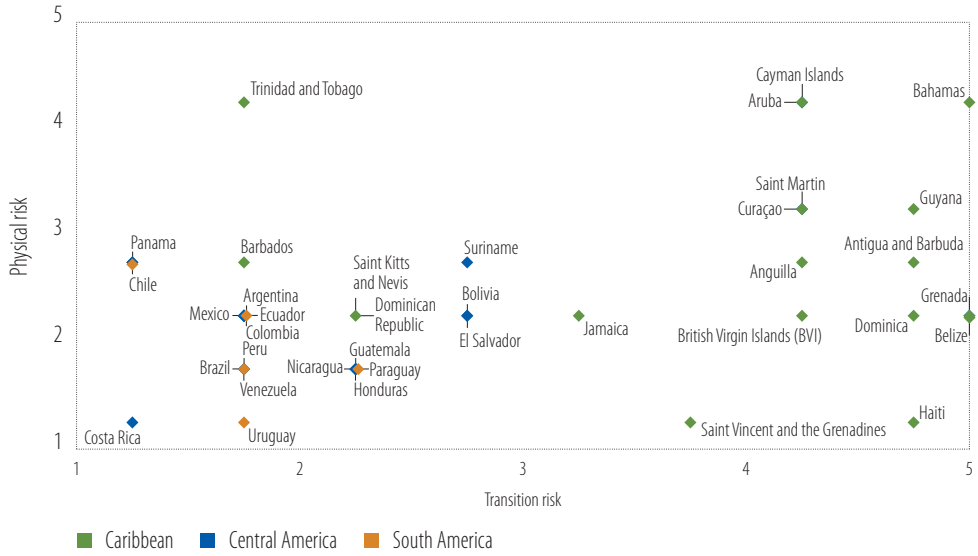
Source: *European Investment Bank.*

As a second step, each sector of economic activity is assigned a level of climate risk for both physical and transition risk. To move forward with a cross-sectoral and cross-country analysis, at this stage, an aggregation exercise had to be done to match the internal sectoral risk scores with the broader sectoral aggregation of non-financial corporations on their lending exposure datasets. For the most part, there is a large overlap between the two, but in some cases judgement was exercised in matching them. Ultimately, each sector is attributed a qualitative risk level, presented in Table 2, by applying a reasonable threshold.[14] Physical risk is deemed to be highest in the agriculture and mining sectors, while for transition risk there is an overlap with the mining sector, and tourism joins the list. The sovereign and household exposures are assigned their respective country climate risk scores (Figure 7).[15] The reasons for this are that, on one hand, the sovereign component has both direct and indirect exposure to the whole economy, and on the other hand, households are such a broad category that they mirror the country-level risk.

14 Overall, the quantitative scores range from 1-5. The qualitative scores may be: Low (very light green, not pictured in Table 2 and corresponding to scores < 1.5), Medium-Low (green, corresponding to scores > 1.5 and < 2.5), Medium-High (orange, corresponding to scores > 2.5 and < 3.5) and High (red, corresponding to scores > 3.5).

15 Appendix 1 provides a detailed overview of EIB climate risk scores at country level, for both climate and transition risk, including a brief explanation of the methodology.

Figure 7
EIB climate risk country scores



Source: *European Investment Bank.*

As a third step, exposures to the sovereign, households and non-financial corporations are weighted by their respective physical and transition risk scores. To be concrete, the aggregate banking climate risk (BCR) score is calculated separately for physical and transition risk as:

$$BCR_i = NFC_i w_{NFC} + S_i w_H + S_i w_S,$$

where NFC_i is the EIB non-financial corporation climate risk score for sector of economic activity i, S_i is the EIB climate risk score for country i, w_{NFC} is the weight of the banking sector's exposure to non-financial corporations, w_H is the weight of the banking sector's exposure to households and w_S is the weight of the banking sector's exposure to the sovereign. The three weights (non-financial corporation, household and sovereign exposure) are calculated by adding up the total loans or bonds extended by the banking system to each sector in local currency terms. The weights are the relative shares of the three exposures. This way, the weights add up to 100. Note that the weights are not the share of total assets, as the total assets of the banking sector are larger than the assets considered here.

Finally, after computing the aggregate banking sector climate risk scores, we take the country dimension into account by notching them up or down based on each country's level of physical or transition risk. For instance, the exposure of Luxembourg's agricultural sector to physical climate risks is entirely different to that of Haiti. Therefore, if a country is classified as having high physical risk according to the EIB climate risk scores, the sectoral physical risk scores are notched up (meaning higher risk), and vice-versa. Table 3 quantifies the magnitude of this notching exercise. Depending on the country's EIB climate risk scores (which range from 1 to 5), a corporate score can be notched up (or down) by as much as 1 (-1) — applying the full magnitude of adjustment if the country has the highest (lowest) possible risk score. With 27 countries in the present sample, this results in 54 industrial notchings (one each for physical and transition). Of these, only one has a magnitude of adjustment greater than ±0.75; the average notching is -0.1, for both physical and transition risk. This is mostly driven by South and Central American countries, which dominate the sample and belong to the lower part of the EIB climate risk scale. The final scores are on a ten-point scale between 1 and 5 where scores < 1.5 are labelled "Low", scores > 1.5 and < 2.5 are "Medium-Low", scores > 2.5 and < 3.5 are "Medium-High", and scores > 3.5 are "High".

Table 3
EIB climate risk country score and corporate score adjustments

Country Score	Adjustment	Country Score	Adjustment
1	-1.00	3.25	0.00
1.25	-0.75	3.75	0.25
1.75	-0.50	4.25	0.50
2.25	-0.25	4.75	0.75
2.75	0.00	5	1.00

Source: European Investment Bank.

Results

This section presents the results of the calculations of the EIB aggregate banking climate risk scores, looking into the dimensions of physical and transition risk separately. The scope of analysis includes a total of 27 countries: six from Central America, nine from South America and 12 from the Caribbean. These reflect the countries for which two important data points were readily available: data on lending exposures at an adequate level of aggregation from national central banks or regulatory bodies, and data on sovereign debt holdings by the banking sector from the International Monetary Fund's Monetary and Financial Statistics database.[16] Note that end-2022 data are used for the large majority of countries.

Sector exposures differ significantly across countries, although generally the main channel through which banks are exposed to physical and transition risk is non-financial corporations. Table 4 below shows the share of bank exposures to different sectors as a share of the total loan book. The table considers the three main sectors toward which the banking sector has exposures — non-financial corporations, households and sovereign debt. As mentioned before, non-financial corporations are split into eight further granular sectors of economic activity which, if added together, show the relative exposure of the banking sector to non-financial corporations as a whole.

Focusing solely on the loan book for non-financial corporations, Paraguay and Belize stand out as having the largest exposures to high-risk sectors, albeit from different sources.[17] Paraguay is the country with the largest exposure to overall sectoral risk (80% of total exposure), and its aggregate exposure to high-risk sectors is also the highest (29% of total exposure), with agriculture being the clear driver. Similarly, the runner-up, Belize, is a country where tourism contributes 30% of GDP, and thus the banking sector's loan book has one of the highest tourism exposures, with 11% of all lending activity being directed there.

Beyond these top two, for a further seven countries, combined exposures to high-risk sectors of economic activity are at least 9% of total relevant exposures, and highlight regional disparities. On one hand, in Latin America, Argentina, Bolivia, Ecuador, Uruguay and Honduras stand out for their exposure to agriculture which is, in aggregate, the most relevant component among lending to high-risk sectors, highlighting the prominence of physical risk in the region. Indeed, agriculture is widespread, and some countries are among the leading exporters of products like soy and maize (Argentina, Bolivia and Paraguay), sugar cane (Paraguay), coffee and palm oil (Honduras), beef and other cattle (Argentina) and fruits and vegetables, as well as products that later feed into other industries (including medium-risk sectors like manufacturing), such as cotton. On the other hand, for the remaining Caribbean countries, those with the highest exposure to high-risk sectors of economic activity are Grenada and Saint Kitts and Nevis — at 16% and 9% of all banking exposures, respectively — with lending to tourism being particularly important, in line with the country's and the wider region's economic concentration in that sector.

16 For Brazil, Paraguay, Peru and Uruguay, data were exceptionally sourced from S&P's Connect Banking dataset. Notably, no data on lending to the tourism sector are available for these countries, causing bias in the analysis.

17 As a reminder, overall they include agriculture (physical), mining (physical and transition) and tourism (transition).

Finally, it is important to note that exposure to extractive industries is fairly underrepresented in banks' loan books across Latin America and the Caribbean. Mining is the only sector of economic activity within non-financial corporations where risk is classed as High for both physical and transition risk. Still, despite several countries being heavily dependent on this sector, particularly via exports — such as Brazil (iron ore), Bolivia (silver, lead and zinc), Chile (minerals and petroleum), Argentina (lithium), Mexico (oil) or Peru (coal) — this is not reflected in a higher exposure to this sector via banks' direct lending. One reason for this could be that, in cases like Mexico, the sector is dominated by state-owned enterprises, which borrow under state guarantees directly from the treasury. In other cases, like in Brazil or Chile, the companies that operate in this sector borrow directly from foreign banks or issue debt in international markets. This implies that part of the exposure may be comprised in the sovereign exposure rather than in the sectoral one or may not even appear on domestic banks' balance sheets at all.

Risks stemming from household and sovereign exposures are in some cases also non-negligible, but there are significant differences across countries. Household exposures are largest in the Caribbean, with shares ranging from 7% in Guyana all the way up to 67% in Saint Vincent and the Grenadines. This contrasts with an average exposure to households of 24% in Latin American countries. Turning to sovereign exposures, by contrast, Nicaragua, Guyana and Argentina have the largest among the sample, ranging between 51% and 95%.

Results concerning the concentration of lending to high-risk sectors on banks' balance sheets are, on average, comparable to other regions in the world. The forthcoming Finance in Africa 2023 report shows that, on average, African countries have 6% of their loan book in high-risk sectors[18], against an average of 7% in Latin America and 8% in the Caribbean. Still, as was shown in the section above, financial sector depth is low, especially in the Caribbean, which is the sub-region most exposed to climate risk.

Another noticeable difference to sub-Saharan Africa is the non-negligible contribution of lending to extractive industries, and therefore direct exposure to physical and transition risk. As seen above, however, this is less so the case for Latin America and the Caribbean, where agriculture and tourism are the main drivers, respectively.

18 Note that in Finance in Africa 2023 the tourism sector is not considered separately, and is likely included under the service sector, which would underestimate the share of lending in high-risk sectors.

Table 4

Share of banks' balance sheet exposure by sector of economic activity and respective risk category, % of total loans, 2022

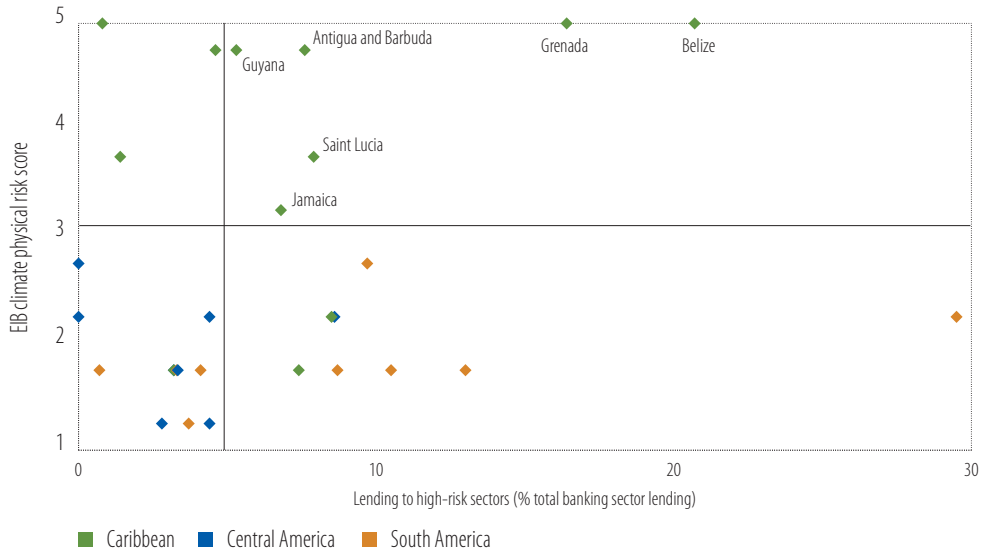
	Agriculture	Mining	Tourism	Manufacturing and industry	Trade	Services	Other	Real estate and construction	Corporate	Household	Sovereign	Banking sector's level of exposure to	
Country												**Physical risk**	**Transition risk**
Costa Rica	2%	0%	2%	3%	8%	12%	3%	27%	57%	26%	17%	Low	Low
Guatemala	4%	0%	1%	13%	9%	0%	15%	8%	50%	4%	46%	Medium-Low	Medium-Low
Honduras	5%	1%	3%	15%	12%	0%	15%	11%	62%	3%	34%	Medium-Low	Medium-Low
Mexico	1%	0%	2%	7%	5%	5%	2%	9%	31%	24%	44%	Medium-Low	Medium-Low
Nicaragua	0%	0%	0%	0%	3%	0%	0%	1%	4%	1%	95%	Medium-Low	Medium-Low
Panama	3%	0%	0%	6%	21%	3%	0%	9%	42%	51%	7%	Low	Medium-High
Central America	***2%***	***0%***	***1%***	***7%***	***10%***	***3%***	***6%***	***11%***	***41%***	***18%***	***41%***	***Medium-Low***	***Medium-Low***
Argentina	6%	1%	3%	8%	6%	4%	3%	1%	32%	16%	51%	Medium-Low	Medium-Low
Bolivia	8%	0%	1%	14%	11%	5%	3%	31%	73%	26%	1%	Medium-High	Medium-Low
Brazil	0%	0%	0%	5%	6%	7%	0%	1%	20%	32%	48%	Medium-Low	Medium-Low
Colombia	2%	0%	1%	8%	8%	5%	7%	10%	41%	47%	12%	Medium-Low	Medium-Low
Chile	3%	1%	0%	4%	7%	28%	4%	4%	50%	40%	10%	Low	Medium-Low
Ecuador	7%	1%	1%	12%	21%	7%	2%	5%	55%	0%	45%	Medium-Low	Medium-Low
Paraguay	29%	0%	0%	9%	18%	11%	9%	3%	80%	17%	4%	Medium-Low	Medium-Low
Peru	4%	0%	0%	14%	15%	17%	0%	8%	58%	34%	7%	Medium-Low	Medium-Low
Uruguay	13%	0%	0%	11%	12%	13%	3%	3%	54%	34%	12%	Medium-Low	Low
South America	***8%***	***0%***	***1%***	***9%***	***12%***	***11%***	***3%***	***7%***	***52%***	***27%***	***21%***	***Medium-Low***	***Medium-Low***
Antigua and Barbuda	0%	0%	8%	0%	8%	22%	4%	0%	42%	40%	18%	High	Medium-High
Bahamas	0%	0%	1%	0%	0%	1%	5%	4%	11%	56%	33%	High	High
Belize	10%	0%	11%	3%	0%	3%	11%	39%	76%	14%	10%	High	Medium-Low
Dominica	0%	1%	4%	1%	6%	20%	8%	0%	39%	31%	30%	High	Medium-Low
Dominican Republic	3%	0%	4%	6%	12%	2%	10%	23%	60%	23%	17%	Medium-Low	Medium-Low
Grenada	1%	0%	15%	2%	4%	10%	3%	0%	36%	60%	4%	High	Medium-Low
Guyana	4%	1%	1%	7%	0%	19%	2%	0%	33%	7%	59%	High	Medium-High
Jamaica	1%	0%	6%	3%	0%	9%	11%	3%	34%	46%	20%	Medium-High	Medium-Low
Saint Kitts and Nevis	0%	0%	8%	1%	5%	17%	4%	0%	35%	46%	18%	Medium-Low	Medium-Low
Saint Lucia	0%	0%	8%	2%	7%	16%	3%	0%	36%	52%	12%	Medium-High	Low
Saint Vincent and the Grenadines	0%	0%	1%	1%	6%	10%	1%	0%	19%	67%	14%	Medium-High	Low
Trinidad and Tobago	0%	1%	2%	18%	0%	24%	7%	12%	65%	11%	25%	Medium-Low	Medium-High
Caribbean	***2%***	***0%***	***6%***	***4%***	***4%***	***13%***	***6%***	***7%***	***41%***	***38%***	***22%***	***Medium-High***	***Medium-High***

Source: *National central banks or regulatory bodies, the IMF's Monetary and Financial Statistics database, EIB non-financial corporation sectors' risk scores, EIB climate risk scores.*

Note: *(1) Year-end 2022 data for the vast majority of countries. (2) The two columns to the right distinguish each country's aggregate banking sector exposure to physical or climate risk, calculated as described in the previous section. Hence, scores < 1.5 are labelled "Low" and coloured light green; scores > 1.5 and < 2.5 are "Medium-Low" and coloured light yellow; scores > 2.5 and < 3.5 are "Medium-High" and coloured light orange; and scores > 3.5 are "High" and coloured red.*

Countries with the highest shares of lending to high-risk sectors do not, for the most part, overlap with those with the highest levels of physical climate risk identified in the EIB scoring model (Figure 8). Banking sectors in the region seem to be diversifying their loan books away from the most exposed sectors as the vast majority of countries fall in the bottom quadrants (low physical risk) as well as in the top-left one (high physical risk, low portfolio exposure). By contrast, a few Caribbean countries are in a vulnerable position with a twofold concern: high physical risk and high lending to high-risk sectors by banks. Among them are Grenada and Belize, which have the highest possible score on the scale regarding physical risk, paired with high shares of private sector lending to high-risk sectors totalling 21% and 16%, respectively, which works as an aggravating factor.

Figure 8
EIB climate physical risk score vs. share of lending to high-risk sectors

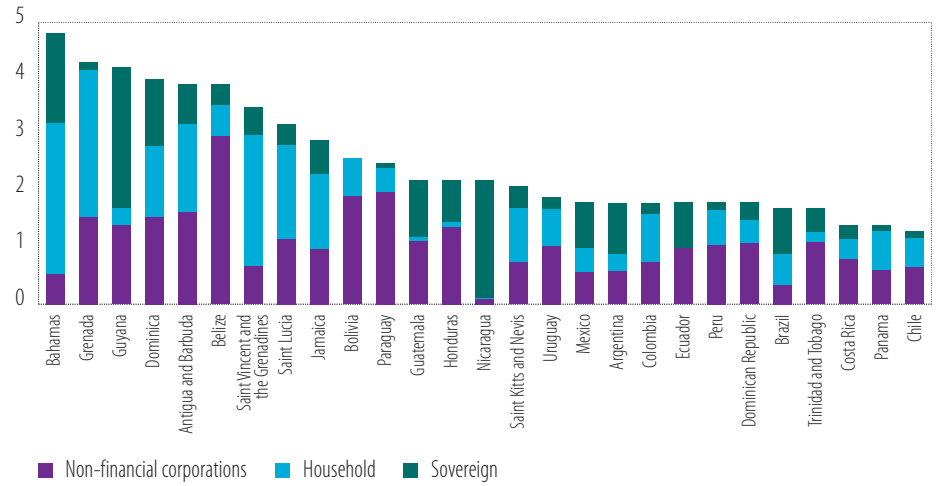


Source: *EIB. Author's calculations.*
Note: *The quadrants are marked by a vertical line, which is the median lending to high-risk sectors in the whole sample (4.9%); and by a horizontal line, which is the mean of the EIB physical risk scale.*

The aggregate physical climate risk of the banking sector is the highest in the Caribbean, particularly in The Bahamas, Grenada and Guyana (Figure 9). The average physical climate risk exposure for the Caribbean is 3.4, which technically still qualifies as Medium-High risk (with the High bracket starting at 3.5). Central and South America follow at a significant distance, scoring 1.9 each, which instead qualifies as Medium-Low risk. Another clear conclusion from the chart is that physical risk is considerably higher in the Caribbean (clustered on the left-hand side) than in Latin America.

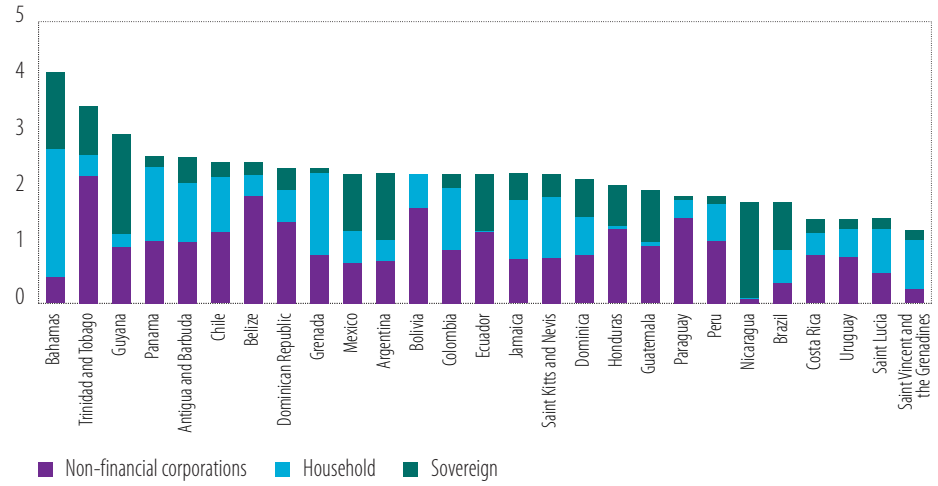
As for transition risk, the picture is more homogeneous (Figure 10). The average transition risk for the Caribbean is lower than for physical risk (2.5 for transition, instead of 3.4 for physical, mainly driven by acute risk) and is closely followed by Latin America, which scores 2.1 overall. The reasons for this pattern are twofold: First, EIB climate country risk scores in the region are more homogenous for transition risk; and second, some economies in Latin America are more exposed to economic sectors vulnerable to transition risk, such as mining.

Figure 9
Aggregate banking sector exposure to physical risk by sector



Source: *National central banks, EIB aggregate banking exposure scores, author's calculations.*

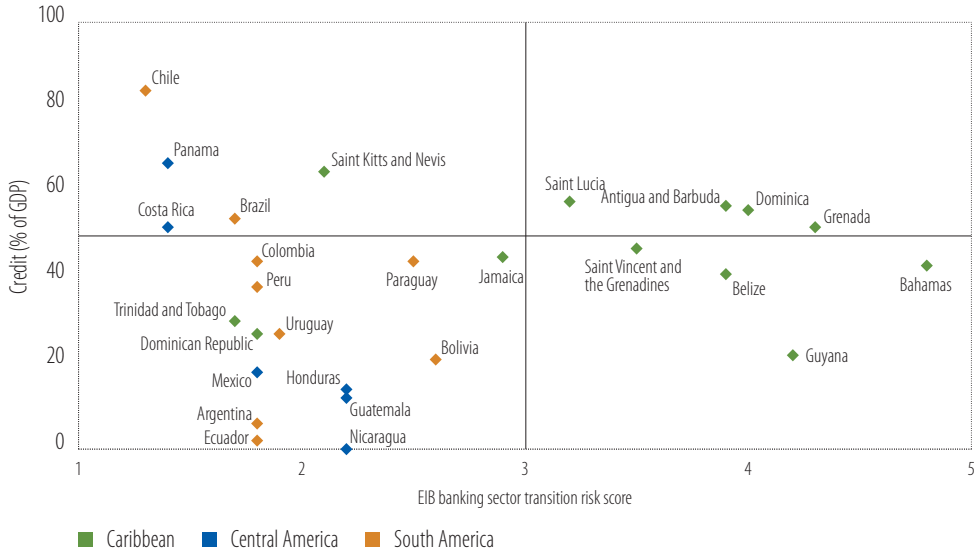
Figure 10
Aggregate banking sector exposure to transition risk by sector



Source: *National central banks, EIB aggregate banking exposure scores, author's calculations.*

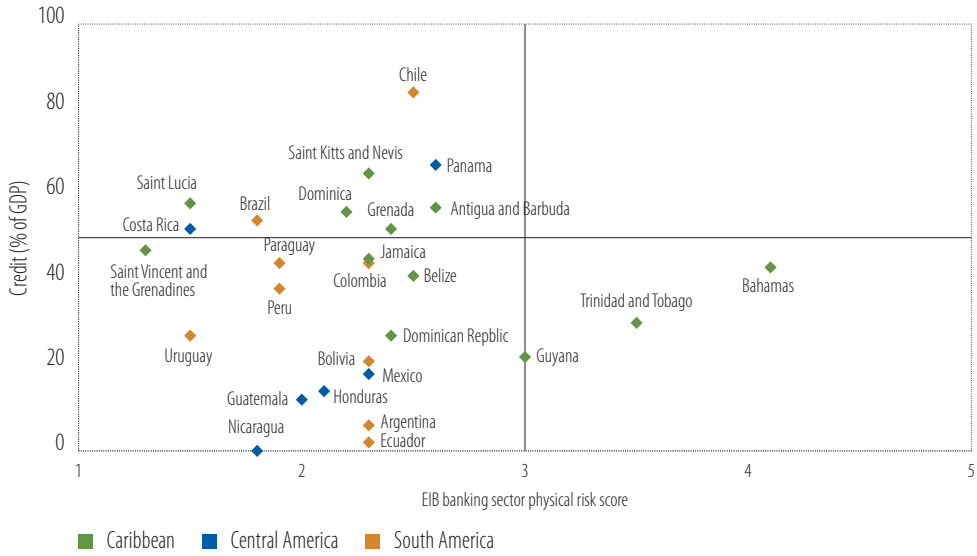
For a complete picture, the relative scale of banking sector credit exposures must also be considered. The analysis thus far has weighted climate risk based on the size of exposures, without reference to the overall size of the banking sector in each country. But when taking the overall size of the banking sector into account (Figures 11 and 12), the Caribbean countries turn out to be riskier; in particular, The Bahamas, Belize, Jamaica and Paraguay. At the other end of the spectrum, Argentina, Nicaragua, Honduras and Bolivia have both lower financial depth and lower aggregate exposure to physical risk.

Figure 11
Banking sector exposure to physical risk and total banking sector credit



Source: National central banks, EIB country and industry risk scores, author's calculations.

Figure 12
Banking sector exposure to transition risk and total banking sector credit



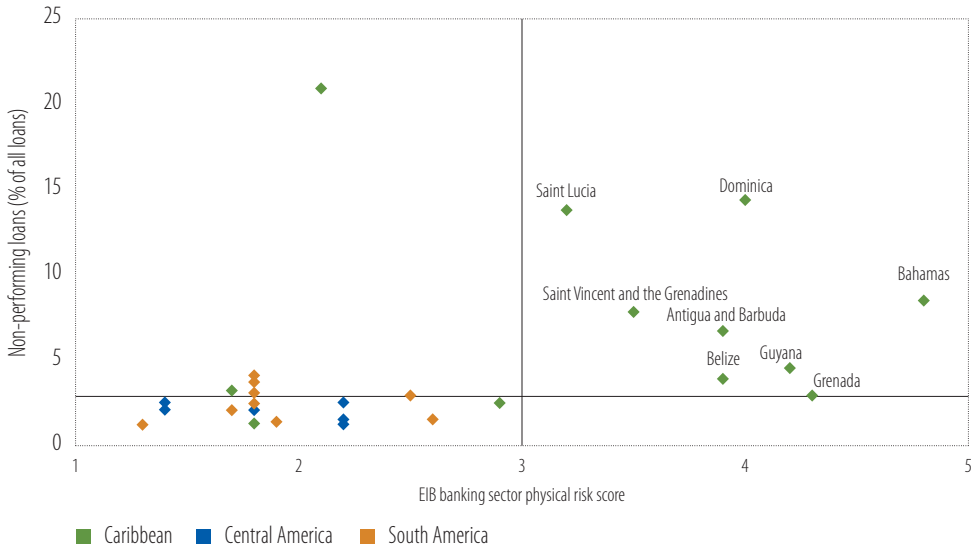
Source: National central banks, EIB country and industry risk scores, author's calculations.

Finally, it is also relevant to consider the current ability of banking sectors to cope with climate risks. In the previous section we assessed the soundness of banking sectors in greater detail, concluding that most financial sectors have remained remarkably sound and profitable, despite significant differences across countries. As highlighted in Figure 13, a few countries are in a delicate position, with both high risk and a high share of non-performing loans. Again, this double risk is far more prominent in the Caribbean

than in the other sub-regions, notably in The Bahamas, Saint Vincent and the Grenadines, Dominica, Saint Lucia, and Antigua and Barbuda. Most of the other countries, like other regions of the world, have a relatively low share of non-performing loans (less than 5% of total loans) thanks to policy measures taken during the pandemic. Still, this situation may change, as the global macroeconomic backdrop remains highly uncertain and the impact of monetary policy tightening has yet to be fully transmitted to the real economy.

Figure 13

Non-performing loans versus aggregate banking sector exposure to physical risk



Source: *National central banks, EIB country and industry risk scores, author's calculations.*
Note: *The quadrants are marked by a horizontal line, which is the median non-performing loan share in the whole sample (2.9%); and by a vertical line, which is the mean of the EIB physical risk scale.*

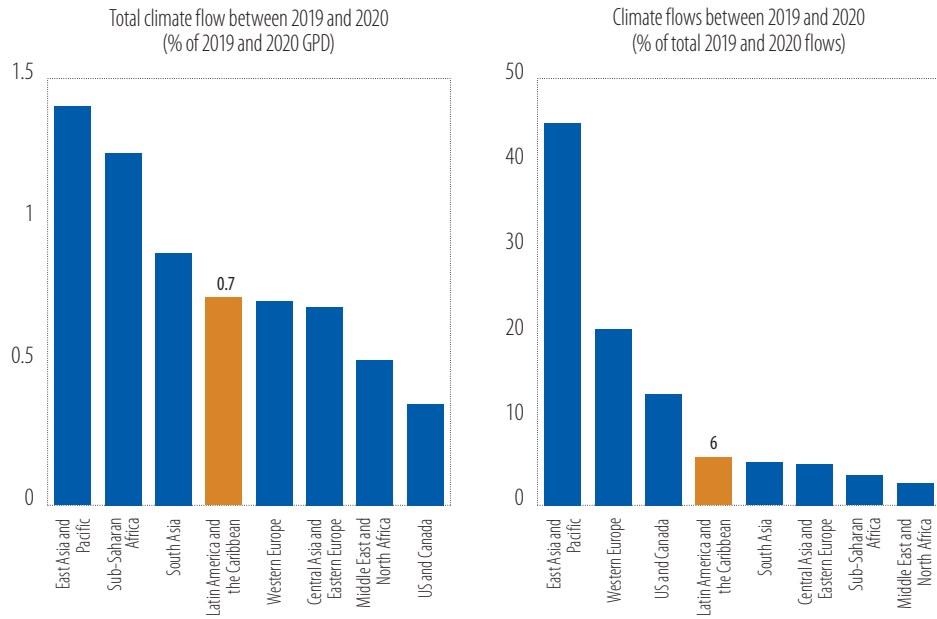
Climate risks and financing: The role of international financial institutions

Capital flows for climate projects in the Latin America and Caribbean region have been lagging other regions, particularly given the need to overcome physical risks in Caribbean countries (Figure 14). Against this backdrop, and given the risks faced by the banking sectors in these countries, international financial institutions and multilateral development banks have a major role to play. In recent years, there has been more capital flowing toward climate projects globally. The Climate Policy Initiative (CPI, 2022a) reports that in the ten years between 2011 and 2020, climate finance doubled to reach $653 billion globally on average across 2019/2020, based on an annual growth rate over the decade of around 7%. Initial estimates for 2021 from the Climate Policy Initiative indicate that total climate flows are in the region of $850-940 billion, representing a sharp increase in growth despite the impact of the pandemic.

At the global level, climate finance is dominated by mitigation financing, which accounts for about 90% of investment. Over the last decade, about 70% of this mitigation finance has gone toward renewable energy generation, although low-carbon transport is a significant growth area. There is also a relatively even split between public and private sources. However, the growth rate of public funding has been significantly higher over the past ten years, as its starting point was notably lower.

Latin America and the Caribbean countries receive a relatively small share of global climate finance — only around 6% of the total in 2019 and 2020 (Figure 1). Global climate flows are dominated by East Asia and the Pacific, ($563 billion, or 43% of total flows) due to the presence of China in the region, followed by Western Europe and North America (20% and 13%, respectively). By contrast, climate finance in the Middle East and North Africa totalled $32.6 billion over 2019/2020 (2% of the global total), while sub-Saharan Africa saw $43.8 billion of climate investment (3% of the global total). In addition, as a share of GDP, climate flows to Latin America and the Caribbean lag other developing economies in Asia and even sub-Saharan Africa.

Figure 14
Climate flows in the sub-regions



Source: Climate Policy Initiative, Global Landscape data; author's calculations.

As shown in this paper, the Caribbean is more exposed to climate risk than other parts of Latin America and the Caribbean, with banks' aggregate exposure for both physical and transition risk at Medium-High. In addition, the banking sectors in some Caribbean countries are also in a weaker position to finance the climate transition. Central and South America follow the Caribbean at a significant distance and are classified as Medium-Low for both physical and transition risk, with banking sectors also exhibiting more ability to cope with future losses. Nevertheless, this aggregate snapshot masks significant differences across countries. As the potential damage from climate change becomes more evident and the economic backdrop deteriorates, some of the less risky countries may migrate to the higher risk category, with a reduction in their capacity to finance climate transition.

Against the backdrop of considerable financing needs, the international financial community and public development banks have an important role to play in supporting both public and private green investments by providing long-term, patient funding at affordable rates and sharing part of the risks. By doing so, they spread the positive externalities stemming from climate change mitigation investments, generating societal benefits that are not necessarily internalised in financial returns.

Multilateral development banks and international financial institutions can also provide technical assistance, identify market gaps, and help shape new markets and tools. Through loan screening and lending activities, development banks can provide market intelligence about the existing challenges and opportunities, offering guidance in the design of development policies and facilitating their implementation. Where markets for certain kinds of technology or investment activity are underdeveloped or absent, they can act to overcome information barriers and the "wait and see" attitude of would-be investors, to help create those markets (Mazzucato and Penna, 2016). The emergence of the global green bond market, kicked off by the EIB's inaugural Climate Awareness Bond in 2007, is a clear example of this. Nurtured by the early issuance activity of the EIB and other multilateral development banks, total issuance now exceeds $1 trillion. Addressing information barriers and transparency issues has proved critical in this, both to give investors confidence and to guard against greenwashing.

The EIB has a long track record of financing in the region, with a focus on climate resilience. Since the EIB began investing in Latin America in 1993, it has financed over 150 projects in 15 countries, providing around €13 billion. Its activities in the Caribbean began in 1978, where it has granted over €2 billion in financing for over 220 operations. In 2022, almost 80% of the operations signed in the region were for climate mitigation and adaption projects. This is in line with the EIB's Paris alignment strategy and the Bank's commitment to support €1 trillion of climate action investment worldwide by 2030.

A strong supporter of international financial coordination, the EIB has joined forces with other international financial institutions to address the challenges posed by climate change. For instance, the EIB is piloting the use of climate resilient debt clauses with other multilateral development banks. These innovative contractual clauses will give sovereign borrowers in Least Developed Countries and Small Island Developing States the option to defer debt service for a limited period in cases of certain defined emergencies caused by climate change and natural catastrophes. This way, the risk of debt distress as a direct consequence of natural disaster can be mitigated. Although the concept of climate resilient debt clauses is not new, they have been rare so far and the EIB initiative to offer them now is a key element of the European Union's response to the calls from the Bridgetown Initiative. The ultimate impact of these clauses will depend strongly on the number of creditors participating, so a joint and coordinated effort is important.

Building on the Resilience and Sustainability Facility with the International Monetary Fund, the EIB is also working closely with other international financial institutions and public development banks to scale up climate finance and crowd in private climate investment to build climate resilience, including in several Latin American and Caribbean countries. The groundbreaking partnership is part of ongoing efforts by the international community to reshape the global climate finance architecture. This includes moving beyond small-scale projects to significant long-term investments that leverage existing mechanisms to facilitate public-private partnerships and attract private sector investments. Taking the specific needs of individual countries into account, our joint efforts will build on a three-pronged approach to address challenges triggered by climate change combining policy reforms, capacity development initiatives, and financing arrangements.

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Appendix 1: The European Investment Bank climate risk country scores

To better understand and monitor climate risk at the country level, the European Investment Bank (EIB), as part of various activities related to the EIB Group Climate Bank Roadmap (European Investment Bank, 2020) and the European Green Deal, developed a climate risk methodology to map climate-related risks at the country level. These risks are reflected in the European Investment Bank climate risk country scores (Ferrazzi et al., 2021). The scores are a tool to help understand the relative climate risks faced by countries, as well as the environmental and policy conditions faced by firms in each country. They can also help to identify mitigation and adaptation priorities and related financing needs.

For each country, two main types of risks are taken into account: (1) physical risk covers the impacts of the changing climate, including the risk of natural disasters (acute risk), as well as more gradual changes (chronic risk); and (2) transition risks are policy and regulatory risks driven by the introduction of stringent climate policies to help countries achieve carbon neutrality in line with the Paris Agreement goals.

The physical risk scores are based on an estimate of the total annual burden each country faces in terms of damage, costs and losses (as a percentage of GDP) related to climate change. The scores are composed of the following building blocks:

- Acute risks of extreme weather events related to hydrological risks (floods and landslides), meteorological risks (extreme temperatures, fog, storms) and climatological risks (droughts, wildfires).
- Losses deriving from the impact of disasters on agriculture. On top of the damage to physical infrastructure (agricultural machinery, irrigation systems, livestock shelters, etc.), farmers incur losses related to lower crop yields (Chen et al., 2015; FAO, 2017; Feyen et al., 2019; Moody's Investors Service, 2019).
- Chronic risks arising from long-term and gradual shifts in climate patterns (Feyen et al., 2019; NGFS, 2020; Roson and Sartori, 2016), namely:
    - » The impact of sea level rise, which is itself the result of melting glaciers and ice sheets (Bamber et al., 2019; Diaz, 2016, IPCC, 2019; McMichael et al., 2020).
    - » The impact on the quality of infrastructure (World Bank, 2016). Just as natural disasters damage infrastructure, gradual changes in climate can place infrastructure under higher strain as well, making upgrades necessary and increasing maintenance costs.
    - » The impact of higher temperatures on productivity: the increase in temperatures beyond certain levels is expected to reduce the productivity of workers (Woetzel et al., 2020).
    - » The impact of water scarcity (World Bank, 2016). Water has an economic impact, as it is needed in agriculture (70% of water is used for the irrigation of land), industry and cities.

In addition, the physical risk score incorporates an assessment of each country's capacity to adapt to climate change. Fiscal revenues and sovereign risk ratings are used as a proxy of each country's financial capacity to adapt to climate change, while governance indicators and the level of human development are used as indicators of institutional capacity. For these reasons, developed countries are better able to cope with the impacts of natural disasters, while developing countries are suffering severe consequences (Hochrainer-Stigler, 2006).

In a similar way, the transition risk scores are based on an assessment of a country's exposure to the economic changes caused by the global climate transition, and on its capacity to reduce the negative impacts of that exposure (mitigation capacity). Countries can mitigate transition risks by taking action to limit or reduce greenhouse gas emissions. The long-term economic impacts of the climate transition will be lower for countries that can swiftly shift to a lower-carbon development model.

The transition risk scores are based on:

- Revenues stemming from the fossil fuel business. These are expected to decline in the future due to stricter climate policies and changing consumer preferences.
- Greenhouse gas emissions performance. Higher emissions imply higher costs in the future as a result of more stringent climate policies.
- Mitigation capacity, which has three dimensions:
  - » Performance in deploying renewable sources of energy.
  - » Performance in implementing energy efficiency improvements.
  - » The level of commitment to tackling climate change, based on the nationally determined contributions each country has set under the Paris Agreement.

Based on the economic literature and an econometric analysis, these different components are given appropriate weights to create a composite indicator that reflects the transition risk country score. In addition, when assessing the performance of emissions, energy efficiency improvements and renewables deployment, the scores consider (1) what the countries have achieved in the recent past, (2) where they stand currently and (3) how far they are from the global optimal standard.

Table 1

EIB climate risk country scores

Latin America and the Caribbean climate risk country scores			
Country	**Region**	Physical risk	Transition risk
Anguilla	Caribbean		
Antigua and Barbuda	Caribbean		
Barbados	Caribbean		
Aruba	Caribbean		
Cayman Islands	Caribbean		
Grenada	Caribbean		
Haiti	Caribbean		
Jamaica	Caribbean		
Curaçao	Caribbean		
Saint Kitts and Nevis	Caribbean		
Dominican Republic	Caribbean		
Dominica	Caribbean		
Saint Vincent and the Grenadines	Caribbean		
The Bahamas	Caribbean		
Trinidad and Tobago	Caribbean		
Virgin Islands (British)	Caribbean		
Saint Martin	Caribbean		
Mexico	Central America		
Guatemala	Central America		
El Salvador	Central America		
Honduras	Central America		
Nicaragua	Central America		
Costa Rica	Central America		
Belize	Central America		

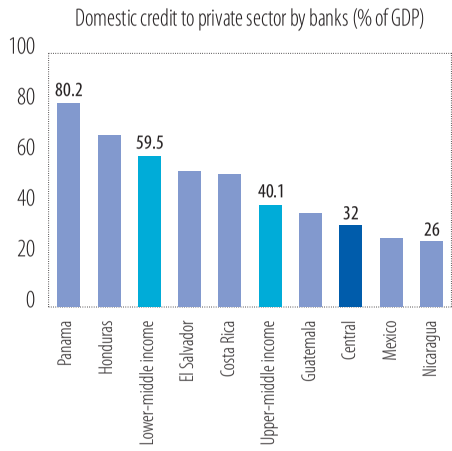
Latin America and the Caribbean climate risk country scores

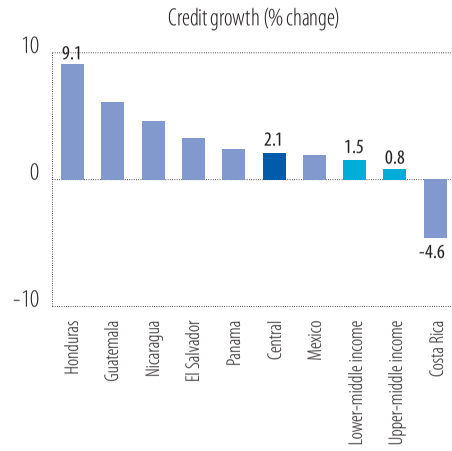
Country	Region	Physical risk	Transition risk
Panama	Central America		
Argentina	South America		
Bolivia	South America		
Brazil	South America		
Colombia	South America		
Ecuador	South America		
Paraguay	South America		
Peru	South America		
Uruguay	South America		
Venezuela	South America		
Chile	South America		
Guyana	South America		
Suriname	South America		

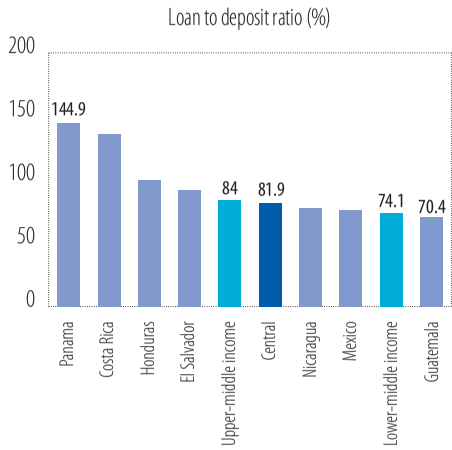
Source: *European Investment Bank.*
Note: *The different colours signal the level of climate risk for each country, for both physical and transition risk, from green (low risk) to red (high risk), according to the EIB climate risk country scores (Ferrazzi et al., 2021).*

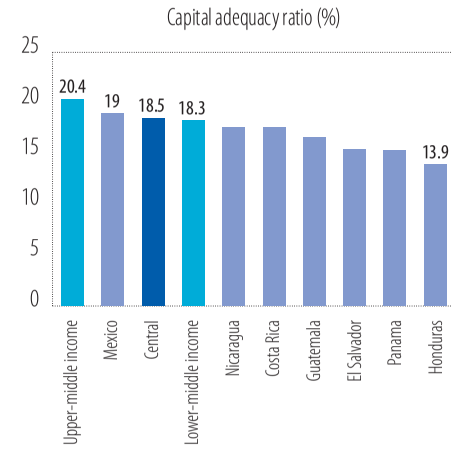
Appendix 2: Banking sector fundamentals – cross-country analysis by sub-region

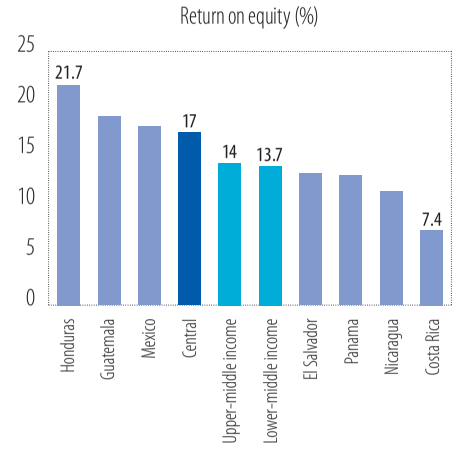
Latin America – Central

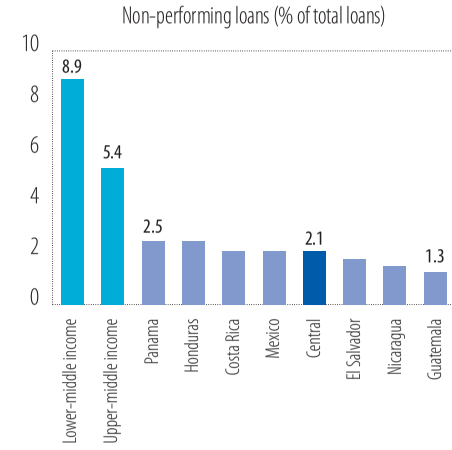




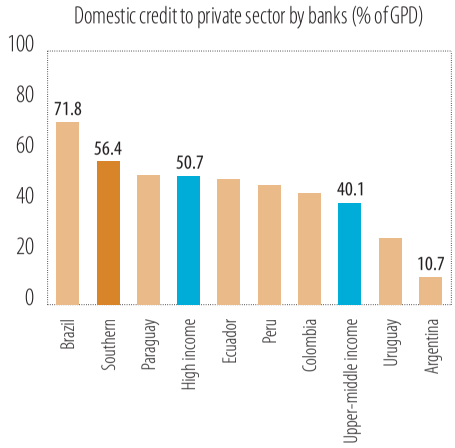


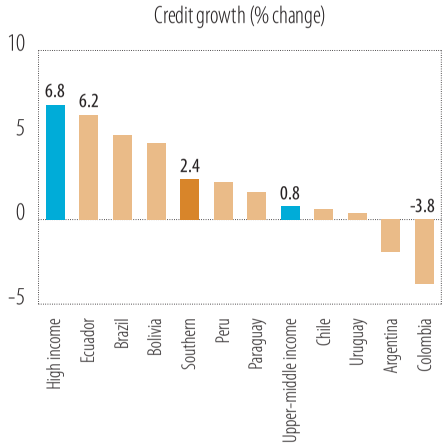


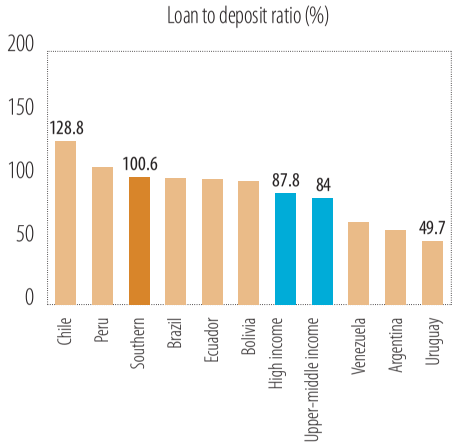


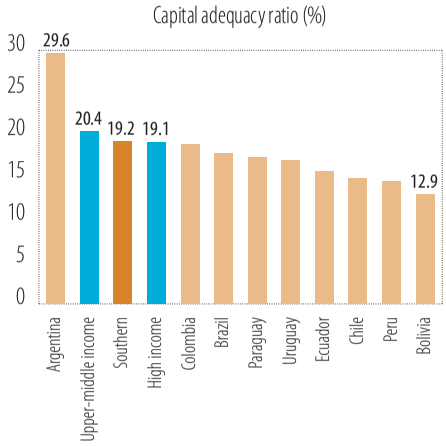


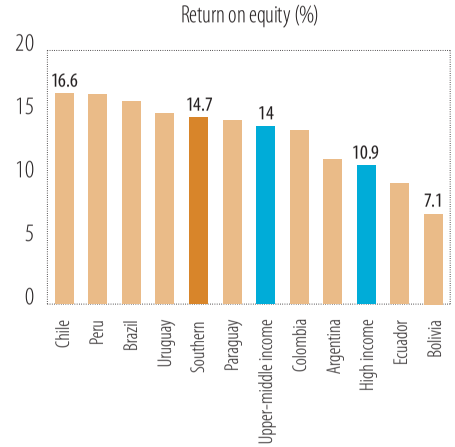
Latin America – South

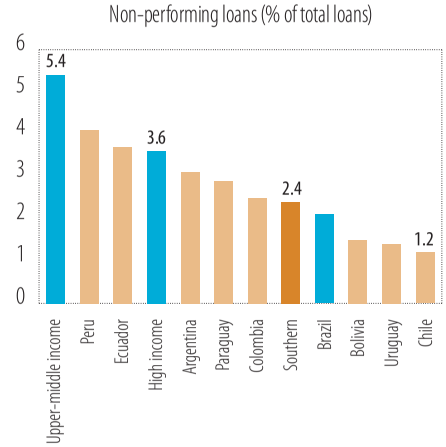




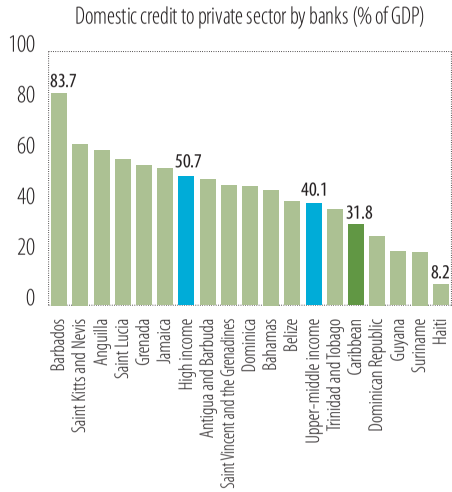


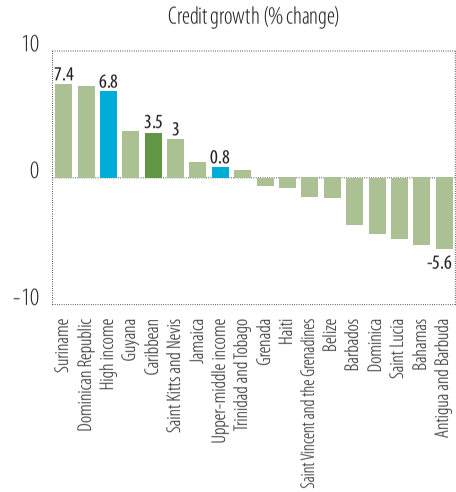


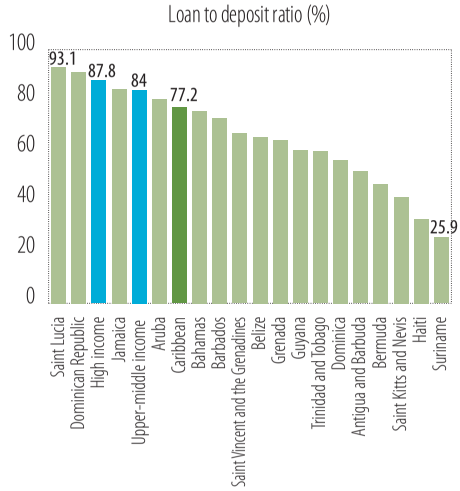


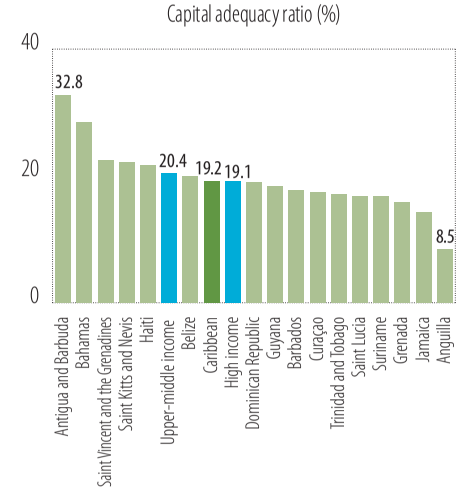


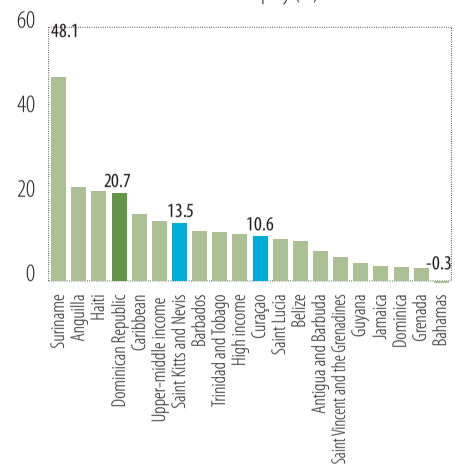
Caribbean

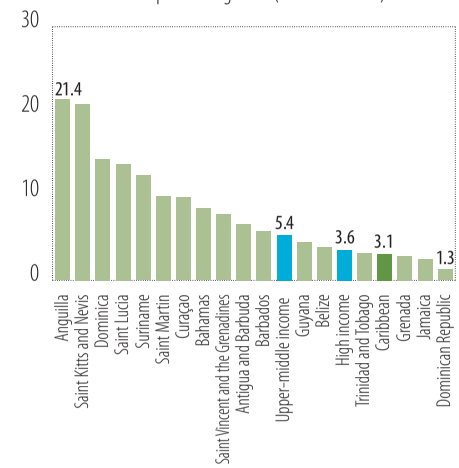

Domestic credit to private sector by banks (% of GDP)
100
80
60
40
20
0
83.7
50.7
40.1
31.8
8.2
Barbados
Saint Kitts and Nevis
Anguilla
Saint Lucia
Grenada
Jamaica
High income
Antigua and Barbuda
Saint Vincent and the Grenadines
Dominica
Bahamas
Belize
Upper-middle income
Trinidad and Tobago
Caribbean
Dominican Republic
Guyana
Suriname
Haiti


Credit growth (% change)
10
0
-10
7.4
6.8
3.5
3
0.8
-5.6
Suriname
Dominican Republic
High income
Guyana
Caribbean
Saint Kitts and Nevis
Jamaica
Upper-middle income
Trinidad and Tobago
Grenada
Haiti
Saint Vincent and the Grenadines
Belize
Barbados
Dominica
Saint Lucia
Bahamas
Antigua and Barbuda


Loan to deposit ratio (%)
100
80
60
40
20
0
93.1
87.8
84
77.2
25.9
Saint Lucia
Dominican Republic
High income
Jamaica
Upper-middle income
Aruba
Caribbean
Bahamas
Barbados
Saint Vincent and the Grenadines
Belize
Grenada
Guyana
Trinidad and Tobago
Dominica
Antigua and Barbuda
Bermuda
Saint Kitts and Nevis
Haiti
Suriname


Capital adequacy ratio (%)
40
20
0
32.8
20.4
19.2
19.1
8.5
Antigua and Barbuda
Bahamas
Saint Vincent and the Grenadines
Saint Kitts and Nevis
Haiti
Upper-middle income
Belize
Caribbean
High income
Dominican Republic
Guyana
Barbados
Curaçao
Trinidad and Tobago
Saint Lucia
Suriname
Grenada
Jamaica
Anguilla


Return on equity (%)
60
40
20
0
48.1
20.7
13.5
10.6
-0.3
Suriname
Anguilla
Haiti
Dominican Republic
Caribbean
Upper-middle income
Saint Kitts and Nevis
Barbados
Trinidad and Tobago
High income
Curaçao
Saint Lucia
Belize
Antigua and Barbuda
Saint Vincent and the Grenadines
Guyana
Jamaica
Dominica
Grenada
Bahamas


Non-performing loans (% of total loans)
30
20
10
0
21.4
5.4
3.6
3.1
1.3
Anguilla
Saint Kitts and Nevis
Dominica
Saint Lucia
Suriname
Saint Martin
Curaçao
Bahamas
Saint Vincent and the Grenadines
Antigua and Barbuda
Barbados
Upper-middle income
Guyana
Belize
High income
Trinidad and Tobago
Caribbean
Grenada
Jamaica
Dominican Republic

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