First Street

GLOBAL CLIMATE ANALYSIS

The Resilience Spread

How Climate Change Is Reshaping Regional Economies

426 Global Cities Analyzed
$55.9 Trillion Urban GDP
Projections Through 2100

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$1.8T

Global Resilience Spread

Current buffer between economic strength and climate exposure

$2.5T

Global Lost Productivity

Current strain on global GDP without new adaptation measures

Methodology

Analysis based on First Street's Macroeconomic Models using SSP scenarios and climate-adjusted migration patterns.

The Climate Resilience Equation

Climate risk is reshaping the world's most populous markets. Natural disaster damages have risen more than tenfold since the 1980s, now costing the global economy over 200 billion U.S. dollars (USD) annually. These losses fall disproportionately on urban centers, the very hubs that power global growth and investment. First Street's analysis of 426 major global cities reveals a striking paradox: over half of global urban GDP is concentrated in places facing the highest levels of acute climate risk. Hurricanes, floods, and wildfires increasingly threaten more affluent regions within North America and Europe, while chronic risks such as drought and extreme temperatures weigh heavily on emerging economies.

next 75 years, climate risk is projected to erode more than USD 2.5 trillion in global productivity, or over 2% of today's GDP. By century's end, over half of major cities are expected to show negative resilience spreads, signaling that climate pressures may surpass economic capacity worldwide. this balance is not permanent. Without significant adaptation investment, the resilience spread is projected to steadily decline, tipping into negative territory by 2085 as intensifying hazards outpace economic capacities. Altogether, climate risk is projected to erode over USD 2.5 trillion in global economic productivity over the next 75 years, more than two percent of today's global GDP, as mounting hazards outpace current adaptation and narrow the resilience spread.

> **Climate risks' impact on location desirability already outweighs local economic strengths in roughly 30% of global cities today.**

Altogether, climate risks' impact on location desirability already outweighs local economic strengths in roughly 30% of global cities today. This is captured by what First Street calls the "resilience spread," the gap between an area's economic capacity and its climate exposure. In total, this spread equals about USD 1.8 trillion, indicating that many of the most exposed cities still retain a net economic edge. Without significant adaptation, however, the buffer is projected to shrink steadily, turning negative by 2085 as intensifying hazards outpace resilience. Over the

The implication is clear: resilience is not fixed. Cities that thrive today may falter tomorrow if climate risks intensify, as expected but not uniformly, and begin to outpace the economic foundations that support their growth. Other geographies with fewer climate risks may sustain or even improve their relative position. For policymakers, this means adaptation is essential to preserve competitiveness and tax bases; for investors, it underscores that climate pressures will increasingly determine where capital can achieve true climate-linked alpha.

Ten Critical Insights

01

Climate hazards are not evenly distributed
Acute risks (floods, hurricanes, wildfires) cluster in more affluent regions such as North America, Western Europe, and East Asia with above average levels of climate exposure while chronic risks (sea-level rise, heat, drought) are more prevalent across Southeast Asia and Sub-Saharan Africa.

02

Global economic output is heavily concentrated in high-risk cities
Over 52% of global GDP lies in the top 25th percentile of acute climate risk, with cities like New York, Sydney, and Vancouver displaying high economic productivity coupled with high hazard exposure.

03

High-risk cities and regions have historically driven economic growth
Cities like Sydney and Miami rank among the top 2% most exposed to climate risk yet have outpaced global economic trends, by more than twice the global average and roughly 50% faster than global rates since 2001, respectively. Together, North America, Europe, and Asia Pacific have driven 88% of global GDP and growth over the past half century, despite facing the world's highest exposure to floods, storms, and wildfires.

04

Market resilience to climate risk depends on macroeconomic fundamentals
Market resilience to climate risk depends on macroeconomic fundamentals. First Street defines the "resilience spread" as the buffer between economic strength and climate risk, using climate-adjusted migration as a proxy for consumer sentiments reflective of those two factors. Roughly 30% of global cities face negative spreads today while 70% maintain positive ones, signaling an overall optimistic outlook on climate's economic threats today.

05

The global resilience spread is positive but eroding.
Today's economy has a buffer of USD 1.8 trillion in GDP against climate risk thanks to current adaptation efforts and consumer optimism, but that value could tip negative by 2085 if no further adaptation actions are taken.

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06

The indirect cost of climate threatens trillions in lost productivity
By century's end, climate risk may ultimately exert greater pressure on the economic performance of major global cities than baseline conditions can offset, resulting in USD 2.5 trillion of lost economic productivity from indirect impacts alone.

07

Regional resilience is diverging
North America and Europe are projected to lose 1.5% and 1.2% of their respective resilience spreads over the next 30 years, while Latin America, MENA, and Sub-Saharan Africa retain modest positive spreads, albeit from smaller economic bases.

08

Cities are sorting into distinct growth trajectories
First Street projections signal that over the next three decades, markets will sort into patterns of expansion (9% of cities), stabilizing and maturing (53%), or softening and contraction (38%), highlighting how climate pressures are most likely to reshape long-term.

09

Resilience varies within markets, not just across markets.
While First Street's Macroeconomic Models project cities like London may reach net negative effects from climate risk impact on market attractiveness by 2055, neighborhood-level outcomes diverge,underscoring a need for granular, district-level analysis, overlaid on country level geo-spatial insight.

10

New Orleans shows the deepest negative resilience spread
Repeated hurricane and flood shocks, most notably Katrina (2005) and Ida (2021), have eroded recovery, driving population decline and soaring insurance costs. The city's resilience spread stands at -10.3% today and is projected to deteriorate further in the coming decades.

Where and How Are Climate Risks Concentrated Today?

Global natural disaster damages have grown exponentially over the last five decades, rising from an annual average of 12 billion U.S. dollars (USD) in the 1980s to USD 158 billion per year in the decade to 2023 (Ritchie et al., 2022) (**Figure 1**).

Yet direct damages are only part of the story; these events have also triggered business interruptions, supply-chain breakdowns, and lost productivity. Altogether, physical climate risk has cost the global economy on average 0.2% of its gross domestic product (GDP) annually over the last decade, amounting to more than $203 billion in losses every year (Ritchie et al. 2022).

These losses have sweeping consequences for municipalities and global financial institutions, prompting an in-depth examination of how geography is impacting investments in an era of elevated climate risk. Many of these natural disaster losses can be traced back to impacts on urban centers, the same places that drive global growth, innovation, and investment.

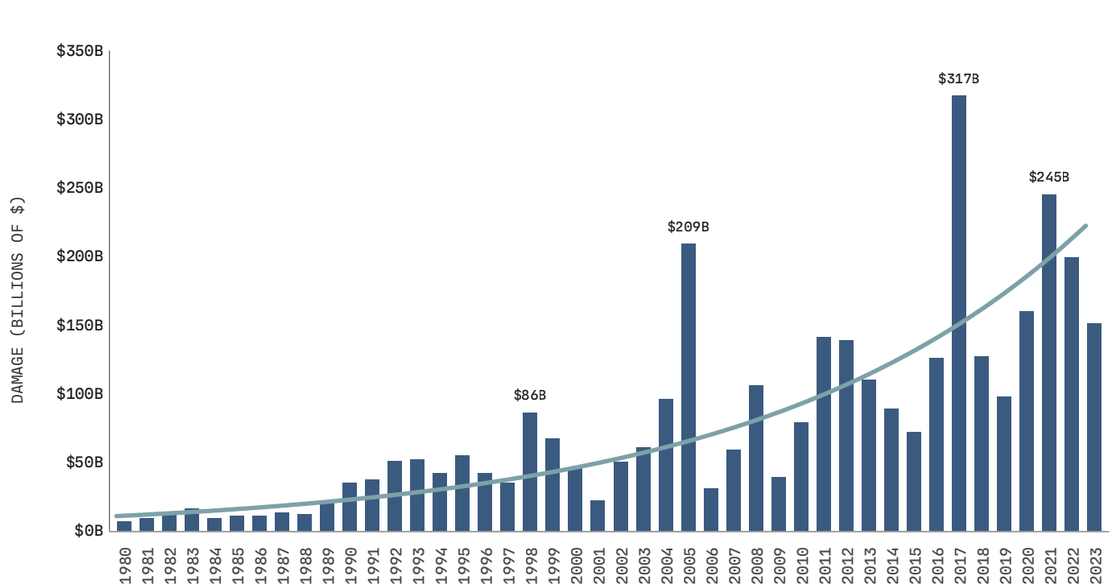


Figure 1. Global Damage Costs From Natural Disasters (Excluding Earthquakes), 1980 to 2023
Source: EM-DAT, CRED / UCLouvain (2024) with major processing by Our World in Data
Note: Data not inflation adjusted and reflects nominal value of costs from each year.

Many of these natural disaster losses can be traced back to impacts on urban centers, the same places that drive global growth, innovation, and investment. Many of these natural disaster losses can be traced back to impacts on urban centers, the same places that drive global growth, innovation, and investment. This report focuses on climate risk's impact on 426 urban cores with populations over one million, which power the global economy with a cumulative GDP of USD 55.9 trillion.

2021 "Bernd" Floods

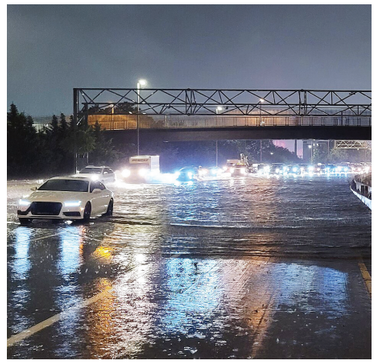
Central Europe floods caused tens of billions of USD in damage as they inundated Cologne, Düsseldorf, and Liège (Flood Resilience Alliance, 2022).

Image: *In this July 15, 2021 file photo destroyed houses are seen close to the Ahr river in Schud, Germany (AP Photo)*

2019-2020 "Black Summer"

Australia's bushfires blanketed Sydney, Melbourne, and Canberra in smoke.

Image: *Australian Bushfires - Kangaroo Island, South Australia*



2021 Hurricane Ida

Over USD 80 billion in property damages across New Orleans and NYC. (NOAA, 2024)

Image: *Long Island Expressway in New York City shut down due to flash flooding from Post-Tropical Storm Ida's landfall*

Chronic vs. Acute Hazards

When examining the distribution of climate conditions across the globe today, it is evident that different regions face very different types of risk. To capture these differences, First Street's global hazard model estimates for each major city are grouped into chronic and acute categories, providing each location with a percentile-ranked risk profile for both.

Chronic risks reflect long-term, gradually intensifying physical climate stressors such as heat, drought, or sea level rise, while acute risks capture short-term, high-intensity events like floods, storms, or wildfires.

Chronic Risks

- Sea-level rise
- Extreme heat
- Drought

Concentrated in Southeast Asia and Sub-Saharan Africa. These threats unfold gradually, allowing time for planned adaptation.

Mapping these risks illustrates that chronic risks today, derived from a current snapshot of risk from First Street's heat, drought, and flood models, are concentrated in cities across Southeast Asia and Sub-Saharan Africa, across low- and middle-income countries (LMIC), and emerging regions of the globe more generally (**Figure 2**).

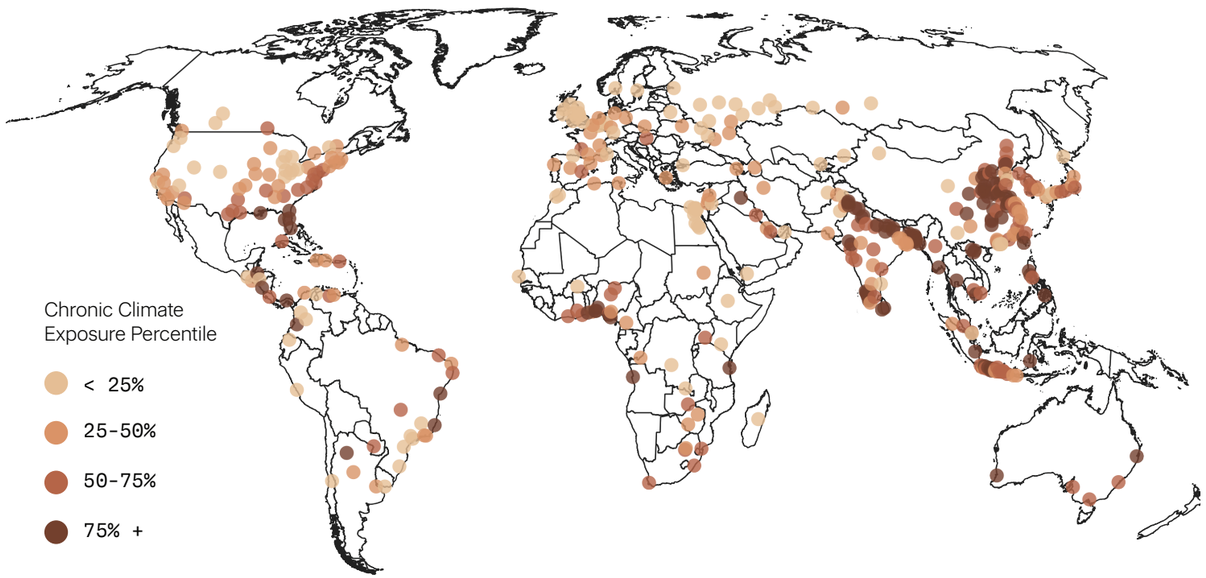


Figure 2. Chronic Climate Exposure Across Global Cities with 1 Million+ Residents
Note: Chronic risks include sea-level rise, drought, and extreme temperatures. Multi-hazard chronic climate exposure calculated as the geometric mean across individual hazard percentile rankings.

These threats are significant but unfold gradually, allowing ample opportunity for planned adaptation and long-term investment in resilience.

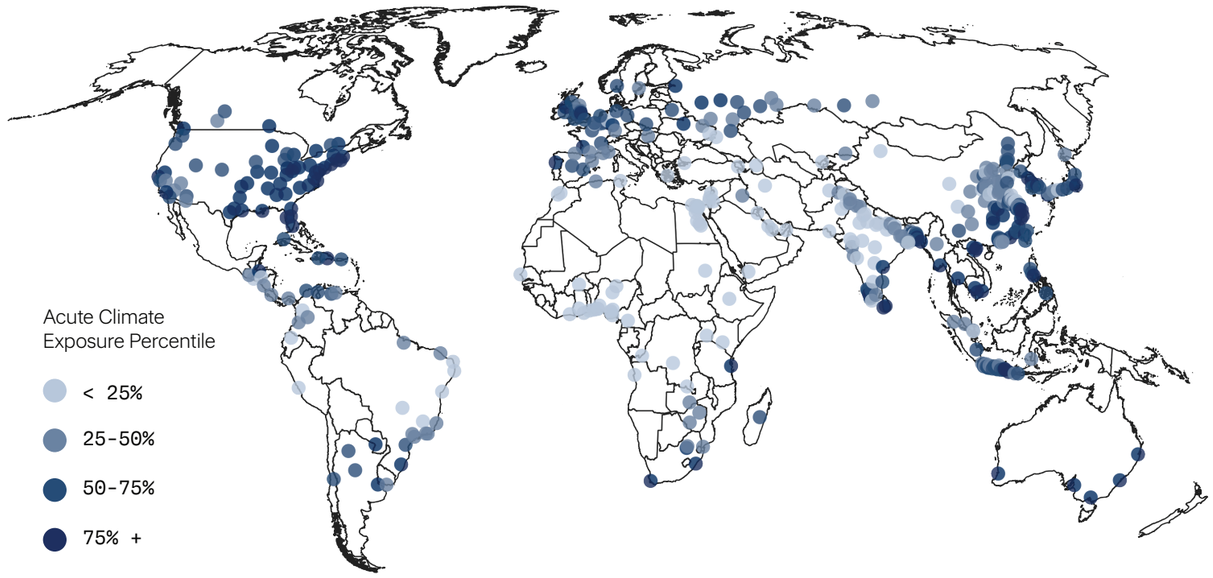


Figure 3. Acute Climate Exposure Across Global Cities with 1 Million+ Residents
Note: Acute risks include flooding, wildfire, and extreme winds. Multi-hazard acute climate exposure calculated as the geometric mean across individual hazard percentile rankings.

Acute Risks

- Flooding
- Wildfires
- Extreme winds

Concentrated in North America, Western Europe, and parts of East Asia. These deliver sudden shocks requiring immediate response.

By contrast, acute risks today, modeled using First Street's flood, wind, and wildfire models, showcase that higher levels of risk are concentrated in higher-income regions such as North America, Western Europe, and parts of East Asia (**Figure 3**). These hazards deliver sudden shocks that are far harder to manage and require costly preparedness, limiting the ability to focus on long-term adaptation and requiring a short-term assessment of risk to hedge against their costly damages.

Being aware of both chronic and acute hazards is essential for avoiding the negative outcomes associated with climate risk. However, acute risks are of particular concern and can destroy assets and disrupt capital flows more suddenly in the near-term.

How Does Climate Risk Intersect with the Global Economy?

The global economy has been fueled by economic productivity and growth coming from three main regions: North America, Europe, and Asia Pacific. These three regions account for roughly 88% of both the world's GDP today and growth over the last half century (**Figure 4**). As explored above, these three regions also face the highest risk of exposure to floods, storms, and wildfires.

The distribution of acute climate risk itself is skewed, with a small percentage of areas facing the extreme end of exposure. Therefore, to understand this relative to global economic activity, First Street ranked cities into percentiles across their discrete exposure to floods, wildfires, and windstorms based on First Street's global hazard models, correlated to their GDP (using the United Nations (UN) projection for 2025).

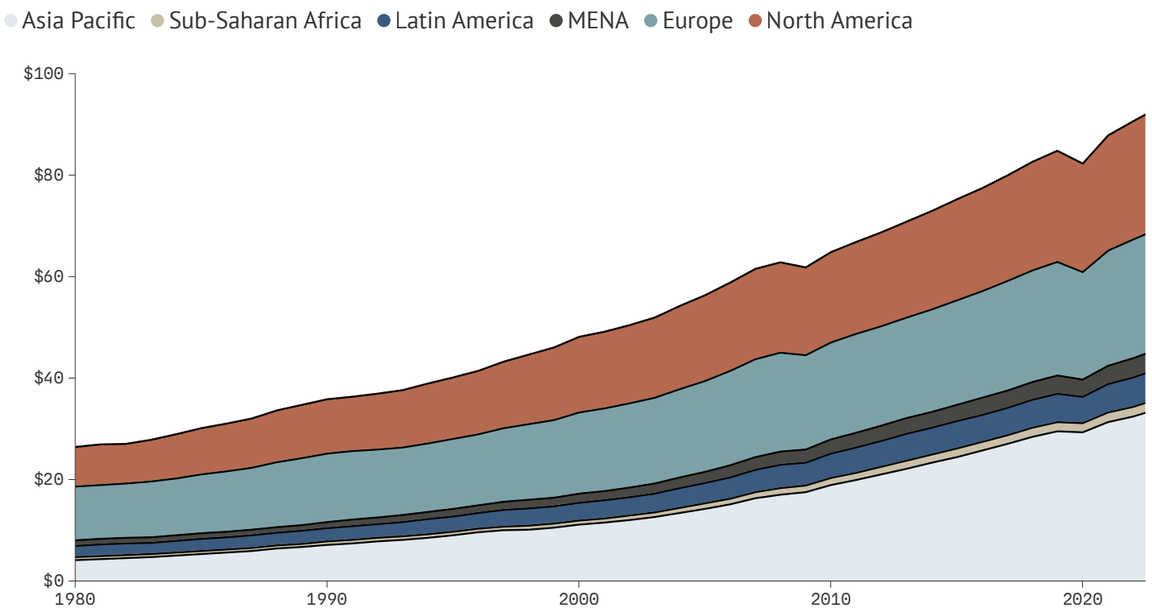


Figure 4. Global Regional GDP Trends, 1980 - 2023
Source: First Street analysis of World Bank country-level GDP, nominal dollars

A multi-peril acute climate risk exposure percentile can be identified by taking the geometric mean across the three peril percentiles. Mapping this multi-peril ranking against the distribution of GDP reveals a clear S-curve: the cities with the highest economic output cluster in the top quartile of acute climate risk, while those with the lowest output cluster in the bottom quartile (**Figure 5**).

This pattern highlights a critical paradox for global investors and stakeholders in these cities, illustrating that many of the world's most productive, high-growth cities are also the most exposed to sudden costly climate shocks, making resilience planning and capital allocation decisions especially important to understand and diligence.

> Many of the world's most productive, high-growth cities are also the most exposed to sudden costly climate shocks.

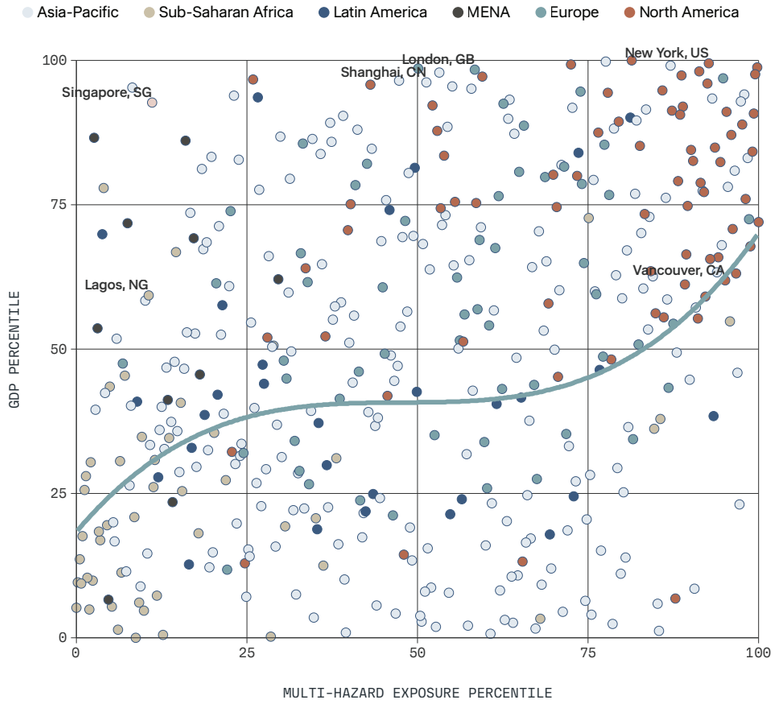


Figure 5. Acute Climate Exposure Distribution vs. GDP Distribution, Urban Centers with 1M+ Residents
Note: Percentiles represent equally weighted distributions of values across multi-hazard exposure and GDP, respectively.

52%

Global GDP in High-Risk Cities
$29.3 trillion at risk from severe weather events

Taken together, over 52% of global urban GDP is clustered in the top 25th risk quartile (**Figure 6**), driven by key metropolitan markets such as New York, Sydney, and Vancouver. This amounts to USD 29.3 trillion at high risk of disruptions from severe weather events like hurricanes, floods, and wildfires.

The prominence of these cities and others with high acute climate exposure counterintuitively may be traced back to their long-standing geographic advantages, including deep-water ports, access to natural resources, and key trade routes that have drawn capital and populations for decades. These same drivers for economic productivity continue to support strong property markets and robust population growth, even as acute hazards like wildfires, hurricanes, windstorms, and flash floods raise insurance costs and demand expensive resilience investments.

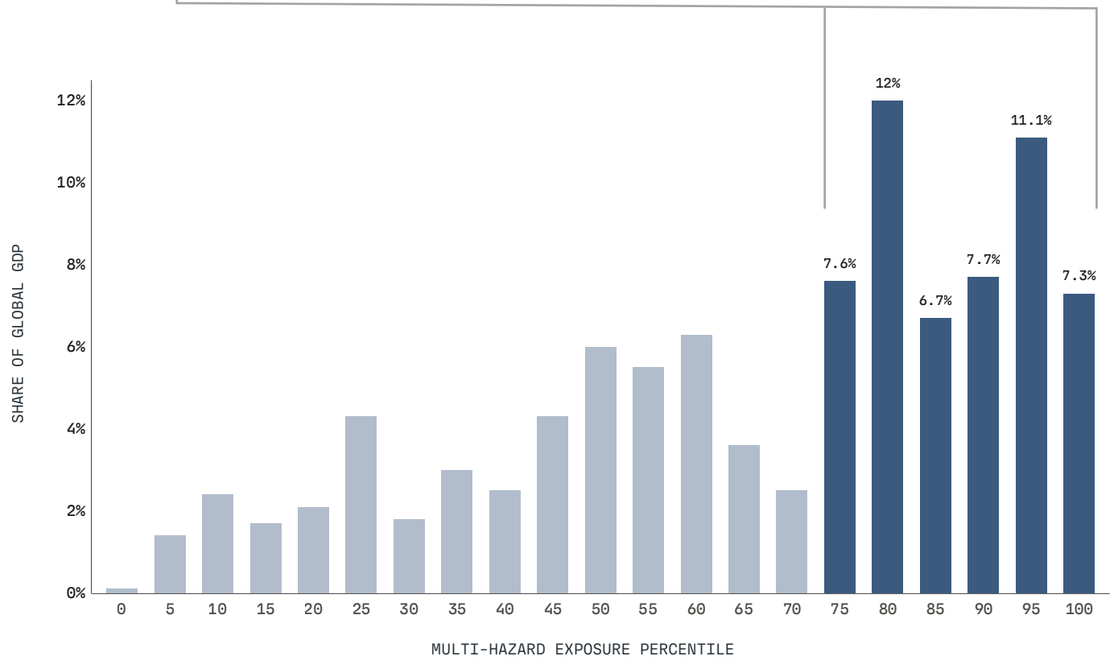


Figure 6. Share of Global Urban GDP Across Multi-Hazard Exposure Percentiles

Image: *New York City, USA*

Alternatively, about 36%of global urban GDP, or USD 19.9 trillion, occupies the mid-range of acute risk between the 25th to the 75th percentiles, encompassing influential centers such as London, Shanghai, Stockholm, and Bogotá, while only 12%, or USD 6.7 trillion, falls in the lowest-risk quartile, which includes a mix of emerging and established cities like Lagos and Singapore.

Regionally, the distribution of GDP between acute risk tiers tells a nuanced story across regions of the globe (**Figure 7**). North America and Europe show the greatest concentration of cities in the top 50th percentile of risk, including London and New York, reflecting both their large urban economies and their exposure to acute climate events.

36%

Mid-Range Risk
$19.9T

12%

Lowest Risk Quartile
$6.7T

Image: *Sydney, AUS*

Image: *Vancouver, CA*

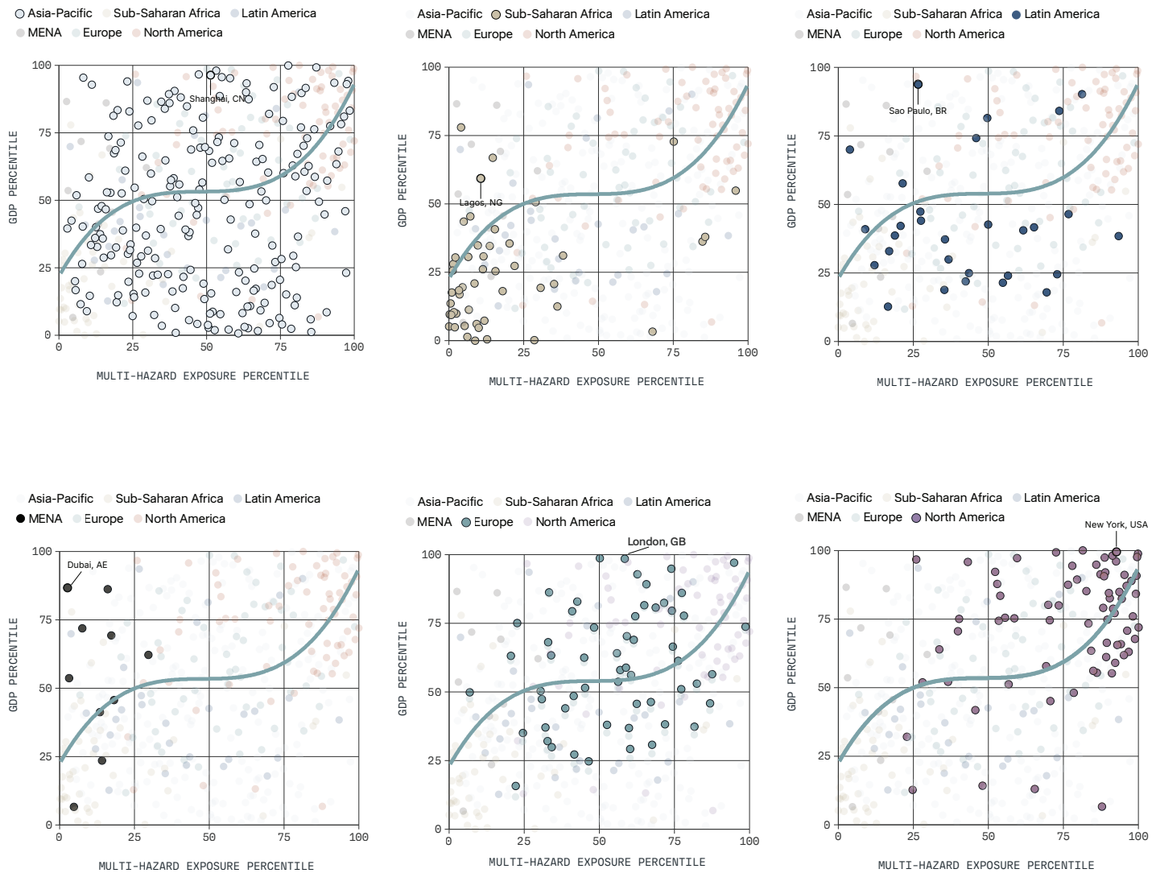


Figure 7. Acute Multi-Hazard Exposure Distribution vs. GDP Distribution Split by Region

Asia-Pacific and Latin America are more dispersed along the risk-GDP curve: cities such as Shanghai or São Paulo combine strong GDP with varying levels of acute risk, creating a broader spectrum of exposures for investors. In contrast, MENA and Sub-Saharan Africa lean heavily toward the lower-risk.

Given this distribution of GDP concentration within higher climate risk areas, historically it has been the case among some areas that high-risk cities thrive with comparably higher rates of growth than the global average.

Cities like Sydney and Miami rank among the top 2% globally in terms of climate risk, yet both have demonstrated exceptional economic performance (**Figure 8**).

Since 2001, Miami's GDP has grown at more than twice the global average rate and nearly four times faster than the U.S. average. Similarly, Sydney's economy has expanded roughly 50% faster than both global and national trends in Australia.

Acute climate risk exposure percentile:

50th World	95th Australia
82nd United States	98th Sydney, AUS
	99th Miami, FL

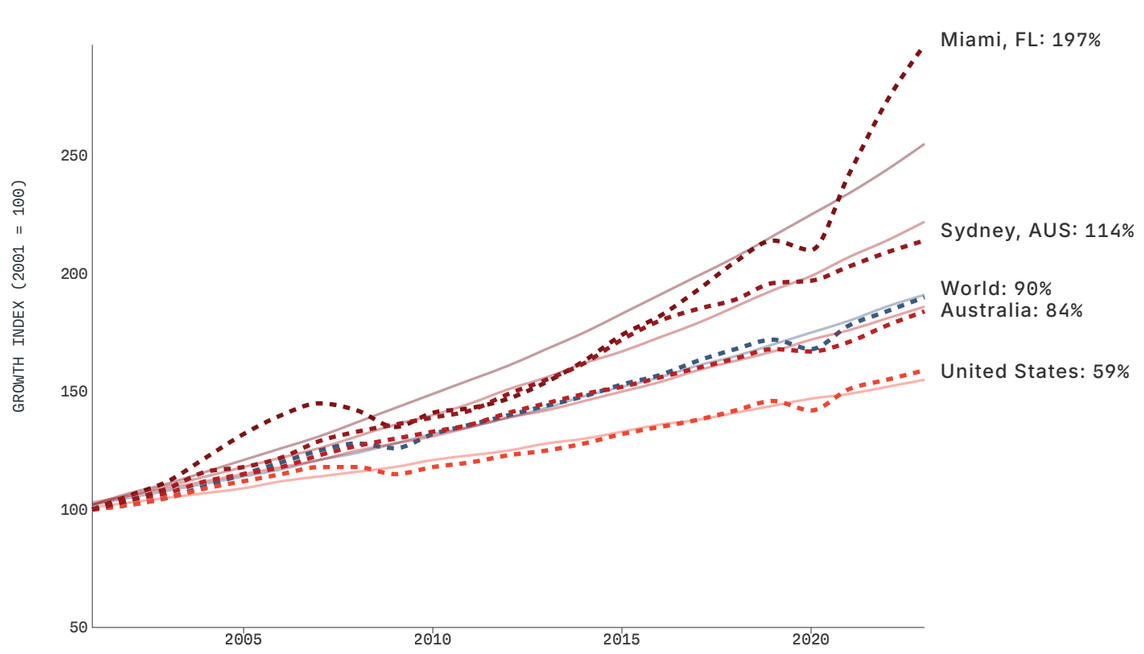


Figure 8. GDP Growth Trends, 2001 - 2023
Source: First Street analysis of World Bank country-level GDP (nominal $), U.S. Bureau of Economic Analysis GDP by Metro Area (nominal $)

What Defines Market Resilience to Climate Risk & How Is It Distributed Today?

The relationship between climate risk and economic productivity reflects opposing forces of market attractiveness: climate exposure erodes value on one side, while economic fundamentals sustain it on the other.

Together, these dynamics determine an area's resilience relative to exposure. While market attractiveness reflects a city's current appeal as a place to live, work, and invest, market resilience captures its capacity to withstand and recover from climate-related disruptions without lasting economic or social decline.

First Street estimates climate migration and its economic impacts by comparing the direct effects of climate risk alone with the combined effects of climate and broader economic forces. Altogether, three important components for understanding climate-macro interactions are captured (**Figure 9**)

01 Climate Opportunity Cost

The adverse influence of climate risk on market attractiveness, as acute shocks and chronic stresses undermine consumer confidence and impose direct and indirect costs on economic outcomes.

02 Market Mediating Effects

The role of underlying economic and social conditions in shaping resilience. Strong, diversified economies and livability factors can buffer climate pressures and sustain positive consumer sentiment, while weaker conditions can amplify climate impacts and accelerate decline.

03 Climate-Macroeconomic Resilience Spread

The net outcome of these opposing forces, capturing the balance between a market's structural advantages and the costs of climate risk.

To better understand how these forces interact, First Street has identified population movements as a direct proxy for consumer sentiments toward market attractiveness and a leading indicator of subsequent economic vitality, reflecting where households and businesses are willing to commit capital. To capture this interplay, First Street's Macroeconomic Models, which power its Geo-Strategy Module, estimate how climate exposure influences global migration patterns.

More information on First Street's Macroeconomic Modeling Suite may be found here.

For governments and investors alike, population momentum influences a cascade of key metrics, including property values, rental demand, infrastructure utilization, and municipal tax revenues, all of which drive asset performance and market stability.

Resilience Spread = f(Market + Climate)

Market

Population: Growth trends, migration

Economy: GDP, job growth, median income

Amenities: Housing, transportation, built environment

Climate

Acute Risk: Hurricanes, severe storms, floods, wildfires

Chronic Risk: Extreme heat, water stress, sea level rise

Figure 9. Conceptual Equation Defining the Climate-Macro Interaction

Outcomes across the resilience spread show how some markets maintain positive spreads and continue to grow despite significant exposure, supported by strong economies and attractive amenities — such as access to jobs, quality schools, transportation networks, and cultural or recreational assets — while others with weaker economic foundations and amenities experience negative spreads and are more vulnerable to climate-induced stagnation or decline.

Results from First Street's Macroeconomic Model show that about 30% of major global markets face a negative resilience spread, where climate risks already outweigh local economic and social fundamentals (**Figure 10**).

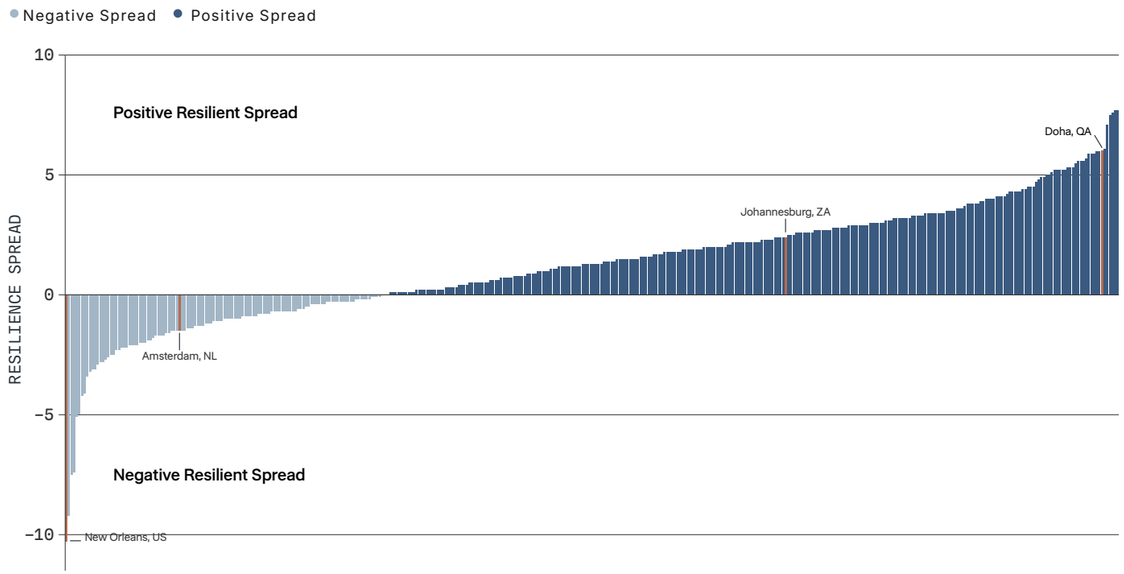


Figure 10. Distribution of Resilience Spread Today (2025) Across Urban Centers with 1M+ Residents

30%

Negative Resilient Spread
122 cities where climate risks outweigh fundamentals

70%

Positive Resilience Spread
304 cities with economic strength offsetting climate risk

Cities Under Pressure

Migration trends in these areas reflect weakening consumer sentiment, translating into an average -1.5% spread between climate risks and economic foundations, with some markets seeing spreads as low as -10.3%. When resilience spreads turn negative, it signals markets already struggling, where further erosion of fundamentals could accelerate out-migration, depress productivity, and undermine valuations.

Cities like Amsterdam and New Orleans illustrate how climate risks can outweigh macroeconomic strengths, producing negative resilience spreads.

Amsterdam

In Amsterdam, long-term threats from sea-level rise, heightened flood and wind risk, and growing heat stress are only partially offset by the city's advanced, diversified economy and global logistics role.

Negative Resilience Spread

-1.5%

Climate Effect	Market Effect
-9.9%	+8.4%

Resilience Spread = Climate Effect + Market Effect

Resilience Spread Breakdown

Positive Factors

- Advanced, diversified economy
- Global logistics hub
- Modest population growth

Negative Factors

- Impending sea-level rise
- High flood and extreme wind risk
- Growing heat stress
- Limited affordable housing and housing shortages

Sluggish population growth (below 1% annually), housing shortages, affordability pressures, and mounting tourism challenges limit the city's resilience to projected climate risks, contributing to a net-negative spread of -1.5%.

New Orleans

In New Orleans, the imbalance is far starker: despite its strategic port and cultural significance, the city's acute exposure to hurricanes and flooding, most notably Hurricane Katrina (2005) and Hurricane Ida (2021), has repeatedly undermined recovery and stability.

Negative Resilience Spread

-10.3%

Climate Effect	Market Effect
-15.9%	+5.6%

Resilience Spread = Climate Effect + Market Effect

Resilience Spread Breakdown

Positive Factors

- Strategic port city location
- Strong cultural and social significance

Negative Factors

- Extreme flood and hurricane risk
- Repeat historical natural disasters
- Insurance rate increases and withdrawals
- Declining population

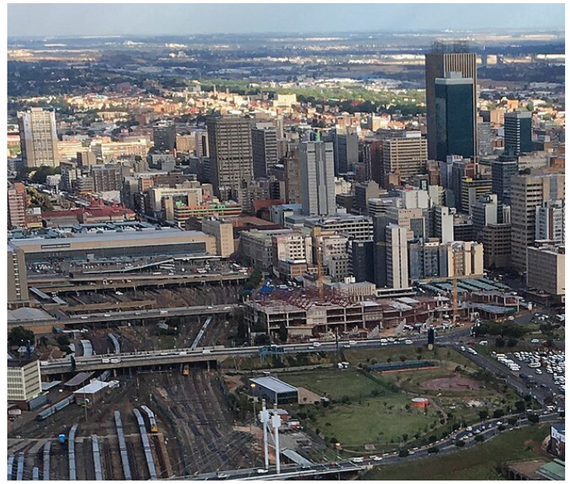
These repeated shocks have driven steady population decline, unaffordable insurance rates, and insurer withdrawal, resulting in a deep negative resilience spread of -10.3%.

Cities Thriving Despite Risk

Conversely, roughly 70% of markets display a positive resilience spread, where diversified economies, robust labor markets, and livability factors more than offset climate pressures. These markets benefit from an average 2.7% cushion, with markets seeing spreads as high as 10.8%, as strong fundamentals sustain consumer confidence despite exposure. These positive spreads imply that markets potentially undervalue their opportunities relative to climate risk, highlighting a hidden upside, as capital inflows remain strong and long-term attractiveness endures.

Cities such as Johannesburg and Doha illustrate how strong macroeconomic fundamentals can outweigh climate risks, resulting in positive resilience spreads.

Johannesburg



In Johannesburg, while climate threats include moderate risks of water scarcity, flooding, and wildfires, they are balanced by a large domestic market with strong consumer spending, a growing working-age population, and a diversified economy across services, industry, and mining.

Positive Resilience Spread

+2.4%

Climate Effect	Market Effect
-4%	+6.4%

Resilience Spread = Climate Effect + Market Effect

Resilience Spread Breakdown

Positive Factors

- Large domestic market with strong consumer spending
- Large & growing working-age population
- Diversified GDP base across services, industry, and mining

Negative Factors

- Moderate risk of water scarcity
- Moderate risk of flooding and wildfires

Together, these factors contribute to a resilience spread of +2.4%, signaling capacity to absorb climate pressures while sustaining economic momentum.

Doha

Despite high exposure to extreme temperatures and water scarcity, the city benefits from a substantial sovereign wealth fund, its role as a major energy exporter, and extensive investment in infrastructure and modernization.

Positive Resilience Spread

+9.1%

Climate Effect	Market Effect
-1.9%	+11%

Resilience Spread = Climate Effect + Market Effect

Resilience Spread Breakdown

Positive Factors

- Large sovereign wealth fund
- Major energy exporter
- Investment capital

Negative Factors

- Moderate risk of water scarcity
- Moderate risk of flooding and wildfires

Combined with policies promoting foreign investment and technology transfer, these strengths underpin a resilience spread of +9.1%, among the highest in global markets.

Global Resilience Today

$1.8T

Net positive resilience spread across 426 global cities

In economic terms, the resilience spread reflects how shifts in consumer sentiment and migration influence productivity and GDP. First Street estimates this net positive spread at USD 1.8 trillion across global cities.

This aggregate outcome indicates that, even as climate risks weigh on some regions, stronger fundamentals elsewhere allow the global economy to still gain more than it is losing as consumers adapt or relocate to sustain growth.

304
Cities With Positive Spread
$1.9 trillion GDP support

122
Cities With Negative Spread
$62 trillion GDP at Risk

> The skew towards more positive resilience spreads than negative across markets coupled with a net positive value globally suggests that consumer sentiments in many markets today remain optimistic about climate risk. Traditional drivers of attractiveness like employment growth, economic diversification, and business-friendly environments continue to draw people and capital despite the presence of climate hazards in even more exposed locations.

70%
Positive Spread Markets

+1.5%
Avg. Positive Resilience Spread

426
Global Cities Analyzed

However, even today, 122 cities, like Amsterdam and New Orleans, maintain a negative resilience spread, together representing USD 62 billion in GDP at risk as current climate risks outweigh the amenities of these cities and leave them exposed to indirect losses. Otherwise, 304 other cities, like Johannesburg and Doha, exhibit a positive resilience spread, with a total of USD 1.9 trillion in GDP support. Over time, however, the resilience spread could narrow or even turn negative if climate risks accelerate faster than consumers and local economies can adapt.

Image: *New Orleans, LA*

Image: *Amstersdam, NL*

> Over time, the resilience spread could narrow or even turn negative if climate risks accelerate faster than consumers and local economies can adapt.

Image: *Johannesburg, ZA*

Image: *Doha, QA*

How Will Market Resilience Evolve in the Future?

A key question for investors and public stakeholders is how intensifying acute climate hazards will reshape the attractiveness and productivity of urban economies in the future, mediated by their underlying conditions to inform their resilience towards climate risks.

Therefore, it is essential to identify which regions and cities will see the greatest rise in risk and whether their resilience spread will remain or diminish as climate risk progresses.

First Street's Macroeconomic Models project how the resilience spread of cities and regions will evolve through 2100 as climate risks intensify. The models simulate the impact of climate exposure on long-run migration patterns, mediated by local amenities, and account for how social, economic and political conditions shift under different Shared Socioeconomic Pathways (SSPs): low (SSP1-2.6), medium (SSP2-4.5), and high (SSP5-8.5) emissions scenarios.

Image: *London, GB*

The results presented in this report draw from the high-emissions pathway (SSP5-8.5), highlighting the scale of potential impacts under a scenario where climate risks are allowed to intensify most severely. Adaptation measures are held constant across time, isolating how consumer sentiment and location desirability change as climate pressures escalate. First Street translates migration impacts into financial terms by modeling the relationships between historical population changes and economic outcomes. These values are projected forward, keeping inflation constant and corrected to 2024, while broader macroeconomic changes are represented through the SSP trajectories.

Analyzing trends both in cities' resilience spreads and their acute climate-risk severity creates a matrix that highlights relative resilience and vulnerability across markets and how that may change over the mid-term through 2055 (**Figure 11**). Cities with strong migration inflows despite rising hazards illustrate their persistent positive resilience spread, while those with negative or declining spreads signal potential long-term weakness.

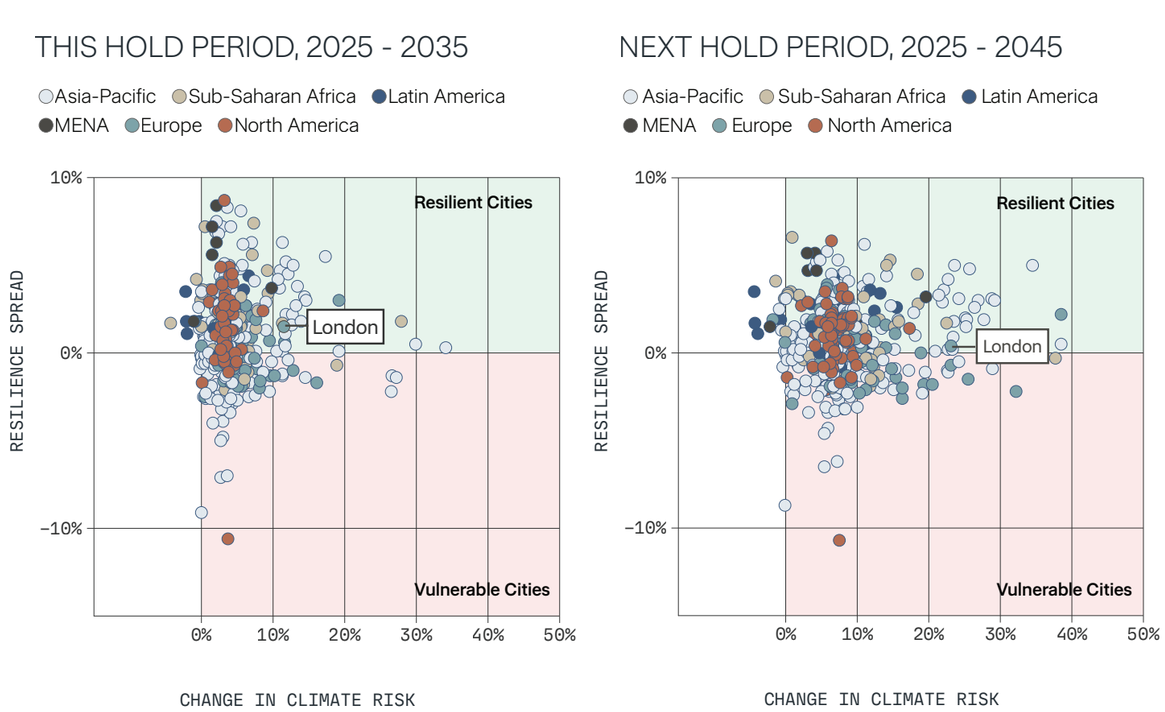


Figure 11. Change in Climate Risk vs. Resilience Spread Matrix

Regionally, North America and Europe show the greatest erosion in their market attractiveness, with the average city in these regions projected to lose roughly 1.5% and 1.2% of its resilience spread over the next three decades, respectively.

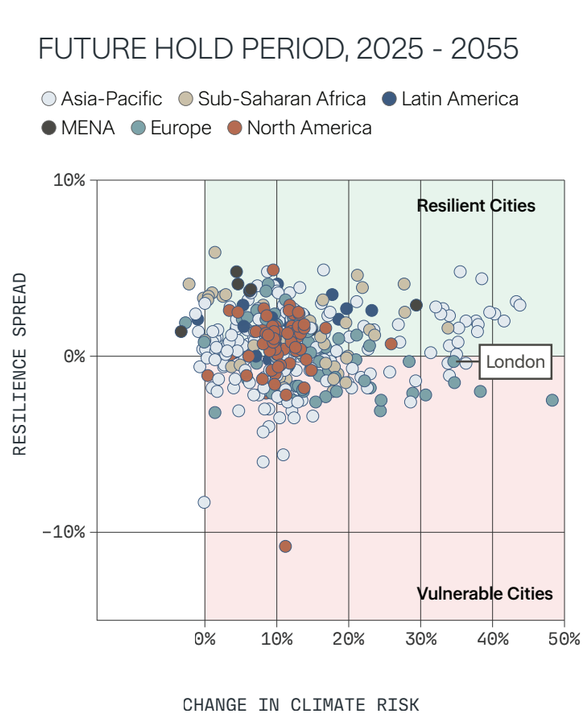
This trajectory differs across mid-term horizons: Europe is expected to retain a positive resilience spread through about 2045 before tipping negative by mid-century, whereas North America stays net positive but with substantially diminished gains. For governments and investors, these patterns underscore how climate may strain consumer sentiments, leading to decreased migration that reshapes property demand and tax bases even within near and mid-term investment windows.

Regional Erosion Rates

North America ..... **-1.5%**

Europe ..... **-1.2%**

Latin America ..... **Modest Positive**



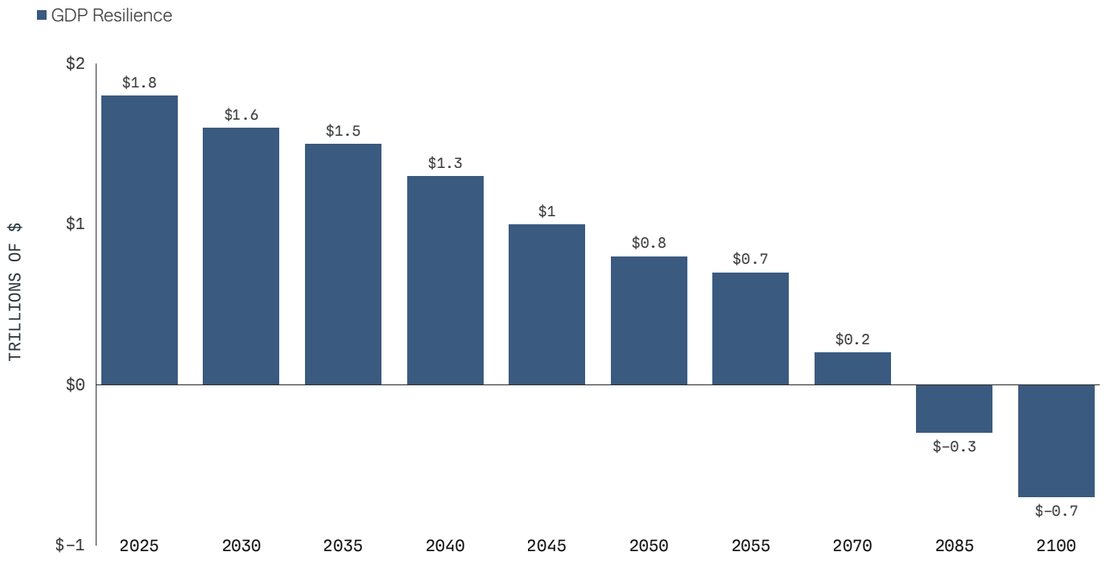


Figure 12. First Street Modeled Macroeconomic Resilience Spread from 2025 to 2100

Taken together, today's resilience spread of USD 1.8 trillion across the examined 426 cities is projected to steadily erode in the face of mounting climate risks if no new adaptation occurs. The spread falls from USD 1.85 trillion in 2025 to just USD 827 billion by 2050, before crossing an inflection point near 2085 when the positive balance turns negative at USD -325 billion, and ultimately declines to USD -691 billion by 2100 (**Figure 12**). This development corresponds to a decline in the share of global cities that maintain positive resilience spreads from 70% in 2025 to 49% in 2100. The global tipping point and decline in resilient cities signals that climate risks will increasingly outweigh the economic contributions consumers make through migrating or sustaining populations and that without significant adaptation, these dynamics will no longer be enough to ensure long-run positive economic outcomes across localities.

> The global tipping point signals that climate risks will increasingly outweigh economic contributions without significant adaptation.

Regional patterns, however, reveal the uneven distribution of erosion (**Table 1**). North America and Asia-Pacific account for the majority of early resilience capacity, together exceeding USD 1.6 trillion in 2025, but are projected to slip into negative territory by 2085, equaling USD -24 billion and USD -144 billion, respectively. Europe's resilience spread deteriorates even more rapidly, turning negative by 2055 and falling to USD -285 billion by 2100. Latin America remains relatively stable, sustaining modestly positive spreads through the end of the century, while MENA and Sub-Saharan Africa maintain only small positive cushions, characteristic of their lesser GDPs.

Year	North America	Asia-Pacific	Europe	Latin America	MENA	Sub-Saharan Africa	Total
2025	892	704	171	38	27	17	1,850
2030	815	596	124	40	26	15	1,616
2035	768	535	103	41	25	14	1,486
2040	716	464	80	42	23	13	1,339
2045	541	343	29	40	21	12	986
2050	479	272	3	41	20	11	827
2055	415	201	-28	41	19	10	658
2070	244	37	-108	39	18	8	237
2085	-24	-144	-211	33	15	6	-325
2100	-168	-281	-285	26	12	4	-691

Table 1. Regional Resilience Spread Outcomes from 2025 to 2100
Note: Values in billions of 2024 U.S. dollars.

Put differently, the mounting strain of climate risk on consumer confidence and municipal adaptation capacity is projected to erode more than $2.5 trillion in global economic productivity over the next 75 years (in nominal terms), as the global resilience spread continues to narrow, equivalent to more than 2% of today's global GDP. This estimate reflects only indirect economic losses, excluding the direct damages to property, infrastructure, and other tangible assets that would further deepen the total impact. For governments, this underscores the urgency of investing in adaptation to preserve fiscal stability and competitiveness; for investors, it highlights the growing importance of directing capital toward markets and assets with genuine climate resilience.

Variations in Market Resilience Across Growth Trajectories

In addition to measuring how macroeconomic resilience to climate risk changes over time, First Street identified six distinct growth patterns that define each market's resilience trajectory and the evolution of its resilience spread.

These six patterns are governed by population migration dynamics, and the resilience spread shifts accordingly such that local economies gain or lose productive capacity as populations relocate. In this way, each growth pattern not only marks the direction of demographic change but also indicates the velocity at which climate risk is reshaping a given area's economic resilience.

01 Expanding Markets
Strong and rapidly increasing in-migration, even in the face of rising climate risk.

02 Maturing Markets
In-migration continues, but the pace of growth begins to flatten as climate impacts accumulate.

03 Recovering Markets
Past out-migration begins to reverse as underlying economic conditions or reduced climate impacts restore growth.

04 Softening Markets
Growth slows toward eventual decline as climate pressures begin to outweigh local economic amenities.

05 Stabilizing Markets
Out-migration persists, but the rate of decline eases, suggesting potential stabilization.

06 Contracting Markets
Weak baseline economic conditions combine with worsening climate impacts, driving faster and sustained out-migration.

Image: *Miami, FL*

Image: *Sydney, AUS*

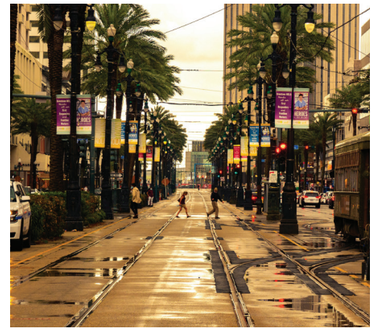


Image: *New Orleans, LA*

Image: *London, GB*

Image: *Shanghai, CN*

Image: *Johannesburg, ZA*

Breaking out the trajectory of market resilience in this way provides a practical framework for key stakeholders to anticipate and respond to climate pressures.

For municipalities, it highlights how climate-adjusted migration patterns may translate into indirect economic strain on housing, services, and tax bases, underscoring the urgency of adaptation planning and investment.

For investors, these trajectories provide a roadmap for timing entry and exit across markets. Expanding markets reward earlier entry and longer holds as rising populations sustain durable demand, for example, while softening markets warn of lessening demand and potential valuation pressure, making shorter hold periods prudent. At the other extreme, contracting markets carry the greatest risk of devaluation and illiquidity, favoring defensive positioning or early exits well before a 10- to 30-year horizon. **Figure 13** offers a conceptual illustration of these growth trajectories and market dynamics.

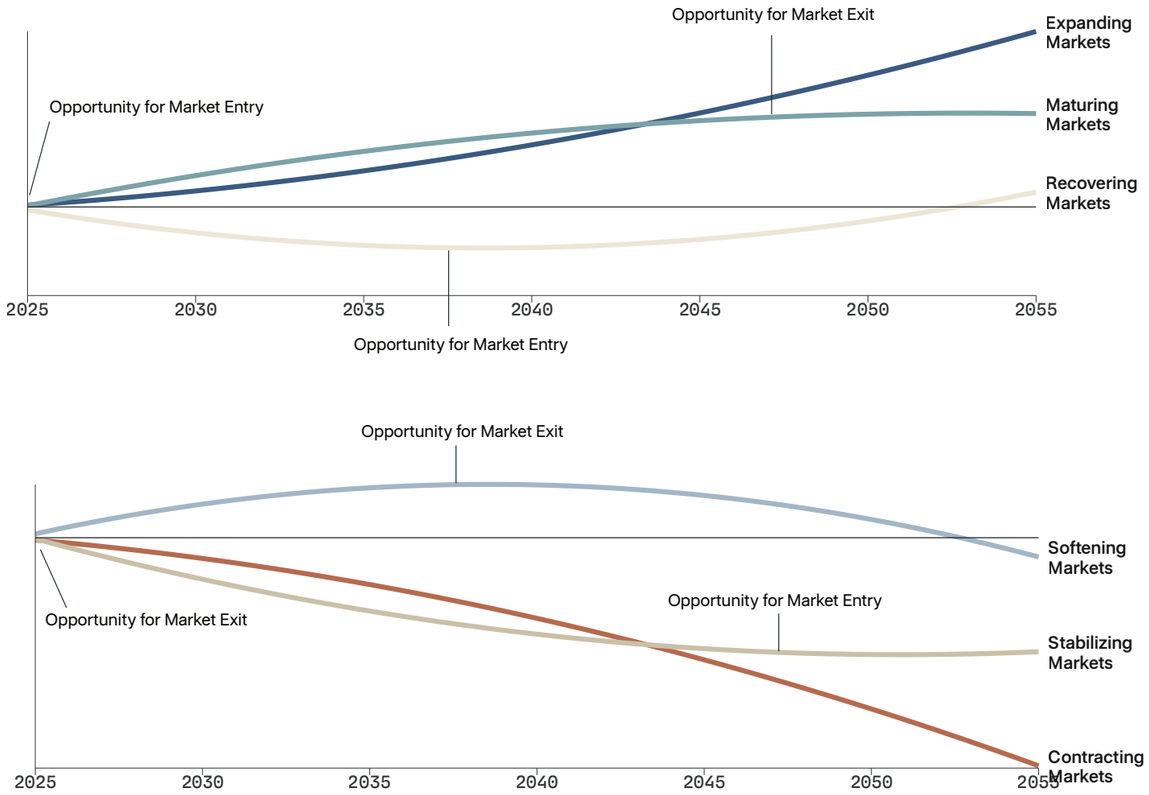


Figure 13. Resilience Spread Growth Trajectories
Note: Trajectories are conceptual and represent the general trend line exhibited by localities in each category.

Income Patterns

Higher-income cities:
Slower growth & contraction

Lower-income cities:
Faster growth paths

Across the 426 global cities analyzed, maturing markets are the most common trajectory,accounting for more than half of all markets (**Figure 14**). These are generally higher-income cities, averaging USD 43,400 in GDP per capita and USD 185 billion in output, reflecting the steady deceleration typical of mature economies.

By contrast, only 9% of cities are expanding markets, largely situated in emerging regions where GDP per capita averages just USD 9,700, consistent with rapid population growth and development.

Tipping-point markets are rare, with just 8% of cities shifting between softening and recovery and vice versa. Among the tipping point trajectories,4% are softening and are characterized as the wealthiest of all patterns (averaging USD 65,700 per capita GDP), demonstrated by places like Miami where rising seas and acute climate risks threaten long-term growth.

Conversely, recovering markets tend to be located in the poorest cities, where GDP per capita is just USD 5,700. Among markets already in decline, 16% are stabilizing and slowing their losses, while 14% are contracting and facing accelerating downturns.

Distribution Overview

Maturing	**53%**
Stabilizing	**16%**
Contracting	**14%**
Expanding	**9%**
Recovering	**4%**
Softening	**4%**

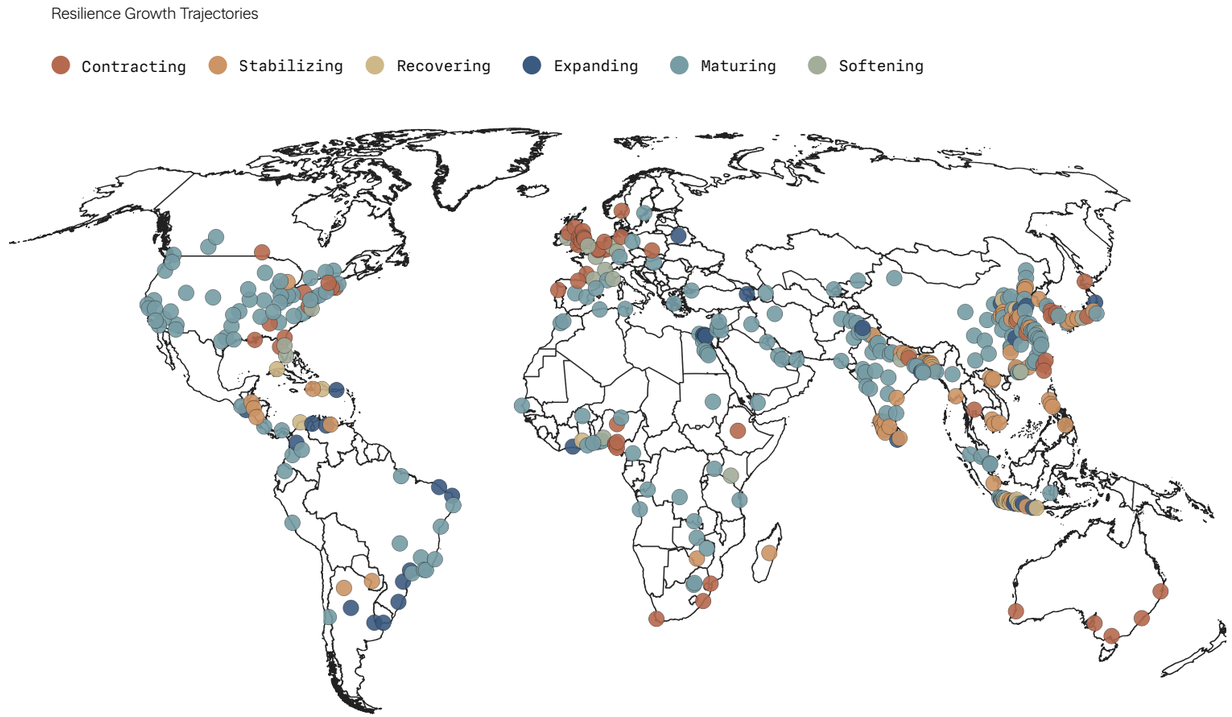


Figure 14. Resilience Spread Growth Trajectories Across Global Cities with 1M+ Residents
Note: Cities within conflict zones or countries at war are excluded from this part of the analysis

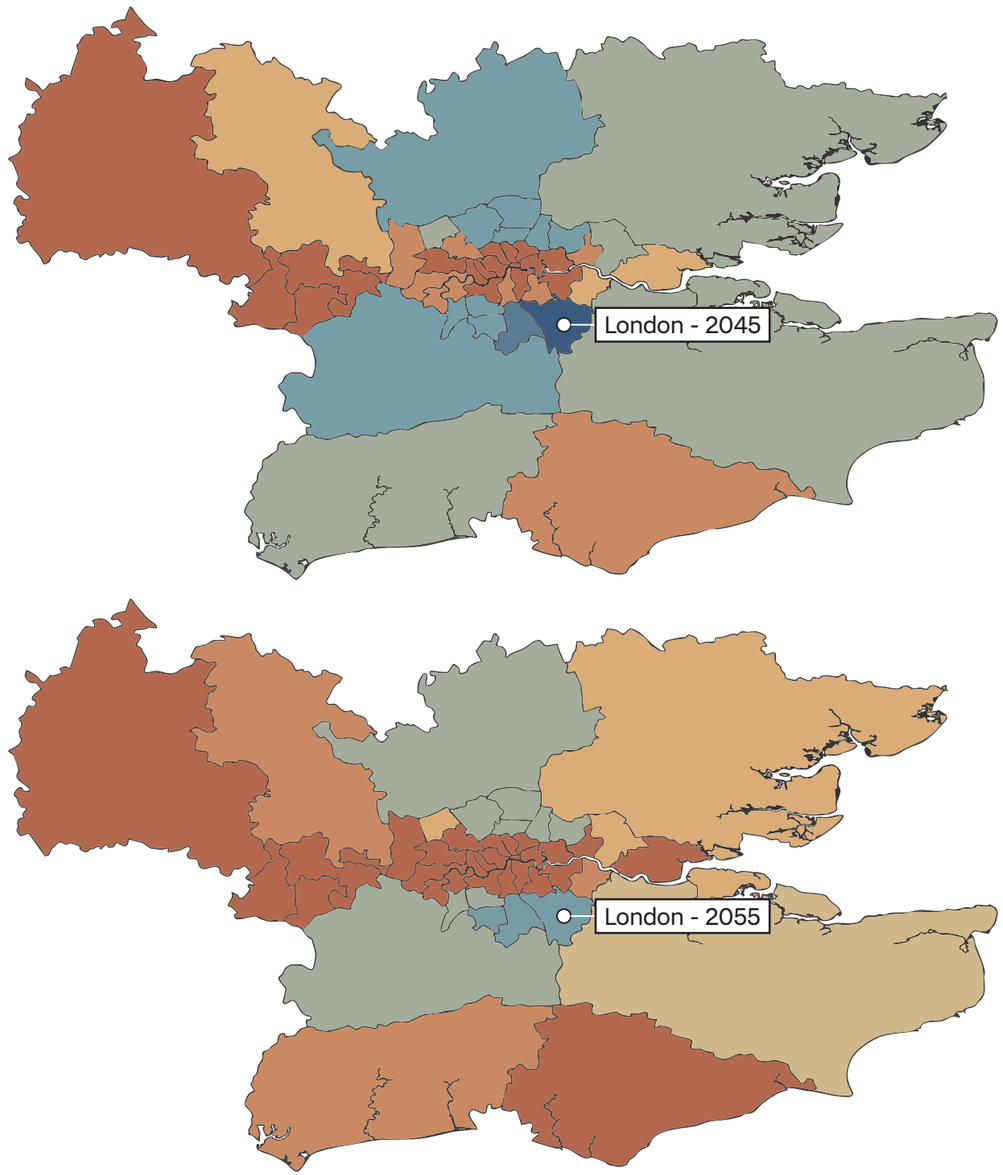
Resilience to Climate Risk Looks Different Within Markets as Well as Across Them

Even in markets with projected losses in resilience or growing negative resilience spreads, outcomes can vary across neighborhoods and sectors, requiring deeper within-market analysis.

These local dynamics reveal how climate risks vary at a granular, spatial level between nearby or similar properties. When combined with underlying macroeconomic conditions, this means some regions face higher risks and weaker economic positions, while others continue to attract people and grow thanks to stronger fundamentals or lower climate exposure.

London illustrates this nuance: while the city as a whole is projected to see a net negative resilience spread by 2055, a neighborhood-level analysis reveals pockets of resilience where certain districts and surrounding communities are expected to maintain desirability over the next three decades (**Figure 15**). Similarly, other neighborhoods face worse impacts than others, highlighting the importance of granular geographic analysis of risk.

Figure 15. London Sub-Market Climate-Macro Resilience Spread



It's important to note that these current projections are modeled without assuming new adaptation measures. Specific to London's case, the city government is enacting significant adaptation plans that, if implemented in time, could materially change London's exposure. Under the Thames Estuary 2100 plan, for example, flood walls east of the Thames Barrier through Kent and Essex are being raised by 0.5 metres by 2040, with central London defences upgraded similarly by 2050 (Euronews, 2024). However, projections of climate risk suggest that by 2035, the waterfront neighborhoods of London could already experience negative impacts.

Market Resilience Lies at the Intersection of Climate Risk and Economics

Climate resilience cannot be understood through hazard exposure alone. The resilience of cities is determined at the intersection of climate risk and economic fundamentals, creating a gap between consumer optimism, supported by favorable macroeconomic conditions, and the drag imposed by climate-related risks.

The "resilience spread" illustrates this relationship, revealing why some markets sustain growth under pressure while others falter.

Today's global resilience spread of USD 1.8 trillion illustrates that, on average, strong macroeconomic conditions and consumer confidence continue to offset the drag of climate hazards. But this cushion is not permanent. Without significant adaptation, the spread is projected to erode steadily, tipping negative before the end of the century as climate pressures intensify faster than foundational macroeconomic conditions.

Crucially, the findings show that high climate risk does not automatically render a market unattractive. Many of the world's most economically productive cities remain hubs of growth despite sitting in the top quartile of acute risk. At the same time, emerging markets with fewer acute shocks and see their resilience spread remain over the century, while many wealthier markets see it decline and even tip negative.

High climate risk does not automatically render a market unattractive. Many of the world's most productive cities remain hubs of growth despite sitting in the top quartile of acute risk.

For policymakers, this means prioritizing forward-looking adaptation to preserve competitiveness and protect tax bases. For investors, it means recognizing that resilience spreads are dynamic, as market attractiveness can shift rapidly if climate stressors accelerate unchecked.

Ultimately, resilience is a moving balance sheet of climate pressures and economic strengths, and the future geography of global prosperity will be defined by how well cities manage both sides of that ledger.

First Street

Global Climate Analysis: THE RESILIENCE SPREAD