

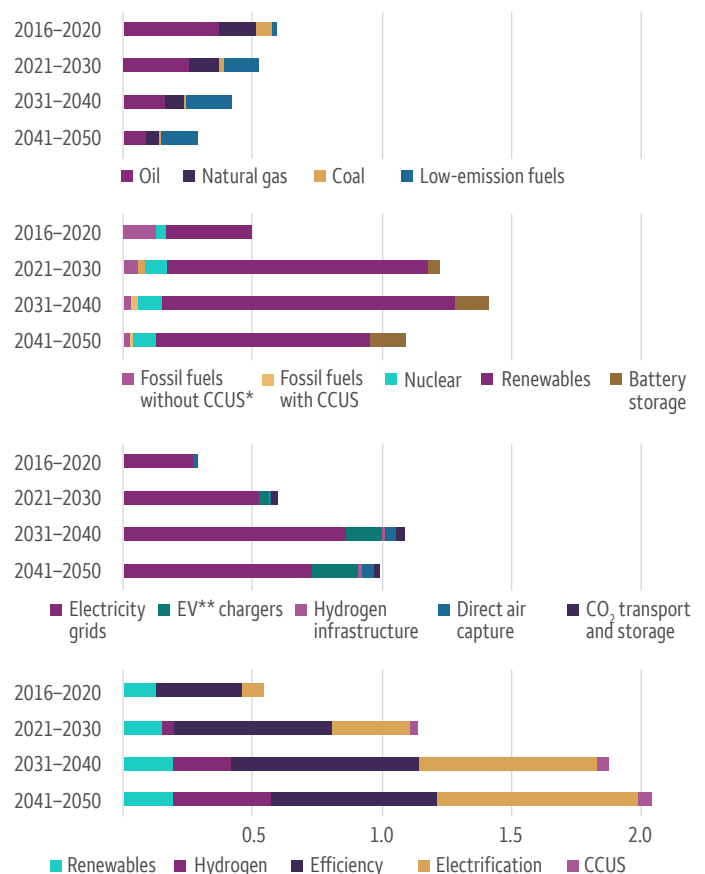
INVESTMENT PERSPECTIVES

Climate change's impact on global banks: A matter of degrees

Executive summary

- **The market is striving to make sense of climate change's implications for banks.** So far, these analyses have had surprisingly little impact on investment opinions.
- **Allspring's Climate Change Working Group (CCWG) expects climate change to increasingly affect bank stocks and bonds.** We see three trends in particular:
 1. **Higher risk.** Climate change is making the real economy—and, therefore, bank assets—riskier.
 2. **Higher near-term growth.** Climate investments likely will expand banks' opportunity set because hundreds of trillions of dollars must be invested if Paris goals are to be met. This is the case even if climate change may inhibit long-term growth.
 3. **Fatter tails.** Our analysis suggests the ability to manage climate risks varies greatly among firms. This will likely increase dispersion in bank security values over time.
- **We've applied Allspring's Climate Transition Framework to Standard Chartered plc to illustrate the potential for outperformance.** It's possible for firms to balance societal responsibility, risk discipline, and financial innovation—including securitization and risk transfer—despite greater potential for loss in climate-induced financial crises.

Figure 1. Global average energy investment needs may total more than \$150 trillion through 2050



*CCUS = carbon capture use and storage

**EV = electric vehicle

Source: International Energy Agency

Climate risks' impact on investment views: All bark and no bite?

The financial community invests extensive time and effort into understanding the impact of climate change on banks. The mountains of investment research we've seen on the topic make this clear. The research focuses on loan-book exposure to emissions-intensive industries, the ability of banks' balance sheets to absorb loan losses, and the credibility of commitments to decarbonize portfolios (among other factors). The main objective of this work is to better understand how corporate responsibility, sustainability, and climate strategy will potentially affect banks' operations and reputations and, ultimately, their fundamentals and stock and bond values.

It's therefore surprising that climate risks have little or no discernible impact on analysts' bank valuations. In published reports, we've so far found no explicit linkage to share-price targets or relative bond valuations. For example, concerning Standard Chartered, these are the most prevalent valuation methodologies publishing analysts have used:

- Price/net tangible asset value
- Sum of the parts using price/earnings at division level
- Gordon growth model
- Return on tangible equity/cost of equity

Bank equities tend to primarily be valued using price/net asset value (NAV) and/or price/cash flow-based multiples. Dividend-based models are also relatively common. Each of these approaches depends on forward-looking assumptions for risk premia and growth. But in the case of Standard Chartered and many other banks, none of the risk premia or growth assumptions we reviewed clearly incorporated the role of climate risks. Further, none of the associated notes' valuation-risk sections referred to climate risks. The main reasons for these conspicuous absences appear to be:

- The COVID-19-driven downturn on the macro backdrop, including near-zero interest rates, has dominated the market's attention.
- Analysts have struggled to see material impacts on banks' performance over conventional one- to three-year forecast horizons.
- Longer-term risks and opportunities related to climate change are too remote in probability and time to be easily modeled or captured with growth and risk-premium assumptions.

Figure 2. The COVID-19-driven downturn severely hurt bank stocks, which have continued to lag the S&P 500 Index



Sources: Allspring and Bloomberg. Past performance is not a reliable indicator of future results.

Higher-risk premia: Funding costs rise as climate change proceeds

We believe climate change, if not addressed expediently, may make the economy riskier by increasing idiosyncratic and systematic risks (including systemic risks).

Because banks' risks track the economy's risks, climate change may cause banks' weighted average risk premia to rise. This rise may be accompanied, at the firm level, by greater dispersion in risk premia across banks. For example, emerging markets are disproportionately exposed to climate change's physical risks and often to transitional risks via fossil fuel dependence. Stronger risk management and increased capital requirements could partially offset this increase if managed well. But, we have concerns that regulatory intervention may unintentionally and negatively affect bank fundamentals.

At a high level, we think of systematic and systemic risk as follows. Systematic risk is correlated with the economy and therefore not diversifiable. Systemic risk threatens the whole system. Systemic risks usually are systematic, but not all systematic risks are systemic.

With its increasingly pervasive physical, regulatory, and market transition effects, climate change is a systematic risk across the economy, according to the Sustainability Accounting Standards Board (SASB). The SASB believes climate risk will continue to affect global energy prices, agricultural productivity, human health and migration, and gross domestic product (GDP). While climate change affects each sector differently, almost no industry is immune. In contrast, the SASB notes a growing body of research suggests that climate change has the potential to be a systemic risk via two channels:

- **Regulatory and transition risks could shift rapidly in energy usage and repricing of assets.**
This shock could impair financial assets and propagate crises throughout the financial system and wider economy.
- **Physical impacts may cause financial losses significant enough to cripple the economy.**
Examples could include catastrophic incidents or a more gradual process over time as temperatures simply rise too much to avoid financial crisis.¹

A riskier economy may make banks riskier and fundamentally weaker.

In our view, financial stability enhances global economic and bank fundamentals. There's a strong basis for this belief. Empirical evidence suggests higher bank capital is associated with higher lending, higher liquidity creation, higher bank values, and higher probabilities of surviving crises.² Correspondingly, research suggests lower capital in banking leads to higher systemic risk and a higher probability of a government-funded bailout that may elevate government debt and trigger sovereign debt crises. The more highly leveraged the banking system, the greater the systemic risk and the more likely that banks will make correlated asset choices and fail together. Many economists have argued that such widespread failures would require affected sovereign governments to rescue the failing banks. These rescue attempts, however, would in turn likely increase the affected governments' indebtedness and expected taxes as well as negatively affect real economic productivity and growth.³

1. Climate Risk Technical Bulletin, Sustainability Accounting Standards Board, October 2016, pp 8 and 9.

2. "Bank Capital and Financial Stability: An Economic Trade-Off or a Faustian Bargain?" Anjan V. Thakor Olin School of Business, Washington University in St. Louis, p 1.

3. Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. "The Aftermath of Financial Crises." *American Economic Review*, 99 (2): 466-72.

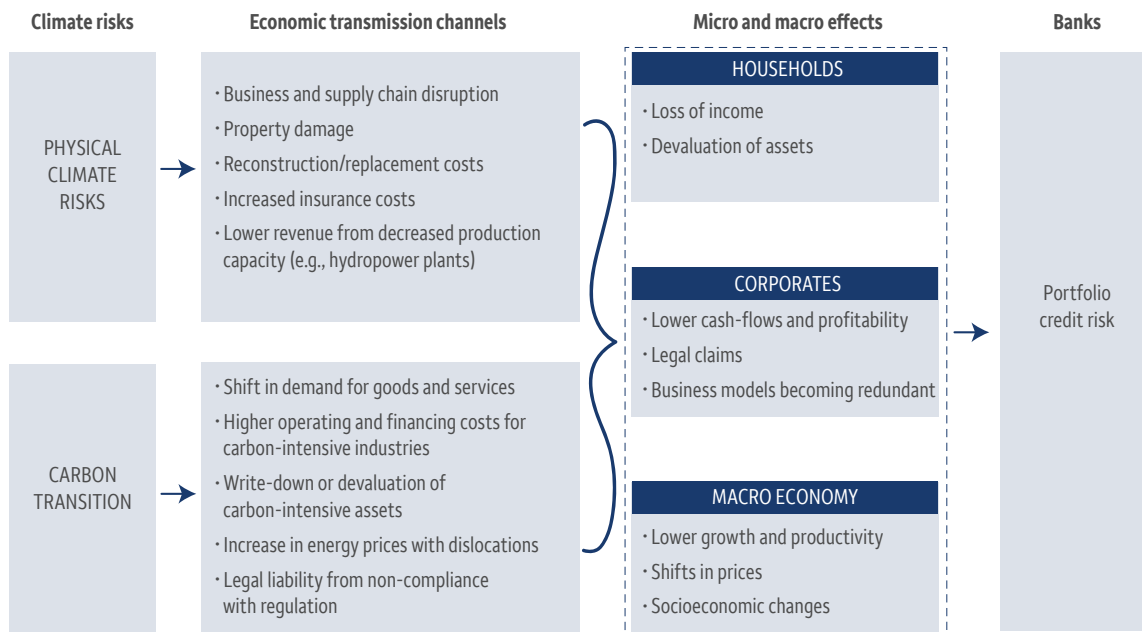
Instead of providing banks with stability, booms and busts make banks' fundamentals more volatile, stunt their growth, and challenge long-term value creation. Over the past eight centuries, there's been a recurring pattern of high leverage in financial institutions that facilitates rapid growth in bank lending and fuels asset price bubbles that precipitate financial crises when they burst. Financial institutions seem to have incentives to take on too much risk.³ This contributes to banking crises that are extremely costly for society.

Banks' role in maturity transformation and their dependence on depositors' confidence make them particularly vulnerable to crises. Savings and demand deposits transform to longer-term direct loans to businesses with considerably more risk. In normal times, banks hold more than enough liquid resources to accommodate withdrawals. But during crises, withdrawals build momentum, and banks are forced to liquidate assets at discounted prices to meet withdrawal demands. This challenge can extend from loans to a far broader range of assets during crises. Moreover, large banks often hold assets in similar risk categories—for example, many were invested in leveraged real estate during the 2007–2009 financial crisis. This trend can be exacerbated if banks seek safety using “too many to fail” logic.

Moody's Corp. has corroborated regulators' concerns that climate change may threaten bank fundamentals.

“ Climate change is creating operational and strategic challenges for banks globally as governments move towards low-carbon economic models, and as physical climate risks become more acute. Banks need to adapt to rapid shifts in the technological, political and regulatory environment, and in stakeholder behaviour, as well as to more adverse climate conditions. This adds to the industry's other challenges, such as those posed by digital innovation. Banks must apply climate criteria across their lending and investment decisions to take advantage of new opportunities. They must also learn to manage emerging risks as climate change disrupts the economy, erodes corporate revenues, and triggers regulatory changes that may affect bank credit quality. Banks can to some extent anticipate these threats and guard against them through forward-thinking risk management and strategic action. However, lenders that are slow to adapt face negative financial and reputational consequences that will erode their credit strength. ”⁴

Figure 3. Climate change may increase bank risk through multiple economic transmission channels



Source: Moody's

4. "Climate Change to Force Further Business Model Transformation for Banks," Moody's Investors Service, Alberto Postigo, April 20, 2021, p 1.

Riskier investments may drive funding costs up and security values down.

If bank assets become riskier, bank funding costs could rise on a weighted-average basis. Higher funding costs may be accompanied by greater dispersion in funding costs across banks. For example, emerging market banks with concentrated exposures to physical and energy transition risks may see funding costs rise disproportionately relative to banks with limited exposures. Funding costs have direct implications for equity and credit security values. All else being equal, higher required returns reduce value.

Several factors may help contain the cost of equity, at least for some banks. European regulators are considering higher capital requirements to accommodate climate risks. Further, if banks demand higher margins on lending and other activities, they may be able to retain capital, strengthen their balance sheets, and moderate any increase in cost of equity. As promoted by the United Nations Environment Programme Finance Initiative and its Principles for Responsible Banking, banks could also direct lending away from fossil-exposed industries in an attempt to de-risk investment portfolios. Loan-book decarbonization is indeed a hot topic for global banks today.

We expect bank regulators globally to consider higher bank capital requirements as a means to contain climate-driven systemic risk. Until the 2007–2009 global financial crisis, the main focus of prudent regulation was to contain risk-taking at the individual bank level. Since then, though, the focus has evolved toward containing system-wide risk-taking. Today, financial stability remains a ubiquitous theme in the initiatives of the regulators of the world's largest banks—including the Federal Reserve, the Bank of England, and the European Central Bank (ECB), as well as regulators in emerging economies. As discussed above, bank regulators have conducted extensive analyses into the potential costs of climate change for banks and economies. These analyses are in the early stages and lack desired data. The consensus is that costs are contained in likely outcomes, but tail risk will be considerable and potentially catastrophic. Momentum seems to favor higher capital requirements as a means to protect against systemic shocks created by climate risk.

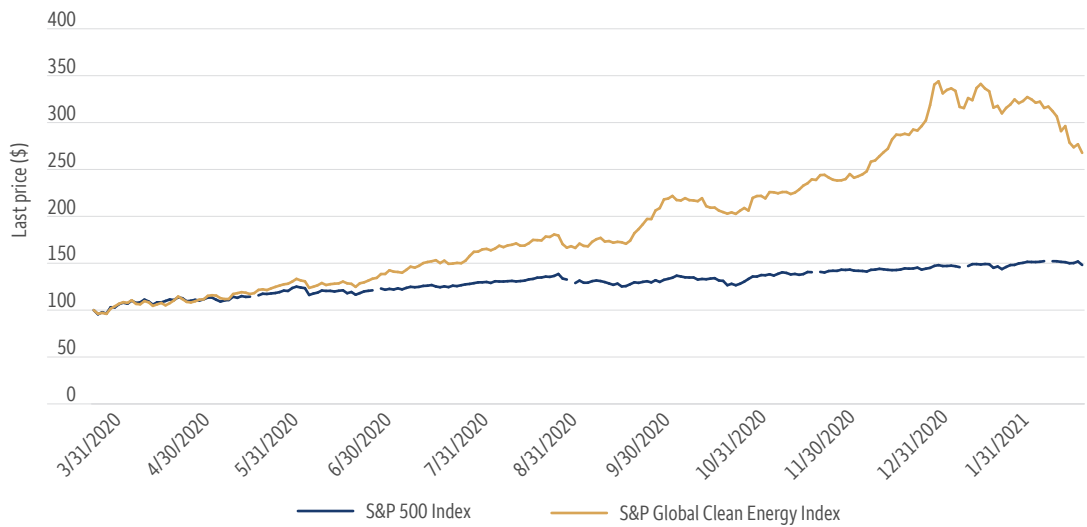
Regulators' assessments of banks' sustainability strategies, at the board and senior management level, are gaining traction. The Bank of England's Prudential Regulation Authority has incorporated sustainability into its senior managers' regime. The European Banking Authority has published plans to incorporate climate and other environmental, social, and governance (ESG) factors into its regulatory framework by 2025. Policymakers seem likely to require disclosures including standardized climate risk exposures, sector measurement parameters, and long-term transition paths. Given this focus, banks have progressed in building the capabilities and data sets needed to understand the risks on their balance sheets and have shifted climate-risk discussions to the board level. We expect these trends to broaden outside of Europe.

Beware of regulatory intervention.

We see risk in regulatory strategies that could unintentionally incentivize banks to excessively concentrate holdings in green assets. While redirecting capital investment to decarbonization and adaptation is essential to contain warming, regulators will need to think carefully about how best to avoid markets' imbalances in the process.

Consider recent flows into “sustainable” exchange-traded funds (ETFs). It appears that too much capital chasing too few green assets can potentially cause price dislocations. Asset values at times have appeared technically inflated beyond what their fundamentals can support. Figure 4 highlights the marked outperformance of clean-energy ETFs relative to energy sector indexes in recent years. Although we would expect banks to maintain discipline in their underwriting decisions at times of lofty valuations, past cycles suggest pressure to boost returns can be extreme and lead to severe losses.

Figure 4. Recent green stimulus and ESG fund inflows may be creating a bubble in some clean energy sectors

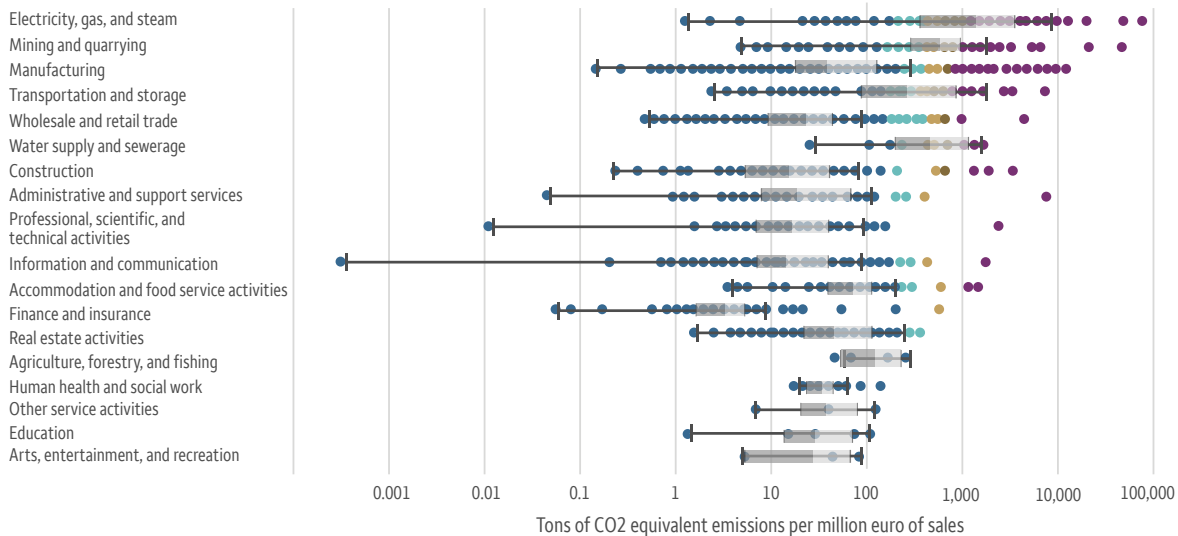


Sources: Allspring and Bloomberg. Past performance is not a reliable indicator of future results.

On a related point, Moody’s questions regulators’ arguments that green assets should benefit from lower charges for risk. Such charges could cause banks to hold less capital against green assets than what’s justified by their credit risk, according to the rating agency. Similarly, mandatory green lending requirements could incentivize less rigorous loan underwriting. One way to mitigate this risk would be to allow banks to adapt gradually and reduce pressure to comply quickly, according to Moody’s.

Figure 5. Banks must look beyond high-emitting industries to understand climate risk exposures

Dispersion of emission intensities both within and across economic sectors



Source: ECB

Industry-led initiatives committed to achieving net-zero emissions are now collaborating to address these risks. The Glasgow Financial Alliance for Net Zero (GFANZ), chaired by Mark Carney, comprises more than 160 firms—responsible for \$70 trillion in assets—that aim to decarbonize the global economy by no later than 2050.

All GFANZ member alliances must:

- Be accredited by the UN’s “Race To Zero” campaign
- Use science-based guidelines to reach net zero
- Cover all emission scopes
- Use 2030 interim target setting
- Commit to transparent reporting and accounting

GFANZ will be joined by 43 banks from 23 countries (with assets of \$28.5 trillion) that today form the Net-Zero Banking Alliance (NZBA). The NZBA is convened by the UN Environment Programme (UNEP) Finance Initiative and co-launched by HRH The Prince of Wales’ Sustainable Markets Initiative’s Financial Services Taskforce.⁵

Higher growth: Climate investments expand banks’ opportunity set

Most published analyses focus on the tremendous costs climate change may have on GDP. Mark Carney, for example, cites estimates that 15% to 30% of global GDP may be forgone due to climate change in business-as-usual scenarios. Carney also emphasizes serious limitations inherent in these estimates, partly due to their failure to consider how society responds to climate change.⁶

In this section, we take society’s responses into account, starting with the likely massive scale of investment. In our view, this expectation—combined with the extensive innovations that attracting this funding will require—should lead to an expansion of banks’ opportunity set across the value chain. This expansion could potentially bolster bank earnings growth for quite some time. This doesn’t mean climate change’s long-dated physical effects won’t eventually hamper growth. They might. Instead, the point is that the initial impact of nearer-term spending appears positive.

Decarbonization investments may total more than \$150 trillion through 2050.

The International Energy Agency (IEA) estimates the world needs to spend \$150 trillion by 2050 on clean energy supply alone. This amount—nearly double the current investment in conventional energy—excludes any funding required to retool energy consumption, which could be comparably expensive.

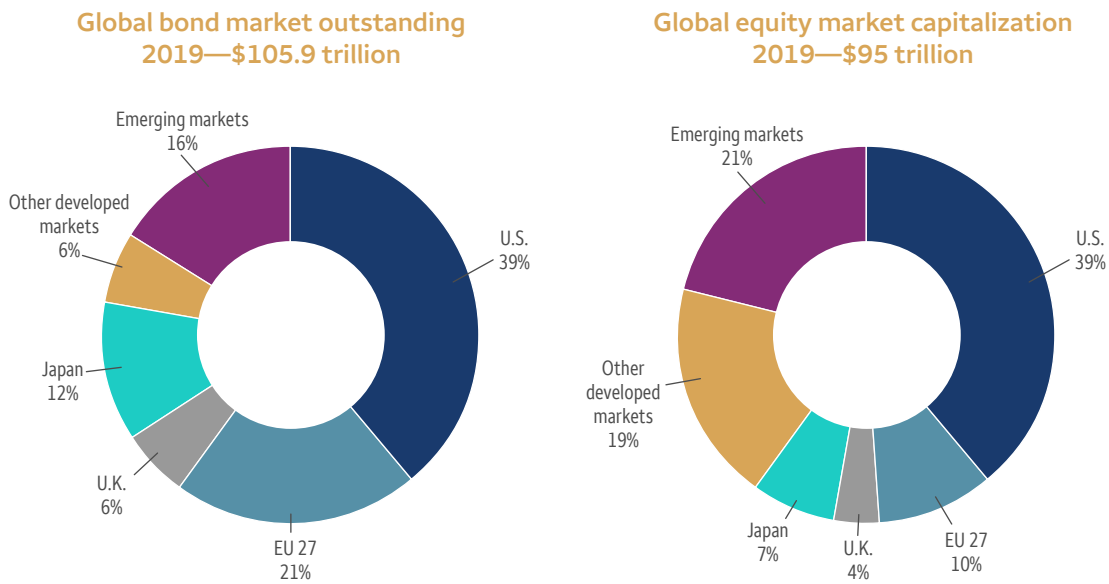
5. “New Financial Alliance for Net Zero Emissions Launches,” United Nations, April 21, 2021.

6. “Value(s): Building a Better World for All,” 2021, by Mark Carney, p 280.

If these figures seem unrealistically high (they initially did to us), consider the profound scale and scope of decarbonization: Roughly 85% of global GDP currently depends on fossil fuel consumption, and decarbonization requires replacing the vast majority of this on an accelerated scale. Even if there were no incremental premia required for green energy systems (and there are), there isn't enough time to reach Paris-aligned policy goals by simply replacing a physical asset stock at the end of its useful life. To achieve warming objectives, extensive replacement needs to occur now. The scale and speed required suggest the IEA estimates' order of magnitude is realistic for meeting Paris Accord goals.

Context highlights the huge scale of this investment. Figure 6 shows that the total values of global equities and global bonds were \$95 trillion and \$106 trillion, respectively, as of September 2020.⁷ Granted, these are measures of stock and not flow (GDP is flow). Nonetheless, decarbonization expenditures represent a major opportunity for financiers.

Figure 6. Climate-driven investment needs are large relative to the sizes of today's capital markets



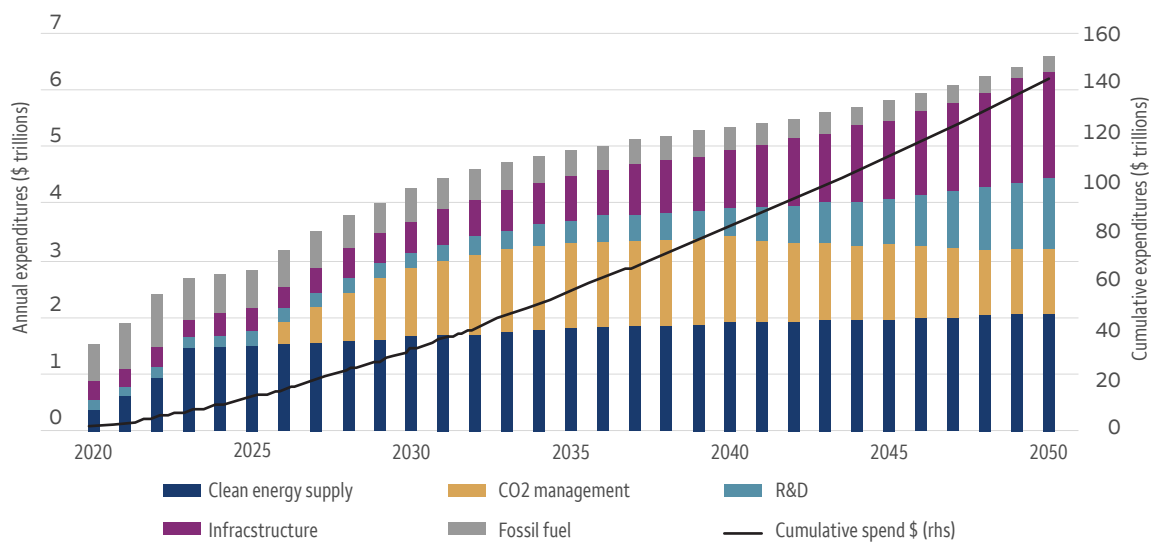
Sources: Allspring and Securities Industry and Financial Markets Association (SIFMA)

Several heads of state have recently heralded the grand scale of these investments. U.S. President Joe Biden compared the transition away from fossil fuels to a “fourth industrial revolution.” Even if some of this investment may have occurred without climate change, a large portion would surely be incremental and accelerated compared with what it would have been in a business-as-usual scenario. This scenario would also be likely to boost job creation. According to Climate Action Tracker, 131 countries responsible for 74% of global greenhouse gas have or are considering net-zero targets with positive implications for job creation.⁸

7. 2020 Capital Markets Fact Book, SIFMA, September 2020, p 7.

8. Warming Projections Global Update, p 2, Climate Action Tracker, May 2021.

Figure 7. The IEA estimates decarbonization-related funding needs for energy supply at \$150 trillion through 2050



Sources: IEA World Energy Investment 2020 and UBS Securities

Adaptation expenses could rival those of decarbonization.

Estimates of adaptation funding needs vary but are generally measured in \$100 billion multiples. For example:

- The World Bank estimates developed markets’ annual adaptation funding needs range from \$94 billion per year, and the UN Development Programme estimates the same at \$86 billion per year.
- The IEA estimates an adaptation funding need of \$90 trillion globally between 2015 and 2030.
- The UNEP in 2016 estimated costs of \$140 billion to \$300 billion per year for developing countries, rising to \$280 billion to \$500 billion per year by 2050.⁹
- The Global Commission on Adaptation (GCA) has argued that investing \$1.8 trillion in five areas—early-warning systems, climate-resilient infrastructure, improved dryland agricultural crop production, global mangrove protection, and water security—could generate \$7.1 trillion in total net benefits.¹⁰

9. Adaptation Gap Report 2018, United Nations Environment Programme, p xiii, December 2018.

10. “Adapt Now: A Global Call for Leadership on Climate Resilience,” p 10, Global Commission on Adaptation, September 2019.

What are adaptation and resilience?⁹

Adaptation in human systems is the process of adjusting to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities. In natural systems, it's the process of adjustment to actual climate and its effects. Human intervention may facilitate adjustment to expected climate.

Resilience is the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance. It includes responding or reorganizing in ways that maintain a system's essential function, identity, and structure while also maintaining the capacity for adaptation, learning, and transformation.

Adaptation investments include activities ranging from strengthening early warning systems, making new infrastructure resilient, improving crop production, protecting mangroves, and making water resources more resilient. These activities deliver a range of benefits. The GCA identified three categories:

1. Avoiding losses of lives and assets—for example, as a result of early-warning systems for storms or heat waves
2. Positive economic benefits—for example, reduced flood risk in urban areas, leading to broader economic investments
3. Social and environmental benefits—for example, resulting from coastal protection measures like green spaces for flood protection, which in turn improve community cohesion and quality of life¹¹

Banks' involvement in adaptation funding is currently limited. United Nations Framework Convention on Climate Change programs are the primary source. Governments and development banks provide the bulk of investments. Insurance and reinsurance companies are also essential enablers as risk transfer is needed to manage weather risks. Going forward, private capital will be crucial to expand funding and help societies adapt.

Bank growth opportunities extend well beyond lending.

Direct lending for decarbonization and adaptation is probably the most obvious growth opportunity for banks. This category includes lending to infrastructure-related firms like utilities, transportation firms focused on rail and autos, and technology firms enabling the electrification of the economy. It also, on a greater scale, includes residential and commercial mortgage markets whose heating and cooling investment needs may rise sharply. New York is one of several cities enacting stricter standards for energy and water efficiency for commercial and industrial properties.

But the world will need to look far beyond bank lending to fund alignment with the Paris Accord. Financial needs are far too great for bank balance sheets to handle it all. But banks will need to play a primary role in enabling investment by others by advising, structuring, securitizing, underwriting, syndicating, and managing nonbank capital to allow for the necessary investments. All of these activities can represent growth opportunities.

11. "Climate Risk and Response," McKinsey Global Institute, p 92, January 2000.

Broader and deeper pools of capital will be needed. Consider, for example, a port in Jakarta. Local government debt capacity is limited. Such projects could benefit from raising secured debt, but sovereign and climate risks have thus far dissuaded the bulk of investors from prioritizing such projects. Standard Chartered plc, in a recent survey of 500 large asset owners, identified a clear bias for developed market over emerging market risks.¹²

How can banks innovate new financial products and services to address this situation?

- **Transferring some climate risk to specialized markets** would allow available financial resources to expand substantially. There's increasing demand globally for targeted green investments that are difficult to access through diversified corporations' equities and credit securities, which often include undesired brown exposures.
- **Securitizing green investments** can simultaneously expand borrowers' debt capacity and connect borrowers with growing sources of demand. We see a large-scale opportunity for new forms of securitization and risk transfer in emerging markets especially and in climate-exposed developed markets as well.

Climate risks can have strong appeal as an alternative investment category. These risks are generally uncorrelated with equity risks. Further, climate-risk markets are still very small in comparison with real estate, fixed income, equity, and other markets. This growth potential is a primary focus for reinsurers and alternative investors today. Banks may be well positioned to assist in developing these markets.

Reinsurers and derivative brokers already provide a broad range of risk-transfer products for infrastructure and commodity investments with climate exposure. Insurance contracts are a common example. Weather derivatives also may prove useful in making such investments appealing to global markets. The weather derivatives market appears to have striking growth potential:

- The Potsdam Institute for Climate Impact Research has concluded that “day-to-day variations in temperature, i.e. short-term variability, has a substantial impact. If this variability increases by one degree Celsius, economic growth is reduced on average by 5 percentage points.”¹³ The National Center for Atmospheric Research commissioned a study estimating a production gap of more than 3% of GDP—the equivalent of around \$500 billion—between the year in which the weather was most favorable for business and the year in which it was least favorable.
- It's likely that the firms best equipped for managing weather risk operate outside the futures markets. It may be that reinsurance companies and investment funds, using customized over-the-counter derivatives, may be best positioned to manage weather risk.¹⁴

12. “The \$50 Trillion Question,” Standard Chartered plc, web-based interactive report, p1.

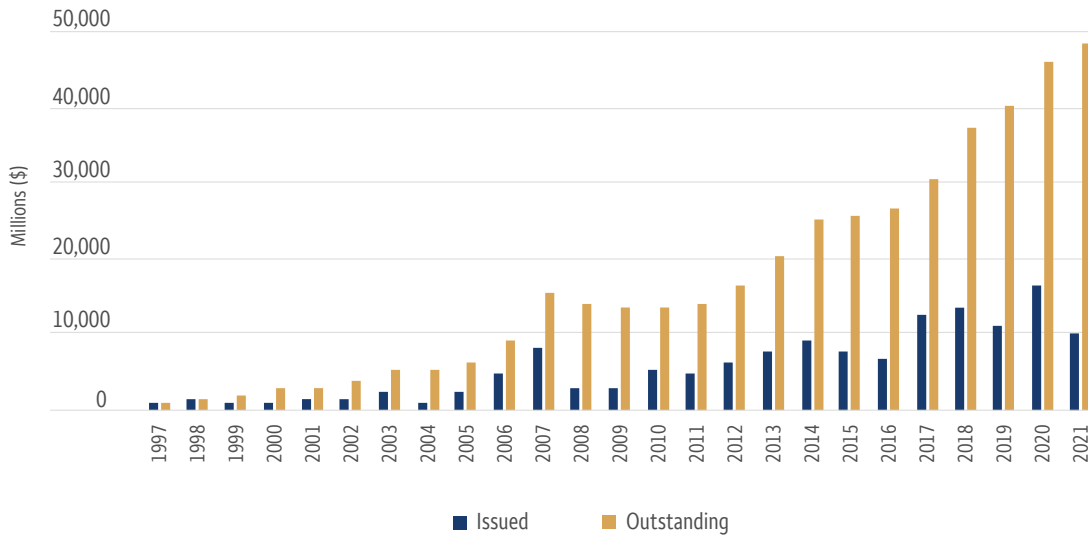
13. “Climate Change: Erratic Weather Slows Down the Economy,” Potsdam Institute for Climate Impact Research, February 8, 2021, p 1.

14. “Why Haven't Weather Derivatives Been More Successful As Futures Contracts? A Case Study,” Hillary Till, *Journal of Governance and Regulation*, Issue 4, 2015, p 4.

Banks can play a valuable role in risk transfer at the sovereign, company, and project levels. Distinctions between services provided by insurance companies and banks—and risk-transfer products themselves—will likely blur, in our opinion. Further, banks and insurers will need to interact to deepen risk-transfer markets.

Figure 8. Risk-transfer markets may need to continue pronounced growth trends to meet climate needs

Catastrophe bond and insurance-linked risk capital: Issued and outstanding



Sources: Allspring and Artemis.bm Catastrophe Bond & Insurance-Linked Securities Deal Directory

Carbon emissions rights, offsets, and various other environmental markets will also be key enablers of decarbonization and adaptation. Besides providing the right economic incentives to public and private sectors, these markets can further enable derivative markets in risk transfer.

Pioneering transformational financial innovations is not new to the banking sector. This role is essentially as old as the banking industry itself. For hundreds of years, banks have played central roles in helping society respond to major events like wars and pandemics. The global economy’s transition away from fossil fuels and toward more climate-resilient infrastructure can be compared with wars and pandemics. All have profound impacts on the economy and the human condition.

The Medici family provided an early example by expanding trade in bills of exchange (a remittance and credit instrument that revolutionized trade) across Europe. At the end of the 13th century, following the transition from itinerant to permanent trading centers, new trade routes opened from Italy and the Low Countries. A dense network of merchant banks linked main trade centers and banking places of Europe—like Antwerp and Frankfurt—down to cities that included Lyon, Geneva, and Genoa. The bill of exchange had become the primary vehicle for trade.¹⁵

15. “The Ascent of Money,” Niall Ferguson, 2018, p 40.

Banks also helped change the face of Europe by greatly increasing loans to foreign kings, courts, and governments. These were often linked to war financings and were already an important part of the international financial landscape in the Middle Ages. For example, Italian bankers lent money to British kings in the 14th century, and Philip II of Spain borrowed from Genoese bankers in the 16th century. In the early 19th century, former European colonies in North and South America borrowed to finance wars of independence and consolidate new states. The Napoleonic wars depended on cross-border lending and ended with France raising funds in London to pay indemnities to Britain, Prussia Austria, and others after the defeat at Waterloo. Ever since the 17th century, war finance and other public expenses have almost always outstripped local tax bases and led to the accumulation of public debt. After many costly wars, the ratio of public debt to GDP exceeded 60% in many countries by the early 1880s.¹⁶

From the market's perspective, sustainability appears to have become a primary responsibility for banks. In a 2019 publication, the UNEP's Sustainable Finance Initiative published the following observations:

- 10 years after the start of the financial crisis, the banking industry is still trying to rebuild trust and increase engagement with clients, customers, and employees.
- The banking industry needs to define and affirm its role and responsibilities in shaping and financing a sustainable future.
- Change is happening. Our economies are becoming greener while Millennials are changing consumption patterns and business culture.
- The international community has defined our shared direction in the Sustainable Development Goals and the Paris Climate Agreement.
- To continue to play a central role in the 21st century, the banking industry has to show how it's meeting society's changing needs and demands.¹⁷

Fatter tails: Climate risks should drive increasingly disparate performance outcomes for banks

- All banks have exposure to climate's physical and transition risks. Some—especially those in emerging markets—face disproportionately high risks.
- We created Allspring's Climate Transition Framework to evaluate the sensitivity of firms' fundamentals and value to climate risks.
- In this case study, we illustrate valuation implications by applying our climate transition framework to emerging markets-focused Standard Chartered. Given its relatively high exposure to climate risks, Standard Chartered highlights the broad range of impacts that climate risks can have on a firm's value.

16. The Oxford Handbook of Banking and Financial History, Cassis, Grossman and Schenk, 2016, pp 4, 7, 11, 219, 248, and 262.

17. Principles for Responsible Banking, Shaping our Future, United Nations Finance Initiative, p 1, December 2018.

About Standard Chartered

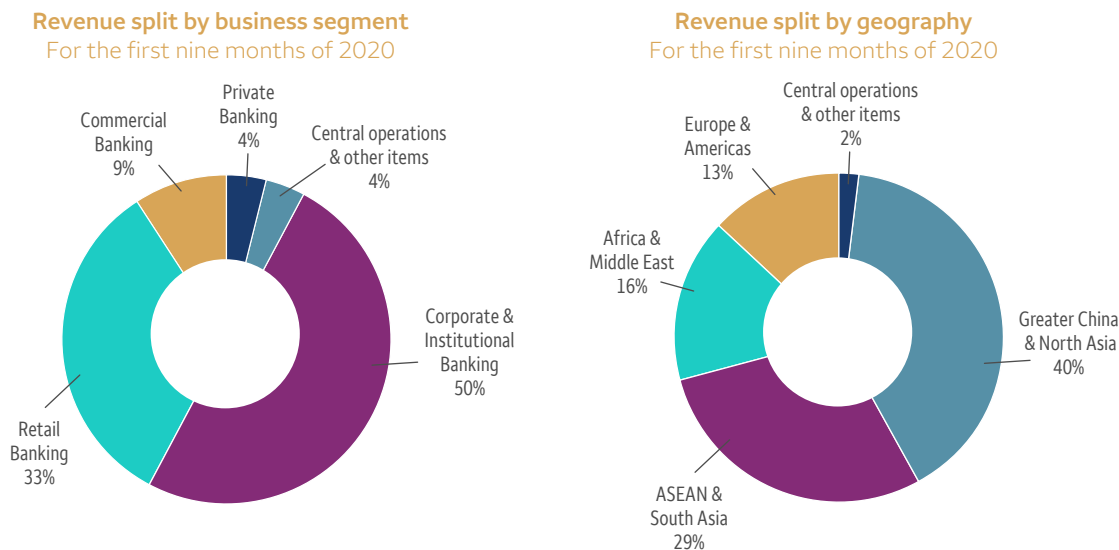
Standard Chartered, a U.K.-headquartered emerging markets–focused bank, operates mainly in corporate and wholesale banking and also has significant retail operations. The bank has four main product areas: Retail Banking, Commercial Banking, Corporate and Institutional Banking (CIB), and Private Banking.

- Retail Banking serves over 9 million individuals.
- Commercial Banking employs 43,000 small and medium-size enterprises in Asia, Africa, and the Middle East.
- CIB’s business with corporate, governmental, banking, and individual investor clients delivered the largest portion of income during the first nine months of 2020.
- Private Banking, which is one of the smallest business segments in terms of income generation, serves around 7,000 clients.

These four areas were streamlined into two businesses in January 2021: Corporate, Commercial, and Institutional Banking (CCIB) and Consumer, Private, and Business Banking (CPBB).

Standard Chartered’s largest geographical presence is in Greater China and North Asia. This is followed by the Association of Southeast Asian Nations (ASEAN) and South Asia, then Africa and the Middle East. Europe and the Americas represent only 13% of overall group operating income.

Figure 9. Risk transfer markets may need to continue pronounced growth trends to meet climate needs



Sources: Allspring and Standard Chartered

CEO Bill Winters chairs the Taskforce for Scaling Voluntary Carbon Markets, an international private-sector platform looking to put in place a scalable and liquid voluntary carbon market to allow companies to meet their net-zero and broader emissions-reduction commitments. Mark Carney initiated the taskforce, which has been set up to function similarly to the Task Force on Climate-Related Financial Disclosures (TCFD). Mr. Winters is also a representative at other leading international forums dedicated to tackling climate change, such as the World Economic Forum (WEF) Alliance of CEO Climate Leaders and the Sustainable Markets Initiative launched by HRH The Prince of Wales and the WEF.

Emerging markets, Standard Chartered’s key focus, are disproportionately exposed to climate risks.

Africa and Asia Pacific are among the most vulnerable globally, according to the Notre Dame Global Adaptation Initiative Country Index.¹⁸ Floods, droughts, and cyclones are increasingly common in these regions. Local economies—and banks, of course—have extensive exposure. Exacerbating these risks, insurance and other risk-transfer products are often unavailable or unaffordable, and local governments often lack the resources to finance recovery on their own.

Fossil fuel-dependent emerging markets can also be especially vulnerable to transition risks. For some countries, fossil exports can account for more than half of all exports. Abrupt decarbonization—initiated domestically or by trading partners—may leave banks with large losses. Government revenues and access to funding may also diminish quickly, according to the Financial Stability Board (FSB). The FSB also notes that over time, climate change’s physical effects may lead to geopolitical conflicts in emerging markets, raising risks to financial stability. A global increase in temperature and its associated sea-level rise could drive the need to relocate very large communities and/or reduce productivity, especially in equatorial environments.¹⁹

How does the market value Standard Chartered today?

In the published research we reviewed, we found no explicit linkage between climate risks and share price or bond-spread targets. Bank equities most often appeared to be valued using price/net asset value (NAV) and/or price/cash flow-based multiples. Dividend growth models were also common. Each of these approaches depends on forward-looking assumptions for risk premia and growth.

But in the case of Standard Chartered and other banks, none of the risk premia or growth assumptions we reviewed clearly incorporated the role of climate risks. Further, none of the associated research notes’ valuation risk sections referred to climate risks. Most of the published work forecasts NAV out one to three years and then applies a discount per the multiples summarized above. Given that climate risks of all kinds will take years to manifest—some sooner, and some later—and given the lack of explicit incorporation of related risk and growth factors, this approach does not allow for meaningful incorporation of climate risks.

18. Notre Dame Global Adaptation Initiative, Country Index, Rankings [for more info, see <https://gain.nd.edu/our-work/country-index/rankings/>].

19. “The Implications of Climate Change for Financial Stability,” Financial Stability Board, pp 12–13, November 23, 2020.

How do we expect markets to interpret climate risks relative to security value?

Allspring's Climate Transition Framework helps identify fundamental drivers of value.

Allspring's Climate Transition Framework has four primary components: strategy and governance, asset position, financial position, and macroeconomic profile. Grounded in traditional credit and equity analysis, the Climate Transition Framework maps climate's physical, transition, and liability risks to firms' market value-based balance sheets.

Figure 10. Allspring's Climate Transition Framework



Source: Allspring

The four summaries below offer key takeaways from applying our framework to Standard Chartered.

1. Climate strategy and governance are competitive advantages for Standard Chartered.

The firm's TCFD report demonstrates that it has thought extensively about how climate risks affect the enterprise, especially with respect to risk and growth. The report is more thorough than those of most global banks. The breadth of Standard Chartered's climate strategy, the adequacy of its governance systems to realize the strategy, and the robustness of its risk culture have all become increasingly evident since a 2015 leadership change.

However, the company is still in a nascent phase of executing its enterprise-wide climate strategy. Investments in adaptation and decarbonization still appear secondary to many legacy activities. So, too, do the financial innovations needed to attract capital to target markets. We envision these activities expanding and rising in prominence in the years to come.

2. Regarding asset positioning, physical and transitional risks may increase the firm's realized losses and risk premia.

We expect climate dynamics to fuel asset growth and incrementally increase asset risk. Regarding risk, Moody's finds Standard Chartered's asset position to be greatly de-risked following commodity- and sovereign-driven impairments of the mid-2010s. Since then, the company has substantially reduced its loan concentrations to single borrowers and sectors, improved portfolio diversity, lowered the share of unsecured personal loans, and kept loan growth conservative to strengthen loan-book resilience.

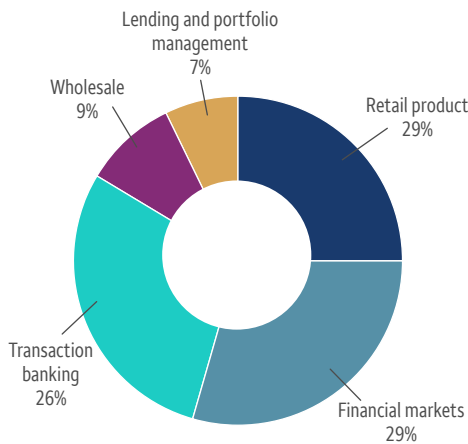
However, in tandem with increased regulatory scrutiny, we believe rating agencies' scrutiny could well increase, even if the agencies' initial responses are unremarkable. Standard Chartered's TCFD report suggests loan-book physical and transition risks are benign. High-level metrics appear consistent with this view (for example, high-emitting sectors were just 8% of loan book at year-end 2020).

Regarding growth, we highlight Standard Chartered's management guidance that risk-weighted assets are likely to grow more slowly than revenues (which the company expects to grow 5% to 7% per year through 2023). Looking farther ahead, we expect climate-related investments to support and possibly surpass these levels. Two changes in the asset portfolio should contribute beyond growth in the loan and capital markets: shifting assets from liquidity to loans and incrementally extending asset duration.

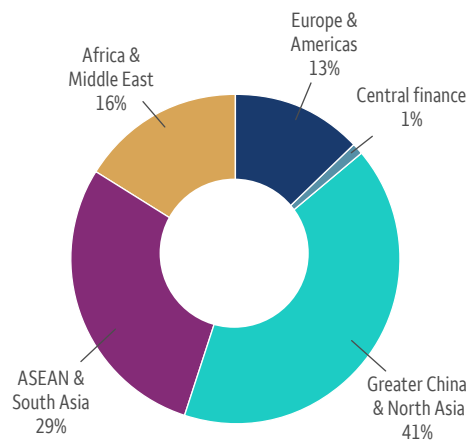
However, we know the firm serves economies that depend heavily on fossil resources for growth and thus are vulnerable to transition risk. Second- and third-order transition effects may become increasingly visible in the years to come. We also know Standard Chartered's largest markets are subject to rising seas; extreme weather; and, in some cases, drought. In our analysis, we allow for more substantial transition and physical risk exposures. We note that Hong Kong's infrastructure is adapting to withstand many of these risks and that Standard Chartered has business-process controls (continuity) that provide further mitigation.

Figure 11. Standard Chartered revenue segmented by business and geography

Revenue split by business segment: 2020



Revenue split by geography: 2020



Source: Standard Chartered

3. Looking at Standard Chartered's financial position, capital and liquidity are solid but profitability

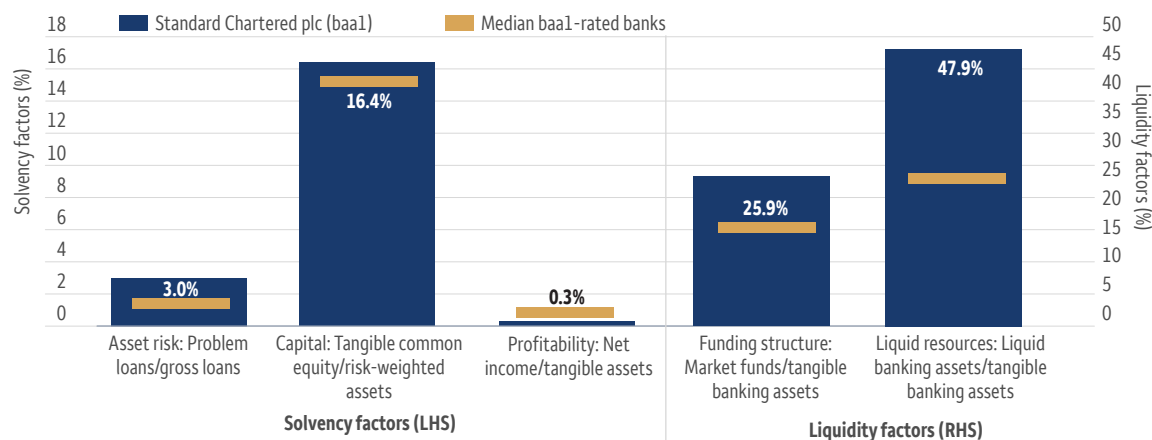
must improve. Capital and liquidity are strong and appear sufficient to support the company's competitive and climate strategies. At the end of the first quarter of 2021, its Common Equity Tier 1 ratio increased to 14%—up sharply from the prior year, driven by low loan growth, profit accretion, dividend restriction, and the sale of its stake in Bank Permata Tbk (PT). Standard Chartered appears well positioned to meet its other capital requirements. As of March 31, 2021, the group reported a 5.1% leverage ratio—much higher than the 3.7% regulatory minimum.²⁰

Liquidity and deposit funding are also strong and consistent with climate objectives. The firm's strong international network has attracted cross-border trade and enhanced the target customers' loyalty. Because of its strong focus on trade finance, a substantial portion of the company's loans are short term and may be liquidated within months. This flexibility further enhances the already-strong liquidity. As of March 31, 2021, 59% of Standard Chartered's total assets were due to mature within

20. Standard Chartered First Quarter 2021 results.

one year, and 70% of those were due to mature within three months. The company holds a large amount of liquid assets in the form of investment-grade Treasury bills and debt securities. Moreover, its excess liquidity is mainly managed in a few key money centers instead of in emerging markets, where cross-border fund transfers may not be reliable. Its funding position is similarly strong. Customer deposits are the primary source of funding, comprising roughly 67% of total liabilities.

Figure 12. Standard Chartered maintains strong solvency and liquidity metrics to guard against market volatility



For problem loan ratio and profitability ratio, we present the weaker of the average of the latest three year-end ratios, as well as the most recent intra-year ratio, or the latest reported figure. For the capital ratio, we use the latest reported figure. For the funding structure and liquid asset ratios, we present the latest year-end figures. This is consistent with the starting point ratios in the scorecard.

Sources: Allspring and Moody's

Profitability is the weakest attribute in Standard Chartered’s financial profile, according to Moody’s.

Earnings have been under pressure for several years due to the combined effects of balance sheet de-risking, declining commodity prices, a low interest rate environment, competition from excess liquidity in many of its key operating markets, and rising regulatory costs. This seems to have troughed following 2020’s sharp decline in rates. But execution risk remains.

We believe Standard Chartered’s revenue growth goal of 5% to 7% annually is realistic. This is the view of Allspring’s CCWG, not company guidance. The latter target is important as this approximates the firm’s observed cost of equity capital and the threshold for shareholder value creation. We consider the prospect of higher rates when estimating revenue growth, profit growth, return on equity, and cost of equity.

4. From a macroeconomic perspective, climate change may increase risk and required return for the company. Looking farther ahead, we believe market-wide, climate-related capital investment—combined with successful execution of the firm’s strategy—can further elevate growth and the potential for return on equity to continue to rise. As discussed earlier, we expect trillions of dollars to be spent over the next several years on decarbonization and adaptation. Standard Chartered is in a strong position to lend to and to arrange financing for governments, corporations, and projects.

Major ratings agencies (for example, Moody’s) believe Standard Chartered’s macro profile is strong based on geographic loan distribution. However, looking forward, certain risks must be acknowledged. Today, Hong Kong represents roughly 25% of the firm’s operating income. In the future, the Greater Bay Area of China will likely be an important contributor to growth. Growing market share with affluent wealth management clients will remain a primary objective. China’s demand for sustainable investments is substantial. Hong Kong remains the leading city in the Greater Bay Area. In addition to geopolitical risks, transition risks related to Southeast Asia’s fossil dependence and extreme weather risks form a defining part of the picture.

Putting a finer point on it: Quantifying the effects

We've developed a simple example to illustrate how transition framework observations can be used to enhance valuation analyses. The example doesn't conclude with a discrete share price or bond spread. Instead, the main purpose is to show striking potential for divergence in performance across banks with substantial exposure to climate risks.

We believe Standard Chartered may have meaningful growth potential if it can use climate investments to drive returns on tangible equity nearer its cost of equity and if the firm remains committed to rigorous underwriting and risk management standards.

We begin our analysis by following two steps to form an **optimistic case** that's generally in line with company guidance.

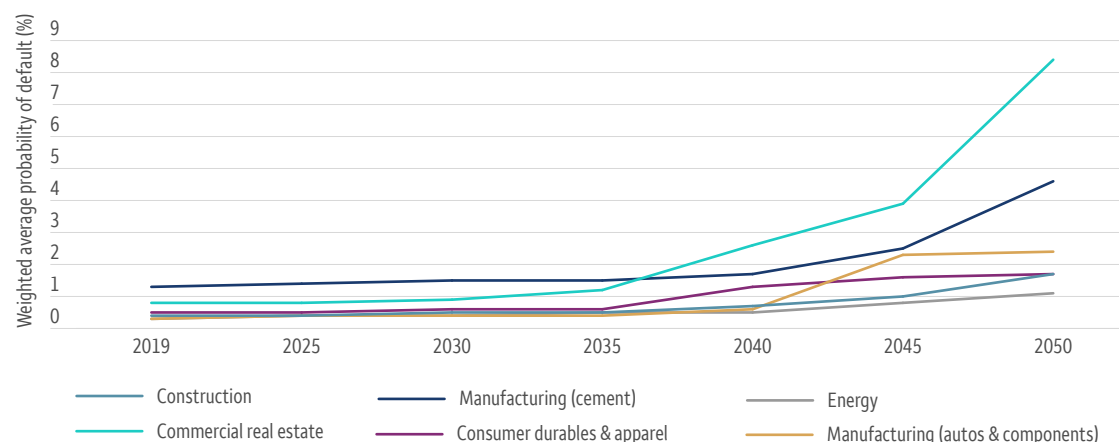
Step 1—forecast period (through 2026):

- We believe that 5%–7% top-line growth, more modest loan and capital growth, subinflation cost increases, and the potential for a steepening rate curve may allow the firm to achieve its 2023 return on tangible equity goal of 7% and possibly exceed it. Decarbonization and adaptation investments are important sources of support for these assumptions.
- We assume a 12% cost of equity to reflect consensus estimates. We envision climate risks driving up both this cost and the return on tangible equity over the long term.
- With respect to cost of equity and return on equity, our primary focus is on the extent that they converge through the forecast period, which happens completely after 2026 in this scenario.
- We assign no value to the following for now but would monitor these closely for increasing impact:
 - Decarbonization of the loan book, depending on market dynamics, must be monitored with the potential for fossil distress and green asset bubbles in mind.
 - Regulation-driven increases in capital requirements are possible for U.K.-domiciled banks. We've made no immediate adjustment given Standard Chartered's relatively strong capital position.

Step 2—terminal value:

- We assume the cost of equity and the return on tangible equity converge in 2027 and that growth proceeds in line with company guidance. This is an important assumption as it allows market value to close the gap with book value. However, we think the assumption is consistent with Standard Chartered's efficiency initiatives. If the company can improve its operating leverage and become more efficient, it should be able to see the return on equity meet or surpass the cost of equity over time. This could be the case even if physical and transition risks and funding costs rise.
- Given the practical impossibility of forecasting discrete transition and physical impacts with accuracy, we reflect them through an increasing-term structure of risk premia. This structure is based on Standard Chartered's climate scenario analysis. The analysis is conservative in that it reflects no human actions are taken to mitigate climate risks.

Figure 13. Standard Chartered’s scenario analysis and probabilities of default in a conservative case where borrowers invest in no additional resilience



Sources: Allspring and Standard Chartered

Next, we focus on what could go wrong in a pessimistic case. Here, we evaluate two potential detractors from Standard Chartered’s performance.

• **Return on equity lags—perhaps severely and abruptly—because:**

- Asset, revenue, and income growth fail to materialize due to lower-than-expected activity in climate investments, other markets, or the general economy
- Increased competition depresses margins in key markets, including Hong Kong
- Costs increase more quickly than management anticipated due to company inefficiencies and/or inflation
- Regulatory requirements called for significantly higher capital that depressed returns

• **Cost of equity increases—perhaps severely and abruptly—due to:**

- Heightened concerns about the value-destructive consequences of physical and transition risks on primary markets
- Geopolitical events in primary markets that reduced transparency and risk, affecting forward performance

Traditional drivers of growth and value

Our example adjusts conventional valuation approaches in three ways:

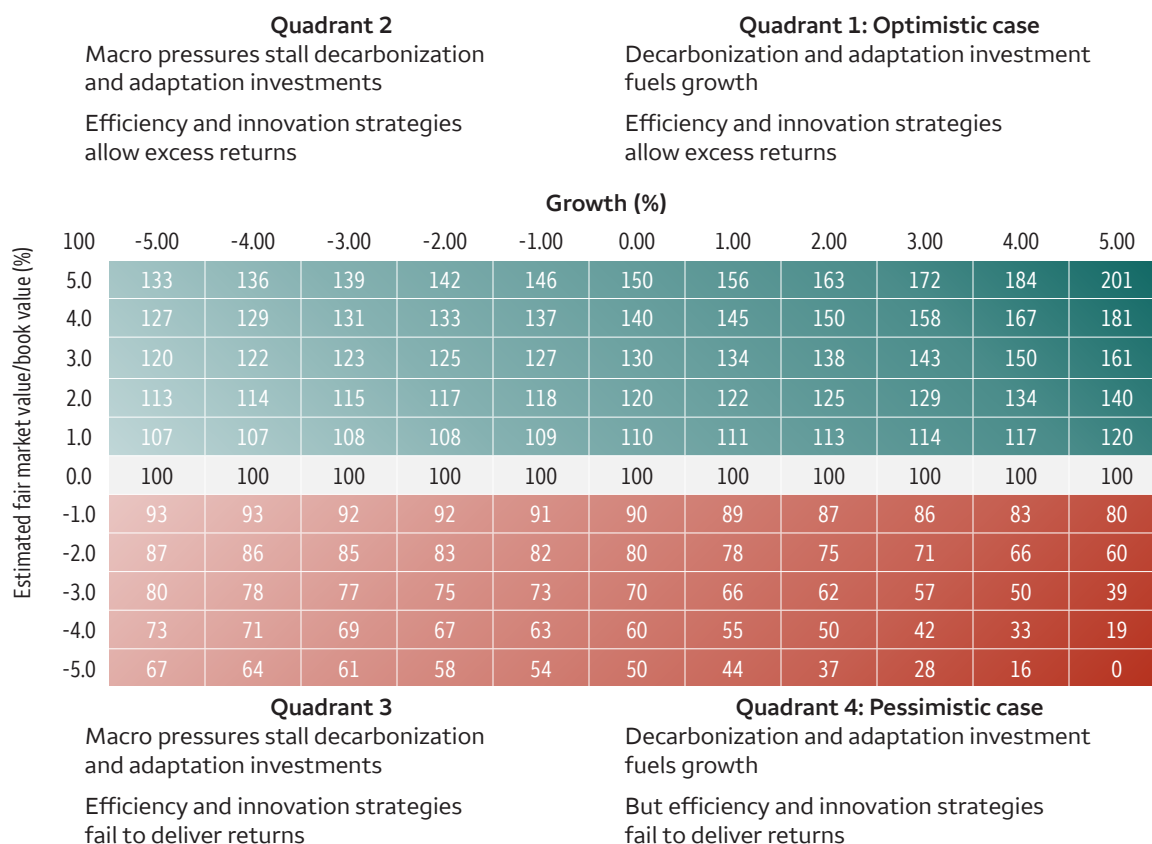
- We extend the forecast period from two to six years. This allows more nuanced treatment of the potential convergence of the cost of equity and the return on equity. It can also handle more granular scenarios around growth as a function of investment trends in Standard Chartered’s key regions.
- We consider a broader range of risk and growth outcomes as a function of climate dynamics.
- Where possible, we use traditional valuation constructs that the market is familiar with to facilitate communication.

When valuing banks, analysts commonly use risk and growth assumptions to determine fair discounts and premia relative to book value. For example:

$$\text{Fair market value/fair book value} = (\text{return on equity} - \text{growth}) / (\text{cost of equity} - \text{growth})$$

In Figure 14, we’ve used this relationship to evaluate Standard Chartered’s range of valuation outcomes under different climate-related assumptions. To simplify, we’ve focused only on climate variables. For now, we don’t address geopolitical and other important risks.

Figure 14. Current market prices reside in the “pessimistic case” quadrant



Source: Allspring Climate Change Working Group

The summary in Figure 14 identifies four quadrants. Our optimistic and pessimistic cases appear in the upper-right-hand (Quadrant 1) and lower-right-hand (Quadrant 4) quadrants. Quadrants 2 and 3 blend Quadrants 1 and 4 with different combinations of return on equity, cost of equity, and growth. Here are the key takeaways:

- The range of potential outcomes using feasible risk and growth assumptions is extremely broad.
- Potential losses in the pessimistic case are severe, approaching 100% in the extreme.
- To mathematically support recent market prices, market-to-book ratios would need to remain negative with positive growth.

Conclusion

- **The market is striving to make sense of climate risks' implications for bank security value.** Investors have rigorously and extensively evaluated how climate change may affect banks. Thus far, these analyses have had surprisingly little impact on investment opinions.
- **Allspring's CCWG expects climate change to have increasing impact on bank stocks and bonds.** We see three trends in particular:
 1. **Higher risk.** Climate change makes the real economy and, therefore, bank assets riskier.
 2. **Higher growth.** Climate investments expand banks' opportunity set as hundreds of trillions of dollars must be invested in adaptation and decarbonization—combined with extensive risk transfer and financial innovation activity—through 2050 if Paris goals are to be met.
 3. **Fatter tails.** The disparate strengths of different companies' climate strategies, asset positions, financial structures, macroeconomic environments, and ability to execute are likely to cause divergence in performance and security value.
- **We've applied Allspring's Climate Transition Framework to Standard Chartered** to illustrate climate change's potential impact on fundamentals. We believe this is possible when companies can balance societal responsibility, risk discipline, and financial innovation—including securitization and risk transfer—despite greater potential for loss in climate-induced financial crises.

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