

The ESG Risk Atlas: Sector And Regional Rationales And Scores

May 13, 2019

What Is The ESG Risk Atlas?

S&P Global Ratings has created the ESG Risk Atlas to provide a view of relative environmental, social, and governance (ESG) risks we see around the world. The Atlas, which takes the form of an online infographic, reflects our observations about various ESG risks that different sectors and geographies face.

For the online infographic, go here:

[Navigating the ESG Risk Atlas](#)

The Atlas comprises a Sector Risk and a Country Risk component. Sector Risk highlights the relative environmental and social exposures of a comprehensive range of business sectors. Country Risk considers corporate governance standards, regulations, and exposure to natural disasters in various countries or regions.

Leveraging our global reach, we have combined insights from our credit analysts located worldwide and from public assessments (such as those from the U.N.-supported Principles for Responsible Investment, World Bank, World Health Organization, and Transparency International) to develop our ESG risk profiles for each sector and region.

What Can It Do?

The Regional Risk component of the Risk Atlas highlights our view about the relative risk exposure of countries and regions to natural disasters and the relative quality of corporate governance standards, while drawing on our analytical opinions and public assessments about the strength of ESG-related regulations. The Risk Atlas ranks countries and regions on a scale of 1-6 for corporate governance, with a score closer to 1 representing relatively stronger standards.

The Sector Risk component of the Risk Atlas combines our analysis of a sector's exposure to environmental and social risk. In environmental risk, we include factors such as inherent exposure to land and water use, manufacturing footprint, and packaging. Social risk, meanwhile, comprises factors including human capital and safety management. The Risk Atlas includes a final sector risk score on a scale of 1-6, with a score closer to 1 representing a relatively low exposure.

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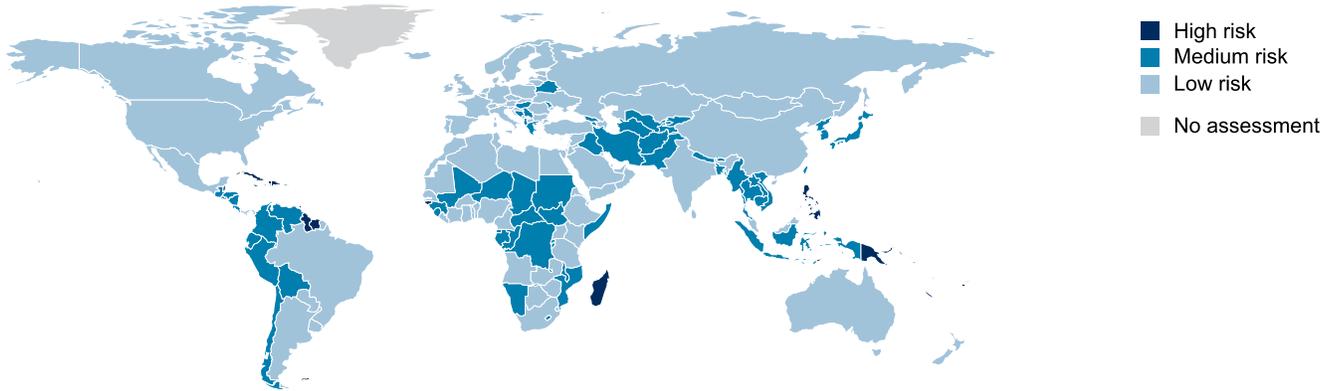
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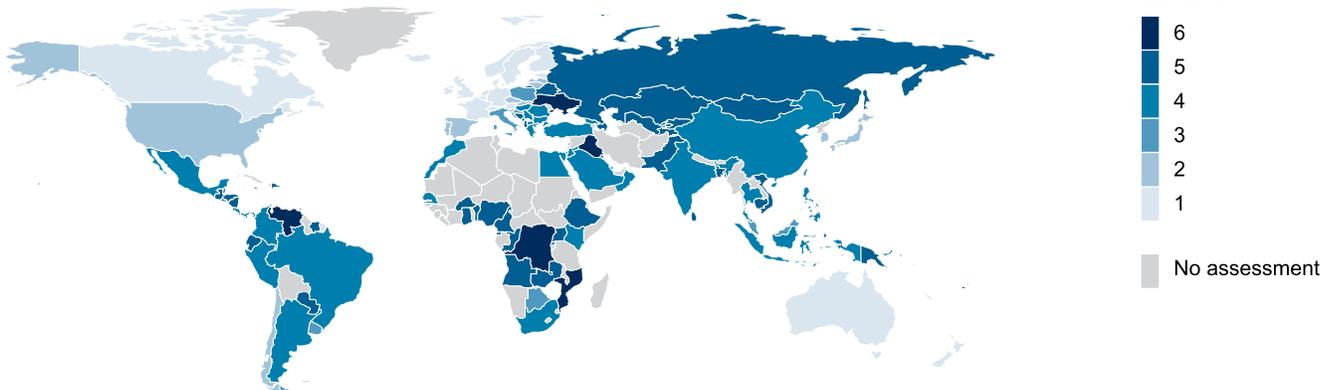
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ESG Country Risk Atlas: Natural Disaster



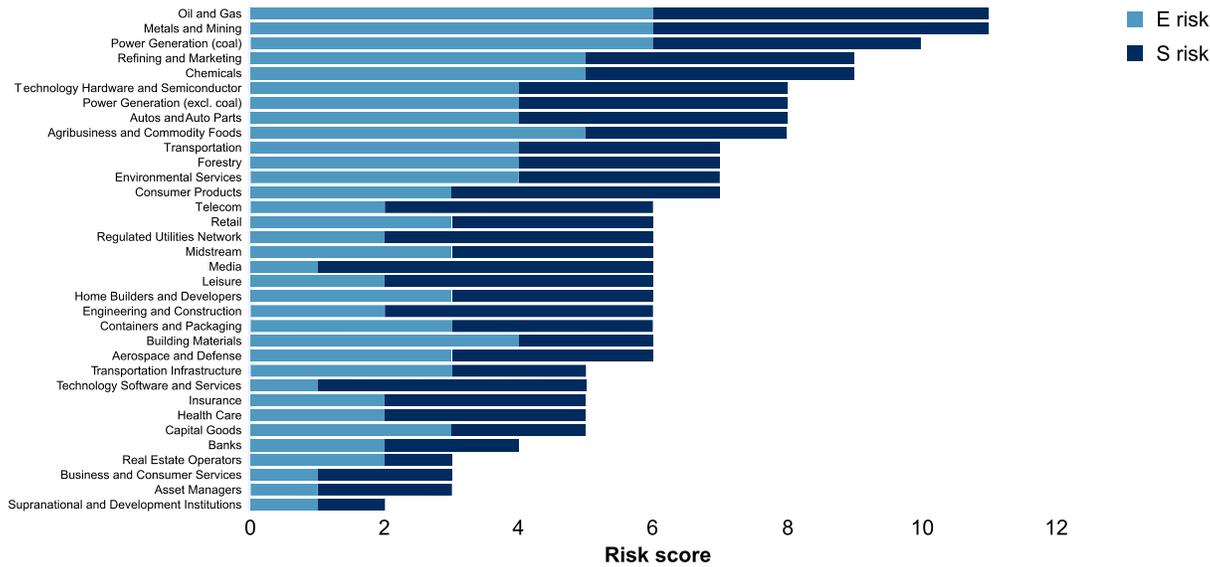
Source: United Nations Office for Disaster Risk Reduction (UNISDR)
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ESG Country Risk Atlas: Governance



Note: A higher score/darker color indicates greater risk. Source: S&P Global Ratings.
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Sector Risk Atlas



Source: S&P Global Ratings.
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Sector Risks

Table 1

Sector Risk Atlas

Sector	Score	Comments
Aerospace and defense		
Environmental	3	The environmental risks for the commercial aerospace-focused companies are weighted toward GHG emissions. Aircraft engine emissions are being increasingly regulated, which could increase demand for the newest aircraft, but also might require investment in new product development. This could be material if ever-stricter regulations require major technological changes. These same regulations also hurt their airline customers' profitability, which could constrain their ability to buy new aircraft. Furthermore, if stricter emissions regulations require a significant investment from airlines to meet them, higher ticket prices, reduced air travel, and ultimately lower demand for aircraft could result. Pollution and toxicity are risks primarily founded in defense-focused companies due to the materials sometimes used during manufacturing.
Social	3	Social risks for the sector are mixed. For aircraft manufacturers, product safety is a key risk, because an aircraft accident caused by a design flaw or poor quality could result in order cancellations or significant costs to fix the problem. Employee management is important because the workforce is aging rapidly and replacing retiring workers with qualified people is difficult. The industry also is mostly unionized. As well, social cohesion is a risk because terrorist attacks, especially involving aircraft, have resulted in less air travel and order cancellations from airlines, although the duration of the impact has been lessening. In contrast, the threat of these events can boost demand for defense contractor products. Defense contractors do sometimes face reputational risk related to the production of certain types of weapons (such as nuclear) or sales to certain countries, but these are political decisions made by their government customers, who generally focus on strategic military needs.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Agribusiness and commodity foods		
Environmental	5	Environmental risks surround using water resources to help expand crop cultivation, which could affect water availability for communities and the ecosystem. Biodiversity could also lessen as agribusiness companies use certain high-yielding crops, reducing the number of varieties being cultivated. Despite higher sales of co-products, commodity food industries often produce waste that can hurt the environment such as animal manure, which contaminates soil. Finally greenhouse gases are being produced during the process of transforming agricultural commodities into commodity foods.
Social	3	The industry is gradually becoming less labor-intensive and gradual mechanization creates discontent among workers and social tension in communities where agribusiness is a significant employer. Tension can arise between large agribusiness companies and small farmers when it comes to land expansion, notably in emerging markets. We also see customer safety, especially the quality assurance and traceability of agricultural products, as important, as well as consumer attitudes towards genetically modified foods. Best-in-class agribusiness companies increasingly support local communities to develop sustainable farming techniques (such as for cocoa) to ensure solid production and because their main clients--large food and beverage multinationals--are becoming more sensitive to consumer pressure.
Asset managers		
Environmental	1	The asset management sector has limited use of physical infrastructure and facilities. Asset managers are primarily service providers that produce low levels of GHG emissions, low levels of pollution, and have inconsequential land and water usage. Their exposure to climate change is lower than banks as they usually do not have a lending business that brings indirect risks through their borrowers. However, asset managers are exposed to climate change through the potential impact on their investment performance if the value of the companies they invest in gets depressed because of the transition to a low-carbon economy. This could hurt their investment fees, reputation, and competitive position. Still, asset management companies usually intend to reduce their exposure to the most polluting sectors/entities, start to introduce tighter ESG criteria in their investment decisions, and typically have well-diversified investment portfolios. The industry also benefits from the increasing adherence to the UN-supported Principles for Responsible Investment.
Social	2	Social exposure for the asset management sector reflects the risks coming from social cohesion, demography, and human capital management. At the same time, they face material reputational risks that could damage their customer franchise. For instance, data privacy and security issues could lead to a rapid loss of confidence. Risks from poor investment advice or mis-selling could also cause reputational damage and large fines. The industry benefits from being regulated and supervised, although it's less strict than for banks and not uniform across regions. Finally, asset managers have a low exposure to human capital management because they usually employ a small and skilled workforce.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Autos and auto parts		
Environmental	4	The automotive sector is directly exposed to GHG emissions. In China and Europe, which together account for about 50% of annual global auto sales, environmental regulation is leading the auto industry toward CO2-neutral vehicle production. In China, regulations limit average fleet CO2 emission to 117 g/km; Europe is eyeing 95g/km by 2021. Compliance with these targets will involve sizable investments in technologies and new products over the next three years. We expect the return on these investments to be lower compared to petrol or diesel vehicles until demand for electric vehicles reaches sufficient scale and battery costs decline further. In the meantime, we see stress on operating margins and free cash flows as research and development and capital investments increase as a share of sales. Furthermore, consumer acceptance of electric vehicles will depend on government incentives, evolution of battery costs and range, and infrastructure suitability. Increasing consumer aversion to diesel, particularly in Europe, adds to the problems in achieving CO2 emission targets and exposes automakers to potentially significant fines. In 2018, many European carmakers reported a wider gap between those targets and actual result, partially due to lower diesel engine sales.
Social	4	The auto sector's sensitivity to social risks focus on changing consumer habits and preferences for mobility services that would alter the traditional ownership model. Consumer demand for cars is unlikely to diminish given higher incomes, but its form and nature will continue to change, resulting in risk and opportunities for the sector. The auto sector has been subject to trade tariffs throughout the years and various governments such as Germany, the U.S, China, the U.K., and South Korea have politically supported local companies. Therefore, the sector is vulnerable to shifting political landscapes that can disrupt otherwise highly efficient supply networks. Subsequently, the workforce is vulnerable to sudden plant closures, so the sector has greater incidents of strikes from the highly unionized workforce.
Building materials		
Environmental	4	Building material companies are very exposed to GHG emissions and waste risks. Cement and other heavy-side building materials companies typically need to crush and move raw materials to produce their end-products, which may require a lot of fuel and create waste and pollution. The cement industry, together with steel, ammonia, and ethylene, produce about half of total CO2 emissions in the industrial sector. Most large cement players, particularly in EMEA, are committed to reducing carbon emissions in line with the Paris Climate Agreement, mainly through greater usage of alternative fuels and raw materials to reduce the clinker ratio. We believe more of a cement company's capex will be for energy efficiency and compliance with environmental regulations. Building materials companies may also be exposed to climate-related risks (storms, harsh winters, etc.), which can interrupt local operations and damage equipment. Climate changes also shape needs for building materials and consumer behavior, and can make companies adapt their product offerings.
Social	2	Social risks in the building material industry are less relevant than environmental risk. Companies typically track and manage incidents and have specific programs to educate their work forces, resulting into a low safety management risk, particularly in developed countries. Consumer behavior is becoming a key driver due to greater demand for green products and accelerating innovation rates. Additionally, population growth, urbanization, and rising living standards provide opportunities for medium to long-term growth, but building materials will need to adapt their product offerings to evolving population needs.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Business and consumer services		
Environmental	1	Business services companies generally have little to no manufacturing operations and not much exposure to processes that create pollution or environmental waste by-products. Climate change may be a small risk though for those sensitive to food input, energy, and fuel costs, or weather patterns. For example, rising energy prices could affect technology-intensive business process outsourcers that rely on energy-intensive data centers. Fuel prices can also affect some distributors' route densities.
Social	2	Because business services companies are labor-intensive, human capital management, safety management, and consumer behaviors are key social risks. While workforce mismanagement can disrupt operations, work stoppages or shortages occur less frequently and aren't as costly because employees aren't generally unionized and can be more easily replaced. Shifting consumer preferences are an issue when the transition to e-commerce disrupts companies serving brick-and-mortar retailers, but this also creates opportunities for virtual service providers. Safety management is most critical for private prison operators and security services staffing companies whose staff are often in dangerous working conditions.
Banks		
Environmental	2	Environmental risks for the banking sector balance the low use of physical infrastructure and facilities needed to operate against the material indirect exposure coming from its lending and investment activities. In addition, the fast-growing use of IT services in banking (digitization, cloud computing, big data) is increasing CO2 emissions, even if their physical infrastructure is reducing. Regulators, investors, customers, and activists are increasingly looking at the banking sector's contribution and exposure to environmental risks through their lending and investment activities. Although these risks can be significant, we see the introduction of ESG criteria in their underwriting policies, lessened exposure to polluting sectors or entities, as well as the generally high level of diversification of their loan and securities portfolios, as important mitigating factors.
Social	2	Social exposure for the banking sector is limited despite its exposure to consumer behaviors (retail and wholesale) and human capital management. Banks rely on customer confidence, the loss of which could rapidly damage their franchise, for instance if there's data privacy or security problems. Risks around conduct issues with customers, such as mis-selling, or illegal activities like money laundering or tax evasion, can also cause serious financial and reputational damage. Nevertheless, the industry benefits from significant regulation and supervision, which supports its stability and enhances customer confidence. As evidence, while several stakeholders blamed banks for the 2008 global financial crisis, 10 years on most people still have bank accounts with the same institution. As a services sector, a large productive human workforce is at the core of banks' business models. Greater use of digitization, automation, and AI bring new challenges and risks that require banks to adjust their operating models, continuously train their large workforce, and potentially reduce that workforce significantly over time.

The ESG Risk Atlas: Sector And Regional Rationales And Scores

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Capital goods		
Environmental	3	The greatest environmental considerations for the capital goods sector are reducing carbon emissions reduction and resource management. The sector is inherently exposed to GHG emissions, water use, and waste decontamination. Companies typically need to develop production processes and incur compliance costs to meet required environmental standards and mitigate the potential for costs and fines to address environmental matters like emissions, water use, and waste disposal. Historically, environmental claims such as asbestos or pollution-related liabilities have resulted in large fines or financial obligations, although in many cases these were largely manageable and absorbed by the issuer's balance-sheet capacity or cash flow generation. Given the broad set of end markets capital goods companies serve, the sector is exposed to supply chain participates with tight regulations such as oil and gas and utilities.
Social	2	Our social risk assessment focuses on the sector's exposure to changing consumer behavior and human capital management risks. Changing consumer behavior is fueling greater automation at production plants and changes in labor force skillsets that would meet targeted operating efficiency strategies. Automation, digitalization, and robotics are happening globally in the industry and create new opportunities for growth and better profitability, both for technology providers and users. However, they will fundamentally change the work environment for employees.
Chemicals		
Environmental	5	The chemical sector is inherently exposed to waste, pollution, and toxicity. The sector is also exposed to water use, scarcity, efficiency, and decontamination risks and climate change. Many chemical products, raw materials, and by-products or effluents could be polluting and toxic. These risks arise from regular operations, but also if there is an accident when manufacturing certain hazardous chemicals. Because of this, there is considerable regulatory scrutiny, which has increased in stringency over time. Additionally, the transportation of chemical raw materials and finished products heightens the exposure to these factors.
Social	4	The chemical sector has high exposure to demographic changes, including those driven by rising populations, urbanization, and greater economic development in many parts of the world. These factors may provide growth opportunities, but they also amplify the risks of manufacturing, transporting, and consuming chemical products. We also consider greater exposure to changes in consumer behavior towards chemicals, plastics, and other products like seeds and traits. We believe that social awareness towards chemical products, especially around health and environmental issues, will become more influential. For example, consumers' willingness to pay a premium for farm produce grown without pesticides or fertilizer could affect demand for those products. Although some of these trends currently don't largely affect chemical demand, consumers' perception of chemical products could be a risk.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Consumer products		
Environmental	3	Excessive use of plastic packaging is a growing risk, which the industry may have to absorb through its cost base. Environmental risks indirectly affect the industry, primarily through water, land use, and the climate impact of agricultural inputs and post-consumer waste. Neither risk area has so far translated into far-reaching or quantifiable government policy actions. Over the medium to long term, sudden regulatory action on waste management could make the industry bear the cost of switching to more environmentally friendly packaging solutions or pay for the treatment of product waste before such costs can be passed on to consumers. However, strategic actions are already happening. This includes developing a smaller, more automated manufacturing base and improving productivity in warehousing, logistics, and shared services. The benefits are subject to individual companies' scale and management capabilities. We believe the consumer durables sector has a modestly higher environmental risk than the non-durable sector because consumer durables can generate significant hazardous and non-hazardous solid waste and energy use (for example, potentially harmful elements when disposing refrigerators). In addition, energy-using durables, such as kitchen appliances and electronic equipment, can contribute significantly to environmental degradation as they are one of the fastest-growing sectors of residential energy use.
Social	3	Aging populations, consumer behavior, and changing media consumption trends require agility to optimize marketing. For product development, shifts in consumer tastes toward health and wellness have resulted in manufacturers reformulating products, renovating portfolios, and broadening package sizes. Large diversified consumer products companies risk missing opportunities to develop new product lines because of conflicting priorities and entrenched high distributions to shareholders. There has been a shift toward digital advertising channels for the past 10 years in which relevance and effectiveness of advertising relies on machine learning and consumer data harvesting (currently with limited regulatory oversight). We consider social media-related marketing a potential social risk, especially with emerging data privacy laws, but also because of growing consumer sensitivities around factual accuracy and respecting diverse social groups. Regulations surrounding advertising to and protecting minors is a positive for the industry and build positive consumer attitudes. Health and wellness trends associated with growing incomes drive new product development and, ultimately, profits for companies that prioritize investment in them. Rising obesity rates, considered a worldwide public health epidemic, have been linked to greater consumption of additives and preservatives in processed foods and beverages. Governments are focusing on ways to stem obesity and reduce alcohol and nicotine consumption because of their impact on health care resources and increasing costs. These realities have caused companies to invest more in innovation, reformulating products, and increasing transparency on labels. We believe the tobacco sector has moderately higher social risk. It has stringent regulatory requirements on promotion, marketing, packaging, labeling, and usage. The secular decline of combustible cigarette usage is accelerating, which could accelerate as the U.S. FDA-proposed actions for reducing combustible cigarettes' nicotine content and a ban on menthol cigarettes. Companies within the sector continue to perform well as they have been able to offset a good portion of the volume declines with prices, and in some cases are diversifying into e-cigarettes and cannabis. Operating performance and credit metrics could deteriorate if the decline in combustible cigarettes accelerates further and they cannot offset the impact with higher prices or alternative tobacco-related products.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Containers and packaging		
Environmental	3	Key environmental factors for the containers and packaging sector reflect the adverse impact of plastics, as well as opportunities to provide customers with environmentally friendly initiatives like recycling and light weighting. The recent focus on reducing plastic waste has been largely from both stricter regulations and increased consumer awareness. Over the past few years, there has been more scrutiny on the environmental impact of single-use consumable plastics and rising demand for more environmentally friendly packaging alternatives, with newer regulations like plastic bags and straws bans in California and in other municipalities. We expect more regulations could affect the sector. To some extent, these trends have reduced the use of plastic packaging, with other materials (such as paper, glass, and metal) being used instead, if possible. Producers of the latter will likely benefit from this financially. Nevertheless, plastic packaging remains widely used, and we believe that it will remain a key input in some industries (such as pharmaceuticals and food) due to its unique properties (shatterproof, hygienic, durable, flexible, and lightweight).
Social	3	The social risk assessment focuses on the sector's exposure to changing consumer behaviors. Consumers are seeking alternatives to traditional plastic packaging, and plastic packaging producers are trying to capitalize by refocusing their product ranges toward more biodegradable and recyclable plastic products or by light-weighting products, lessening the environmental impact of disposal. They are also seeking to use a higher share of bioplastics and recycled plastics in their production, and are trying to improve the plastic recycling processes. The sector can also face reputational risk related to the amount of plastic in the ocean and the resulting effects on marine life.
Engineering and construction		
Environmental	2	Environmental risk in the engineering and construction sector is weighted toward the exposure to increasing climate change risk. Although companies assume some level of weather-related delays to complete construction projects, extreme weather can cause major delays and project cost overruns. Direct water use is relatively low, but water used in the construction material supply chain contributes to our view of the sector's risk exposure. Similarly, supply chain greenhouse gas emission from site clearing, excavation, and piling is relatively low. Risk of remediation for biodiversity or restitution for incorrect land use is usually low for the construction of high-rise buildings, but can be more relevant for the construction of civil and industrial projects.
Social	4	Social risk in the engineering and construction industry is, in our view, a more relevant risk consideration. The sector's exposure to human capital management risks is very high. The construction industry is labor-intensive, and the ability to find skilled labor, particularly at expected cost levels, directly affects the profitability of construction projects. In addition, given the exposure to unions in some regions, engineering and construction companies can face strikes, which increase the cost and time to complete projects. Safety management is another key risk, given the use of large and dangerous equipment. Companies in the sector track and manage incidents and have specific programs to educate their workforces. Community opposition to construction and dangers of operating in countries with active insurgencies or civil unrest is heightened and regulation could become tougher for contractors, and compliance could result in higher costs.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Environmental services		
Environmental	4	Key factors for the environmental services sector reflect climate change as an environmental risk as well as opportunities for waste haulers to provide customers with GHG-reducing services like waste reduction consulting, recycling, and low emissions collection services. We base this assessment on the sector's inherent exposure to GHG emissions, climate change, waste, pollution, toxicity, and land use. For example, the use, waste treatment, storage, transfer, and disposal contains the risk of significant environmental liabilities. Under applicable environmental laws and regulations, these companies could be liable if their operations cause environmental damage, particularly air, drinking water, or soil contamination. However, because the waste industry has been among the most heavily regulated from the mid-1970s on, the regulatory structure is generally mature. It is also relatively stable because the statutory mandates governing the industry have been established by federal regulation and are delegated to states for enforcement. Nevertheless, we generally expect more GHG emissions, but environmental policies would somewhat help curtail this. In addition, while climate change hurts solid waste services companies via inefficient waste collection routes and associated costs arising from weather disruptions, waste companies also benefit because population growth creates more waste. Also as a partial mitigating factor, the industry has been converting large portions of its collection fleets to natural gas-powered fuel trucks. This trend not only materially reduces GHG emissions but also fuel, labor, and maintenance costs.
Social	3	Human capital management and safety management are key areas within social risks for the environmental services sector. The social risk assessment reflects the sector's exposure to human capital and safety management. Labor unions will likely continue. Safety management is relevant because environmental and waste management services, including constructing and operating landfills, requires large machinery and complex work sites. These can result in truck accidents, equipment defects, malfunctions, and failures. Nevertheless, the sector continues to mitigate labor and safety issues by automating where possible the collection vehicle operations, which reduces costs associated with injuries and improves collection efficiency because fewer drivers are generally required.
Forestry		
Environmental	4	The forestry sector is exposed to land use, water use, and waste risks, with some counterbalancing climate and GHG risks. Many forest product-makers rely on virgin wood fiber from forests or farms, which impart unique risks for resource stewardship and climate risks for tree health. Forests are carbon sinks that can reduce the industry's net carbon output, but fiber baskets worldwide could be at risk from the knock-on effects of climate change like precipitation changes, irregular tree growth, fires, less biodiversity, and infestation. The industry has benefited from a shift to cleaner-burning fuels, with recycled biomass providing a way to reduce energy consumption, cost, and carbon emissions. Water is used to irrigate seedlings and for industrial processes like manufacturing pulp. Much of the water used in manufacturing is recycled and reused, and ultimately treated and discharged. Most forest products are recyclable and raw materials are renewable, but the global recycling system is being strained by contaminated paper waste.
Social	3	The forest products industry is characterized by low labor intensity and high mechanization, which requires continual work force training and safety protocols, extending from the forest to manufacturing plants. Consumer behaviors have reduced demand for writing and printing papers, but demand is growing for products like lumber for construction and containerboard for boxes. Social cohesion risk is moderate, and it's typically managed at the local level. Population growth, urbanization, and rising living standards provide opportunities for medium to long-term growth, but product offerings must somewhat adapt to meet evolving needs.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Health care		
Environmental	2	Toxicity is a key risk, particularly among pharmaceutical manufacturers, life science companies, and hospitals, because the typical manufacturer of pharmaceutical and life sciences products use products that could harm the environment. Hospitals and health care centers handle and dispose of bio-hazardous materials, which exposes them to the accidental release of potentially toxic agents. Pharmaceutical companies have inherent material water-use risks. We do not believe pharmaceutical, life science, or medical device manufacturers are heavy users of fossil fuels and since a larger portion of the health care sector consists of services, we believe GHG emissions for the sector are relatively low. We do not believe there is material land usage in the sector. We think the exposure to climate change is relatively low and manufacturing could be relocated.
Social	3	Pressure is mounting to increase transparency, improve access to quality care, and reduce costs. Access to medications and care are major themes, including a company's pricing policies and keeping underperforming rural or urban hospitals open to serve local communities. In many emerging markets and developing countries, only the wealthy have access to quality care and this is true for portions of the U.S. The pressure to increase price transparency and to reduce prices for products and services could affect not only U.S. companies, but global manufacturers because the U.S. market essentially subsidizes other markets where there are government price controls. Given the importance of health care to the economy and society, we believe changes will likely be incremental over the next five years. On the safety side, there have been product recalls, litigation, and even public health problems because of the side effects of drugs and implanted medical devices. This risk is balanced by heavily regulating and testing products and devices. Consumers don't generally select products (i.e. drugs are prescribed by doctors and insurance companies and PBMs may steer consumption), so we do not view changes in consumer behavior as a major risk. However, the rise of high deductible plans has caused more consumer-oriented behavior and we think this trend will continue. The shortage of health workers such as nurses and doctors is a human capital issue. The aging population generally benefits demand but contributes to higher costs.
Homebuilders and developers		
Environmental	3	Environmental risks for homebuilders and developers face are climate change and rising energy costs because housing and buildings contribute to GHG emissions, primarily through heating and air conditioning. We expect that companies in this sector will continue to effectively manage these risks by enhancing their products' ongoing sustainability and quality while seeking appropriate compensation from property buyers. Regulations to achieve more efficient thermal insulation, and therefore restrict GHG emissions, as well as other conservation standards, are tightening worldwide; buyers appear ready and willing to pay for it because it improves long-term property values. Because of growing awareness around environmental issues, particularly in urban areas, homebuilders and developers must focus on developing environmentally certified assets that meet or exceed local regulations or industry best practice. Developing assets with environmental certification can be a point of differentiation when ranking a specific issuer in the sector. Similarly, having a product offer adapted to withstand natural disasters is a differentiating factor for homebuilders and developers. Supply chain exposure for homebuilders and developers reside in construction materials sourced from building material and construction companies. Those suppliers are the ones primarily exposed to the environmental risks coming from mining, excavating and clearing operations, pollution, or energy or water consumption from producing building materials. The sector has an inherent low exposure to water use and resources scarcity, simply in line with standard human activity. Development activities generally happen on planned and approved land parcels, resulting in limited risks of remediation for biodiversity or restitution for incorrect land use.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	3	The social risks in the sector focus on social cohesion and consumer behavior as the sector’s labor intensity is moderate, community relations tend to be good, and safety issues concentrate around construction. Social cohesion risk exists when developers fail to meet tougher regulations, a development proposal or operation creates community issues, land permits or land conversion rights are seen as prone to lobbying or bribery, or rising property prices in urban areas are perceived as contributing to income inequality and social instability. Safety management risk reflects greater awareness to constantly improve safety standards for construction workers. Changes in consumer behavior and demographic trends influence operating strategies and attitudes in developing specific assets. Notwithstanding that, the industry has a long track record of adapting their products to meet new regulations and property buyers’ changing requirements.
Insurance		
Environmental	2	The insurance sector mostly faces the risk of more claims and indirect exposure from investment activities, balanced with its low use of physical infrastructure and facilities. Insurers are primarily service providers that produce low GHG emissions and pollution with little land and water usage, even if their fast-growing use of IT services (digitization, cloud computing, big data) is increasing their CO2 emissions. However, the insurance industry is exposed to the increasing frequency and severity of extreme weather events due to climate change as it raises the cost of related insurance claims. At the same time, natural catastrophe claims represent only about 2%-3% of total global insurance claims (but is more material for the specialist catastrophe reinsurers). The sector is also exposed to the potential additional cost of health care claims related to air, water, or soil pollution. A strong mitigating factor is that insurers typically can reprice non-life insurance contracts annually. Finally, as some of the largest investors in the world, insurers are financially at risk if the value of the companies they invest in becomes depressed because of environmental risks. But, they usually have well-diversified investment portfolios.
Social	3	Social exposure for the insurance sector reflects its exposure to consumer behaviors, human capital management, and demography. Insurers face high reputational risks that could damage their customer franchise. For instance, data privacy and security problems or mis-selling can also cause reputational damage and large fines. In addition, as a collector of risks, the insurance industry could face significantly more claims in a mass litigation (e.g., asbestos), which could tarnish their reputation. Insurers also have exposure to human capital management, as a large productive workforce is at the core of their business model. Finally, longer life expectancy could hit life insurers by affecting products covering longevity risk.
Leisure		
Environmental	2	Environmental risks tend to focus on climate change because unfavorable and extreme weather can dampen visitation and thus revenue, or damage and even destroy assets. Ocean warming and acidification is affecting the quality of some locations by damaging marine life, which could affect future demand, although many operators have sufficient geographic diversity to mitigate this. Salt water intrusion into coastal aquifers could raise the cost of water for parts of the hotel subsector, although not significantly at present. Emissions and other waste and pollution regulations have a small, but meaningful impact on a subset of leisure operators, especially cruise operators and leisure goods manufacturers. For example, regulations can increase costs and heighten investment spending to develop more fuel-efficient or environmentally friendly ships.

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Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	4	Although difficult to predict, events such as terrorism, geopolitical unrest, and health scares can have a significant negative impact on travel demand and leisure activities. Examples include the aftermath of Sept. 11, European terror attacks in 2015 and 2016, and flu scares over the past two decades. Increased regulations to protect local communities from the perceived harmful effects of gaming can also impair profits. Fires and fatalities on cruise ships and in several theme parks around the world illustrate safety risk. Toy and goods manufacturers also face severe reputation and product liability risks because of accidents. As consumer preferences--partly driven by social media exposure--require constant improvement, the industry will require much capital investment particularly for hotels, cruise ships, casinos, and theme parks. Social media regarding negative travel experiences can quickly present a problem for brands. Technology also introduces new ways to purchase travel and new supply in the hospitality market against which traditional leisure providers need to compete.
Media		
Environmental	1	There are few environmental risks for companies in the media sector. Environmental risks in the sector reflect the low and indirect use of raw materials and relatively minimal waste output. For example, content generation companies such as movie studios and advertising agencies focus on IP development through human capital, and media distributors such as television and radio broadcasters have minimal environmental impact outside of their installed communication networks and office facilities. While print-based media providers like newspapers, magazine publishers, and printers do emit both liquid and solid waste in their manufacturing processes, we believe current regulations and the declining use of print means environmental risks will diminish.
Social	5	The Media sector's social risks include IP theft, content regulation, social media activism, and key man risk. IP theft is substantial for most media companies as many of them develop and rely on proprietary IP with exclusive use rights. Any IP theft would hurt these companies' reputations, competitive advantages, and ultimately on their future profitability. Moreover, we believe that as content companies reach for more thrilling or nontraditional entertainment they may face backlash or negative feedback from regulators or content-users. Recently, the rise of social media movements through microblogging have proliferated. We believe high-profile media companies or media figureheads run the risk of being accused or implicated in a social movement, which could hurt their brand reputation and potentially lower growth prospects and cash flows. Finally, we believe content-producing media companies are substantially exposed to key man risk because they depend on individuals with extraordinary creative talents, charismatic influence, or similar leadership qualities to drive revenue growth. Without them, it's uncertain whether these organizations could maintain key sales relationships, comparative advantages for creative content, or organizational momentum.
Metals and mining		
Environmental	6	By nature, mining threatens the environment and competes with other businesses and communities for water and electricity. It can also release toxic elements to the air, water, or soil. Open pit and underground mining involve crushing and treating large amounts of ore, resulting in tailings that may alter ecosystems if containment isn't proper. Other types like heap leaching use toxic fluids (cyanide or sulfuric acid) that are devastating when leaked to the environment. Alloy production such as steel or aluminum are extremely power-intensive and heavy air polluters. Steel mills generate significant carbon dioxide, nitrogen oxide, and particular matter that need proper treatment before being released to open air. Finally, coal-fired power plants are heavy air polluters, so governments are increasingly limiting them and incentivizing greener forms of energy.

The ESG Risk Atlas: Sector And Regional Rationales And Scores

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	5	Safety management for the metals and mining sector is key since large and dangerous equipment is used, and some mining sites are located in remote and sometimes hostile environments. Companies typically track and manage incidents and have specific programs to educate their work forces. Social cohesion is another key risk, specifically social license to operate, given the land use and disruptions that mining sites can create for nearby communities. Governments worldwide increasingly need miners for social infrastructure and other forms of social responsibilities to concede or renew operating licenses. Poor management of these factors typically leads to reputational issues, license suspension/termination, adverse litigation, staffing issues, and unrest.
Midstream		
Environmental	3	The midstream sector is inherently exposed to GHG emissions, pollution, transportation spills, water use, and contamination risks. Pollution is material for companies transporting hydrocarbons. For example, for companies to build their infrastructure they must secure environmental permits, which have become increasingly difficult to obtain from regulators. Environmental protests and legal challenges for new pipeline construction has sometimes caused substantial delays and increased costs. The combustion of carbon-based fuels results in more CO ₂ in the atmosphere, and natural gas largely consists of methane, another GHG. Water use and the risk of contamination is also particularly relevant.
Social	3	Safety management is key for the midstream sector given the construction of sophisticated infrastructure-like pipelines, storage terminals, and processing and fractionation assets that handle volatile and toxic hydrocarbons that have important environmental repercussions. Companies typically track, manage, and report incidents (OSHA) and have specific programs to educate their work forces. Social cohesion is another key risk, specifically permits to construct and operate, given the land use and disruptions that pipeline routes can create for communities. Long-term demographic and consumer behavior trends are increasingly influential as demand for natural gas continues to grow in the northeastern and southeastern U.S., generally at the expense of coal generation.
Oil and gas		
Environmental	6	The oil and gas sector is inherently exposed to GHG emission, pollution from well head and transport spills and leaks, and water use and contamination risks. The combustion of carbon-based fuels results in CO ₂ , notably oil-derived products and natural gas. Natural gas (largely methane) is another GHG, though when burnt for power generation it is much less polluting than coal. Gas' role as a bridge fuel in the energy transition should support demand over the next two decades or so. Oil production can also be a direct source of GHGs through methane leaks or gas flaring. Also, pollution is material for companies producing and transporting hydrocarbons and may cause financial and reputational damage. The environmental impact of plastic waste is also a consumer focus, especially for disposable plastics. Plastics are largely derived from petrochemicals, which account for about 14% of crude oil production. Consumer switching from disposables may moderate overall growing demand for plastics. Plastics used in construction have much longer useful lives and thus have less immediate visible impacts on the environment. Water use and the risk of land and aquifer contamination is particularly relevant for tight oil and gas producers due to hydraulic fracturing activities. Many countries have stringent development, operating, and decommissioning requirements and potential penalties for companies that extract hydrocarbons.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	5	Safety management is a key risk for the oil and gas sector given drilling activities and sometimes harsh environmental conditions, especially offshore. Companies typically track and manage incidents and have specific programs to educate work forces. Social cohesion is another key risk, specifically license to operate, given the land use and disruptions that drilling and production sites can typically create for nearby communities. In addition, relationships to communities and governments are important in that a lack of shared benefits could create opposition. Long-term consumer behavior will likely become more influential in the energy transition away from carbon fuels and disposable plastics or those uneconomical to recycle. The adoption of low-carbon electric cars won't significantly affect oil demand in the next decade. A mitigating factor for producers could be the natural decline of oil and gas fields (4%-5% per year), which may help balance supply and demand.
Power generation (coal)		
Environmental	6	Environmental risks in the power generation (coal) sector relate to the inherent material exposure to carbon and GHG emissions, air pollution through gases and air particles and, increasingly, water use and contamination risks. Power generation based on coal creates significant environmental damage, and we view this industry to be as risky as the oil and gas industry. These environmental risks could lead to significant cost and regulatory constraints. In this context, we recognize that there is an important political drive worldwide, notably the Paris Agreement, to reduce the carbon footprint by rapidly shifting to renewable energies (solar and wind) and new technologies to reduce emissions. The pace of reducing coal in the energy mix is inconsistent and we believe coal generation operators could have different timeframes to adapt their strategies. We see political scrutiny of environmental topics remaining high, but companies' strategies already capture these well. We see a higher likelihood for environmental risks to be reflected in higher thermal generation costs with increased CO2 prices, because of a more harmonized and constraining CO2 allowances market led by a stronger political push.
Social	4	Social risks in the sector are weighted toward exposure to safety and reliability, social cohesion and ultimately consumer behavior risks. Power generators play a crucial role for communities in their role as essential energy provider and need to stay affordable and reliable. This means that they are vulnerable to local criticism and negative political intervention, which could lead to strong opposition and arbitrary taxation. Utilities are generally socially intertwined with the local communities because they are usually the large local employer with a high degree of unionized staff. Finally, long-term consumer behavior is likely to be increasingly influential in the energy transition away from polluting energy sources.
Power generation (excluding coal)		
Environmental	4	Environmental risks include pollution, land usage, waste management, and contamination of nuclear sources. The transition toward cleaner power is being enacted globally. However, because renewable energy is intermittent and continues to rely on subsidies, further significant growth of renewable energy depends on better technology that will lower the cost of renewable energy and battery storage. Nuclear generation, despite its low carbon footprint, poses several threats from environmental perspective when it comes to the future of long-term nuclear waste storage, severe operational issues (reactor outages create production strains and would ultimately resort to switching to polluting thermal production) up to low probability major environmental and human catastrophes (Chernobyl, Fukushima). Natural gas is less environmental harmful than coal, emitting about half the CO2 of coal and making it a lower carbon footprint baseload option for power generation. Natural gas also benefits from policies aimed at increasing the share of intermittent renewable generation, and the gradual phasing out other energy sources, such as coal and nuclear (in Europe). However, we believe that natural gas represents a bridge fuel to the low carbon future and the duration of natural gas as a primary source to generate electricity will depend on the development of new energy storage technologies.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	4	Social risks include safety and reliability, social cohesion, and consumer behavior. Power generators play a crucial role for communities because they provide essential energy that needs to stay affordable and reliable. This means they are vulnerable to local politics and, which could lead to strong opposition and arbitrary taxation. Utilities are generally socially intertwined with the local communities because they are usually a large local employer of unionized staff. Long-term consumer behavior will likely be increasingly influential in the energy transition away from polluting energy sources. Social risk for nuclear generators also includes proper nuclear waste management, including storage.
Real estate operators		
Environmental	2	Real estate operators are primarily exposed to climate change since they use energy to heat or cool buildings. Enhancing a real estate asset's sustainability can boost an issuer's operating efficiency (conserving energy, reducing water usage, and managing waste), reduce operating costs, and encourage creating environmental benchmarks to monitor individual assets and portfolios. As awareness of environmental issues grows, particularly in cities, landlords need to focus on owning environmentally certified assets (that meet or exceed local regulations/industry association best practices) and reposition assets with a sustainability focus to ensure they're attractive to a variety of tenants. Owning a portfolio of assets with environmental certifications (LEED, BREEAM, FEED, NABERS) can help differentiate assets from peers. If a landlord purchases a new or refurbished building with low GHG emissions, efficient water use, and low waste, pollution, and toxicity, it can offset the potential impact of extreme climate events on the portfolio. Many rated REITs have tapped the green bond market to fund growth in sustainable assets and projects so they can improve their sustainability initiatives and expand their investor base.
Social	1	The real estate sector is not labor-intensive, maintains good community relations, and faces no material safety issues. However, changing consumer behavior and demographic trends are influencing issuers' operating strategies and attitudes toward owning specific assets. The industry has historically adapted its assets to meet new regulations (e.g. housing) and evolved to meet changing tenant requirements (e.g. more flexible office space, short-term leases, and upgraded retail space rented out to health-conscious retailers). Retail sector disruption due to e-commerce is affecting retail landlords and the level of investment required to reposition assets. On the flip side, industrial assets are benefiting from the e-commerce tailwind. Workforce mobility and better technology could also result in a growing preference towards co-working office assets, affecting long-term demand for office real estate. Multifamily residential properties have responded to demographic shifts driven by rising urbanization and higher standards of living. We expect the demographic trends in developed markets that drive infrastructure spending are heightened and will influence each real estate asset's market position and quality differently.
Refining and marketing		
Environmental	5	The refining and marketing sector is materially exposed to GHG emissions, pollution, transport spills, and contamination risks. The refining process requires energy and creates CO2 emissions. The risk of pollution and accidents is material for companies refining and distributing hydrocarbons and may result in substantial financial and reputational damage. The risk of land contamination during operations and the cost of clean-up before property can be turned over to alternative use are significant, especially at refineries. Because hydrocarbon fuels are flammable and are frequently produced near and distributed through populated areas, most countries have stringent operating and safety requirements for oil product refiners and marketers.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	4	Safety management is critical for the refining and marketing sector and generally routine because oil products are combustible and pollute. Some refinery complexes are huge, so accidents can be major events involving fatalities. Companies typically track and manage incidents and have specific programs in place to educate work forces. We believe consumer behavior will likely be more influential in the energy transition away from carbon fuels. With more concerns about global warming, fuel retailers, as the local face of the oil industry, might bear an increasing burden of protests and disruption. Poor management of social, and particularly safety, factors typically lead to reputational issues.
Regulated utilities networks		
Environmental	2	The regulated utilities network sector's environmental risks are focused on its pure infrastructure status rather than fossil-based emissions. The key risk that effects electric transmission and distribution networks is their exposure to climate change, including wildfires, storms, hurricanes, and tornadoes. To protect against some of these risks, networks are undergrounding and hardening their systems, making them somewhat less susceptible to climate change. For natural gas networks, we focus on gas explosions and leaks that emit GHGs and may effect biodiversity. For water networks, environmental risks are primarily focused on clean water and water usage (i.e., spills and losses). Another area of environmental focus is droughts, which could cause water shortages for water networks and can increase the risks of wildfires for electric networks.
Social	4	The regulated utilities network sector plays a crucial role for communities. Network operators provide energy, gas, or water to people and organizations, and these services require satisfactory customer service. Any disruption to these services would trigger potential negative political pressures or put at risk their license to operate. Customers need to consider the fees for services as fair, and we see increased social and regulatory pressures in terms of acceptability of tariffs. Maintaining a reliable, safe, and viably economic network is thus key to managing regulatory risk and public opinion. Developing new infrastructures also implies land use and permits, which can create conflicts with local communities. For gas networks, safety management is key (incidents typically have larger impact/human death toll). Finally, utilities are generally major local employers with many unionized employees, which exposes them to human capital management risks.
Retail		
Environmental	3	Changing consumer behavior could result from climate change and emissions and land-use regulations could affect supply chains. Longer-term shifts in seasonal shopping and buying patterns could require retailers to adapt product offerings or selling seasons. Emissions regulations are risks since logistics have become more complex. Companies face moderate longer-term risks, principally because of tighter GHG emission regulations. The cost of compliance and how it affects optimal customer delivery is a longer-term risk. A retailer can mix owned and outsourced capacity for logistics to provide flexibility in addressing this risk by selecting lower-emission service providers. Land use is a risk for both customer-facing and logistics operations.
Social	3	Customer brand perception, preferences, and demographics are risks and opportunities because social and economic factors drive consumer demand for discretionary goods. These social risks can be impactful because of the potential immediacy of adverse customer actions stemming from social factors. Opportunities for sales growth or cost improvements could arise if retailers successfully manage these risks. Human capital management is critical in this labor-intensive sector as mobile apps change the retail landscape. Accordingly, risks include the quality of the customer-facing workforce and an organization's ability to execute change. The compensation, health, and safety of a retailer's direct and indirect (through supply chain transparency) workforce is another social risk. Retailers must also address consumers' preference for rapid delivery and price transparency in diverse markets.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Supranational and development institutions		
Environmental	1	Environmental exposure for the supranational and development institutions sector (SDI; which includes multilateral institutions and development banks) is based on its low use of physical infrastructure and facilities. SDIs are primarily service providers that produce low GHG emissions and pollution, with little land and water usage. Given their primary mandate and focus on addressing global development and environmental challenges, their lending and investment activities are typically accompanied by tighter environmental underwriting criteria than private commercial banks, which ultimately limit or reduce their environmental exposure. This also affects how they carry out their operations sustainably.
Social	1	Social exposure for SDIs reflects human capital management, consumer behaviors, and social cohesion. Their employee base is smaller than commercial banks and largely driven by the positive impact their activities have on development (health, education, environment, and infrastructure). Greater global focus on environmental and social issues should ensure a strong supply of skilled labor to the industry, strengthening its position. However, in the unlikely event that SDIs fail to comply with their mandate, internal guidelines, or face negative environmental or social events, their reputation and relations with various stakeholders could be hurt. The risk of operational disruptions in their own activities is low even if some of their project financing is struck by conflicts, social unrest, and protests. Overall, we see social cohesion risk as limited as SDIs tend to work well at the local level and frequently interact with local governments.
Technology hardware and semiconductor		
Environmental	4	The hardware and semiconductors industries face risks from GHG emissions stemming from the significant amount of water, chemicals, and energy needed to manufacture and dispose of old equipment, and from climate change because some manufacturing facilities are in areas exposed to chronic or acute weather-related events like floods and earthquakes. For example, severe flooding across Thailand in 2011 significantly disrupted manufacturing hard disk drives, a crucial component for personal computers, causing global industry supply shortage and high component costs for almost two years. Hardware and semiconductor vendors, through their own internal manufacturing or their supply chains, have manufacturing operations that possess inherent water-use risks that contribute to our view of the sector's environmental risk exposure. Certain hardware companies are also exposed to risks around the sourcing of minerals like tin, tantalum, tungsten, gold, and cobalt, which are all used in electronic equipment. Also, these finished products often carry relatively short life cycles, creating a need to dispose of old equipment. Given these risks and more regulatory and industry focus, hardware and semiconductor companies have increasingly emphasized creating and implementing best practices that extend to their vast global supply chain network. These efforts include purchasing more emission credits or procuring renewable energy, which helps indirectly reduce GHG emissions and energy, labor, and other operational costs; and enhancing products' sustainability by using less plastic and shifting toward more light-weight, recycled materials in products and packaging. Over the past few decades, many hardware and semiconductor firms have outsourced their manufacturing operations to specialists in lower-cost regions. We believe that these supply chain arrangements lower the environmental risk exposures for the hardware and semiconductor industries because they consolidate manufacturing operations at the service providers, which will likely operate more efficiently and in a more environmentally friendly manner. Technology hardware and semiconductor companies that have manufacturing operations also face potential liabilities from land use as they could be exposed to asset retirement obligations.

The ESG Risk Atlas: Sector And Regional Rationales And Scores

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	4	We view these industries to have material exposure to gender inequality, workforce diversity, rapid change in consumer preferences and tastes (i.e., smartphones and gaming products), and, especially, privacy and security concerns, as many technology companies collect, manage, and monetize sensitive information that are at risk of misuse. As workloads shift from on-premise data centers to cloud computing, maintaining a reliable, secure, and economical cloud computing platform is a key to client satisfaction and helps mitigate regulatory intervention. Furthermore, health, safety, and labor issues around working hours, poor working conditions, labor shortage, and occupational safety are also major areas of concern, particularly in Asia. However, technology has also improved living standards and business productivity and lessened some environment and social risks.
Technology software and services		
Environmental	1	The technology software and services sector has few environmental risks because companies have limited use of physical infrastructure or facilities and most don't have manufacturing operations. They also produce low GHG emissions, pollution, or environmental waste and have low land and water use, even if greater use of software and IT services increases their CO2 emissions. Technology software and services companies have limited to no exposure to toxic materials. Exposure to incremental costs or potential physical impacts on assets associated with climate change events is low as software and services companies tend to have flexibility in where their operations reside. Companies often avoid operating in areas subject to extreme climate events. Risk of remediation for biodiversity or restitution for land use is low. Certain companies that operate data centers or provide hosting services to customers carry some risk exposure to GHG emissions, but increasing environmental risk awareness, technological advancement (i.e., virtualization software and cloud computing business models), and conscious decisions to use environmentally friendly LEED-certified buildings have significantly reduced companies' carbon footprints, and we expect this trend to continue. Furthermore, as software functionality replaces or improves hardware products, we expect the environmental risks for the technology software and services industries--and for all companies globally--to benefit from reduced carbon emissions and lower overall waste output.
Social	4	Social risks in this sector are weighted towards gender inequality, workforce diversity, rapid change in consumer preferences and tastes, and, especially, privacy and security concerns, as many technology companies collect, manage, and monetize sensitive information that are at risk of misuse. Any theft of corporate or individual information could damage a company's reputation and earnings prospects, and increase the risk of regulatory scrutiny and restrictions. For example, noncompliance with the European Union's General Data Protection Regulation could carry fines of up to 4% of worldwide revenue. Workload migration to the cloud mandates maintaining a reliable, secure, and economical cloud computing platform to ensure client satisfaction and mitigate regulatory intervention. These demand shifts and high standards are important credit risk factors as they require technology companies to invest aggressively in R&D, without any guarantee of adequate returns. Furthermore, health, safety, and labor issues related to working hours, working conditions, labor shortages, and occupational safety are also major areas of concern, particularly in Asia. However, technology has also improved living standards and business productivity, and lessened some social risk factors.
Telecom		
Environmental	2	Environmental risks for the telecom sector reflect low direct and indirect use of water and its relatively low contribution to waste, pollution, and toxicity. Because the sector uses energy to power its communication networks, data centers, and operations (such as truck rolls, IT systems, call centers, and points of distribution), the sector contributes to GHG emissions. In addition, the sector has exposure to climate change risks because a notable portion of its operating infrastructure (as well as customers) is exposed to extreme weather conditions like hurricanes, tornadoes, ice storms, or flooding.

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Social	4	<p>Consumer behavior is a moderately high risk for telecom given shifting demand toward innovative services such as broadband-based and over-the-top products. Demand shifts could create significant capital allocation challenges and affect return on capital given the sector's long-life assets. In addition, given the sector's expansive reach and visibility, its systems stability, as well as consumer confidence in industry actions on privacy, community engagement, equity, and corporate citizenship, also contribute to our social risk assessment. Debate over the societal impact of excessive social media use (particularly among younger demographics) and the effects of misinformation could increase social pressure to reduce or change usage patterns. Health concerns around potential radiation from telecom equipment and devices are a small but notable factor that could affect consumer usage of telecom services. Telecom companies are large employers, typically with a significant unionized workforce, so human capital management is another key social risk. Given the sector's large and ethnically diverse customer base, community relationships and sensitivity form low but important social cohesion risks. Safety management risks stem from the industry's technicians and personnel building and maintaining the telecom infrastructure, including towers and data centers.</p>
Transportation		
Environmental	4	<p>Transportation is a heterogeneous sector, and its subsectors must deal with distinct risks. Most face high and increasing regulation of GHG emissions, with airlines and shipping companies facing the greatest risk. For airlines, the risk is mostly long-term because, in 2016, most countries agreed to rules under the U.N.-sponsored International Civil Aviation Organization that apply only to international routes and can be met fairly easily using current and planned aircraft engine technology over the next several years. However, this might become gradually more costly thereafter. European airlines face a separate additional emissions trading scheme to help offset emissions there. Shipping companies face near-term regulations by the International Maritime Organization that mandate much lower emissions of sulfur compounds as of Jan. 1, 2020. Measures to meet this are costly (mostly either using more expensive fuel or installing "scrubbers") in a competitive industry with low margins. Other sectors, such as railroads and trucking, face some regulations but they tend not to be as impactful.</p>
Social	3	<p>Passenger transportation companies face risks on social cohesion, as airlines are a high-profile target for terrorism and disrupted by war, but freight transportation is relatively less affected. Community opposition to expansion of transportation infrastructure (such as airport runways) limits growth and raises operating costs, but also allows transportation companies to raise prices by limiting capacity in the market. Employee management is a factor because many transportation companies are heavily unionized and strikes can be very costly and disruptive. Another risk is safety, particularly for airlines, for whom accidents are highly visible and deadly (albeit rare statistically). For freight transportation companies, the safety risk relates mostly to employees or accidents that endanger others (such as toxic or flammable spills from rail accidents). Other social risks, such as exposure to consumer behavior or demographic shifts, are much less of a risk, and can even be favorable. The spread of internet commerce has been a boon for freight transportation and global demographic trends are propelling airline traffic.</p>

Table 1

Sector Risk Atlas (cont.)

Sector	Score	Comments
Transportation infrastructure		
Environmental	3	Because the transportation infrastructure sector facilitates the movement of people and goods, these businesses have fewer environmental risks, which are mostly supply chain-generated. For example, the actual users of transportation infrastructure (planes, cars, and ships) rather than the businesses themselves produce emissions. This indirect exposure affects asset operations, although we would expect that underlying demand for these assets won't change fundamentally even as transport manages its exposure to emissions over time. Extreme weather events, insurable or not, can disrupt business, typically for shorter timeframes. Weather events do affect airport and port operations, and the severity and frequency of major weather events seem to be increasing. Land use can be a risk factor for expansions, extensions, and new developments. Transportation infrastructure businesses are often in populous urban areas. Planning and approvals for developments requiring new land or more intensive use of existing land can be harder to achieve as governments in some jurisdictions respond to increasingly vocal communities. Land use factors are more a risk to future growth than existing operations.
Social	2	The concept of "license to operate" is gaining significance for transportation infrastructure, especially because many of these businesses are monopolistic. The effect on lifestyle, congestion, noise, and air quality on communities has been gaining the attention of media, businesses, investors, governments, and regulators. Businesses cannot focus solely on their customers, but need to skillfully manage a range of stakeholders, otherwise it can damage their reputations and important relationships and hurt business. Roads and airports, especially, are exposed to social risk given their human patronage. Demographic risks like aging populations, population density, urban infill could all be influences as well. These factors can be as much about opportunities as risks: how companies anticipate or react to demographic trends will have important ramifications for their future prospects. Safety management is also an important issue since customer and freight security is essential to performance. Businesses typically have prescriptive policies and procedures to govern employees and contractors, and customer and user education is increasingly a focus for management teams.

Regional Risks

Table 2

Regional Risk Atlas

Country	Score	Comments
Argentina	4	Much of the workforce remains in the informal sector of the economy and poverty has been rising. The country's regulations and tax code impose heavy compliance costs for businesses, and encourage informality and tax evasion. The rule of law suffers from corruption in public agencies, as well as politicization of administrative and sometimes judicial decisions. Nevertheless, a new anti-corruption law was adopted in 2018 (Law 27.401) to address this issue, and corporate governance standards in the country seem to be improving. The recent launch of a new corporate governance-focused segment on the Buenos Aires Stock Exchange and an update to the Corporate Governance Code due before summer 2019 are positive steps. The governance segment will follow the same voluntary basis of the Brazilian Novo Mercado. The revised Code will now cover important new topics such as gender diversity on boards and will operate on a comply-or-explain model for listed companies.

Table 2

Regional Risk Atlas (cont.)

Country	Score	Comments
Australia	1	A strong rule of law and regulatory oversight ensures Australia's high corporate governance standards, evidenced by its focus on compliance and accountability. A recent Royal Commission into the financial sector found lapses in governance and risk management and effectiveness of financial regulation. Despite this, governance standards remain strong by global standards. Besides extensive regulations, namely from the Corporations Act and the listing rules from the Australian Stock Exchange (ASX), companies have largely accepted the non-binding, principles approach to governance in the ASX Corporate Governance Principles. Private and public sector corruption levels are low. Australia ranks 13th on the 2017 Corruption Perceptions Index.
Brazil	4	Brazil's regulations and complex federal and state tax code impose heavy compliance costs for businesses and encourage informality and tax evasion. Most of the workforce remains in the informal sector of the economy and poverty has been rising. Political scandals involving corruption at the highest government levels created strong public backlash and led to jailing several political and business leaders. The country's judicial system, which operates at federal and state levels, can make applying laws complex and slow. While Brazil has comparatively strong laws and regulations, particularly on corporate governance, the main issue is implementation. We expect this to strengthen following significant improvements in recent years, namely stronger B3 stock exchange listing rules on governance (Novo Mercado segment), new governance guidelines for state-owned enterprises, and greater shareholder rights protection. Concentrated ownership is common in Brazil and the use of multiple class share structures with unequal voting rights may negatively affect minority shareholders. The Brazilian Institute of Corporate Governance's Corporate Governance Code is the best practice reference document in the market. It's not mandatory, but since 2017 companies must report on their recommendations on a comply-or-explain basis. Despite improvements regarding board independence and diversity, Brazil lags behind developed markets. There are limited formal requirements for ESG disclosure, but companies, particularly large ones, tend to report widely on their environmental and social efforts.
Canada	1	The rule of law and respect for human rights are both very strong. Unlike other advanced countries, there's been no rise in populist political parties or social movements that question the mainstream consensus on economic, social, or immigration policies. Canadian governments at all levels have actively pursued environmental and social regulations. While there's no federal regulatory agency, the Ontario Securities Commission (which oversees the Toronto Stock Exchange) carries significant weight regarding corporate governance recommendations. Canada follows a "principles-based" approach to corporate governance. Overall, governance standards are good and improving. Companies usually have smaller boards, meet more often, and have fewer joint CEO/chair positions, but board renewal and over-boarding are issues. However, boards can lack adequate independence, and remuneration or nomination committees are less common than in other jurisdictions. Local institutional investors have been active on ESG and stewardship amid growing regulatory momentum to improve companies' ESG disclosure led by the Canadian Securities Administrator.
China	4	Social standards are in line with most other major developing economies. The government recently strengthened legal protection for workers and consumers. Chinese corporate governance standards are also on par with other economies at this stage of development. The central government's recent push to reform state-owned enterprise structures in line with good governance practices is a major development. In 2018, China revised its Code of Corporate Governance for listed companies, accounting for the OECD requirements and particularly focusing on ESG disclosure and board diversity. Hong Kong also amended its Corporate Governance Code in 2019 and issued its guidance for board directors. Hong Kong-listed listed companies have been required to report on their ESG performance on a comply-or-explain basis since 2017. Official corruption has been less of a problem over the past few years due to the central government's anti-corruption drive. This effort has also been extended to government-related companies and financial institutions. Still, corruption among private enterprises remains an issue. Although judicial reforms are ongoing, the private sector has yet to trust that the rule of law is significantly improving.

Table 2

Regional Risk Atlas (cont.)

Country	Score	Comments
France	1	France is among the most advanced countries on ESG regulations, including mandatory disclosure and reporting sustainability indicators. Overall, corporate governance is in line with advanced economies' standards. In addition to the EU Non-Financial Reporting Directive's recommendations requiring the disclosure of ESG data, French companies must also disclose the social and environmental consequences of their activities under domestic law (Grenelle Act), the financial risks they face from climate change, and their remediation strategy (Energy Transition Law). Further, under article 173 of the Energy Transition Law, institutional investors must disclose the ESG factors incorporated in their investment policies and their contribution to the energy and ecological transition. Besides a strong regulatory framework, the Afep-Medef Code and the recommendations from the Financial Markets Authority provide non-binding guidance for best practice on governance and pay. Despite waves of privatization, the state remains an important player in the French capital markets, as shareholder in several large listed companies. On diversity, listed companies are legally required to reach 40% women on boards in a bid to reach parity.
Germany	1	Germany has strong institutional and governance effectiveness, with much transparency and accountability. The rule of law is strong, the judiciary is independent, and corruption is viewed as a minor issue. Germany has a moderate amount of ESG regulation. While Deutsche Börse AG doesn't require ESG reporting as a listing rule, companies of over 500 employees are implementing the EU Non-Financial Reporting Directive's recommendations, which mandate the disclosure of ESG data like diversity and pay ratios. The German Corporate Governance Code (Kodex) is the reference document for Germany's best practices and works on a comply-or-explain basis. While the recommendations are much less specific than most European codes, companies exhibit strong governance practices. Companies are typically governed by a two-tier board system, a management board of executives overseen by a supervisory board comprising non-executives, including shareholder and employee or labor union representatives. While not world-leading, there are corporate disclosure requirements for selected ESG aspects, and both occupational pension funds and insurers must inform on whether and how they account for ESG considerations when managing pension fund assets under their control.
India	4	India's social standards remain low by global standards, with significant inequality. India's judiciary is among its strongest institutional elements. The public places considerable faith in judicial institutions and the court system enjoys robust independence. India's corruption levels are average from a global perspective, but have been gradually improving thanks to its strong democratic institutions. India's corporate governance framework is based on the 2013 Companies Act and the Securities Exchange Board's (SEBI's) regulations. Since 2018, SEBI has been implementing the Kotak governance committee's recommendations to improve practices at listed companies. Board diversity has been better, particularly since the 2013 Act mandated all listed companies have at least one female director. Board effectiveness and succession planning are issues. Large boards often comprise directors sitting on multiple boards, which may affect their attendance and effectiveness of participation. Furthermore, many board members have had long tenures, dampening the introduction of new board members, but this will likely improve because retirement is pushing succession planning and more churn. ESG reporting has improved and more companies have improved their disclosure. Regulators like the Bombay Stock Exchange (BSE) have made ESG disclosure mandatory for the top 500 companies listed on the BSE and National Stock Exchange.
Indonesia	4	Social standards are in line with most other major developing economies, but there is significant disparity among Indonesian society. Rules for worker protection are strong but enforcement is patchy. Corporate governance standards are generally weak, particularly for smaller or unlisted companies. Indonesia's financial services regulator Otoritas Jasa Keuangan did release a roadmap to improve corporate governance in 2014, but the implementation of best practices is still lacking. This exacerbates the fact that many listed companies often fail to comply with mandatory regulations. Boards often lack independence and diversity, while compensation disclosures are scant. Transparency is limited and ESG disclosure is below other developing countries. Corruption remains an issue like many other countries in the region. The judicial system is inefficient and outcomes can be unpredictable.

Table 2

Regional Risk Atlas (cont.)

Country	Score	Comments
Italy	3	Italian institutions' effectiveness somewhat lags behind similarly developed European countries. The perception of corruption is also higher than the European average (the country ranks 53rd out of 180 in Transparency International's Corruption Perception Index). The Italian Code of Corporate Governance, revised in 2018, is the reference document for best practices and follows a comply-or-explain principle. Companies of over 500 employees are implementing the EU Non-Financial Reporting Directive's recommendations, which mandate disclosing ESG (including diversity) risks. Ownership is concentrated because many Italian companies continue to be tightly controlled through cross-holdings and pyramidal ownership, often to the detriment of minority shareholder rights. The government also maintains sizeable shareholdings in large publicly listed companies. Italy fares well on female participation on boards, thanks to a reform establishing legislated quotas to ensure gender balance on corporate boards. However, boards often lack international expertise.
Japan	2	Corporate governance practices are sufficient but somewhat below standards of other major advanced economies. Board diversity and transparency are areas where businesses lag their counterparts in other advanced markets. Improving Japanese corporate governance, backed by the recent government's strong initiative, has been a key thrust of the current government's economic revival strategy. Indeed, the revision of the Stewardship Code in 2017 and of the Corporate Governance Code in 2018 were important advances on the public policy front, but the implementation efforts have been somewhat slow. Despite some improvements, some traditional habits are proving quite entrenched, such as cross-shareholdings among companies, limited outside director oversight, and limited diversification in management. Gender diversity in senior positions remains low, with less than 4% of executives in listed companies being women, although government's objectives are to reach 10% of female executives and 30% of senior managers by 2020. Japanese boards are typically male-dominated and, often, by former executives with long tenures. Although it has been improving, the lack of diversity on boards, in terms of age, background, gender, and experience, might impede progress to transparent governance and nimble decision making to adapt rapidly changing business environment.
Mexico	4	Mexico's public institutions suffer from shortcomings that limit their effectiveness in providing basic public services, ranging from law and order to contract enforcement to proper regulation and supervision. A high level of violence and perceived corruption increase the risk of doing business. Despite regular elections and changes of government, the quality of governance has remained poor, contributing to the country's weak GDP growth in recent years. More than half the workforce is in the informal sector, with low wages and few social benefits. The poverty rate has remained high, despite a stable economy with low inflation. Mexican politics has been divisive, reflecting social gaps and divisions. Despite significant governance improvements enacted in the Capital Markets Law, dual-class share structures, cross-holdings and pyramidal structures are common and often to the detriment of minority shareholders rights. Local retirement fund administrators have been a strong proponent of better governance practices. In 2018, the pension regulator, Comisión Nacional del Sistema de Ahorro para el Retiro, published guidelines for funds to explicitly integrate ESG in their investment processes.
Russia	5	Social standards in the Russian Federation are moderate, but commonly used indicators of social standards vary relatively significantly. Overall, most indicators for social standards in Russia display worse values than what would be predicted purely based on the country's per capita income level. Political power is highly centralized and essentially concentrated in the hands of the president, with weak checks and balances. Corruption and rent seeking is perceived as comparatively high in Russia (the country ranks 138th out of 180 in Transparency International's Corruption Perception Index). The enforcement of laws and contracts is often selective. Corporate governance practices vary significantly between large publicly listed companies that are committed to transparency and governance practices in line with their OECD peers and the rest of the market, notably state-owned enterprises. State-owned enterprises are a defining feature of the Russian economy, the government controlling (directly or indirectly) over a third of listed companies. There is extensive ecological regulation in Russia, but control over its execution is limited and fines are relatively small. The corporate governance code specifies the basic governance principles, required for listing on the stock exchange, which all public companies have to follow on a comply-or-explain basis, but levels of implementation vary. Equally, there are many large privately owned companies where transparency is a major issue, because the quality and breadth of corporate disclosure is intentionally very limited.

Table 2

Regional Risk Atlas (cont.)

Country	Score	Comments
Saudi Arabia	4	The kingdom has been working on major initiatives to attract international investments into the country. These include regulations designed to improve corporate governance from weaker levels, particularly focusing on shareholder rights and corporate transparency, both of which are key components of Saudi Arabia's Vision 2030. We view the kingdom's inclusion into global equity indices and announcements of large corporate sales, potential international debt issuance, and IPOs as signs of progress. Ownership of key companies is largely concentrated and some of the most important challenges that companies face are succession planning and improving transparency. Saudi authorities have recently initiated reforms aimed at liberalizing a traditionally very conservative society, including the promotion of women's rights and increasing labor participation of Saudi nationals.
South Africa	4	The Company Act of 2008 and the King Code have strived to improve governance practices in the country. In particular, the King Code, now at its fourth edition, has been a key driver for corporate improvements. It is a principles-based code for corporates, including integrated sustainability reporting, which the Johannesburg Stock Exchange has now adopted as a listing requirement. Unlisted companies can also choose to adopt the code and must disclose their performance on a 'comply-or-explain' basis. The Companies Act requires, among other things, companies over a certain size to have a social and ethics subcommittee of the board that reports on the U.N. Global Compact's 10 principles on human rights, labor, the environment, and anti-corruption. South Africa has a strong democracy with independent media. In 2016, allegations of leakages in public funds weakened the country's governance frameworks and public finances. However, checks and balances remain strong, especially amongst the judiciary. Since the new president took power in February 2018, there is a renewed impetus to the reform agenda and pursuing accountability through the courts and various commissions of inquiry.
South Korea	2	South Korea ranks well in the Rule of Law index (18th) published by the World Justice Project, which recognizes the strengths of its justice system as well as a sound legal framework. Corporate governance is good in South Korea, although not as robust as in many other advanced economies. Concentration of corporate decision-making, in particular at chaebols, has often negatively affected minority shareholders rights and it is one area where Korean businesses lag their competitors in developed economies. Cross-holdings among the members of a chaebol afford the power to control a large conglomerate while holding a relatively small proportion of shares. The roles of CEO and chair are joint at most Korean listed companies, a practice potentially undermining adequate management oversight. As defined in Korean law, listed companies are ruled by two sets of governance standards, depending on their capitalization. For instance, large companies must have a majority of outside directors on their boards. As for gender diversity, despite recent gradual improvements, South Korea still has the highest percentage of all male boards in emerging economies. The current government has made chaebol reform a policy priority, but with chaebols having such strong dominance over the economy, reforms will be cautious and gradual.
Sweden	1	Sweden benefits from a long-track record of very strong institutional and governance effectiveness. The level of transparency and accountability is high. It is considered one of the least corrupt countries in the world and there is an unbiased enforcement of contracts through a robust legal system. Relatively strong ESG regulations complement institutional governance. These rules are not limited to corporate disclosure requirements and governance rules, but also include legislation that mandates the large AP (Allmänna Pensionsfonder) public pension funds to consider environmental and ethical considerations in their investment decisions. However, corporate ownership is still extremely concentrated. Nearly all listed companies have a controlling shareholder, often using dual-class share structures with unequal voting rights to maintain control. Over two-thirds of Swedish companies have multiple share classes, far more than any other European country. Members of the nomination committee are elected directly by the general meeting and while this is positive from a shareholder-rights standpoint, large shareholders wield a greater influence over the composition of these committees and, therefore, the overall board.

Table 2

Regional Risk Atlas (cont.)

Country	Score	Comments
Turkey	4	Since 2013, pressures on Turkey’s regulatory institutions and judiciary have coincided with a weakening of checks and balances and less predictable legal enforcement. One of the consequences of this deterioration is a notable decline in foreign direct investment over the past half-decade. Nevertheless, governance standards still benefit from a relatively advanced institutional framework. Since the publication of the landmark Capital Markets Law in 2012, the Capital Markets Board of Turkey has been working on further improving governance standards. Corporate Governance Principles, revised in 2014, introduced new and important clauses on areas such as board diversity or related-party transactions, among others, and made some provisions mandatory. Pyramidal ownership structures are the prevalent model in Turkey, where controlled conglomerates own controlling shares at most companies, which can affect minority shareholders rights. This is reflected on boards, which are often made up of several executives from the controlling group, while adherence to international best practices is more common among the key large-cap listed companies.
U.K.	1	The U.K. benefits from strong institutions and corporate governance practices. This includes robust and independent institutions and high rule-of-law standards, as well as very low actual and perceived levels of corruption. Governance guidelines are primarily based on the UK Code of Corporate Governance published by the Financial Reporting Council. The Code, revised and strengthened in 2018, provides a broad set of recommendations, including executive remuneration and board composition, follows a comply-or-explain model, and is widely regarded as best practice internationally. The recent version strengthened provisions on the role of the audit and nomination committees, chair tenure, and stakeholder engagement. Overall levels of corporate disclosure on ESG are strong and the country benefits from a very active institutional investor base, which has been fueling the demand for better disclosure and corporate engagement. Legislation taking effect in fall 2019 will also require pension funds to disclose the financial risks they face arising from ESG factors.
U.S.	2	With robust institutions and rule-of-law standards, the U.S. demonstrates many strong characteristics but lags several other countries with respect to ESG regulations and social indicators. Income inequality is higher than in other OECD countries, but has been so for over a century. Social services are similarly less generous than in most wealthy countries. Governance is characterized by a very stable political system, strong rule of law, a powerful judiciary, and effective checks and balances. Conditions of doing business are generally high. The U.S. follows a rules-based approach to corporate governance, focused on mandatory compliance with requirements from the major exchanges (NYSE and NASDAQ) as well as legislation. Exchanges requirements mandate high standards of corporate governance. The NYSE requires companies listing on its exchange to have boards made up of a majority of independent directors and have separate remuneration and nomination committees. However, establishment of formal requirements on ESG reporting are behind those of European countries. While a growing number of companies have an independent chair, the combination of CEO and chair roles is still popular, which can create issues regarding management oversight. Remuneration continues to be a contentious point, because U.S. executive pay dwarves global pay levels. The CEO-to-worker pay ratio is ever-increasing, leading to social tensions and shareholder criticism.

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