ENSO – Understanding how El Niño and La Niña drive multi-year market impacts

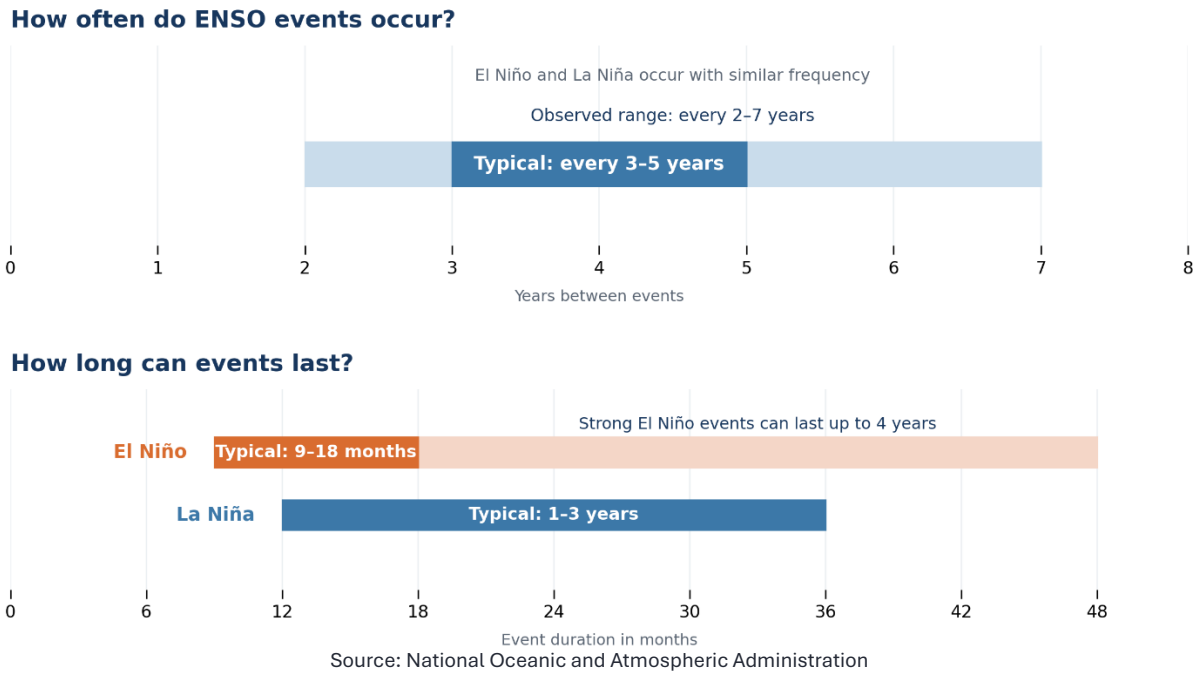
Introduction

With a very strong El Niño event currently developing in the Pacific Ocean[1] and past events causing trillions of dollars in global economic losses and multi-year slowed growth,[2,3,4] discerning how this occurrence will translate into market impacts is critical. But any robust analysis should also factor in how El Niño exists as part of a larger dynamic and evolving system which involves the Pacific Ocean moving from states of normalcy into and out of El Niño and La Niña events in a system called the El Niño-Southern Oscillation (ENSO) cycle.[5] As an investor, understanding the dynamics of the entire system is important because impacts from both types of events can **compound,** resulting in **non-linear outcomes across asset classes** and **overlapping shocks** with implications for long-term asset allocation, risk, and stewardship priorities.

El Niño and La Niña explained & emerging evidence for changes to both

El Niño and La Niña are changes in ocean temperature in the Pacific Ocean that generally develop between March and June, reaching peak intensity between December and April. They result in localised changes in sea surface temperatures, ocean currents, and overlying atmospheric winds that ultimately impact weather patterns across the globe. On average, El Niño events occur every 3 to 5 years but can vary from 2 to 7 years and last for 9 to 18 months with stronger El Niño events lasting up to 4 years. La Niña events occur with a similar frequency with durations lasting longer, about 1 – 3 years.[6]

El Niño and La Niña frequency and duration



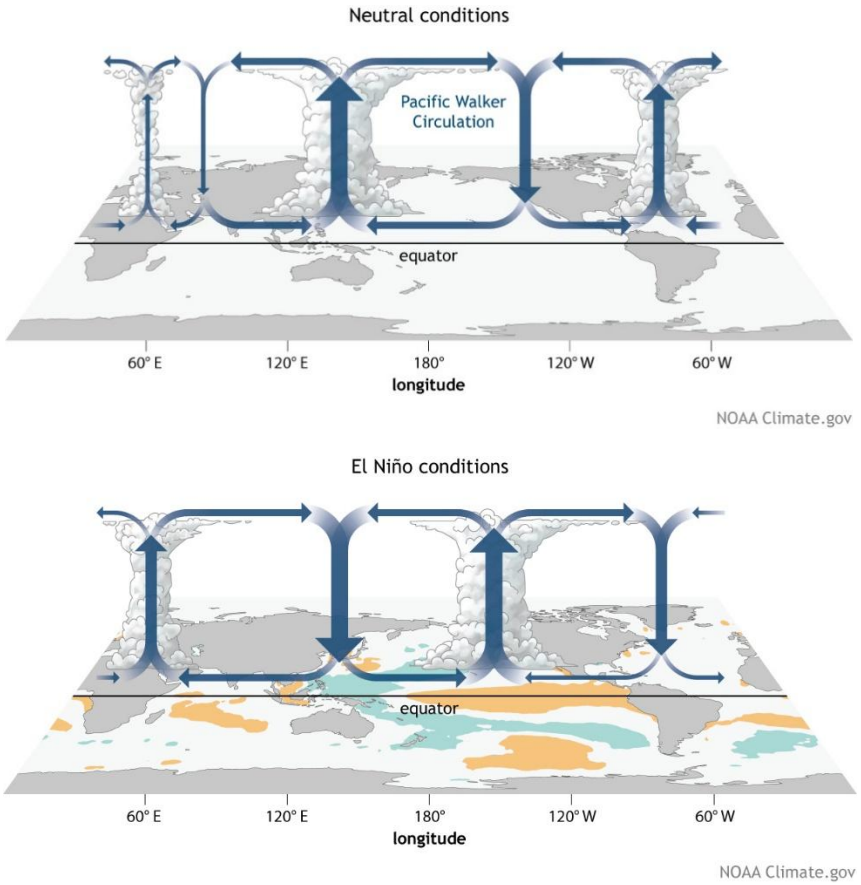
Source: National Oceanic and Atmospheric Administration

El Niño

The exact cause of El Niño is unknown, but the key to understanding changes in global weather patterns as a result of El Niño can be derived from understanding how ocean surface temperatures impact the atmosphere and the associated winds as well as how those winds affect the movement of the ocean surface water compared to normal (i.e., neutral) conditions.

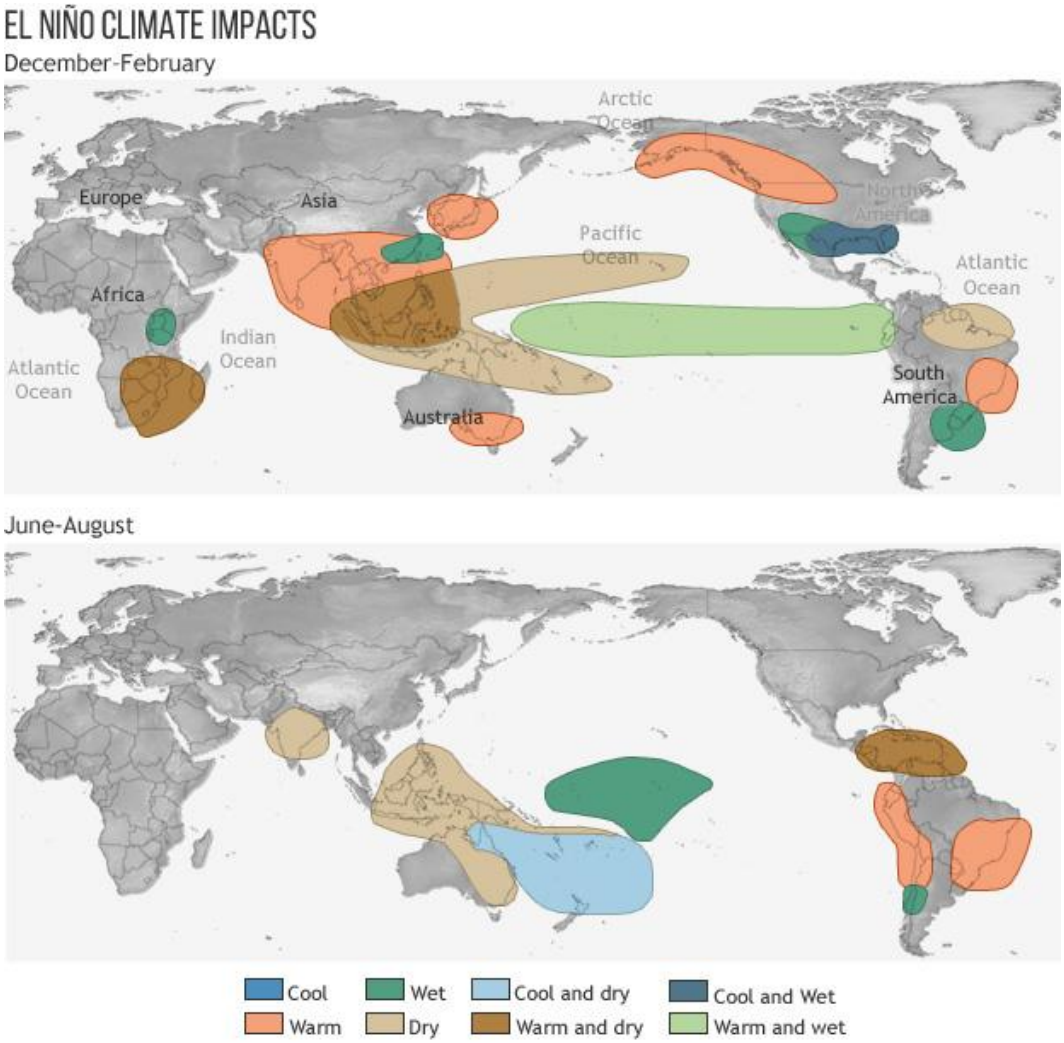
Under normal conditions, the warmest waters for the Pacific Ocean are near Asia, pushed there largely by the trade winds that blow westward, and cold water near South America swells up to replace the lost warm water.[7]

El Niño occurs when central and eastern Pacific Ocean surface waters become warmer than usual, reducing the development of the typical low-pressure system that forms over east Asia and weakening of the trade winds.[8]



Source: National Oceanic and Atmospheric Administration

The overall impact of the entire process is less precipitation over Eastern Asia and parts of Australia and more precipitation over the central and eastern Pacific as well as the normally dry U.S. southwest.[9,10]



Source: National Oceanic and Atmospheric Administration

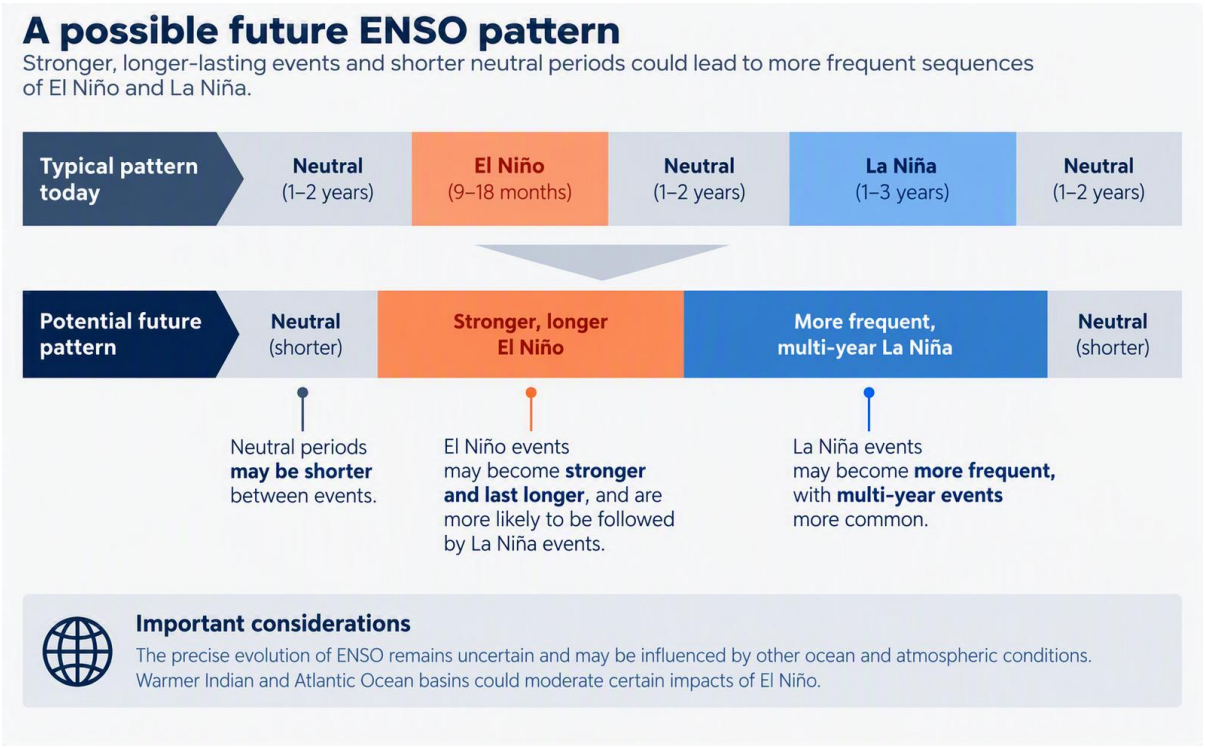
La Niña

La Niña is the inverse of El Niño. Instead of weakening the system, it supercharges the system leading to above-average rainfall in East Asia while reducing the rainfall in the Western U.S., causing hotter drier air and inverse impacts globally.[11]

Emerging evidence about changes to El Niño and La Niña

Emerging evidence indicates that climate change may affect the strength, duration, and frequency of El Niño and La Niña events. Several studies have noted that climate change is likely to increase the strength of El Niño events due to the enhanced warming of the tropical Pacific Ocean with additional evidence indicating that stronger El Niño events are more likely to last longer and be followed by La Niña events.[12] Additionally, other emerging evidence points to climate change altering the tropical Pacific towards a state that resembles a

permanent La Niña-like condition, with future warming scenarios suggesting that multi-year La Niñas could become more common.[13,14] Overall, this would suggest a future world with reduced existence of neutral conditions. However, despite the potential for increased strength, duration, and frequency, the overall impact of each event could be moderated by other factors. Some evidence suggests that warmer Indian and Atlantic Ocean basins could moderate certain impacts of El Niño.[15]



Source: Janus Henderson Investors

Therefore, a future warmer world due to climate change may experience changes in the strength, duration, and characteristics of ENSO events, although the precise evolution of the system remains uncertain and could be influenced by other inter-ocean basin conditions.

Common global impacts: El Niño vs La Niña

Feature	El Niño (Disruption of Normal Conditions)	La Niña (Amplification of Normal Conditions)	Why It Matters for Investment Portfolios
Core Mechanism[16]	Weakens normal Pacific trade winds and ocean circulation	Strengthens normal Pacific trade winds and circulation	• El Niño introduces deviation from normal conditions • La Niña intensifies existing patterns
Ocean Temperature[17]	Warmer eastern/central Pacific	Warmer water towards western Pacific	• El Niño drives redistribution • La Niña reinforces global weather patterns
Extreme Weather[18]	Redistributes floods, droughts, storms across regions	Intensifies already typical extremes (e.g., droughts, hurricanes)	• El Niño leads to new shocks • La Niña leads to more severe existing risks
Cycle Dynamics[19]	Can trigger follow-on La Niña	More likely to persist across multiple years	Combined, they create compounding, multi-year risk cycles
Climate Change Interaction[20]	Increasing intensity and duration	Increasing frequency and persistence	Potentially fewer neutral periods and greater climate variability

Regional impacts: El Niño vs La Niña

Location	El Niño (Disruption of Normal Conditions)	La Niña (Amplification of Normal Conditions)	Why It Matters for Investment Portfolios
U.S.[21]	Wetter South; drier/warmer North	Drier/warmer South; wetter/cooler North	Amplifies drought or flood risk depending on region and ENSO event
Southeast Asia[22]	Weakens monsoons, increasing drought risk in Indonesia and India	Strengthens monsoons, increasing flooding risk	Both types of events will negatively impact agricultural output and increase food inflation
Latin America[23,24]	• Flooding in Peru and Chile • Drought risk in Brazil and Amazonia region	Reinforces baseline wet/dry conditions	Both events can negatively affect agriculture, while El Niño negatively impacts mining in the Atacama Desert, Chile
Africa[25]	Reduced rainfall in some regions places pressure on crops and hydropower	Reinforces baseline variability	El Niño predominately causes the most impacts on utilities and crops
Europe[26]	Potentially heatwaves	Reinforces prevailing seasonal patterns	If it does amply heatwaves, then it is likely to expect water stress and increased energy demand for cooling
Eastern Pacific Ocean[27]	Disrupts upwelling, causing reduced fish stocks	Reinforces ocean circulation patterns	El Niño likely most problematic via supply shocks

Why investors need to care about both El Niño and La Niña

While commonly described as a cycle, El Niño and La Niña events do not occur on a regular schedule, at equal frequencies, for consistent lengths of time, or immediately after each other, but they can.[28] From an investment perspective, this is important to understand because it means after one event ends, it is not a guarantee that the system will create a situation allowing for recovery or resetting and instead, even worse, create other problems that might compound risk.

Impacts to a drought-prone area

One upside of El Niño for the U.S. Southwest, a dry-climate region, is increased precipitation over a longer period. This is generally viewed as a positive because it brings welcome rain and snow that can benefit water-intensive sectors such as agriculture, mining, and heavy industry. However, the arrival of El Niño also brings risks such as increased flooding and landslides, which could offset any gains to those exact industries through disruption of crop growth, flooding of mines, and damage to infrastructure. And worse yet, the arrival of increased precipitation from El Niño is not a guarantee to replenishment of water in the area as several conditions must be met.[29]

Water is best absorbed into the environment by multiple slow, light soaking rains over an extended period. However, if the area has been dry for an extended period, quasi-impermeable soil through soil compaction and loss of vegetation has developed. [30,31] The compacted soil can behave like an impermeable surface, preventing water from soaking into the ground and increasing run-off and flood risk.[32] Second, a powerful El Niño further enhances flooding risk because a more powerful El Niño brings heavier, more severe storms. Heavy rainfall is less well absorbed because the water falls too quickly for the area to absorb the moisture. Together, more powerful storms and quasi-impermeable soil compound risk by increasing the likelihood of flooding. Additionally, if the area was under an extended drought, the vegetation is likely dry and more easily prone to wildfires. If a wildfire recently occurred in the area prior to the arrival of El Niño, then the area is at heightened flood risk and increased risk from landslides because wildfires destroy the vegetation that help hold the moisture and soil in place. [33,34] Both the flooding and landslides can negatively impact crop growth, result in the flooding of mines, and damage to infrastructure.

There is evidence that a powerful El Niño has an increased chance of being immediately followed by La Niña.[35] If that were to occur in the U.S. southwest, it creates its own set of risks as an amplifier of neutral weather conditions, which are dry and hot for the area. Amplified dry and hot conditions in this region are likely to cause or extend drought conditions.[36] If La Niña arrives, it may reset the dry conditions that led to quasi-impermeable soil, priming the area for more wildfires as well as flooding and landslides. It may also limit the potential for water levels to recover, further increasing risk to sectors in the area that are dependent on high volumes of water. And, if La Niña events increase in frequency and length, it could result in more time spent under dry regional conditions, increasing the likelihood for droughts, and decreasing the chance of recovery from drought during an El Niño event.

Impacts to a high precipitation area

The impacts from El Niño and La Niña can be opposites of each other, with some areas getting less rainfall from one and more rainfall from the other. For an area that typically receives high precipitation, like Indonesia, under normal conditions, an El Niño, which decreases precipitation in the region, poses a risk for the agricultural industry, potentially lowering crop yields.[37] A strong El Niño event is concerning due to the higher likelihood for

lower precipitation levels and the possibility of prolonged disruption before conditions return toward historical norms. Furthermore, a strong El Niño increases the chances of being followed by La Niña, which is not necessarily beneficial for the region either because La Niña supercharges normal conditions.[38] In Indonesia, for example, this could cause above-average rainfall increasing flood risk impacting agricultural crops.[39]

Financial implications

Global changes to weather patterns, via excess precipitation in some areas and drought in others, have global implications for a variety of sectors. Sectors commonly impacted include agriculture, ocean fisheries, metals and mining, and insurance, but many others can be impacted as well, such as power via hydropower and transportation.[40,41,42,43,44] Research studies have shown that El Niño and La Niña events can trigger "abrupt ecological transitions" across marine and terrestrial systems, from coral bleaching and fisheries collapse to vegetation dieback and shifts in water systems.[45] Other studies link these events to lower crop yields and food-price inflation, reduced fishery stocks, hydropower and industrial output shortfalls, higher healthcare costs from shifting disease patterns, and weaker tourism revenue.[46]

From a macroeconomic perspective, studies have shown that El Niño and La Niña events can have widespread economic impacts, with some research estimating losses ranging from billions to trillions of dollars globally and effects persisting for multiple years.[47,48] For example, one study estimated the global economic losses at $3.9 trillion for the 2015-16 El Niño event over three years with the first-year losses at $739 billion. However, not all impacts are equal, with high variability at country and regional levels and some areas seeing benefits while others experience losses.[49] For example, an International Monetary Fund (IMF) analysis found that areas such as Indonesia, South Africia, and Australia had negative growth in real GDP while regions like Mexico and Thailand experienced positive GDP impacts.[50]

ENSO variability can also materially affect individual businesses, with widely variable sector impacts.

Key sector impacts from a strong El Niño and La Niña

Sector	El Niño: Overall impact	El Niño: Early effects	El Niño: Lagged effects	La Niña: Follow-On effects	Potential price and earnings impacts
Agriculture[51,52,53,54]	Crop effects vary substantially by geography	Drought risk in India, southeast Asia, Indonesia, Australia, and northern and central Brazil Excessive rainfall or flooding risk in other regions	Soil-moisture deficits, crop disease, or flood damage may affect the next planting cycle	Likely to bring heavier rainfall in Asia and other drought impacted regions but too much rain could also disrupt crop production Drier conditions return in parts of Brazil and the southern U.S.	Commodity price volatility – cocoa, coffee, grains, palm oil may face upward pressure Producers may benefit from higher prices but have less volume Processors may experience delayed margin pressure
Insurance[55,56]	Lower Atlantic hurricane risk Redistribution of localised extreme weather: -Storms -Floods -Wildfires	Claims more likely to occur from short-term physical events in the U.S. than from hurricane damage	Reserve development and reinsurance pricing likely to follow	La Niña likely to increase Atlantic hurricane risk and amplify drought-related wildfire exposure creating different catastrophe losses in the U.S.	Regional specific losses might pressure underwriting earnings and impact renewals via higher premiums
Metals & Mining[57]	Regionally different impacts can be expected such as reduced water availability in some locations while excessive flooding disrupting operations in others	Drought would cause hydropower shortages impacting copper, nickel, and aluminum production in parts of Asia Flooding in the Atacama Desert would reduce copper production in Chile	Smelters and downstream manufacturers may experience delayed shortages if mine disruption impacts raw material availability	Follow-on La Niña conditions may cause similar problems but in other regions further exacerbating raw material availability	Disrupted operators could experience lower volumes, while unaffected producers could benefit from stronger prices
Power / Utilities[58,59,60]	Regionally different impacts such as reduced hydropower availability and temperature-driven demand	Milder winter in northern Hemisphere reduces demand in some regions Reduced hydro output in drought areas	Reservoir replenishment may extend beyond the El Niño event	Increased heating demand in northern Hemisphere Hydropower reduction risk in other areas	Earnings sensitivity to power generation mix and weather-driven demand such as wholesale power prices rising where reduced hydropower occurred
Consumer / Food & Ag Processing[61]	Higher agricultural, energy, and transportation costs begin building upstream, but may initially be absorbed	Reported input-cost pressure may emerge after the initial agricultural and commodity-price response	Manufacturers may reprice products as contracts reset. The long-term effect depends on pricing power, product mix, hedging, and consumer elasticity	Follow-on La Niña impacts could extend cost pressures	Gross margins may weaken before selling-price increases take effect. Companies with strong brands and pricing power may recover costs
Construction & Engineering[62]	Physical asset damage from extreme weather cycles	Increased storm/flood damage will result in a need for rebuilding demand	Reconstruction backlogs may increase in subsequent quarters or years, especially when public infrastructure requires replacement	A follow-on La Niña could add hurricane, flood, or wildfire damage before El Niño-related reconstruction is complete, increasing backlogs	Contractors may benefit from higher demand, while regional construction-material and labor prices may rise

Yet, the greatest investment value may come not from just planning for the upcoming El Niño, but from factoring in what is likely to follow a strong El Niño. For example, investors in the copper industry might be closely watching flooding in the Atacama Desert, a region well known for high copper productivity. An investor looking at the short-term risk from El Niño might reduce holdings in a copper company in the region and instead allocate to others located elsewhere that would capitalize on constrained markets. Meanwhile, if considering the larger system, they might instead evaluate how prepared a mining company in the region is to recover from the impact (reducing time to market for its copper compared to competitors) and invest in those better positioned to recover quickly and continue production when El Niño ends and La Niña arrives

Similarly, an investor with shares in a consumer company dependent on palm oil production might be concerned on how a drought in Indonesia due to El Niño would impact supply. In advance of the arriving El Niño, the investor might try to find consumer goods companies with sufficient stock or purchase power to mitigate the short-term impacts to production. However, an investor considering the multi-year impact from both El Niño and a follow-up La Niña might instead work to identify companies that have diversified their supply chain and modified products to reduce reliance on palm oil in addition to evaluating for increased stockpiles and purchasing power, acknowledging that a larger ENSO cycle could impact negatively impact multi-year reduced crop yields.

Conclusion: Why investors should look beyond a single El Niño and La Niña event

No two El Niño or La Niña events are alike, so one cannot accurately predict what will definitively happen, but certain known impacts are likely, such as flooding in the Atacama Desert, drought in Indonesia impacting palm oil production, and weakened hurricane season in the Atlantic Ocean. An investor thinking holistically about the overall system can prepare for impacts that are likely to occur, but, more importantly, they must also consider what is likely to come next and thus prepare for both.

Investors must recognize that while El Niño and La Niña are opposites in terms of weather and Pacific Ocean conditions, they are not necessarily balancing forces. They do not occur at the same frequency, length of time, or intensity. For investors, considering the dynamics of the larger system implies a shift from viewing El Niño or La Niña as episodic risks to incorporating them as recurring drivers of sector dispersion and macro volatility. Portfolio analysis should therefore consider both short-term disruption events and the potential for longer-term, compounding shocks. Investors must also track and consider future impacts from climate change that could further alter the characteristics of both El Niño and La Niña events by increasing the likelihood of more disruptive ENSO-related impacts.

Footnotes and definitions

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Asset allocation: The allocation of a portfolio between different asset classes, sectors, geographical regions, or types of security to meet specific objectives of risk, performance, or time horizon.

Capital expenditure: Money invested to acquire or upgrade fixed assets such as buildings, machinery, equipment, or vehicles in order to maintain or improve operations and foster future growth.

Decarbonisation: The process of reducing the amount of carbon, mainly carbon dioxide (CO2), sent into the atmosphere, to combat global warming and climate change.

Diversification: A way of spreading risk by mixing different types of assets or asset classes in a portfolio on the assumption that these assets will behave differently in any given scenario. Assets with low correlation should provide the most diversification.

Earnings per share (EPS): EPS is the bottom-line measure of a company's profitability, defined as net income (profit after tax) divided by the number of outstanding shares.

El Niño: A climate pattern in which central and eastern Pacific Ocean surface waters become warmer than usual, altering atmospheric circulation and global weather patterns.

El Niño-Southern Oscillation (ENSO): The broader climate system encompassing recurring transitions between El Niño, La Niña, and neutral conditions in the tropical Pacific Ocean.

Environmental, Social, and Governance (ESG): Environmental, Social and Governance (ESG) factors relate to the quality and functioning of the natural environment, the rights, well-being and interests of people and communities, and the governance of companies & their stakeholders.

Exposure: The amount invested in an asset or market, and could potentially lose, should an investment fail. It is another way of describing financial risk.

Factor risk: A macroeconomic variable (such as economic growth, inflation or liquidity) or a style characteristic (such as value or momentum) that contributes risk (and/or return) to an asset or asset class.

Gross domestic product (GDP): The value of all finished goods and services produced by a country within a specific time period (usually quarterly or annually). When GDP is increasing, people are spending more and

businesses may be expanding. GDP is a broad measure of the size and health of a country's economy and can be used to compare different economies.

Gross margin: Gross margin is the percentage of revenue a company keeps after subtracting the direct costs associated with making its products or providing its services.

Inflation: The rate at which the prices of goods and services are rising in an economy. The consumer price index (CPI) and retail price index (RPI) are two common measures.

La Niña: The opposite phase of El Niño characterised by cooler-than-average eastern and central Pacific Ocean temperatures and a strengthening of normal trade wind patterns.

Portfolio: A grouping of financial assets such as equities, bonds, commodities, properties, or cash. Also often called a 'fund'.

Pricing power: A company has pricing power when it can raise prices regardless of the economic backdrop without losing to competitors, whether that is due to the unique nature of its product, or specific market demand.

Purchasing power: This refers to how much you can buy with a specific amount of money. It goes up and down over time according to various economic factors such as inflation.

Risk: The acceptance of greater risk in exchange for potentially higher returns. This can apply to both individual investors and companies.

Scope 3 carbon emissions: Associated greenhouse gas emissions related to the entire value chain of a business that it is indirectly responsible for, from products purchased from suppliers to its own products when consumers use them.

Security: A broad term that refers to shares, bonds, or any other financial instrument.

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