



El Nino: The next supply shock?

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Current forecasts point to one of the strongest El Nino events on record in Q4. That matters because El Nino events can act as a multi-dimensional supply shock, with a causal link to higher food and energy prices, alongside broader supply-chain disruption. This would be problematic at any point in time, but it's a particular issue today because of existing supply-chain stresses and the backdrop of above-target inflation. So a very strong El Nino event would be another negative supply shock, at a point when the global economy has limited room to absorb one.

This paper explores what an El Nino is, and why a very strong one later this year would be so concerning. It also takes a look at what happened on previous occasions, and the channels through which it affects the broader economy and financial markets.

We also consider the potential consequences this time round. Much will be weather dependent, but the precedents from the 1970s show how an El Nino event can coalesce with other shocks to keep inflation persistently above target, just as we've seen in recent years. Moreover, this is particularly damaging for many EM economies, where food can make up as much as a third of consumer expenditure.

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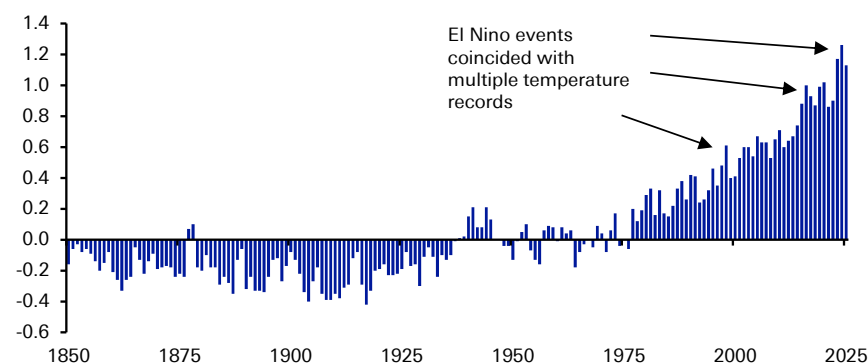
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What is an El Nino?

- An El Nino event is the warm phase of the El Nino-Southern Oscillation (ENSO), which is a variation in winds and sea surface temperatures in the Pacific Ocean. This oscillates between warming phases (called El Nino) and cooling phases (called La Nina).
- The warming El Nino phase occurs when there are unusually warm sea surface temperatures in the eastern Pacific. These warmer waters mean that the Pacific jet stream moves south relative to normal, which creates changes in weather patterns and ecosystems.
- We can see the effect on global temperatures too. Even as temperatures have been rising anyway over recent decades, the record years have often coincided with El Nino events, including 1998, 2016, and 2024.
- Unfortunately, El Nino events are correlated with a higher frequency of natural disasters, with more people affected by disasters in El Nino years relative to neutral years. Flooding is one that sees a particular increase, but it is also associated with temperature changes too.
- The effects of an El Nino vary considerably by region. In the US, it normally coincides with wetter conditions in the southern US along the Gulf Coast. In stronger episodes, this can extend to California and the Southwest too. But in other regions it is more likely to cause drought, like Australia, whilst India sees weaker monsoon rains.
- In practical terms the main effect of an El Nino is disruption to food production. But there are other effects too. El Ninos have been correlated with the spread of climate-sensitive diseases, and one study found that the El Nino in 2015 contributed to the spread of the Zika virus since it created conditions beneficial for mosquito-borne transmission.¹ Furthermore, natural disasters like flooding increase the frequency of poor hygiene conditions or undernutrition, so there is an impact there too, and El Ninos have been linked to many famines and even conflicts.
- For markets, an El Nino is capable of hitting agricultural production, hydropower, shipping, and even has effects on public health and political stability. In other words, it operates as a multi-channel supply shock.

Figure 1: Global land and ocean average temperature departure with respect to 1901-2000 average (degrees celsius)



Source : National Centers for Environmental Information, Deutsche Bank

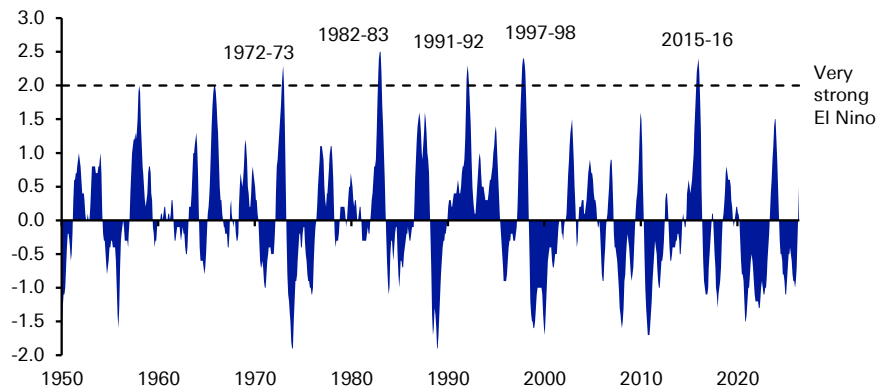
1 Caminade C, et al. Global risk model for vector-borne transmission of Zika virus reveals the role of El Niño 2015. Proc Natl Acad Sci U S A. 2017 Jan 3;114(1):119-124.



What's particularly bad about this one?

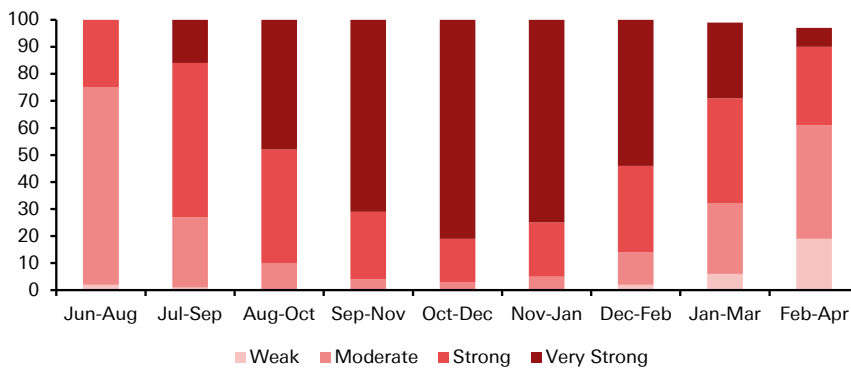
El Nino cycles typically repeat every few years with irregular frequency. However, today's episode is particularly concerning because forecasts suggest it will be a very strong one, ranking among the most serious in recent history.

Figure 2: Relative Oceanic Niño Index



Among others, the US Climate Prediction Center have said this could be one of the strongest in over 75 years, with an 81% chance of it reaching the "very strong" threshold over Oct-Dec. It even has a 73% chance of reaching the "strong" threshold of 1.5C as soon as the July-September period.

Figure 3: US Climate Prediction Center forecasts (%) for El Nino



A very strong El Nino means it's more likely to shift rainfall and temperature patterns across multiple regions simultaneously. And from a macro perspective, the risks are non-linear. For instance, a modest food shock can be absorbed via inventories, imports or substitution. But a large shock propagating across multiple countries can't be absorbed as easily, with second-round inflation effects more likely to result.

The timing is particularly bad right now, because the global economy is already facing significant supply-chain stress. Most notably, the closure of the Strait of Hormuz has led to a spike in oil and gas prices this year. And even if the El Nino is temporary, the resulting inflation shock will push inflation higher at a time when it's



already above target in many countries.

These risks are already being considered by policymakers in decision making, particularly in emerging markets. Indeed, this year has seen central banks in India, Peru and Colombia all reference El Nino in official publications.

What happened on previous occasions?

2023-24: Supply-chain disruption and record temperatures occurred with the last El Nino.

- The most recent El Nino offered a clear example of what can happen, and this didn't even hit the "very strong" threshold.
- 2024 was the warmest year on record, and the episode saw severe droughts in parts of the world, including parts of South America, along with severe flooding in East Africa and South America, consistent with the typical redistribution of rainfall during El Nino.
- Meanwhile, the Panama Canal had its 3rd driest year on record in 2023, meaning that authorities had to cut shipping passing through. The disruption to commercial shipping demonstrated how El Nino is more than just a food price story.

2014-16: The last "very strong" El Nino had broader food security and public health implications

- Just as in 2024, the El Nino of 2016 also saw the biggest upward global temperature anomaly to date.
- Ethiopia suffered its worst drought in decades, leaving millions of people in need of food assistance. Moreover, the Pacific hurricane seasons saw 16 hurricanes in each of 2014 and 2015, the joint-highest number of record.
- One study found that El Nino was a contributing factor to the spread of the Zika virus, since it created conditions beneficial for mosquito-borne transmission.

1997-98: The "very strong" El Nino also had major climactic and public health implications

- 1998 was another record year for global temperatures, and included many extremes around the world. For instance, San Francisco saw its wettest rainfall season since 1889-90, whilst Peru saw 16 times its average rainfall.
- Meanwhile, after major flooding in east Africa, there was an outbreak of Rift Valley fever in Kenya, Somalia and Tanzania. The outbreak also led to major losses of livestock too.

1982-83: The El Nino occurs when high inflation is still lingering

- By 1982-83, inflation had fallen substantially from its earlier heights, aided by monetary tightening like that seen under Paul Volcker at the Fed. However, the El Nino didn't help matters, as it caused major climactic disruption once again, including flooding in the United States, and droughts in Indonesia and Australia.

1972-73: The El Nino played a role in raising inflation before the first oil shock



- Although the oil shock of 1973 was the primary factor that drove the stagflation of the 1970s, several other shocks including the El Nino had already occurred beforehand. This was significant because collectively, they served to push up inflation and inflation expectations. For instance, US fiscal spending had already risen in the late-1960s, thanks to the Johnson Administration's Great Society programmes and the Vietnam War. Then in 1971, President Nixon ended the dollar's link to gold, ending the system of fixed exchange rates that had prevailed after WWII, and in February 1973 there was a dollar devaluation. Amidst all these inflationary pressures, the El Nino event further drove up food prices.

Even further back

- Back in the mid-17th century, there was a period when El Nino events happened about twice as often on average. This was an unusually turbulent period of global history that's been termed the "General Crisis". Some historians have proposed that climactic changes such as El Nino played a role in fomenting instability.

How does an El Nino affect the economy and global markets: The main transmission channels

A useful way to think about El Nino is a set of different supply shocks via multiple channels: food prices; energy prices; supply chains; EM balance sheets; and growing risk premia resulting from the heightened risk of social/political unrest. For individual economies, the impact depends on their exposure to food in the consumer basket, and the extent of intervention from policymakers, be that via food subsidies or tighter monetary policy to counteract inflation.

1. Food: The clearest inflation channel

- **Direct supply hit:** El Nino shifts rainfall patterns, raising the odds of drought in parts of Asia and Australia, and flooding in parts of the Americas. This causes damage to crops, kills livestock, and leads to shipping disruption.
- **Emerging market exposure:** The impact of a food shock varies considerably across different economies. In the US for instance, food-at-home makes up just 8% of the consumer basket for CPI inflation. By contrast, in several EM economies, over a third of household expenditure is on food, and an IMF paper² found that the inflation response to El Nino was biggest in economies where food made up a higher share of the consumer basket. So emerging markets like India and Indonesia are among those more severely affected. Moreover, food inflation is a problematic category because it's a necessity, and consumers can't easily substitute away from it, as they can with luxury goods.
- **Second-round effects:** Beyond the immediate impact, El Nino also has second round effects on inflation. For instance, governments may cushion the impact of higher food prices with subsidies. That might reduce the domestic hit temporarily, but by further boosting demand and raising fiscal deficits, it pushes the adjustment elsewhere and risks creating further inflation overall.

2. Energy and Hydropower: The less-obvious inflation channel

2 IMF Working Paper: Fair Weather or Foul? The Macroeconomic Effects of El Niño (2015), Cashin, Mohaddes and Raissi.

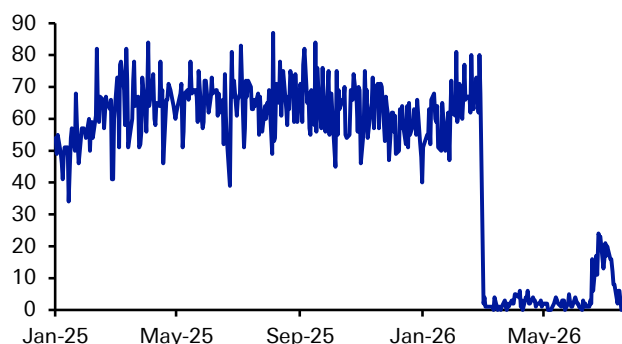


- **Hydropower shortfall:** Lower rainfall in some regions means there's less electricity generated from hydro-electric dams. Moreover, the droughts mean this cut to electricity generation is happening just as heat is raising demand for cooling, and more water is required for irrigation. So there's less supply of energy, just as demand goes up.
- **Fuel-switching channel:** With hydropower output down, this then forces a substitution into other forms of energy, such as gas, coal or oil-fired generation, again raising demand for those other fuels and lifting power prices.

3. Shipping/supply chains

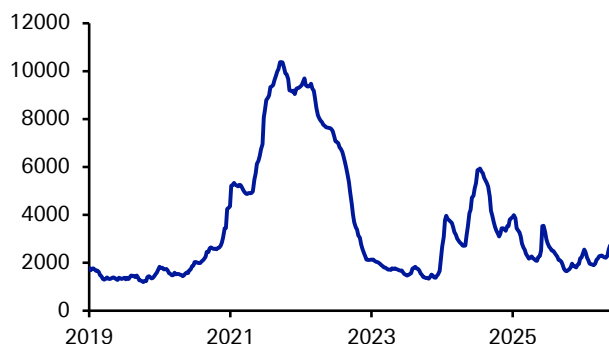
- **Climate effects on supply chains:** The last El Nino in 2023-24 showed how it can impact supply chains, quite aside from a direct impact on the food supply. For instance, Panama had its third-driest year on record in 2023, with rainfall around 30% below average, forcing authorities to restrict the number of ships passing through. This is a point covering around 5% of global maritime trade.
- **Interaction with other chokepoints:** Any supply-chain issues are particularly troublesome today, because the Strait of Hormuz has seen traffic almost completely stop thanks to the US-Iran conflict. So the more transit points that are impacted, the more difficult it is for other routes to absorb any disruption. Indeed, some measures of shipping rates have already doubled since the start of the year
- **Macro Transmission:** If key routes are restricted or closed, then that raises shipping rates further, increases delivery times, and means firms want to hold more inventories against future disruption. So it's another negative supply shock, on top of that seen from higher food and energy prices.

Figure 4: Strait of Hormuz tanker vessel crossings



Source : Bloomberg Finance LP, Deutsche Bank

Figure 5: World Container Index Composite Container Freight Benchmark Rate (USD/40 Foot Box) Drewry



Source : Bloomberg Finance LP, Deutsche Bank

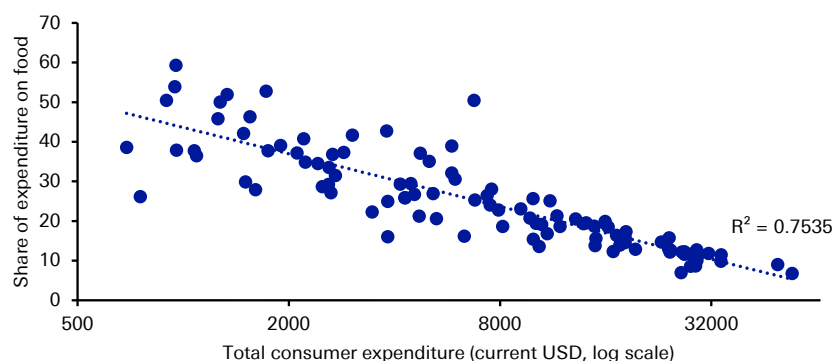
4. EM vulnerability

- **Climate impact:** By virtue of their geographic position, emerging markets are more likely to face the impact of flooding or drought associated with El Nino.
- **Household exposure:** Emerging market economies have more exposure to food prices, so any price shock hits them harder, with food making up over a third of consumer expenditure in several countries.



- **Policy challenges:** This vulnerability makes the policy response to an El Nino event particularly acute. Central banks might raise rates to keep inflation expectations in check and defend the currency, but that doesn't solve the actual supply shock itself. Moreover, if fiscal policy is used to cushion the impact, the shock is then shifted onto public balance sheets, and sovereign risk can become an issue.

Figure 6: Total consumer expenditure vs share of expenditure spent on food, 2023



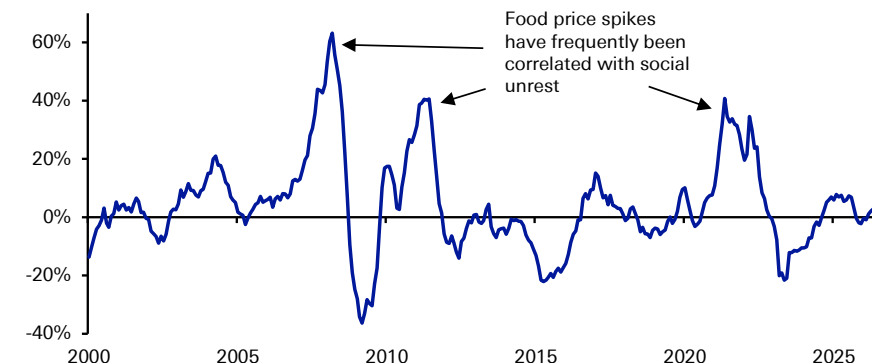
Source : USDA Economic Research Service, Our World in Data, Deutsche Bank

5. Social/political unrest

- **Higher food prices raise the risk of unrest:** Throughout history, higher food prices have often been correlated with political unrest. Clearly it takes many factors to spark unrest, but the squeeze on disposable incomes means that any existing dissatisfaction is magnified. If an El Nino leads to higher food prices, that in turn makes unrest more likely.
- **Recent precedents:** In 2010-11, higher food prices were regarded as a contributing factor behind the Arab Spring. A few years earlier in 2007-08, there was a wave of instability across many EM countries, including Tunisia, Egypt, Cameroon, Ivory Coast, and Haiti. And more recently, the 2022 price shock was a contributor to protests in Ecuador, Sierra Leone, Haiti and Panama.
- **Historical precedents:** Looking further back, several of history's most important revolutions took place against the backdrop of higher food prices. The French Revolution of 1789 came after a succession of harvest failures. The 1848 revolutions in Europe happened at the end of the so-called "Hungry Forties", when there was a severe famine after the failure of potato crops. And in Russia in 1917, food shortages played a key role in fomenting discontent, with supplies hampered in part by the reallocation of farm workers into the military for WWI.



Figure 7: UN Food and Agriculture World Food Price (year-on-year % change)



Source : Bloomberg Finance LP, Deutsche Bank

What does it mean for economies and markets?

A very strong El Nino event would be another negative supply shock when the global economy has limited room to absorb one. The combination of higher food and energy prices will mechanically raise inflation, and broader supply-chain disruption risks creating further price pressures when the Strait of Hormuz has already been blocked.

This is particularly problematic, because experience shows that a prolonged period of above-target inflation raises the risk of inflation expectations becoming unanchored. That in turn can create a self-fulfilling wage-price spiral, as if firms and individuals expect high inflation, then they will set their prices and bargain for wages accordingly.

In several respects, this is reminiscent of the experience in the 1970s. Back then, a series of seemingly unconnected supply shocks (including an El Nino) occurred that collectively kept inflation high. Even though each might have been temporary on paper, implying policy should look through and not over-react, the reality was that the shocks began to feel permanent because they kept on happening. So inflation expectations rose and policy eventually had to react.

Emerging markets are particularly vulnerable as well, with the risk greatest in places where food is a larger part of the consumer basket, and where fiscal space is more limited to accommodate any shock. Moreover, we know from recent history that higher food prices are also linked to higher instances of social unrest, creating further economic uncertainty.

Finally, there is a clear human cost to severe El Nino events. The frequency of natural disasters goes up and there is a greater risk of famine. Moreover, public health issues are often correlated with El Nino events, with several channels in operation, including the heightened risk of cholera after flooding, or the added risk of malaria from conditions more favourable for mosquitos.

Given the forecasts for the strength of this El Nino, this will be an important event to look out for over the months ahead.



Appendix 1

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