



2026 Verisk Global Modeled Crop Losses

October 2026

Market overview

The global crop insurance market

Among the major agricultural insurance sublines, crop insurance is by far the most developed globally, accounting for the largest share of total agricultural insurance premiums. Crop insurance products generally fall into three broad categories: named-peril insurance such as hail, index-based insurance, and multiple peril crop insurance (MPCI).

The global crop insurance market continues to expand in response to increasing weather volatility, growing food-security concerns, and broader recognition of agricultural risk. Although projections vary due to differences in methodology, market definitions, and regional coverage, recent industry estimates place global crop insurance premiums at approximately USD 48 billion in 2025 and suggest that the market could grow at a compound annual growth rate (CAGR) of 5–6%, reaching approximately USD 75–77 billion by 2034 [1] [2]. While crop insurance is expected to remain the dominant line of business, its share of total agricultural insurance premiums may decrease modestly as emerging segments such as greenhouse and aquaculture insurance experience faster growth.

Verisk model domains

Globally, the domains covered by Verisk's crop models represent approximately USD 35 billion in premiums, equivalent to 73% of estimated global crop insurance premiums. This modeled footprint spans four geographic domains—the contiguous U.S., Canada, mainland China, and India—and comprises six models: U.S. Multiple Peril Crop Insurance (MPCI), U.S. Crop Hail, China Agriculture (crop, forestry, and livestock), India MPCI, Canada MPCI, and Canada Crop Hail¹. For consistency with the other country models in this analysis, only the crop insurance component of the China Agriculture model is included. Crop insurance is the largest segment of China's agricultural insurance market, although livestock insurance also accounts for over one-third of total premiums.

Verisk's model domains reflect the concentration of crop insurance premiums in the world's largest regional markets. North America accounts for the largest share of global crop insurance premiums (46%), followed by Asia (39%), Europe (10%), Latin America (3%), Australia (1%), and Africa (1%) [3].

Governmental involvement

Governments play a critical role in the development and sustainability of crop insurance markets by addressing gaps in private-sector coverage. Common mechanisms of government participation include premium subsidies, research and development support, agricultural insurance legislation, public-sector reinsurance programs, and subsidies for administrative expenses [4]. The modeled domains differ considerably in how these mechanisms are applied, depending on the maturity of their markets. North America's leading position reflects extensive premium subsidies and well-established federal insurance programs, while Asia has experienced particularly rapid growth over the past two decades, driven largely

¹ For all models except China Agriculture, the versions used in this publication are those found in Touchstone Re 2025 (v13). The version of the China Agriculture model used in this publication has not yet been released to the market and is forthcoming. All modeled loss metrics presented in this report, including average annual loss (AAL) and annual exceedance probability (EP) estimates, are based on these model versions.

by the expansion of government-supported crop insurance programs. Similar government-supported expansion has also occurred in non-modeled markets such as Brazil and South Korea.

Take-up rates

In the U.S., take-up rates exceed 90% for many major crops [5], reflecting the maturity of the Federal Crop Insurance Program. The Standard Reinsurance Agreement (SRA) provides government-backed risk sharing and absorbs a significant portion of catastrophic agricultural risk. In China, participation was historically constrained by a lack of products tailored to farmers' needs, insufficient historical data, and limited market awareness. The introduction of nationwide agricultural insurance premium subsidies in 2007 marked a major shift, contributing to an estimated take-up rate of approximately 80% in recent years [6] [7]. India has also experienced expansion in agricultural insurance since the launch of the Pradhan Mantri Fasal Bima Yojana (PMFBY), supported by reforms that have improved affordability and accessibility, although participation remains considerably lower than in the U.S. and China [8] [9]. These differences in market structure and maturity also shape the role of reinsurance. In China and India, where premium subsidies are the primary mechanism for expanding participation, private reinsurers complement government programs by providing underwriting capacity, catastrophe modeling, pricing expertise, and risk management services. To protect insurers from extreme losses, the Indian government has introduced 'Cup and Cap' risk-sharing models under the PMFBY, available in 80:110 and 60:130 variants. Under these models, the government covers claims exceeding 110% or 130% of gross premium, while insurers return surplus premium to the government when the loss ratio falls below 80% or 60%, respectively. Several major states have adopted these models since the 2023 kharif (summer) season. Globally, approximately 55% of agricultural losses remain uninsured, largely because of low insurance penetration in developing countries [10].

Crop losses

The domain-specific insurance structure, including government subsidies, take-up rates and variety of covered perils, leads to a large range of loss outcomes. Verisk's global modeled insured crop average annual loss (AAL) is estimated at USD 27.7 billion², equivalent to an aggregate loss ratio of approximately 80%. The modeled loss ratio is relatively higher in North America, at approximately 87%, largely driven by the U.S. MPCl portfolio, compared with approximately 71% in Asia. Outside Verisk's model domains, average annual crop insurance losses in EU countries are estimated at approximately USD 4 billion against premiums of approximately USD 4.25 billion [11], a loss ratio of over 90%. These differences reflect not only the variations in weather-related hazards but also the policy design and market structure. Weather-driven yield risk is the primary source of loss variability in Canada and India, where coverage is focused largely on yield protection. In contrast, both yield and price are important loss drivers in the U.S. MPCl program, and price changes can either amplify or offset the effects of weather-related yield losses.

² All monetary values for model-related estimates are expressed in USD. Values originally reported in local currencies were converted using the respective annual average exchange rates for 2025.

Global modeled insured crop losses

As shown in Figure 1, the global crop portfolio exhibits a relatively gradual increase in losses toward the tail. Crop losses are generally dispersed across perils, crops, seasons, and regions, allowing adverse outcomes in one area to be partly offset by less extreme experiences elsewhere. Deductibles, coverage limits, and government risk sharing can further moderate extreme losses, although widespread catastrophic events may still generate significant tail risk.

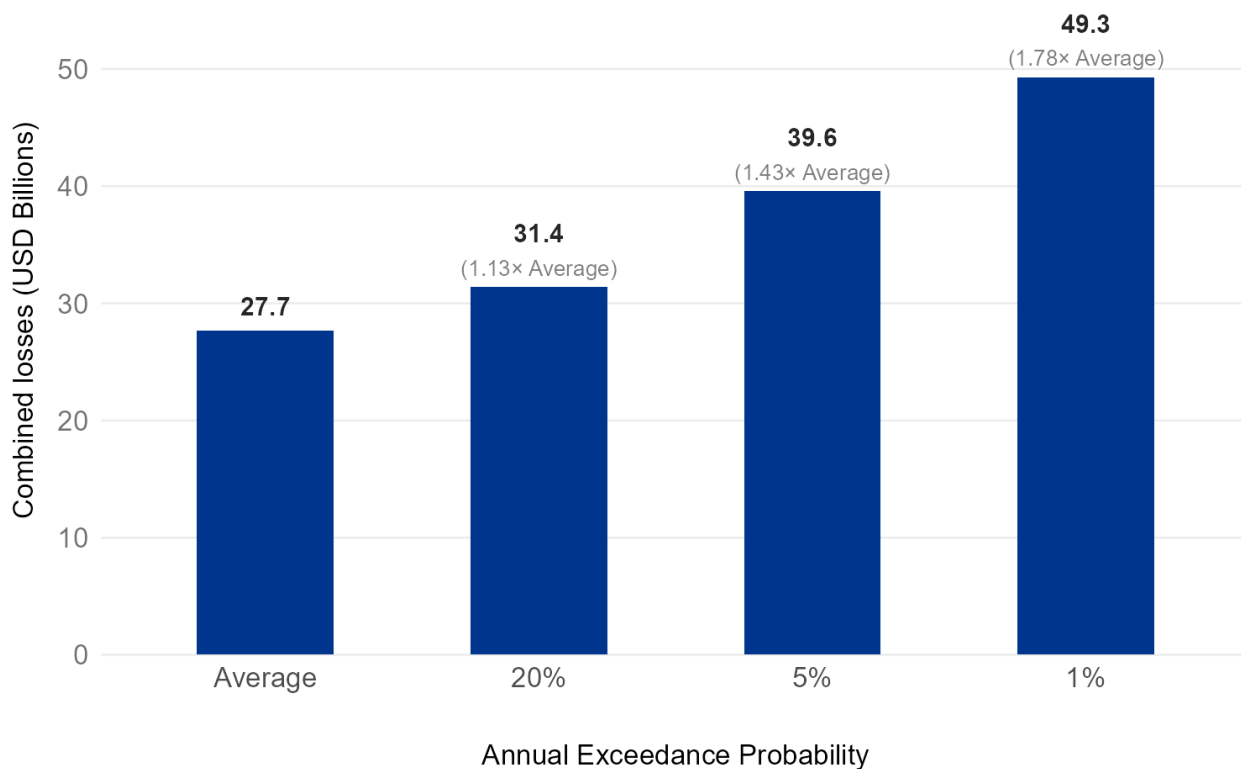


Figure 1. Verisk global modeled insured crop losses: Average annual loss (AAL) and annual exceedance probability (EP) metrics.

While the global modeled insured crop AAL is dominated by the largest crop insurance markets, the portfolio remains geographically diverse across North America and Asia. The U.S. MPCI model represents approximately 55% of global modeled crop losses, followed by China Agriculture (crop) at 25% and India MPCI at 10% (see Figure 2). Together, these three programs account for over 90% of the global modeled crop AAL, reflecting both the scale of agricultural production and the maturity of crop insurance markets in these regions. The remaining losses are distributed across the Canadian MPCI and crop hail portfolios, which provide additional diversification through distinct climatic and agricultural risk

profiles.

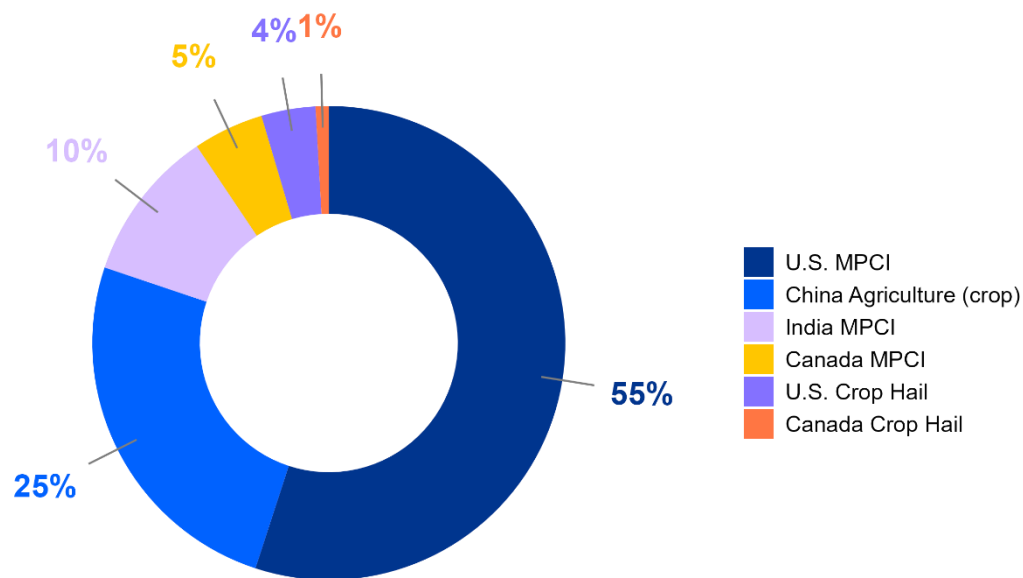


Figure 2. Contribution to global modeled insured crop AAL by model.

Model-specific loss probability metrics reveal meaningful differences in tail-risk characteristics across global crop insurance markets. Figure 3 shows the ratio of 1% exceedance probability loss to AAL by model. Canada MPC I and Canada Crop Hail exhibit the steepest tail risk increases, while China Agriculture (crop) and India MPC I exhibit relatively smaller increases, consistent with their broader geographic diversification. Canada's steep tail may be attributed to the predominance of rainfed production in the Prairie Provinces, which account for the majority of crop insurance exposure. Concentrated crop exposures can also lead to large portfolio losses from single adverse weather patterns such as prolonged, widespread drought. In absolute loss terms, crop hail portfolios show more limited tail risk than MPC I programs, because losses are typically driven by localized convective storms. At the portfolio level, diversification across regions substantially moderates the tail risk, resulting in a global 1% exceedance probability loss that is only 1.78 times the AAL.

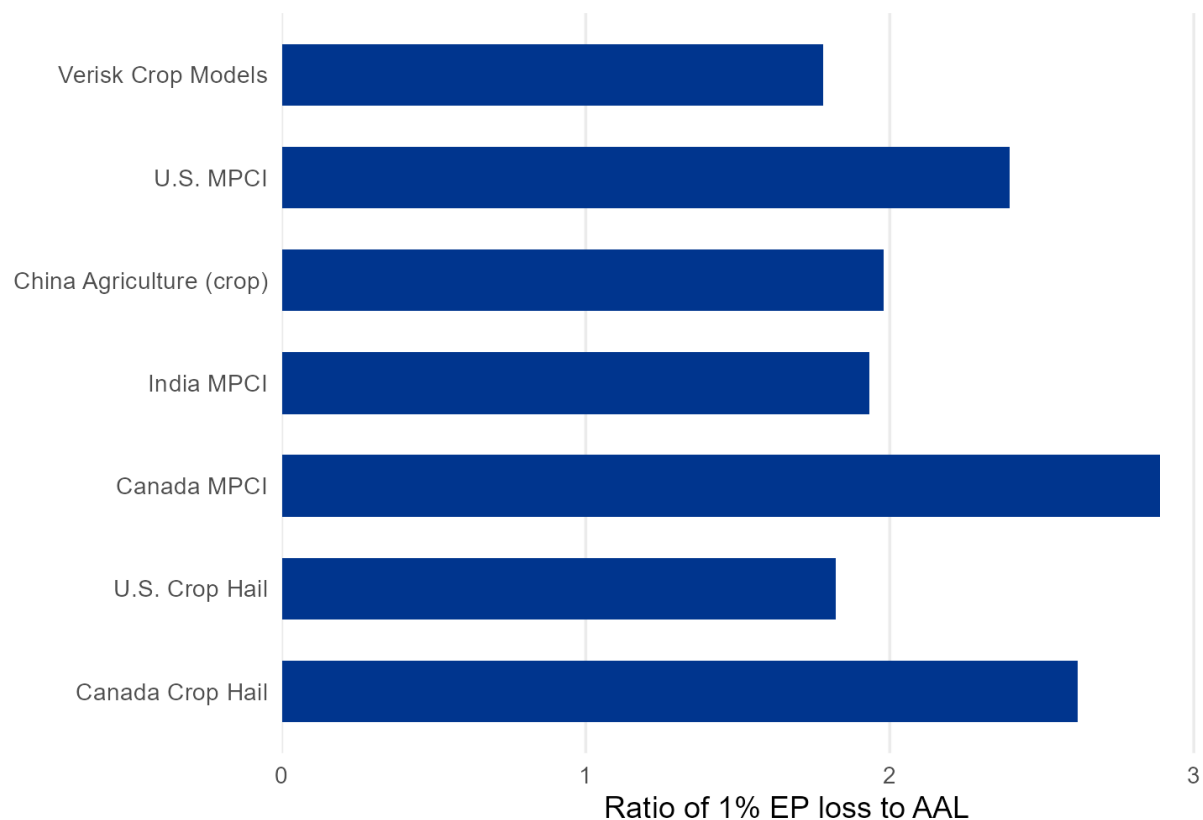


Figure 3. Ratio of 1% EP loss to AAL by crop model, with models ranked by premium.

ENSO impacts

The El Niño Southern Oscillation (ENSO) is a recurring variation in equatorial Pacific Ocean sea surface temperatures (SST) that affects weather patterns around the world. It is an important source of year-to-year variability in temperature and precipitation. ENSO has two main phases: El Niño, which is associated with warmer-than-average SST, and La Niña, which is associated with cooler-than-average SST. The impacts of these two phases vary by region, so the same ENSO phase can produce heat and drought in one area while bringing cooler or wetter conditions to another.

ENSO can cause substantial changes in production for major crops across the world's main growing regions [12]. Across Verisk's crop modeling footprint, ENSO impacts are particularly large in India and China compared with the U.S.

India is one of the most sensitive regions to ENSO. During El Niño, convection shifts eastward over the Pacific, and the Indian summer monsoon weakens, reducing June–September rainfall across much of the country [13]. La Niña has the opposite effect and is associated with normal to above-normal monsoon rainfall. However, this relationship is not deterministic because other climate drivers such as the Indian Ocean Dipole also affect the monsoon [14]. Since kharif crops such as rice, cotton, soybean, and groundnut depend heavily on monsoon rainfall, changes in rainfall patterns can lead to substantial production losses or gains.

In China, the ENSO response is more complicated because it interacts with the East Asian monsoon and varies considerably by region [15]. In the summer following an El Niño peak, the western North Pacific subtropical anticyclone strengthens, directing more moisture toward the Yangtze River valley thus increasing the risk of flooding there [16]. Northern China, in contrast, often experiences warmer and drier conditions during the developing summer and autumn of El Niño events. La Niña produces roughly the opposite pattern [17]. Its impact on agriculture therefore depends on both crop location and whether the event is developing or decaying. Rice-producing areas in the south face greater risks from flooding and waterlogging, while wheat and maize production on the North China Plain is more exposed to drought.

The U.S. experiences smaller agricultural impacts than India or China, although strong ENSO events are still associated with meaningful yield anomalies. El Niño tends to produce wetter and cooler conditions in the West and Midwest, while the South is drier in summer and experiences reduced hurricane activity [18]. La Niña events are approximately the inverse of El Niño, and strong La Niña events are associated with an elevated probability of widespread hot and dry conditions. Corn yields in the Midwest have been shown to be higher on average during El Niño events than during La Niña events, though yield responses vary at regional and subregional scales within the Corn Belt [19]. Insured losses are therefore likely to be higher during strong La Niña events than during strong El Niño events. However, individual years can differ substantially, and the effect on insured losses depends in part on where insured acreage is concentrated and which policies are included. Rainfall Index and Hurricane Insurance Protection–Wind Index (HIP-WI) plans are particularly sensitive because indemnities are directly linked to weather conditions.

The Multivariate ENSO Index (MEI) value [20] is published by the NOAA Physical Sciences Laboratory, incorporating sea-level pressure, SST, zonal and meridional surface winds, and outgoing longwave radiation. Values above 0.5 are classified as El Niño, values below -0.5 as La Niña, and values between these thresholds as Neutral. These observed MEI values can be leveraged in the Verisk stochastic catalog to generate a view of risk specific to a particular ENSO phase. Verisk crop models characterize the probability distribution of potential loss outcomes using large stochastic catalogs comprising 10,000 simulated years. Specifically, each stochastic event in the current U.S. MPCl and India MPCl models as well as in the next update of the China Agriculture model is associated with a Northern Hemisphere summer (July–August) MEI value. Since the catalogs for each modeled region are aligned on the same ENSO phase, stochastic events can be compared across model domains, allowing correlated analysis of global losses.

ENSO correlations for crop models

Among Verisk's crop insurance models, the U.S. MPCl, China Agriculture, and India MPCl models are correlated through a common ENSO-based correlation framework, enabling clients with multi-regional portfolios to assess the impact of climate-driven dependencies across markets. Figure 4 illustrates the impact of correlation on losses; there is no impact on the AAL and changes in the losses become apparent at low exceedance probabilities. In the tail (5% and 1% exceedance probabilities), the correlated portfolio exhibits lower losses than an uncorrelated portfolio would estimate, reflecting the reduced likelihood of extreme losses occurring simultaneously across multiple countries. This can be explained by the contrasting crop yield response to ENSO phases in different regions. For example, El Niño conditions generally have a negative impact on crop yield in India and therefore increase losses in India. In contrast, weather conditions across major crop growing areas in the U.S. are more favorable in El Niño

years, leading to lower losses. La Niña conditions often produce the opposite pattern in both countries. In China, crop yield response to ENSO is more spatially diverse. Because the ENSO-based correlation causes U.S. and India losses to move in opposite directions, severe losses in both regions in the same year become less likely than under an uncorrelated assumption. This creates a natural diversification benefit within globally diversified agricultural portfolios and helps moderate aggregate tail risk.

Correlated vs uncorrelated combined losses

U.S. MPCl + China Agriculture (crop) + India MPCl | label = correlated minus uncorrelated

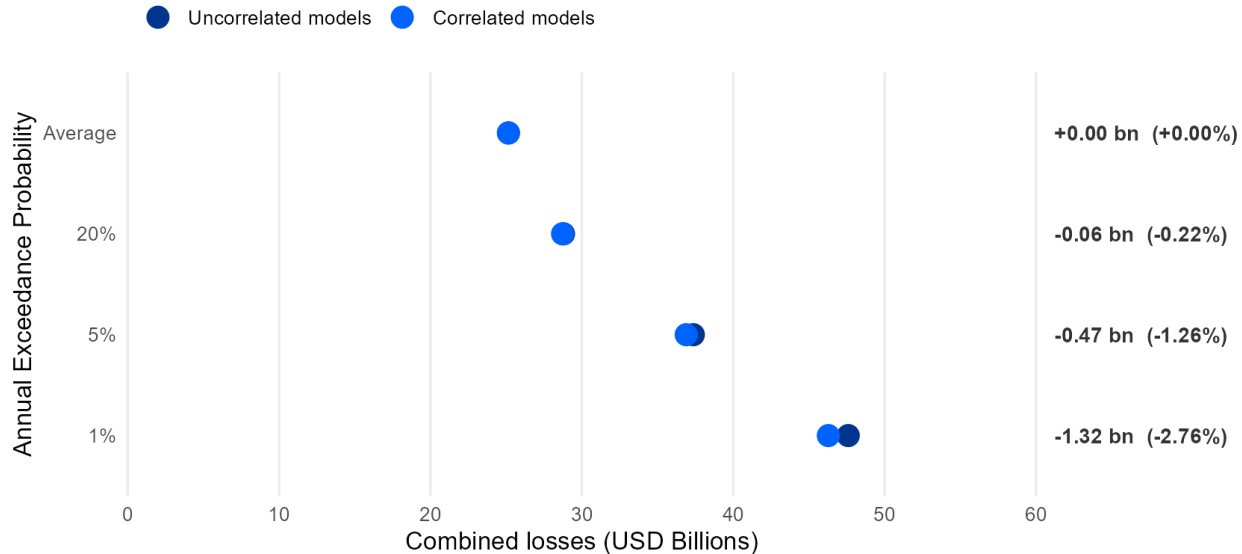


Figure 4. AAL and EP metrics for combined modeled losses: correlated models vs. uncorrelated models.

A strong El Niño year

Strong El Niño events over the past few decades have had global climate impacts, substantially affecting ecological and socioeconomic systems [21]. A strong El Niño event is characterized by a positive average SST anomaly of at least 1.5°C in the central and eastern equatorial Pacific [22]. To assess the effect of strong El Niño conditions on combined crop losses, the full 10,000-year catalog was filtered to separate years with a July–August MEI value above 1.5 (719 years). Figure 5 shows that strong El Niño years have a small impact on average combined losses but substantially reduce tail losses. Compared to full catalog, the strong El Niño subset is USD 0.3 billion (1.2%) lower at the AAL. The reduction grows further into the tail, reaching USD 5.2 billion (11.3%) at the 1% annual exceedance level, indicating strong El Niño years suppress tail losses disproportionately rather than lowering losses uniformly. To assess sampling variability, 10,000 bootstrap samples were created from the full catalog, each containing 719 years to match the number of strong El Niño years. The resulting distributions were compared with the strong El Niño loss estimates. At the 5% and 1% exceedance probabilities, losses during strong El Niño years fall outside the 5th–95th percentile bootstrap intervals of the full catalog. Moreover, fewer than 0.1% of the full-catalog bootstrap samples produce lower losses than the strong El Niño subset, indicating that the observed reduction in extreme losses is significant.

The U.S. MPCI accounts for the majority of the combined portfolio AAL and therefore remains the primary driver of tail-risk outcomes despite its comparatively lower sensitivity to ENSO. At the average level, lower losses in the U.S. MPCI portfolio are largely offset by higher losses in India and China. However, the tail behaves differently as the impact of the decrease in extreme U.S. MPCI losses dominates. Strong El Niño conditions tend to be associated with milder summer weather across much of the Corn Belt, which lowers the chance of the widespread drought and heat stress that often drive severe U.S. MPCI losses. The higher losses in India and China during strong El Niño years have a smaller impact on the combined tail than the decrease in U.S. losses. ENSO mainly affects India's kharif season through Indian Summer Monsoon rainfall and has a weaker influence on the rabi (winter) season. In China, ENSO impacts are more heterogeneous, with some regions experiencing increased flood risk while others may benefit from more favorable growing conditions. Overall, the results suggest a more favorable tail-risk outlook for the combined portfolio during strong El Niño years.

Strong El Niño years reduce combined tail losses

Correlated Models: U.S. MPCI + China Agriculture (crop) + India MPCI | label = strong El Niño years minus full catalog

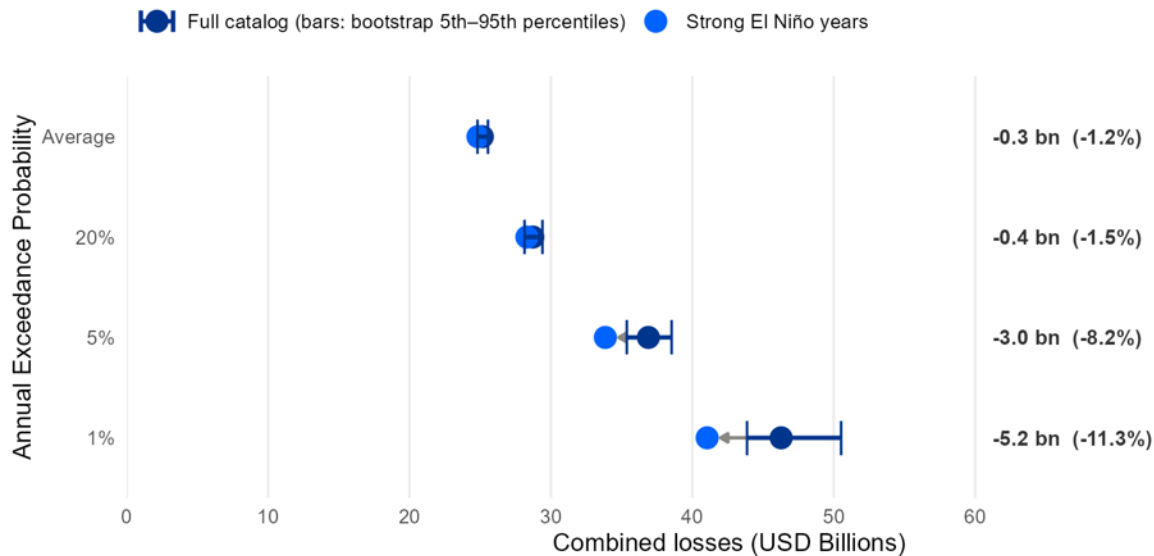


Figure 5. AAL and EP metrics for the correlated models: full 10,000-year catalog vs. strong El Niño years (719 years). A strong El Niño year is defined by a July–August MEI value exceeding 1.5. Full catalog bootstrap results are based on 10,000 replicates, each generated by sampling 719 years with replacement from the full catalog.

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