

# Does Geographic Diversification Work to Mitigate a Company's Weather Risk?

Laura Hershey<sup>1</sup>

<sup>1</sup>Affiliation not available

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LAURA HERSHEY

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**CORRESPONDENCE:**

[laura.hershey@meteoprotect.com](mailto:laura.hershey@meteoprotect.com)

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Weather affects sales volumes and profits of many firms in many sectors. The risk to which firms are exposed is not a matter of regular seasonal fluctuations but rather deviations from the seasonal cycle. For example, when the summer is cooler than normal, a brewer sells less beer, and heating demand is lower if winter is warmer than usual. Overall, it is estimated that 70% of the firms are exposed to weather risk and the financial losses caused by unseasonal weather can be very significant.

Yet, global companies that operate worldwide tend to think that they are not exposed to losses caused by unseasonal weather, or exposed to weather risk, precisely because they operate worldwide. Companies and institutions believe that if weather conditions are unfavourable in one place, they will be favourable elsewhere, and the losses suffered in one regional zone will be offset by the gains made in another.

But does geographic diversification really work to manage weather risk?

In addressing this question, the research and development team at Meteoprotect, the largest weather

risk management firm in Europe, studied the statistical likelihood that a company will mitigate their weather risk by shifting demand, supply or production outside of the region. They examined meteorological data over the period of 1985-2013, for both Europe and the US, quarter by quarter, to determine the correlation between weather patterns on the two regions.

The findings are startling. Overall, geographic diversification as a natural hedge only works 27% of the time. Meaning, 73% of the time, companies will not profit from diversifying their holdings between the two continents. Specifically, Meteo Protect found that there is little symmetry between weather patterns in Europe and the US. In layman's terms, for a company, which has operations both in the U.S. and in Europe, this means that if the U.S. experiences adverse weather conditions which would affect the company's profits or sales there, there is only a one-third percent likelihood that Europe would be experiencing favourable weather conditions at the same time.

Breaking down the numbers, overall, temperatures swing in the same direction 44.25% of the time. So, if there is a quarterly temperature fall in the US which is reducing the demand for beer there, there is likely to be a quarterly temperature fall in Europe too, and beer sales there will also be weak for the same quarter. Specifically, for the first quarter temperatures swing in the same direction 72% of the time, for the second quarter 28% of the time, for the third 31%, and for the fourth 46%.

Now, to look at the more positive situation for a company that temperatures may swing in the opposite direction between the US and Europe, this happens only 27% of the time. So, if the US experiences adverse weather conditions (eg. an unusually cool summer, which leads to the reduction in the demand for a fashion houses' summer product line), it is extremely unlikely Europe will be experiencing favourable conditions and that summer dresses will be flying off the shelves there to make up for the sales slump in the US. Specifically, for the first quarter temperatures move in the opposite direction 25% of the time, for the second quarter 38% of the time, for the third 15%, and the fourth 30%.

Thus, the researcher and development team at Meteo Protect has exposed geographic diversification as a natural hedge against weather as a myth. It only works 27% of the time, which is clearly a statistically poor result.

What is the underlying meteorological reasoning for this? Natural variability phenomena such as the ENSO oscillation (El Nino/La Nina) drive similar weather patterns in very different patterns of the world. For example, the La Nina effect resulted in December to February 2010-11 caused cool temperatures in the eastern US and cooler temperatures right across Europe.

Ironically, if an American company decided to take advantage of geographic diversification, believing that the 27% success rate of geographic diversification was still worth it, they would be inadvertently exposing themselves to other weather-related risks. This is because the United States has statistically lower temperature variability than Western Europe. In fact, in the United States average quarterly temperature swings are 43% lower than in Europe. Why? This lower temperature variability can be partially explained by the fact that surface area of the US is twice the size of Europe and temperature averages across the United States thus "flatten" out. So, if an American company moved aspects of its enterprise to Europe it would incur the problems associated with temperature variability there.

From the opposite perspective, if a European company thought that the 27% success rate of geographic diversification was still worth it, they also would be expose themselves to other weather-related risks. The United States has been experiencing a sharp rise in extreme weather events (storms, floods, extreme temperatures, droughts) since 1980. Thus, the European company could expect to be affected by weather-related natural catastrophes which it didn't have to contend with in Western Europe, where there has been no clear trend of weather extremes (in fact, there has been a rather downwards trend since 2007).

Clearly, geographic diversification is not only an ineffective weather risk management strategy but it is a costly and precarious one. Fortunately, there is a better way, thanks to advances in meteorology,

numerical forecasting techniques, data assimilation, interpretation and post-processing model outputs. Today, the relationship between a company's performance indicators (such as sales volume, cost of production, net income) and any weather parameter can be identified and measured to the precision of a one degree in the temperature, one millimetre of precipitation, or one meter per second of wind measured in days, weeks or even years. Using these variables, index-based weather insurance can be selected in order to protect an enterprise against the financial impact of weather anomalies, compensating for losses in sales volume, cost of production, or net revenues through predefined payments based on the occurrence of specific weather conditions.

In other words, taking into consideration the weather that is expected and has been accounted for in all aspects of the supply chain, index-based weather insurance is purchased for the event that weather does not arrive as expected. Compensation proportional to the magnitude of the expected loss is paid to the company if a predetermined threshold of adverse weather is triggered. Unlike traditional insurance, index-based weather insurance triggers a payment completely linked to the defined weather event pre-determined as demonstrating a causal linkage to an enterprise's revenue streams, and not to the losses. Payment is simple, transparent and automatic, without requiring a field loss assessment.

Thus, contrary to geographical diversification, index-based weather insurance is a solution that is precise, targeted, proportional and cost-effective. It's not only time to kill the myth of geographic diversification as a natural hedge, but to take advantage of a hedge that truly protects you on those rainy days.