Get a grip on the weather — risk management with weather derivatives

All companies operate in an uncertain environment and are exposed to ever more rapidly changing conditions. Strategic planning attempts to attain the greatest possible clarity on potential changes in the environment, e.g. the actions of competitors, the legal environment, regulation, etc., so that the steps necessary to achieve business objectives can be agreed upon.

One objective of endeavors is to achieve budgeted financial earnings that reflect the successful implementation of all measures.

For many sectors, weather is a key but non-controllable variable which increases in importance where there is an elevated requirement for constant earnings. Nevertheless companies do not need to passively accept the effects of the weather on their business success as it is possible to hedge these effects. Weather effects on individual events such as open-air concerts or golf tournaments can be hedged as well as effects over longer periods, e.g. summer seasons for outdoor swimming pools and ice cream parlours, windfarm power generation, gas supply for domestic heating purposes or work progress on a building site. Many risks have a direct effect on the company's earnings as costs are often mostly constant.

With the availability of data, reliance on the weather can now be transformed from a diffuse uncertainty to a quantifiable risk. This allows for the possibility of evaluating the use of products for hedging against risk. Available products calculate the probability of occurrence for various events on the basis of historical values. A variety of sectors now have another instrument for risk management alongside existing instruments to hedge interest rate, foreign exchange and commodity price risks. Nevertheless a detailed study of the individual products is necessary prior to the use of these instruments.

The most common form is use of an "insurance", in which a premium is paid for an option at the start of the contract. At the end of the contract period, cash settlement is made once the hedged variable is known.

Here are two practical examples of the diverse applications of weather derivatives:

Public utility — gas sales: hedging against a warm winter

The standard application for weather derivatives is hedging against a warm winter as less gas is supplied to customers than was expected and mostly also contracted (volume risk). This is further complicated by price risk if the volumes that are not required hit an oversupplied market – possibly below the purchase price as a forward transaction – as all suppliers are faced with the same volume issue.

In order to avoid or at least reduce this risk, a heating degree day (HDD) product can be purchased (purchasing a put option) which defines a HDD value, total heating demand, for the contract period. The actual temperatures are compared with daily reference values over the contract period and totalled to give the relevant values for the payment. If temperatures fall below the reference values over the course of the contract, the public utility receives financial compensation corresponding to the temperature difference in order to reduce the decrease in margins. To achieve the intended aim of earnings being as stable as possible, it is necessary to agree the shortfall sensitivity in advance. This will also have a considerable impact on the amount of the premium.
If the temperature is above the agreed value, and heating demand is therefore higher than that hedged, no further payment is made. The premium paid in advance is not refunded and the public utility generates at least the margin budgeted by supplying its customers.

Local authority — wind power: hedging against low wind supply

Another form is to hedge an index value without paying a premium. The partner who is ultimately the beneficiary of the index pays an agreed amount to the other partner. An example of this is the contract available on the European Energy Exchange (EEX) in Leipzig since October 2016; this can be used to hedge wind yield (product: wind power futures). A wind farm operator and a power plant operator could be trading partners using this exchange. When wind occurrence is low, the wind farm operator risks being unable to generate the revenue expected from marketing electricity. When wind occurrence is high, the power plant operator risks being able to sell energy only at low prices in spot trading. These conflicting interests are the best conditions for a trade, as risk reduction is the primary goal of both partners.

Fluctuations in markets, as presented in detail in the KPMG study "Public utilities on the road to crisis" (https://assets.kpmg.com/content/dam/kpmg/pdf/2016/04/stadtwerke-in-der-krise-kpmg-2016.pdf) for instance, show that it is becoming less feasible to accept poor financial earnings. This approach should be taken in order to actively quantify and manage additional risk with new instruments as practice shows that risks remain despite risk management being in place.