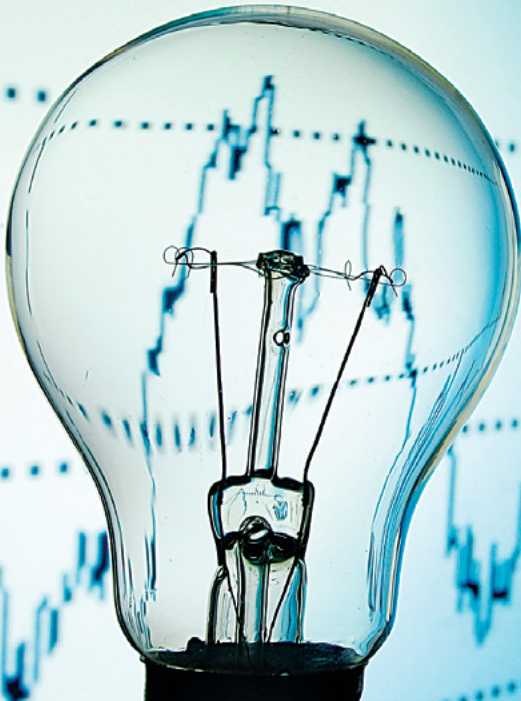# INCERTUS

Software Module And Trading
Strategy For Cross Border
Electricity Transmission Rights

KEY ASPECTS

- Successfully backtested in many developed markets.
- Due to complexity of the strategy, market opportunities are likely to exist for at least 5 years.
- Adjusted Sharpe ratio, using maximum drawdown, usually exceeds 150%.
- Market is immature and is not used for investment opportunities.
- Statistical and de facto arbitrage opportunities still exist.
- Algorithm works both with PTRs and FTRs.
- Returns are generally higher in undeveloped markets.

DESCRIPTION

Foundation of the software module is our proprietary algorithm, which calculates a fair value of transmission right, based on dynamics of underlying instrument and electricity market prices.

Backtesting shows that one would have consistently been able to achieve above average returns if investment decisions were based on buying transmission rights that were undervalued according to the model.

The module can be further customized to your functional requirements or specific markets you are active in. If you want to know more about the suitability of the module for your operations, please contact us and we can discuss about the possibilities of cooperation.

TYPICAL EXAMPLE OF ALGORITHM'S PERFORMANCE ON SINGLE BORDER

Ending balance	2.631.500€
35 month return	163%
Annualized return	45%
St.dev of monthly return	23.1%
Adjusted sharpe ratio	180%
Sharpe ratio	58%
Maximum drawdown	-254.500€
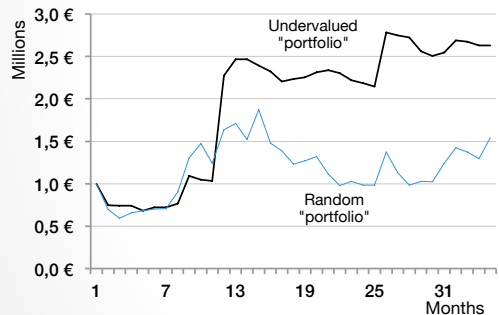
BASIC IDEA

Since transmission rights are today used almost exclusively for hedging physical demand and supply in adjacent countries, auction prices do not reflect the optionality of the product which gives rise to both statistical and de facto arbitrage.

To develop the algoritm we used historical data for monthly auction prices and returns for several markets such as France-Germany, Austria-Switzerland, Italy-Austria and countries of former Yugoslavia.

BACKTESTING IN PRACTICE

To illustrate how te bactesting was done we shall present the procedure for Germany-France (TR) market. The market is selected since it offers the largest historical dataset and is by all accounts the most established of European markets, thus offering a good benchmark about the state that other markets will be in near future.

The backtesting was done on dataset spanning the period Jan 2009 – Aug 2013. The first part of the dataset was used to calibrate the model and the second part as a test period for algorithms performance by purchasing TRs that were undervalued according to the algorithm. The measure used as the degree of mispricing was the ratio of auction price and theoretical price.

BACKTESTING RESULTS

The more an option is undervalued according to the algorithm the higher the expected return.

For a portfolio of options that are undervalued by 10% or more, the expected return is 26%.

For a portfolio of options that are undervalued by 20% or more (30% or more) the expected return is 103 and 116%.

On the other hand the return from simply buying all options regardless of the algorithm is 15%.

RETURN vs MISPRICING

These results are for GER-FR-GER, but in other markets returns are generally higher. This is due to the fact that other markets are not as well established and therefore the pricing tends to be even less efficient.
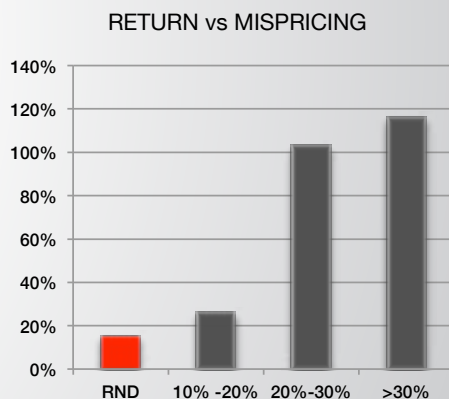
RISK PROFILE

In the context of transmission rights, one cannot use standard deviation as a proxy for risk. This is due to the fact that losses are naturally limited but the upside is unlimited resulting in positively skewed distribution with high standard deviation but relatively smaller actual risk. This is why maximum drawdown is used as a risk benchmark and by using it to construct an adjusted Sharpe ratio (akin to Calmar ratio) we can see that even on risk adjusted basis the algorithm produces abnormal returns. Generally the returns vs. maximum drawdown are around 160%.

CAPITAL REQUIREMENTS

To sufficiently diversify the investment portfolio and mitigate the losses from a given contract one should commit in exess of 5 million € of funds to effectively implement the strategy. Additionally, due to improved diversification, the risk- return profile improves even further if TR trading is implemented between several countries.

SOFTWARE INTERFACE

Modules interface is extremely simple and only user inputs required, are to prepare and input data in the module and determine the appropriate degree of mispricing that triggers the purchase recommendation.

By varying this parameter one can adjust the capital needed to execute the trading strategy as well as maintain a level of safety margin.
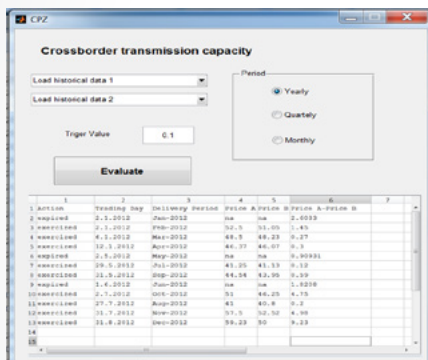
DEPLOYMENT & SUPPORT

Software is ready to use out of the package, requires minimum training and no integration to existing IT infrastructure. Despite the ease of use, we are commited to offer all our support during the deployment phase.

CONTACT

If you are interested in the module and want to know more about its operation or suitability to your trading activities don't hesitate to contact us on:

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