INCERTUS

Software Module For Constructing Hourly Price Forward Curves (HPFC)

KEY ASPECTS

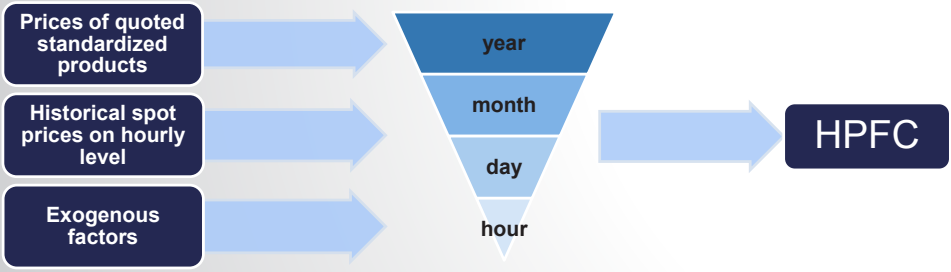
- Our module breaks down prices of traded yearly, quarterly and monthly power futures to daily and hourly levels.
- It is useful for pricing of non-standard products, contracts with deliveries on specific hours, valuation of flexible power plants on hourly basis and calculation of statistical risk measures (VaR, CVaR).
- It incorporates past behavior of spot price movement, where statistical approach is used for long-term predictions.
- In order to further enhance the quality of short-term predictions, extension with fundamental approach model is possible.
- Embedded optimization algorithm ensures that all constructed curves are arbitrage-free with respect to all other liquid instruments.
- Compatible with any existing market data and has the possibility to include cross-border transmission capacities.

DESCRIPTION

Our module helps clients to gain insight in future price movements, that enables a solid foundation for pricing of any product or process that is based on hourly level. Our statistical approach ensures that all past price movement patterns are transferred into future predictions. Furthermore, when additional information about exogenous factors (forecasts regarding temperature and cloudiness, historical trading volumes etc.) is available, it can be used in order to improve short-term predictions.

The module works with all existing markets for which historical hourly prices and current future prices are available. Additionally, if futures are traded only on foreign markets, module allows to incorporate cross-border capacities to provide relevant curves for the client.

BREAKDOWN OF MONTHLY AND YEARLY DATA TO HOURLY PRICES



HPFC – basic construction and extensions

Hourly price future curves are artificially constructed curves that predict the future price, which will be on average realized on electricity spot market on hourly level. Basic idea of their construction is to look at past spot prices and identify significant patterns on seasonal, daily and hourly basis. Since characteristics of a specific day change throughout the year, our algorithm groups days that are expected to have similar daily profile. In this context, it identifies the differences between different seasons and months, as well as it treats separately workdays, weekends, holidays and bridge days.

Improving predictions with exogenous factors

Past patterns are good predictors for the shape of future hourly profiles, however, when it comes to short-term predictions, we can improve them by including fundamental factors. Weather forecasts are especially helpful when it comes to predicting effects on supply and demand and consequently how these affect hourly prices. With our fundamental model, you get more reliable estimates, which lead to enhanced pricing of short-term products.

Problem with exogenous factors is that information about them is rarely available on a desired level of detail and historical datasets that are long enough to quantify their effects reliably. Therefore, we offer you our service that checks suitability of available data and then develops a fundamental model which correctly incorporates all available information.

Optimizing curves to avoid arbitrage

After predictions are constructed either on statistical or fundamental approach, our software makes sure to eliminate any possibility of arbitrage with respect to existing quoted prices of standardized products. The module uses optimization algorithm to include all data about relevant products for a chosen period. Therefore, all constructed HPFC are arbitrage-free with respect to traded futures.

The only exception when not all market data is taken into account, is in the case of overlapping of available products (e.g. 3 monthly products for the same delivery period as one quarterly product). In this case the algorithm uses only shorter products.

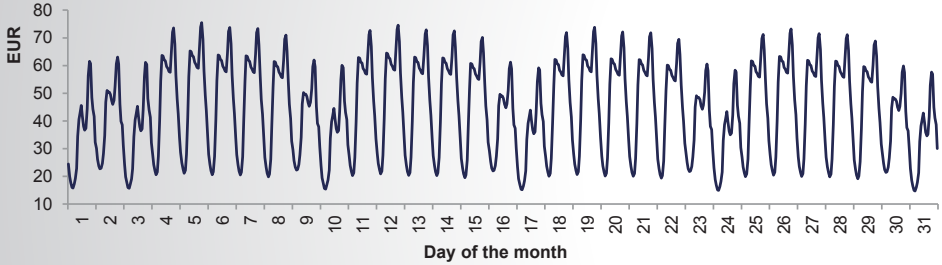
INPUTS AND OUTPUTS

In order for the module to start working properly, a time series of historical **realized spot electricity** prices on hourly level and a list of **currently traded futures** contracts are needed. It also has an optional extension that allows the client to input the price of **cross-border capacities**, which are then incorporated into future curves.

In case of extended model, the required data is determined after our revision of available information regarding exogenous factors that are relevant for your specific case.

By default, algorithm then identifies the optimal past period for making predictions. However, user can manually change it to any desired past period. Afterwards, user only has to decide for which future periods does he wants that the curves are constructed and press the button. It is that easy.

Results are primarily provided in form of array with **point predictions** for each hour of a chosen period. Furthermore, the **standard errors** of all predictions are estimated and given in another column of array. Optionally, client can choose **graphical output** where all curves are plotted in line charts in order to provide a better picture.



DEPLOYMENT & SUPPORT

Software is developed as a Microsoft Excel module, requires minimum training and easy integration to existing IT infrastructure. Despite the ease of use, we are committed to offer our clients all the support during the deployment phase.

CONTACT

If you are interested in the module and want to learn more about its operation or suitability for your trading activities, please do not hesitate to contact us on:

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