KPMG

Predictive analytics for cashflow forecasting

Finance and Treasury Management Switzerland

Computer-assisted forecasting methods help corporate treasuries with the company-wide liquidity planning

Companies can survive for a long time without profits, but in the worst case, they can become insolvent within a few days if the necessary liquidity reserves are not ensured. Many a company has found itself in a liquidity crunch following the concurrence of certain events. One such event is currently the Coronavirus crisis that brings countless companies to the brink of their liquidity limits. But regardless of the Corona crisis, recent surveys among treasurers revealed that liquidity planning was and still is at the top of every Treasury's agenda. To keep liquidity at the forefront helps to ensure that liquidity fluctuations are adequately hedged and that general liquidity shortages can be overcome safely and cost-effectively.

Basically, there are several approaches (direct and indirect method) and planning methods to do this. The choice of planning method depends on many company-specific parameters such as business model, business management, complexity and availability of data and systems. An overview of state-of-the-art methods and their requirements as well as a definition of planning approaches may be found in our February newsletter.

In the following we focus on the so-called predictive analytics in cash forecasting (PA-CF), one of the direct approaches in the liquidity planning.

Predictive Analytics is a sub-discipline of data mining; it uses historical data to predict future events, for instance in Controlling, Sales, Treasury/Finance but also with regard to insurances, mobility and marketing. Historical data is used to prepare a mathematical model that captures important trends and seasonal discrepancies, extrapolating time series into the future. This predictive model is then applied to current data to predict what will happen next. At this point, actions are proposed to achieve optimal results, which is part of the next phase, Prescriptive Analytics.

Predictive analytics in cash forecasting apply stochastic methods to generate forecasts of individual liquidity-relevant planning items based on data analysis. To obtain these, additive regression, autoregressive models (such as ARIMA) or even neural networks are used for modeling, whereby the transparency of the forecast is no longer a given with the latter. Initially, the granularity of an item is irrelevant. In principle, a forecast can be created for cash balance, total cash flow, free cash flow, operating cash flow, as well as for individual business transactions (for example, payments from sales). As such, the complexity and degree of detail of the modeled time series are fundamentally flexible. Also, the general statement applies that the higher the granularity, the more specific the understanding of the underlying business processes; these can then be incorporated.

Advantages of predictive analytics approaches – an overview

A classic example in Corporate Treasury is to forecast liquidity needs for daily use over a period of 13 weeks using historical data as well as external and internal business-relevant time series.

Designing and implementing a predictive analytics framework, described below, is helpful for this. Before anything else, it should be said that a consistent implementation will result in a number of advantages for the liquidity planner, some of which will be highlighted below:

- Predictive analytics methods provide liquidity managers with information that can significantly improve the efficiency of decision making, as it is based on reliable information and high-quality data. It skips the need for a decentralized process, whereby the generation of planning data is usually the responsibility of the individual reporting units.

- By introducing predictive analytics, the process of liquidity planning can be automated and ideally be performed at the push of a button. This replaces the manual preparation of the liquidity forecast, which is very time-consuming and requires recurring coordination efforts that place a major burden on Treasury.

- The number of possible applications in liquidity management is practically unlimited. Any number of models as well as internal and external explanatory input parameters may be used to optimize forecasts, which means that any number of complex issues can be analyzed.

- The process is also scalable, which means that the software continues to function when size or volume is changed to meet user requirements. When applied to the predictive analytics approach, it means that an increasing number of time series can be analyzed without major adjustments to the currently used model portfolio. The computation time per time series does not change significantly, although it must be clearly emphasized that the total time required will increase. In practice, this can reflect changes in the business model or changes in the business units due to M&A activities.

- Downstream software solutions, such as business intelligence reports, can present the results in a highly detailed, user-friendly form tailored to the target group. As the aggregation levels can be freely defined, both the Board of Directors and the operational treasurer are provided with decision-related information at the required level of granularity that can be called up at any time.

Framework necessary to implement predictive analysis

The requirements for using and implementing a liquidity forecast in Treasury can vary a great deal from company to company. For this reason, it is particularly important to first prepare the framework for the future modus operandi as well as for every individual project. Usually, there are six steps to introducing new forecasting methods:

Target mapping
First, the general project objectives and expected results as well as their use within the liquidity planning are defined. Apart from technical requirements such as for instance the aggregation level of the time series to be forecast, also so-called non-functional requirements (NFR) (which consist mainly of technical framework conditions) need to be defined. In order to estimate the project's required budget and time frame, the degree of automatization and the number of positions to be analyzed are also decisive. In this step, many companies often wonder about the targeted embedding of data science in the Target Operating Model when it is their first such project.

Data extraction
All forecasting models must be fed with internal and external data sources. Based on the project's objectives, an initial catalog of key figures must be prepared that defines the data to be extracted from the source data systems. A data model is then derived and implemented based on the catalog of key figures. In doing so, it is important to keep an eye on the requirements and special features of each individual source systems for a smooth data extraction process in the future.

Data cleansing
Ensuring adequate data quality is the ultimate goal and, as experience shows, also very time-consuming. In principle, using a handful of indicators, such as the uniqueness of individual entries or the completeness of data records, is often highly beneficial for data quality. The great advantage of high-quality data is that useful information can already be identified and analyzed in this step. A nice side-effect of this sub-step is that data that was recorded incorrectly in the source systems is detected and corrected. This often has positive effects on other departments, for instance in terms of accounting quality, which is not to be underestimated.

Modeling
Predictive modeling makes it possible to prepare forecasting models automatically. Selecting the model and calibrating the parameters is done automatically by means of so-called trainings, whereby selected sets of input parameters are used to calibrate the model. This leads to the selection of optimal stochastic models for each liquidity item examined. In addition to the history and the time series to be forecast, the following parameters, for example, are used as input factors:

- Quality-assured data from internal and external sources
- Structural effects such as seasonal discrepancies, business cycles, trends
- Identified and analyzed anomalies, significant outliers

Theoretically, the model universe is infinite, but from experience, the model families of additive regression and ARIMA have proven to be helpful liquidity estimators. A model's quality is reviewed using predefined error metrics. These metrics measure the difference between actual and target values. They should be selected in a targeted and question-based manner, as not every metric should be applied to all models.

Deployment
The generated forecasts are fed into the liquidity planning process and decision-making processes with the help of business intelligence tools (such as dashboards). Here, a decision must be made whether the conclusions are then automatically executed by the system or whether they must first be interpreted and initiated by corporate treasury staff. In the first case, automation is indispensable, although it does not rule out human involvement.

Monitoring and adjusting the model
The ongoing monitoring of the model serves to review whether the requirements of models that are used to compute the liquidity forecasts are met. In addition, it must be ensured that requirements stemming from changes in the IT infrastructure are implemented at all times.

Predictive forecasting methods in hybrid planning approaches

The 6-step framework for setting up and operating predictive analytics in cash forecasting provides a highly flexible methodology for generating forecasts in liquidity management and implementing them in regular operations. However, it does not necessarily need to be applied to all liquidity-relevant time series. For instance, volatile investment cash flows are often better estimated by the individual departments and can then be incorporated into liquidity planning.

As mentioned at the outset, there are several approaches to liquidity planning and predictive analytics is one of them. In addition to its greatest strength in modeling complex issues in any granularity, this approach has also been shown to have weaknesses. Depending on the model, the transparency of the results is significantly limited and the responsible planner then faces the question to what extent he/she trusts the forecast models. As a consequence, on the way to a fully automated solution, Corporate Treasury initially should favor a so-called hybrid process that combines several approaches (depending on the business transaction), incorporating a plausibility check by the responsible planner. As time goes by, trust will grow steadily, and with it the degree of automation of the predictive forecasting method.

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