

Performance criteria for effective usage of the current volatility indicator in predictive modelling of price dynamics in financial markets

Meri Amirkhanian

ISMA University of Applied Sciences, Riga Latvia

**Corresponding author's e-mail: meri.amirkhanian@gmail.com*



Abstract

A set of criteria for the effectiveness of using the indicator of current volatility in forecasting modeling of price dynamics in financial markets is proposed. It is shown that at least one of the criteria of this complex can be methodologically used to evaluate the effectiveness of models of socio-economic systems of any nature (after some adaptation, taking into account the specifics of this system).

Keywords: effectiveness, criteria, model, profit

1 Introduction

The use of various models already built to predict the dynamics of prices in financial markets is possible if the proposed models are effective in a particular financial market. Otherwise, it is necessary to determine the performance criteria of each model. The article discusses the assessment of financial models in terms of an indicator of current volatility. Nowadays, there is no economic and mathematical model that would be completely break-even. For that reason, for one or more transactions with income, a trader can make one or more transactions with losses. In this case, the amount of loss from one transaction may exceed the amount of income from several previously completed transactions. Therefore, working with a selected (optimal) set of model parameter values can be considered effective if the amount of income during testing exceeds the amount of income from applying the same model for any other set of model parameter values.

2 Main part

To assess the adequacy of the model in the financial market, criterias for its effectiveness are necessary. Since the models will be tested for investment horizons of various depths, we need such a performance criteria that would allow us to adequately compare the results of the model. Therefore, we introduce the indicator "Average income per month":

$$ANI=(POI-R\cdot PO)-UL-R\cdot UO)/M,$$

where ANI - net average income per calendar month for the analyzed period (taking into account the broker's remuneration and other obligatory expenses inherent in a particular financial market);

UO - the number of unprofitable operations for the billing period;

PO - the number of profitable transactions for the billing period;

POI - the amount of income received from profitable transactions;

UL - the amount of losses received from loss-making operations;

M - the number of months during which the time series of quotes is analyzed;

R - the amount of remuneration to the broker for a transaction made by a market participant, including other mandatory contributions to the market [2].

From the point of view of the effectiveness of forecast models of price dynamics in the financial market, one can offer a number of criteria such as "total income for the analyzed period", "average income per transaction for the analyzed period", "average income for the calendar period (day, week, month, year, etc.), some of which have already been discussed above.

When analyzing the same market, these criteria are quite informative. But a comparative analysis of the effectiveness of the model for various markets raises a number of additional problems:

- adequate use of cross-rates, changing dynamically when analyzing markets in different currencies;
- accounting of differences in the length of the trading session comparing national and international markets;
- other differences between among financial markets.

Therefore, a criteria is suggested for the relative efficiency of the model (Ef), which is devoid of these shortcomings. The general view of it can be described by the formula:

$$Ef = \frac{P_{mod}}{P_{abs}}, \quad (1)$$

where P_{mod} - income from the use of the model in the studied calendar range in the analyzed market;

$P_{abs} = \sum_{i=1}^n |P_i - P_{i-1}|$ - absolutely possible income in the studied calendar range in the analyzed market;

P_i - price of the analyzed financial asset at point i of the studied calendar range ($i \in [1; n]$);

n - number of points in the studied calendar range [1].

If the price dynamics is represented by a 4-dimensional vector $P_i = (Open_i, High_i, Low_i, Close_i)$, the $Close_i$ price is selected, since it is considered the most optimal price for a candlestick transaction in the financial markets.

It should be noted (this is the opinion of the author) that adjustments must be made to the criteria of the relative effectiveness of the model (Ef), taking into account the slippage in the financial market, fixed market fees, including brokerage fees for transactions and other obligatory payments, which are usually set in a specific market for a particular financial instrument:

$$Ef_1 = \frac{P_{mod} - mk}{P_{abs} - (n-1)m}, \quad (2)$$

where Ef_1 — the quantitative value of the modified criteria for the relative efficiency of the Ef model;

P_{mod} - income from the use of the model in the studied calendar range in the analyzed market;

$P_{abs} = \sum_{i=1}^n |P_i - P_{i-1}|$ - possible income in the studied calendar range in the analyzed market;

References

- [1] Menshikov I S 2017 *Market risks: models and methods* Computer Center of the Russian Academy of Sciences
[2] Kussy M Y 2011 *Methodological foundations of the use of reflexivity*

m - amount of slippage, fixed market deductions, including brokerage fees for the transaction and other obligatory payments;

k - number of transactions when applying the model;

P_i - price of the analyzed financial asset at point i of the studied calendar range ($i \in [1; n]$);

n - number of points in the studied calendar range.

3 Conclusion

The concept of "effectiveness" always introduces some element of subjectivity into this term. For example, what is effective for one subject is not always effective for another subject. The described set of criteria will allow us to correctly test the proposed set of models, taking into account the concept of "efficiency", which the most demanding economic agent puts into this term. The peculiarity of the criterion modified by the author is that he considers the net income of the economic agent from the application of the model, in contrast to the criterion in which the gross income is studied.

in forecasting modeling of trends in financial markets NAS of Ukraine, Institute of Industrial Economics