

The use of neural network approach in financial asset management

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Typical activities of financial asset management, such as asset allocation, stock ranking, bond trading, stock exchange trading and in general portfolio choices, have a considerable role in modern finance. Professional operators and especially banks are highly interested in understanding and predicting financial markets' trends.

One key area of interest for banks is the asset-liability management, that has to be optimised on the basis of the bank's expectations and predictions about financial market evolution. The banks often use simple linear models to evaluate the possible future scenarios and support their strategic decision process. My research addresses the construction of a neural network model of the mortgage loans' production at national level, that may be used as a basis for a more effective decision support system.

The existing econometric models of mortgage market are traditionally based on multivariate regression. Several authors have stressed the limits of this approach for financial asset management, i.e. [Refenes and Azema-Barac, 1994]. After a review of these criticisms, the reasons for using alternative models based on neural-network software technology will be taken into consideration.

The fundamentals of neural network technology will be discussed [Chichocki and Unbehauen, 1994], with a special consideration for financial modelling related issues; the supposed advantages of neural networks will be shown and documented by a comparative review of the existing models in the financial asset management.

The formulation of the supposed mortgage production function and the neural network model identification will be made in a methodological framework, taking into account the economic theory directions and the preliminary empirical results obtained in [Gardin and Virili, 1995]. In that paper a neural network model of the mortgage market production is described, that can obtain good out-of sample predictions in the short-term. These predictions are based on the future (and lagged) values of mortgage interest rate, inflation, disposable income, stock and price of dwellings for sale, and on the number of dwellings in the rental sector. Unfortu-

nately, the future values of these indicators are not available at prediction time.

First of all, a methodological framework for the neural model selection and evaluation will be adopted. Then, the preliminary model will be extended in order to include the main determinants of some, if not all, the future values of input variables. Each extension will be substantially equivalent to building a separate neural network model. At the moment I am planning for two extensions: one for the housing market and one for the disposable income.

Finally, the model will be used to come to budgeting and asset allocation decisions; as a starting approach we can imagine that several estimations of the future values of mortgage interest rates and inflation will be introduced into the model by the user. What-if analysis will allow the user to evaluate several scenarios of the future mortgage production. Efforts will be devoted to show the role and relevance of the variables involved in the model and to deal with the qualitative and judgmental factors that can influence the future evolution of the market.

References

[Chichocki and Unbehauen, 1994] Andrzej Chichocki and Rolf Unbehauen. *Neural Networks for Optimization and Signal Processing*. John Wiley & Sons, Cichester, England, 1994

[Gardin and Virili, 1995] Francesco Gardin and Francesco Virili. Non-linear modelling of Dutch mortgage market. *Economic & Financial Computing*, 5(2): 131-145, Summer-Autumn 1995

[Refenes and Azema-Barac, 1994] Apostolos-Paul N. Refenes and M. Azema-Barac. Neural Network Applications in Financial Asset Management. *Neural Computing & Applications*, 2(1): 13-39, January-March 1994.

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