

# EMPIRICAL EVALUATION OF THE BLACK-LITTERMAN MODEL

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## Abstract

The problem of asset allocation was first theorized as a mathematical problem by Markowitz [1], with his Mean-Variance model (MV). His approach assumed that only two factors mattered to investors: risk and return of assets. The main idea of the model is to create a portfolio by maximizing the expected returns subject to a given risk level. Despite its prominence in financial studies, the model presents some problems, such as poorly diversified portfolios, counterintuitive results, disregarding the opinion of the decision maker on the performance of the assets in the future and high sensitivity to the variables.

As an alternative to the Mean-Variance model, Black and Litterman [2] proposed a new approach which uses Bayesian statistical methods to match the long-term market balance - derived from the CAPM ( Capital Asset Pricing Model) - with investors views about future returns. While similar to the Mean-Variance model, the Black-Litterman model (BL) optimizes the returns subject to a risk matrix, but with two significant contributions. The first one is the idea of the BL model to set a neutral starting point in portfolio optimization process. The second is the possibility to incorporate investor's opinions about asset returns to the model.

The main purpose of the Black-Litterman approach is to introduce a portfolio allocation model that gives intuitive and stable results, overcoming the problems observed in the Markowitz approach. Additionally, the BL model has the advantage of including expectations and subjective expert opinions, creating a portfolio that does not purely depend on past information.

Despite the important contribution of the BL model to portfolio theory, their effectiveness in the world of finance is still not well known. Two of the most

important outstanding questions are if the use of Black-Litterman really solves the problems of the Markowitz model, as well as if the results obtained from running the model are consistent with observations in the real world.

Another major question is to determine how the investors view could be estimated considering that such parameters are subjective and depend on the investors analysis of assets. A possible method to determine such views is to calibrate time series models, such as ARMA and GARCH. This approach may be more advantageous since it offers a robust methodology for the view selection.

This study aims to test the Black-Litterman model with a case study using 15 highly traded assets which are part of So Paulo Stock Exchange index (Ibovespa) as variables. It is expected that the results of this study will provide information about the performance of the Black-Litterman model verses the Mean-Variance model. Also, we will test the effectiveness of time-series models ARMA and GARCH in obtaining investors views for the application of the BL model.

#### REFERENCES

- [1] H. MARKOWITZ, *Portfolio Selection, The Journal of Finance*, 7 (1952), pp. 77-91.
- [2] F. BLACK AND R. LITTERMAN, *Global Portfolio Optimization, Financial Analysts Journal*, (1992), pp. 28-43.