The Analysis of the Capital Market Efficiency

Professor Gabriela-Victoria ANGHELACHE, PhD
gabriela.anghelache@gmail.com
Andreea NEGRU (CIOBANU), PhD Student
Cătălina Claudia SAVA, PhD Student
Academy of Economic Studies, Bucharest

Abstract
The efficiency of the capital market aims the relation existing between the mechanism of the market prices forming and the existing information on the market at the respective moment. According to the theory of the years '60, a market may be considered as efficient if the prices of the transacted financial assets on the market incorporate entirely the available information, either public or private. The efficiency of the capital market is a sine qua non condition for the efficient allocation of the capitals within the economy and represents a fundamental hypothesis of the classical methods of the evaluation of the financial assets (Markowitz, CAPM etc).

Key words: capital market, efficiency, portofolio, Treynor-Black model , placement

JEL Classification: G14

The themes of the market efficiency has been approached by numerous researchers of caliber, among them mentioning the names of E. Fama, L. Fisher, R. Roi, M. Jensen or L. Blume.

Thaler (2009) suggests that the hypothesis of the efficient markets has two components: the price is correct and there are no arbitrage opportunities, and analyses both of them starting from empirical observations.

Stricto sensu, the first hypothesis, i.e. the price is correct, suggests the fact that the prices of the financial assets must reflect the all available information and adjust themselves instantaneously in order to incorporate entirely and faithfully any new information. Thaler defines the information as the sum between the present available information and the expected information (for instance, the analysts’ expectations as regards the potential merges of companies).

The hypothesis of the lack of arbitrage opportunities implies the fact that no investor can generate in a steadiness manner profits in excess as against the market of the respective asset (assets). Since the information is entirely and faithfully incorporated in the prices of the financial assets, the changes of the market quotations (as well as the sense of these changes) depends on the new information entering the market, only. As the new information enter the market in an aleatory manner, the prices fluctuations will be also aleatory, which implies the impossibility “to be approaching the market” constantly.

The Treynor-Black model of analysis of the efficiency of the capital markets
The Treynor-Black model represents a framework for optimizing the investment portfolios that combines the market inefficiency with the active portfolio management. This model is based on the premise that the markets are almost efficient, in the sense that the number of over and under-evaluated assets on the market is limited. The model aims to
constitute an optimum risky portfolio allocated between the market portfolio of the CAPM model (passively managed portfolio) and an actively managed asset, composed of assets assumed to be incorrectly evaluated on the market. Of course, to the extent the capital market moves away from the equilibrium, the role of the actively managed portfolio becomes more and more important.

The main steps in the algorithm of the Treynor-Black model are the following: 

- The development of the expectations regarding the evolution (in terms of the duality efficiency-risk) of the passively managed portfolio – the portfolio of the market M;
- The identification of the limited number of incorrect assets evaluated on the market, namely those assets for which the coefficients a record high positive or negative values. The coefficient a is defined as the difference between the estimated yield of a financial asset and the expected profitableness of this one, according to:

$$\alpha = E(R) - [R_f + \beta \cdot (E(R_M) - R_f)]$$

The setting up of the weights for the assets incorrectly evaluated by the market in the actively managed portfolio (noted by A). The weight $w_i$ of an asset of doesn’t matter what value from the structure of the portfolio A, is given by the following expression:

$$w_i = \frac{\alpha_i}{\sum_{k=1}^{n} \sigma^2(\epsilon_k)},$$

where n is the number of assets incorrectly evaluated and $\sigma(\epsilon_k)$ represents the non-systematic (specific) of the asset k.

To note the fact that Treynor-Black model brings into prominence the coefficient a (the abnormal expected performance) and the specific risk of the equities. High weights are associated to the equities of high (either positive or negative) values of the coefficient a and with low specific risk, while the model is penalizing the equities characterized by a big non-systematic risk due to the elimination, in this way, of the benefic impact of the diversification on the portfolio. According to the Treynor-Black model, the weights of the equities in the active portfolio A will be:

- reduced for the financial assets characterized by high $a$ and high specific risk;
- considerable for the financial assets characterized by high $a$ and low specific risk;
- positive (long positions) for assets with a bigger than zero;
- negative (short positions) for assets with a smaller than zero.

The forming of the optimum portfolio $P$ by allocating the placements between the active portfolio A and the market portfolio (passive) M. The portfolio $P$ presumes those proportions of the portfolios A and M for which its Sharpe ratio $RSP$ is maximized, where $RSP$ is defined by:

$$RSP = \frac{E(R_P) - R_F}{\sigma_P}$$

namely, the excess of the expected profitableness (as against the risk-free asset) per unit of undertaken risk. In fact, this is the market price of the risk related to the optimum portfolio P.

The following graph illustrates the border of the efficient portfolios and the optimum portfolio P for an investor:
The line of the capital market, the Markowitz efficient border and the portfolio P for a certain investor

To note the way in which the Treynor-Black model is utilizing the modern theory of the portfolio initially developed by H. Markowitz. Particularly, the optimum portfolio P represents the tangent point between the fundamental line of the capital market for an investor and the Markowitz efficient border (curve MA). The previous graph shows the fact that the portfolio of the market M may be “approached” by allocating the funds to the asset a, which is equivalent with saying that: RSP>RSM

The setting up of that proportion of allocation of capital between the portfolio P and the risk-free asset is that satisfying the degree of the investor’s aversion to risk. The optimum investment (combination between Rf and P) is represented graphically as the tangent point of the market line with the indifference curve of the investor, as shown by the figure bellow
The comparative evaluation of the performance

The improvement in performance comparatively with the portfolio M can be established as a difference between the Sharpe ratios of the two portfolios, being easy to demonstrate that the outcome equals to:

\[
RS_p - RS_m = \left[ \frac{\alpha_A}{\sigma(\epsilon_A)} \right]^2
\]

which represents the informational proportion of the actively managed asset A. Thus, the Treynor-Black model supplies a formal framework for the portfolio management, which analyses the erroneous evaluation of the financial assets, perceived by the market operators and exploits it through techniques of active management of portfolio, maintaining meantime a well diversified portfolio (the portfolio P) that combines the market diversified index M and the actively managed portfolio A) for an investor.

If the capital market is efficient, the coefficients \( a \) are null and the active management of the portfolio brings no benefit to the investor. According to the Treynor-Black model, during such periods the investors allocate their funds in an optimal manner, between the risk-free asset and the market index M.

On the contrary, when the markets become inefficient, some of the available assets are erroneously evaluated and the related coefficients \( a \) are no more null. In addition, if a big number of equities become incorrectly evaluated, the active portfolio A contains a large number of equities which implies not only the fact that it will have a high coefficient \( a \) but – on the ground of the diversification – it will have also a low specific risk, making thus that the potential benefits of the active management of portfolio are significant during the periods of the market inefficiency. According to the Treynor-Black model, during such periods, the active managed portfolios will hold substantial weights within the overall placements of the investors.

References