Theoretical and Applied Economics
Volume XXIX (2022), No. 2(631), Summer, pp. 187-195

Model for estimating the profitability of placing asset portfolios on the capital market

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Abstract. *The capital market is a reality today. The capital market has an important role to play in regularizing the surplus revenues available to the economic society. In this context, a number of portfolios may be placed on the capital market by investors, individuals or legal entities. The placement must take into account a number of aspects such as: the defined and reasoned market portfolio, the market and the factors acting on the market at a given time, the measurement of the performance of the placement of the portfolios on the capital market. In this article, the authors have studied and analyzed the methods of investigation that investors in the capital market must carry out before carrying out this operation. Asset portfolios are, in theory, within the reach of anyone, but a profitable investment must be based on a study that is well-developed enough to be able to capitalize on market developments influenced by a number of factors and subject to market risk in a future period. One by one, these aspects were analyzed, presented in the form of theories, statistical-econometric relations of calculation and graphical representations, which express more efficiently the way in which the portfolio in question is a real bearer of a performance and will result with a level of profitability thought by the investor. As a methodology, we used first of all a series of statistical quantities that characterize the evolution of the capital market, indicators that refer to the profitability (return) of asset portfolios, adequate graphical representations as well as comparative, structural analysis, leading to the proposed return (expected) by the asset portfolio investor.*

Keywords: investors, portfolios, profitability, market, developments, risks.

JEL Classification: C10, G11.

Introduction

In this article, we started with the presentation of the main key elements involved in placing a portfolio of assets on the capital market.

We presented in detail the rate of return of the portfolio on the market, in a given period of time and in this sense, through graphical representations, we managed to highlight its yield and oscillation which is supposed to exist after placing that portfolio on the market.

We graphically represented the distribution of the return rate of the portfolio on the market in several variants, performing an analysis of the cumulative distribution that assures the investor that doing so will intuit and gain a return in accordance with the quality of the portfolio to be placed on the market.

It is known that the average profitability is the one related to the variability, the rate of return, which is sometimes fluctuating and which also differs over time. The real importance of the market portfolio consists in correlating it with other highly diversified portfolios so that, starting from the fluctuations of the rate of return, we can intuit what the concrete forecasts will be in relation to the profitability of the considered portfolio.

Of course, for testing the positive theory, the normative theory, the choice of a certain index or the level of correlation of the indices that can influence the profitability can be applied. The greater the diversification, i.e. the higher the value of the number of assets, the closer it will be to a certain identified value and the profitability of that portfolio.

Next, we analyzed the market starting from the fact that the relationship between market fluctuations and the variability of the typical rate of return of a security are closely correlated, ie knowing this interdependence of the two we can anticipate the prospect of ensuring a suitable return for that portfolio.

At the end of this article we analyzed the market and industry factors starting from the fact that the relationship between market fluctuations and the variability of the typical rate of return of a security are closely correlated, i.e. knowing this interdependence of the two we can anticipate.

Literature review

The topic addressed by the authors in this article has come to the attention of many researchers. Thus, Altăr (2002) was concerned and approached the theory of portfolios, and Ameur and Prigent (2010) were concerned with the study of structural portfolio management. Anghel et al. (2020) treated in their paper the model for the analysis of significance in the conditions of using the portfolio grouping. Buraschi et al. (2006) were concerned with the correlation of risk with the optimal chosen portfolio. In 2009, S. Clemencon and S. Skanderbeg conducted a study on the selection of a portfolio at extreme risk, and Cox and Huang (1989) analyzes the optimal consumption and the conditions of placing portfolios according to the share price. Geromichalos and Simonovska (2011) considered the liquidity of assets in the formation of international portfolios. Harvey et al. (2010) turned their attention to the analysis of High Selection Portfolio Selection. Li and

Smetters (2011), analyzed a number of issues related to choosing the optimal portfolio in the context of ensuring social security indexation. Markowitz (1959) publishes an extensive paper on portfolio selection in the context of investment diversification, and Merton (1971) was concerned with optimal consumption and portfolio rules when using a continuous time model. In 2012 K.D. West makes a presentation on the econometric analysis of the use of a model when the reduction factor is close to one.

Methodology, data, results and discussions

Portfolio theory, as well as capital market theory, deals with past predictions for the future. The past can provide data on previous predictions. If people predicted the right future ten years ago, the records of the last ten years could be used to measure their previous predictions. Capital market theory can be tested in this way. Such a test does not refer to the capital market theory itself, but to a combined market theory: capital plus the assumption that the record reflects previous predictions.

Some researchers assume that the future will be similar to the past. Predictions based on past relationships can be as useful as those obtained with more traditional methods. Normative procedures that use such methods can be tested. Again, a combination is considered: portfolio theory plus the assumption that the future will be similar to the past.

Simple steps are needed to properly summarize the past. It is not difficult to redefine the concepts used. To predict the future, weights are assigned weights based on their probabilities of occurrence. To summarize the past, the results are assigned weights based on their relative frequency of occurrence.

The rate of return can be determined by multiplying each possible rate of return by the probability of its occurrence. On the other hand, the average rate of return is determined by multiplying each rate of return observed by its relative frequency of occurrence.

The risk of a portfolio is measured by the standard deviation of the rate of return, based on the probability that various deviations from the expected value will occur. The variability of a portfolio's rate of return is also measured by the standard deviation of the rate of return, which is instead based on the relative frequencies of the various deviations from the average rate of return.

The relationship between two variables can be summarized as a correlation coefficient (real), and the volatility (real) of a security or a portfolio that can be calculated. The nature of the measure should be clear in the context in which it is discussed.

Summary measures can be used to describe a data set. For such purposes, the known formulas are sufficient (with relative frequencies substituted for probabilities). But there may be another way to get such measures. The data can simply be considered as a small set of results generated by an underlying process. The purpose is to deduce from the data some aspects of the more general process. For such purposes, the formulas may be slightly modified and various statistical procedures may be relied upon to test the significance of the results as indicators of the characteristics of the basic process.

A key element is the market portfolio, which consists of the proportional holdings of all securities. Theoretically, it includes various types of capital assets. It is nonsense to effectively measure the performance of such a portfolio.

Several stock price indices are available, and two of the most popular are the Dow-Jones Index with 30 Industrial Shares and the Standard and Poor's Composite Index. None include dividends. It is possible to estimate the dividends received by the owner of such a group of securities and then calculate the overall rate of return.

A number of researchers have taken a different approach. First, the rate of return is determined for each of the number of securities in each time period. It is assumed that the rate of return on the market portfolio is equal to the average of the values for the individual securities, respectively:

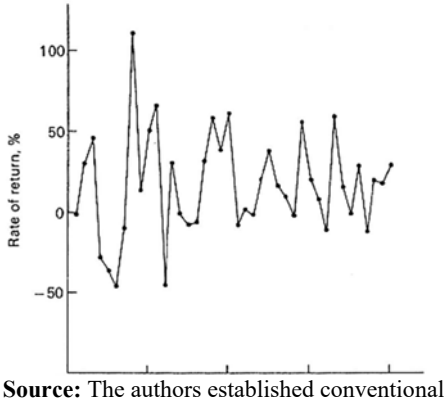
$$R_{Mt} = \frac{1}{N}\sum_{i=1}^{N} R_{it} \quad (1)$$

Where:
R_{Mt} is the rate of return on the market portfolio over time *t*;
R_{it} is the rate of return on the title *i* over time *t*;
N represents the number of titles.

The value R_{Mt} is equivalent to the return obtained by investing an equal amount in monetary units in each security.

Figure 1 shows the annual rate of return, including both dividends and price changes, but no compensation was made for taxes or brokerage fees.

Figure 1. *Portfolio return rate*

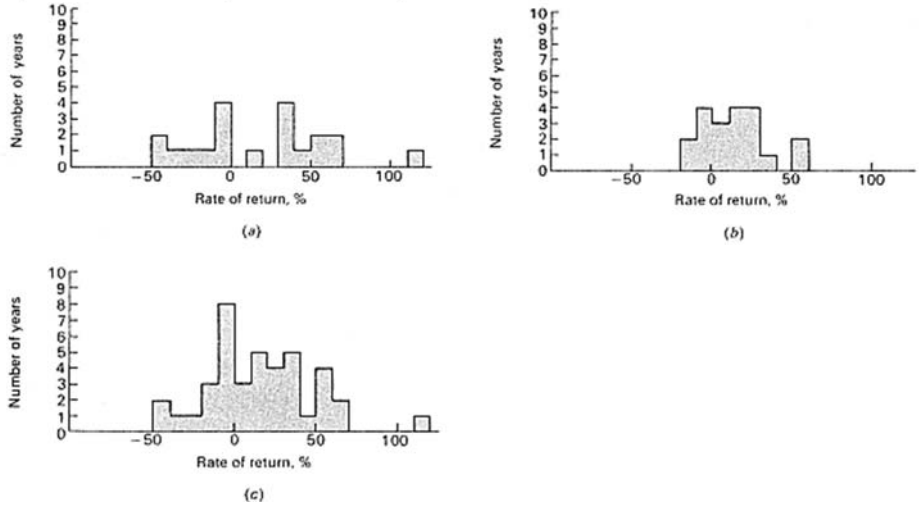


Source: The authors established conventional data that they represented graphically.

As shown in Figure 1, the yield fluctuated more or less randomly to around 16.5% per year. The change was attributed to factors such as improved securities regulation, increased government control over the business cycle, greater investor sophistication and changes in risk attitudes. Whatever the causes, it is believed that there has been a permanent change in the behavior of the securities listed on the Stock Exchange.

The diagrams in Figure 2 are frequency distributions, showing the number of years in which, the rate of return has decreased in various intervals (for example, 0 to 10 percent).

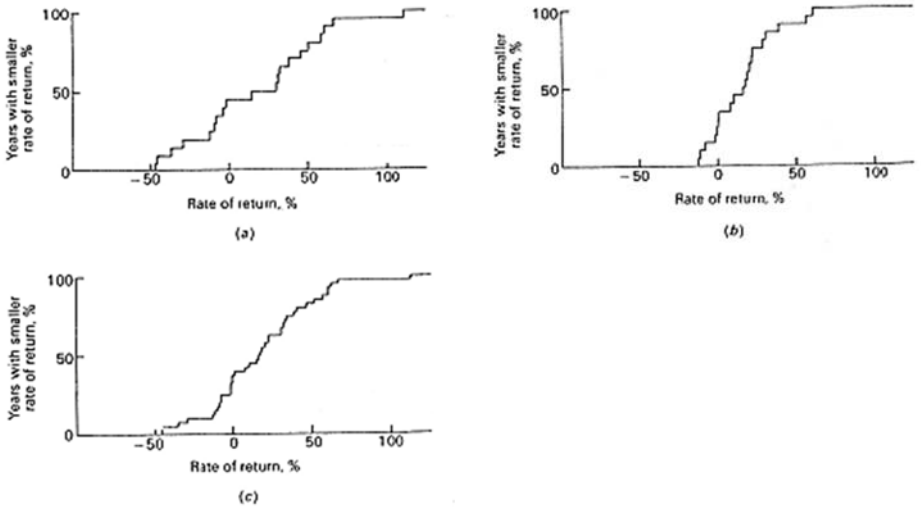
Figure 2. *Distribution of the return rate of the market portfolio*



Source: The authors established conventional data that they represented graphically.

The diagrams in Figure 3 are cumulative distributions, showing the percentage of years in which, the rate of return has fallen below each possible level.

Figure 3. *Cumulative distributions*



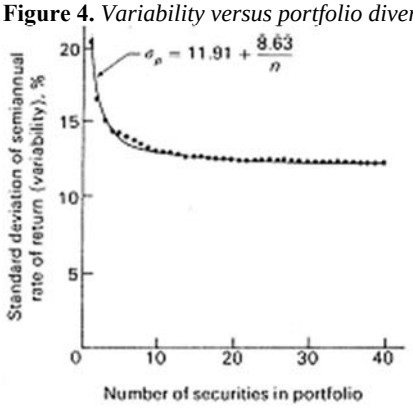
Source: The authors established conventional data that they represented graphically.

The real importance of the market portfolio lies in its correlation with highly diversified portfolios. Fluctuations in the rate of return should explain the change in the yields of individual securities more than fluctuations in the yield of any other portfolio. Some researchers have used this attribute to build an index directly. Given the rates of return for a number of securities over time, statistical techniques are used to derive a series of values. There are many ways to build an index of your market portfolio.

The high degree of correlation between the rates of return is not surprising. If much of the risk of most securities is systematic (in response to market fluctuations), then the rate of return on any reasonably diversified portfolio will be highly correlated with that of the market as a whole. But how many securities must be included in order to obtain a fairly well-diversified portfolio? In other words, how effective is diversification in reducing variability? A study in this regard provides an answer.

The variability of the rate of return was measured for 2,400 selected portfolios from a set of 470 common shares. Each of the first 60 portfolios included only one value. Each of the following 60 portfolios included two securities of equal value. Each of the last 60 portfolios included 40 equals. For each group of 60 portfolios, the average value of the standard deviation of the rate of return was calculated. This figure provides an estimate of the rate of return variability for a typical portfolio of comparable diversification. It is important that the systematic component of variability approximates that of a portfolio with a volatility equal to one.

Figure 4. *Variability versus portfolio diversification*



Source: The authors established conventional data that they represented graphically.

Figure 4 expresses the results it has reached. Each point indicates the average variability of a group of 60 comparable diversification portfolios. As diversification increases, the standard deviation of the rate of return decreases, approaching a level easily interpreted as the standard deviation of the profitability of the market portfolio. The data can be approximated very well by a simple formula:

$$\sigma_p = 11.91 + \frac{8.63}{n}$$

Where:
n = the number of securities in the portfolio in equal amounts.

The greater the diversification, i.e. the higher the value of n, the closer σ_p will be to 11.91. The variability due to the systematic risk for a portfolio with a volatility equal to 1 can be assumed to be approximately 11.9 percent over six months.

According to the formula, the total variability of a typical portfolio of securities with $n = 1$ is about 20.5 percent over six months. Assuming that each point in the figure is in fact a

portfolio with a volatility equal to 1, it is a simple matter to estimate the proportion of the total risk of an average security due to its relationship.

Let σ_r and σ_s represent the total and systematic risk, respectively. For a typical security, we have:

$\sigma_r = 20.5$ and $\sigma_s = 11.9 \Rightarrow \frac{{\sigma_s}^2}{{\sigma_r}^2} = 0.34.$

During the period considered, approximately 34% of the change in the rate of return of a typical security appeared to be attributed to its relationship with the market as a whole. As Figure 4 shows, under such condition's diversification can be extremely beneficial. A typical portfolio with equal amounts in five-currency units will have only 14% more risk, measured by σ_p, than the most diversified portfolio imaginable. A typical portfolio with equal amounts in monetary units of 10 securities will have only 7% more risk than the minimum possible, while a typical portfolio with equal amounts of 20 securities will have only 3 percent more than the minimum.

A study provides further evidence on the relationship between market fluctuations and the variability of the typical rate of return of a security. Sixty-three joint actions were analyzed, with monthly profitability rates calculated.

For each month, the average value of the 63 rates of return was used to represent the return on the market portfolio. The volatility of each security was estimated, along with the proportion of variation attributed to market fluctuations. In order to estimate the typical proportion of variation attributed to market factors, the average value of the corresponding figures for the 63 securities was used.

The analysis was performed for four separate time periods and for the entire period. The figure for the most recent subperiod does not differ substantially from the initial estimate, but the others do. Over the entire period, approximately half of the change in the rate of return of a typical security was attributed to market fluctuations. Under these conditions, diversification can reduce risk very quickly.

The rate of return on the market portfolio fluctuated more reasonably, leading to a corresponding decrease in the change in the rate of return of a typical security attributed to the market (systematic risk). Variability due to other factors (unsystematic risk) also decreased. However, the decrease in the proportion of variance attributed to market factors indicates that the systematic risk has decreased more than the non-systematic risk. Some researchers have attributed this to greater investor sophistication.

It is assumed that each title is evaluated (reevaluated) more on its own decisions than before. Some have argued that change may not be permanent, regardless of its (temporary) cause. For investors who intend to hold sufficiently well-diversified portfolios, change is not important, only systematic risk will matter. In addition, relatively little diversification will go a long way, even if no more than 30% of the total risk of a typical security is systematic.

For regulatory applications it may be sufficient to take the risk into account due to market fluctuations, but additional indices may be useful.

The analysis of the relationships between securities over the entire research period provides some relevant evidence. Market fluctuations accounted for 52% of the change in the typical rate of return on securities. Another group of industry index accounted for 11%. Most importantly, a procedure designed to group securities solely on the basis of the co-movement of their returns over the period produced results consistent with those involved in traditional industrial classifications.

If an index model is to be used for regulatory purposes, it is clearly necessary for the market as a whole to be represented as an index. If additional indices are to be used, it seems reasonable to allow them to represent the conditions in major industries, using standard classifications.

Conclusions

From the study of the article published by the authors and from the interpretation of the presented data, a series of theoretical and practical conclusions can be drawn. First of all, it is necessary to carefully analyze the results of this activity before placing the portfolios of shares on the capital market. This can be done by a fairly careful analysis of how the rate of return of the portfolio over a period of time must reach a certain point, ie a certain result.

The graphical representations show that the analysis of the rate of return of the portfolio must be done in several variants, so as to reach the best return from the investor's point of view.

We can consider that the portfolio placed on the market must be analyzed in correlation with other variables such as market interest, stock values, so that the results are determined as accurately as possible in advance.

The testing of the positive theory can be applied by the normative method, which consists in choosing a certain index or level of correlation of the indices that can influence the profitability of the portfolio.

Another conclusion is that from a practical point of view we analyze the data recorded in the same type of portfolios in a given period and through a forecast study on the factors influencing the profitability we can obtain the parameters that predict the trend of the portfolio of assets we want to place it so that at the end of the period we record results as close as possible to what the investor wants.

These portfolio models are theoretically available to anyone interested, but a profitable investment must be based on a well-developed study to be able to capitalize on them in this context and on the portfolio of assets that the shareholder wishes to place on the capital market.

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