DATA SERIES ANALYSIS FOR FORECASTING

Prof. Constantin ANGHELACHE PhD *(actincon@yahoo.com)*
Bucharest University of Economic Studies / Artifex University of Bucharest
Assoc. prof. Mădălina-Gabriela ANGHEL PhD *(madalinagabriela_anghel@yahoo.com)*
Artifex University of Bucharest

Abstract

The capital market is a form of capitalization of some assets through the placement of portfolios by investors. The methodology used expresses that some random elements can change investors' management policies when they want to place asset portfolios on the capital market.

The capital market is an activity that needs to be seriously studied, and the placement of assets in the desire to achieve a high yield must be done in close accordance with the risk elements that the capital market presents.

In this article, analyzing the data series to make a correct forecast of the yield trend by placing assets on the capital market is very important.

The authors used data from the international literature and resorted to some comparative data and studies using the comparison method and other statistical methods of capital market evolution.

Keywords: *capital market, factors, indicators, portfolios, developments, forecast.*

JEL classification: *C10, E22*

Introduction

The analysis of the economy in general, and of the capital market in particular, must be subjected to a fairly specialized analysis. In this respect, it is intended that, on the basis of the data series available to it at a given time, a forecast of the outlook for the evolution of the capital market is to be made. In this sense, random elements or changes in management policy can be elements that influence the forecast that we intuit that it must lead us to a convenient result, in order to be an investor in the capital market.

The objective of this article is that, based on the analysis that will be carried out, to foreshadow through a forecast the trend manifested by the market in general or the market segment that we want to act on by placing portfolios of assets.

To this end, we are considering establishing an average return, depending on the variability of mutual funds. In this regard, we analyzed, using specific indicators, capital market sizes, recorded situations or the extension of the analysis in order to be able to make the comparison of

volatilities in two periods. In this way, we can identify the modality or trend that a similar portfolio has had that has been placed under approximately the same conditions.

The methodology applied consists in using specific indicators to express by the calculated coefficients (parameters) what the market trend is, given that we want to place a portfolio of assets.

In a perfect market, information about a portfolio is redundant because all the values will be along the security market line. At the same time, managers (investors) who want to place on the capital market must be careful enough for the anticipated study to correspond to the events that sometimes occur surprisingly on the capital market. The prospect of the danger of triggering risks must also be taken into account.

Literature review

Amini et al. (2010) were concerned about the evolution of stock yields. Anghelache and Anghel (2018) studied the main methods and models used in capital market analyses. Aruoba (2019) looked at a number of methods for estimating certain indicators. Cooper (2009) addressed the elements of risk premia. Dobrodolac (2011) presented a series of econometric models applied in the real economy. Jarrow and Yildirim (2003) analysed the evolution of securities prices under certain conditions. Markowitz (2014) addressed issues related to the average variation. Piketty (2014) studied several aspects of capital, understanding the dynamics of capitalism, as well as the relationship between growth and return on capital.

Methodology, resources, results and discussions

Historical values can be used directly, as expected returns, standard yield deviations, correlations and volatilities. Such procedures are based on assumptions, whether they are explicitly made or not. The basic processes must be stable over time, and the historical record must adequately reveal their essential characteristics.

In order to assess the nature of a security or portfolio, a relatively long period of time must be studied. But the longer the period, the less likely it is to assume the stability of the underlying process.

The risk associated with the current commitments of an agent may not be related in a simple way to the behavior of its profits in the past. It's risk esteem using just the record, say, the last five years can be just as dangerous, especially if the standard deviation in the rate of return is used to measure risk. The researcher may be faced with the choice to learn about the wrong thing or too little about the right one.

• ***Random events or changes in management policy***

We will consider a corporation that has recently diversified its production line and taken on new projects relatively unaffected by changes in the economy. Variability and volatility of the rate of return of the past does not provide a satisfactory guide for forecasting.

A more important issue is the process by which prices are set. In an efficient market, the current price is based on all relevant information about the future, including information about the past. If the file shows that a title has been particularly attractive in the past, its price may have increased so that it will not be so attractive in the future, and since the file shows that a title was unattractive in the past, its price may have fallen so that it will be attractive in the future.

In a *perfect market*, the past has limited relevance for the future. Some researchers argue that the past has no relevance at all. One version of this argument assumes that investors are only concerned about the expected rate of return. Under such conditions, in a stable market, prices would adjust until each security (portfolio) offered the same yield. No alternative would differ from the other in a significant way, as the retort has no relevance.

This conclusion is not consistent with the vision of a capital market for the portfolio. Under normal circumstances, prices will be adjusted so that the securities (portfolios) are aligned on a line of the market and their securities. There will be differences, in the sense that the higher the volatility, the higher the expected yield. No value will be miscalculated, and effective portfolios can be obtained by randomly choosing securities.

In order to obtain an efficient portfolio that is suitable for a particular investor, a certain notion of volatility and/or expected return is required. For this, past registration can indeed prove useful.

In a *perfect market*, the rate of return of any title will be random in a particular sense, in the sense that it will be randomly distributed along (around) a characteristic line that passes through the point where the rate of return of both the title and the market portfolio is equal to the pure interest rate.

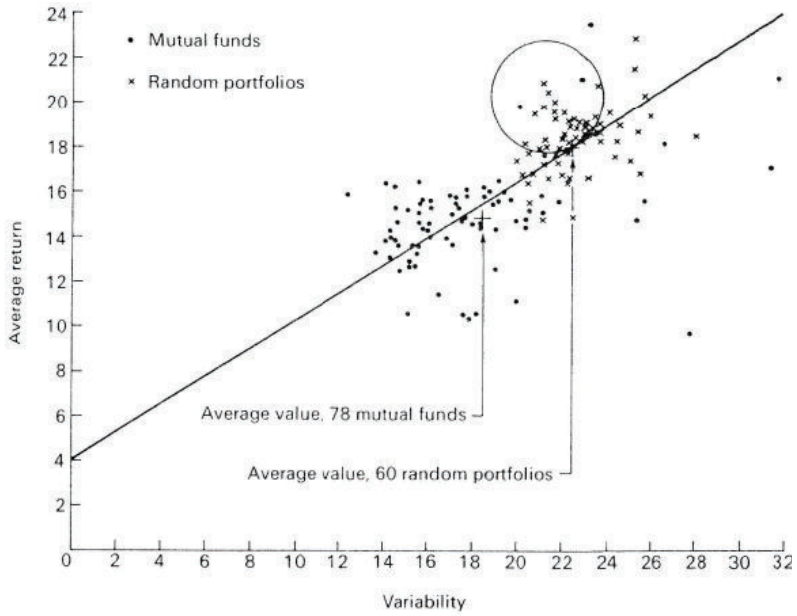
The term random has been used to describe markets where all past information has been taken into account by investors and is thus reflected in current prices. Those who assume that investors are only considering the expected return state that the investor has not analyzed the data. Both groups would disagree with the traditional stock exchange technician, who attaches particular importance to certain sequences of past prices, rates of return, etc. There is currently a lack of satisfactory evidence of the success of any market technique. Systems designed to defeat the *market* contain the elements that fail.

This suggests the danger of conducting a portfolio analysis based entirely on historical data. In a market without erroneous securities, there is only one inviolable rule, namely diversification. If prices adequately reflect current information, almost any well-diversified portfolio will be effective. If the market is *perfect*, any group of, say, n titles can be chosen. But if some securities are easily miscalculated, past registration could help identify a slightly superior group. This suggests a procedure that can do more harm than good.

Figure number 1 shows a case where such an approach has proved beneficial. Thus, axe vertical with the averages in a given period, and the horizontal axis shows the variability (standard deviation) of the annual rate of return during the period.

Average profitability and variability of mutual funds

Figure 1



Values based on net returns are displayed for all 78 mutual funds. Values based on gross yields are displayed for 60 random portfolios, each of which includes 40 securities (in equal amounts), randomly drawn from a group of 150 common shares. Reappeared provide empirical counterparty to the capital market line, linking the point representing the average values obtained for the 60 random portfolios to that of the approximate pure interest rate over that period.

Portfolio analysis was conducted using the historical record of the group of 150 ordinary shares during the period considered, with upper limits of 0.025, included at least 40 securities in each portfolio. Several approaches have been tried, from a complete analysis using all 11,175 correlation coefficients to a simple single-index model based on the market rate of return. They all gave similar results. Perfective orthodoxies behaved well in the subsequent seven-year period.

Reviewing the portfolio based on historical data was more than able to withstand competition from randomly selected portfolios and mutual funds. Reviewing the portfolio based on historical data can be useful, d a full analysis should be ensured.

A simple single-index (market) model adequately summarized the historical record of 150 common actions. The monthly rates of return for those securities during the period considered were analyzed to determine average yields, standard yield deviations, correlation coefficients and volatilities. The first three sets of values were used to perform a complete analysis of the portfolio with upper limits of 0.05. Thirty effective portfolios were selected, from the one with minimal variability (portfolio 1) to the one with maximum average yield (portfolio 30).

A separate analysis was performed using only the first and last set of values (i.e. average yields and volatilities), with the same upper limits (0,05). Thirty effective portfolios have been selected.

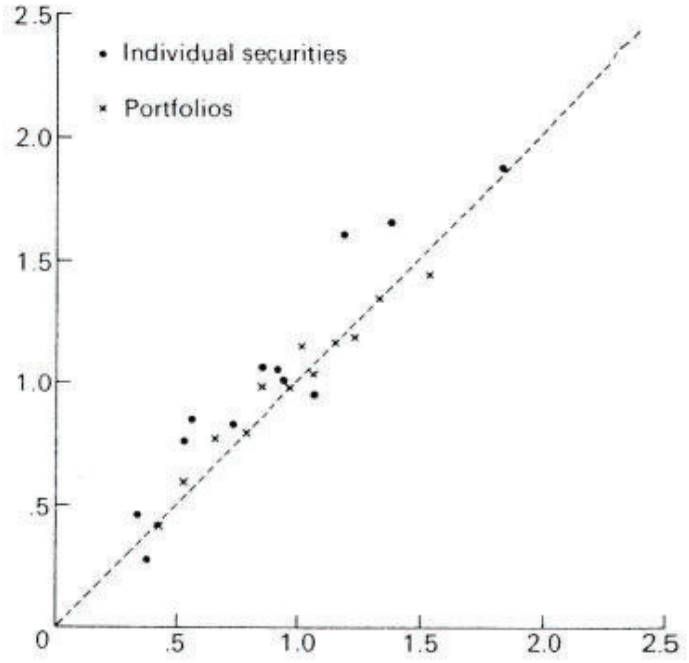
Generalization can be dangerous, but at least in this case, the average yield and volatility seem to have captured enough of the history to adequately serve for portfolio analysis, subject to reasonably strict upper limits.

If a corporation changes its activities or its combination of financial obligations frequently, past volatility may prove unrealistic. On the other hand, in order to reduce the need for investors to periodically modify their holdings, corporate managers can probably try to avoid drastic changes in the volatility of securities in circulation. Records suggest that managers are trying.

Figure number 2 compares volatility over two periods for 12 securities and 12 portfolios. The results, obtained, show that the volatility of individual securities is relatively stable over time, and the volatility of portfolios are even more stable. Each of the portfolios in Figure number 2 include 20 securities (in equal values). Diversification increases predictability. The volatility of the portfolio is the weighted average of the volatility of its component securities. Dis usually much easier to predict an average than to predict the value of a single item.

Comparison of volatilities in two periods

Figure 2



The overall vision is one of a remarkably efficient market. In other words, one in which few securities are likely to be very underestimated or overvalued for a long time. Clearly inferior portfolios can be easily avoided by assuming amounts of diversification. In turn, vastly superior portfolios are hard to find. Some investment managers are not able to consistently outperform selected portfolios using the simplest rules.

If the market is efficient and if an investor does not have special information or predictive power, he should carry out diversification and the selection of an appropriate risk class. In the end we will focus on the portfolios of the right type.

Considering 6 values, it is a simple matter to find one of the many portfolios with a certain desired value. In a *perfect market*, there is no basis for choice, one of the sets can be chosen at random. However, with the outside chance that previous records might contain evidence of miscalculated securities, an investor can select the portfolio with the highest average return in the past period. In other words, we satisfy relationships:

Maximizer $\sum_{i=1}^{N} X_i E_i$ (1)

Subject $\sum_{i=1}^{N} X_i b_i = b_p^*$

Andi $0 \leq X_i \leq \frac{1}{n}$, for each security *i*.

Where: E_i it is assumed to be equal to the average yield of title *i* over a past period;

b_i it is presumed to be equal to the actual volatility of the title *i* in a past period;

b_p^* represents a certain desired level of volatility;

n is a number large enough to force adequate diversification.

This is the simplest type of portfolio analysis. It can even solve it graphically. It should not result in any negative aspect of taking into account both expected profitability and volatility. In a *perfect market*, information about a portfolio is redundant because all the values will be along the security market line.

Conclusions

From the study of this article can be drawn some theoretical and practical conclusions. Thus, a corporation that has diversified its production line by running new projects normally thinks about building in a different structure of portfolios.

For a perfect market, precut has a limited relevance for the future because the perfect market also involves research, investments and innovations, which ensure development at a higher quality level.

No alternative differs from another significantly from another except by passing and having no relevance the content of the analysis undertaken by the authors.

We note that in order to obtain an effective portfolio that is suitable for a certain return for the investor, a certain notion of volatility and a level of forecasted return is required.

There is a danger of conducting a portfolio analysis based entirely solely on historical data, which will lead to some unconvincing or sometimes misleading results.

The average return and profitability of mutual funds is another matter to which an investor of financial assets must pay a sufficiently consistent attention.

The final conclusion is that a simple model with a single market index can adequately summaries the recording and the projected prospect of completion of that operation.

Bibliography

1. Amini, S. et al., 2010, Stock return predictability despite low autocorrelation. *Economics Letters,* 108, 101-103.
2. Anghelache, C., Anghel, M.G., 2018, *Econometrie generală. Teorie și studii de caz*. Editura Economică, Bucureşti.
3. Arcidiacono, P., Miller, R.A., 2011, Conditional Choice Probability Estimation of Dynamic Discrete Choice Models with Unobserved Heterogeneity. *Econometrica*, 79 (November 2011), 1823-1867.
4. Brennan, M.J., Xia, Y., 2002, Dynamic asset allocation under inflation, *Journal of Finance*, *57* (3), 1201-1238.
5. Cooper, I. 2009, Time-Varying Risk Premiums and the Output Gap. *Review of Financial Studies*, Society for Financial Studies, 22 (7): 2601-2633.
6. Dobrodolac, T., 2011, Forecasting by econometric models as support to management, Perspectives of Innovations, *Economics & Business, 7* (1), 72-76.
7. Jarrow, R., Yildirim, Y., 2003, Pricing treasury inflation protected securities and related derivations using an HJM model. *Journal of Financial and Quantitative Analysis*, 38(2), 337-358.
8. Markowitz, H., 2014, Mean-variance approximations to expected utility. *European Journal of Operational Research*, 234, 346-355.
9. Piketty, T., 2014, Capital in the twenty-first century, Boston: Harvard University Press.