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The Performance Analysis of Dynamic Investment Portfolio Insurance Strategies Based on Value at Risk

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Abstract:

The research aims to address the fundamental problem by reducing the systematic risks to which investments in the stock market are exposed and to benefit from the emerging potential provided by investment portfolio insurance strategies, through Value at Risk Based Portfolio Insurance (VBPI), using the comparative analytical approach. The research community was represented by the (ISX60) index, The data was collected through the annual reports of the Iraq Stock Exchange to form three intentional yearly conditional samples for the period (2022-2024), and several financial models were relied upon, such as Simple Ranking, Single Index, Sharpe, and Treynor Models. Several results were reached, as the efficient dynamic investment portfolio before insurance according to the Sharpe model outperformed the VBPI. At the same time, the VBPI succeeded in achieving a performance level according to the Treynor model on the uninsured portfolio. The originality of the research lies in building three efficient dynamic investment portfolios and insuring them according to the Value at Risk Model as a new strategy in insuring investment portfolios.

Keywords: Efficient Portfolio, Portfolio Insurance Strategies, VBPI, VaR, G110, G120, G170.

1. Introduction:

Building and managing investment portfolios is inherently complex, given the vast range of financial assets available and the market fluctuations that impact investment decisions. Traditional portfolio theories, such as Markowitz's (1952) diversification model, have proven inadequate in volatile financial environments. This has led to a growing interest in investment portfolio insurance strategies, which not only mitigate downside risks but also allow participation in market upswings. Among these strategies, Value at Risk-Based Portfolio Insurance (VBPI) addresses gap risks, where a portfolio's value at maturity may fall below the protection level. To counter this, dynamic rebalancing is frequently performed using Value at Risk (VaR) principles, ensuring that the portfolio remains above a certain threshold with a specified confidence level.

This study evaluates the performance of these dynamic portfolio insurance strategies over annual periods, assessing their effectiveness in reducing downside risks while considering the impact of transaction costs on rebalancing operations. By comparing these strategies, the research aims to provide insights into optimizing portfolio protection and maximizing gains in fluctuating financial markets.

In order to cover the research topic, the research can be divided into five sections. The first section presents the introduction. Section 2 presents a review of the literature, while Section 3 is devoted to analyzing the research methodology. Section 4 presents and discusses the results. The last section is devoted to presenting the conclusions.

2. Literature Review and Hypothesis Development:

Markowitz (1952) introduced the mean-variance model, which aims to improve the portfolio by finding the optimal trade-off between return and risk based on fixed-horizon planning. Sharpe developed the modern portfolio theory and replaced the standard deviation with the beta coefficient in his article published in (1964) by relying on diversification to eliminate unsystematic risk and evaluating stocks as a function of systematic risk (Sharpe, 1964). Therefore, the optimal asset allocation contributes greatly to building an efficient investment portfolio. (Reddy et al., 2023) applied Sharpe's single-index model to build optimal portfolios that covered the period before and after Covid-19, focusing on the efficiency of both return and risk. While (Chacko & Viceira, 1999) highlighted the importance of adapting investments to changing market conditions. Portfolio selection in light of the random fluctuations witnessed by the market, as (Liao, 2003) studied dynamic portfolio management strategies, thus reinforcing the need to make continuous adjustments to the portfolio, so that many studies later addressed the strategies of dynamic rebalancing investment portfolios, so that (Zhang et al., 2015) studied the rules that focus on rebalancing through the application of the CPPI strategy and provided experimental evidence applied in the Chinese market, in addition to the study (Theiler, 2011) in which he reached results that reinforced the foundations of dynamic portfolio balance through its ability to reduce risks and maintain rates of return, as the latter focused on clarifying the efficiency of portfolios in the Australian market and the fluctuations it witnesses. The concept of value at risk was also addressed as an insurance strategy for the portfolio in an important study conducted by (Jiang et al., 2009) compared this approach with the CPPI strategy to determine the ability of these strategies to provide downside protection, then (Jonasardottir & Lavstrand, 2011)extensively discussed the sensitivity of the performance of these strategies, explaining their ability to respond to changing market conditions. (Alipour & Bastani, 2023) also reached different results achieved by both VBPI and CPPI in the Markov system switching market. (Z. W. Chen et al., 2014) applied stationary bootstrap methods to evaluate CPPI and VBPI efficacy.

(Zagst & Kraus, 2011) compared OBPI and CPPI, concluding that the fixed-ratio strategy outperformed the fixed-ratio strategy under specific conditions, while (Xu et al., 2019) expanded the application areas of portfolio insurance strategies to include pension funds, reinforcing the benefits gained in long-term planning. Finally, (Trieu, 2017)tested portfolio insurance in the Vietnamese market as one of the developing markets.

3. Methodology:

3.1. Data Collection:

The researchers relied on analyzing the data required to test the hypotheses and achieve the research objectives using the comparative analytical approach to evaluate the performance of VBPI and CPPI using three models: Sharpe, Jensen Alpha, and Treynor. The published reports of the Iraq Stock Exchange related to the ISX60 index were relied upon, and 12 quarterly dynamic investment portfolios were formed for the period from 1/1/2022 to 31/12/2024, varying in size depending on the availability of company data and the continuity of their trading. Table 1shows the research community, which includes the 60 companies included in the Iraq Stock Exchange Index ISX60.

Table 1: Listed Companies in the Iraq Stock Exchange Index ISX60

	Code	Company Name	Sectors
1	AAHP	Al-Ahlyia for Agricultural Production	Agriculture Sector
2	AIPM	Iraqi Products Marketing Meat	
3	AIRP	Iraqi Agricultural Products	
4	AISP	Iraqi for Seed Production	
5	AMAP	Modern for Animal Production	
6	AMEF	Middle East for Production- Fish	
7	BASH	Ashur International Bank	Banks Sector
8	BBOB	Bank of Baghdad	
9	BCOI	Commercial Bank of Iraq	
10	BEFI	Economy Bank	
11	BELF	Elaf Islamic Bank	
12	BGUC	Gulf Commercial Bank	
13	BIBI	Investment Bank of Iraq	
14	BIIB	Iraqi Islamic Bank	
15	BIME	Iraqi Middle East Investment Bank	
16	BMFI	Mosul Bank	
17	BMNS	Mansour Bank	
18	BNOI	National Bank of Iraq	
19	BROI	Credit Bank of Iraq	
20	BSUC	Sumer Commercial Bank	
21	BUND	United Bank for Investment	
22	BUOI	Union Bank of Iraq	
23	HBAG	Baghdad Hotel	Tourism&Hotels Sector
24	HBAY	Babylon Hotel	
25	HISH	Ishtar Hotels	
26	HMAN	Mansour Hotel	
27	HNTI	National for Tourist Investment	
28	HPAL	Palestine Hotel	
29	HSAD	Al-Sadeer Hotel	
30	HTVM	Tourist Village of Mosul dam	

31	IBPM	Baghdad for Packing Materials	Industry Sector
32	IBSD	Baghdad Soft Drinks	
33	IFCM	Fallujah for Construction Materials	
34	IHFI	House Household furniture	
35	IHLI	Al-HiLal Industries	
36	IICM	Iraqi Carton Manufactories	
37	IIDP	Iraqi Date Processing and Marketing	
38	IIEW	Iraqi Engineering Works	
39	IITC	Iraqi For Tufted Carpets	
40	IKHC	Al-Khazer Construction Materials	
41	IKLV	Al-Kindi of Veterinary Vaccines	
42	IMAP	Al-Mansour Pharmaceuticals Industries	
43	IMIB	Metallic Industries and Bicycles	
44	IMOS	Modern Sewing	
45	INCP	National Chemical &Plastic Industries	
46	IRMC	Ready Made Clothes	
47	NAHF	AHliya For Insurance	Insurance Sector
48	NAME	Al-Ameen for Insurance	
49	NDSA	Dar Al-Salam for Insurance	
50	NGIR	Gulf Insurance	
51	SAEI	Al-Ameen Estate Investment	Services Sector
52	SBPT	Iraq Baghdad For General Transportation	
53	SKTA	Kharkh Tour Amuzement City	
54	SMOF	Al-Mosul for funfairs	
55	SMRI	Mamoura Realestate	
56	SILT	Al-Nukhba for Construction	
57	HKAR	Rehab Karbala for Investment	
58	TASC	Asia Cell Telecommunication	Telecommunication Sector
59	VWIF	AL-Wiaam for Financial Investment	Investment Sector
60	VZAF	Al-Zawraa for Financial Investment	

Source: Iraq Stock Exchange website http://www.isx-iq.net.

3.2. Investment portfolio classifications:

The investment portfolio is a diversified basket of assets that can be held (Ye et al., 2020) (Abdel Latif & Mohammed, 2020)and tradable(Lorenzo & Arroyo, 2023). The shares in the portfolio may not be limited to publicly traded company shares. Still, they may consist of non-publicly traded securities such as real estate, in addition to including financial derivatives in their investment portfolios (Chyad & Aljubori, 2021)(Lorenzo & Arroyo, 2023). Markowitz presented the mean-variance model that aims to improve the portfolio by finding the optimal trade-off between return and risk based on fixed-horizon planning(Corelli, 2018). Accordingly, investors focus on distributing their investments based on optimization for a single period, resulting in building a static investment portfolio or what is called an all-weather portfolio that is suitable under all circumstances and is expected to work efficiently across a range of economic scenarios(Nystrup et al., 2018). Investment opportunities require quick action to capture investment opportunities generated. by upward market trends, as well as protection from the downside, which led to the emergence of dynamic asset allocation strategies, allowing portfolio adjustments across its asset components, and responding to economic fluctuations(Liao, 2003)(Alkhalidi & Aljubori, 2021).

The Dynamic Portfolio emerged, which is based on the continuous adjustment of the weights of securities in the investment portfolio, at the hands of Robert C. Merton, who noted that averages and variances do not remain constant over time but change in response to economic conditions (Yuan, 2021).

3.3. The mean-variance model:

The mean-variance model was formulated to build an efficient investment portfolio according to the visions presented by Markowitz as a dual-objective optimization problem (Isma'eel & Ganawy, 2019). The first objective is characterized by its linear nature related to the expected rate of return of the portfolio, and embodies the desire to maximize these returns, while the second objective is quadratic and revolves around the variance of the portfolio. The quadratic nature of this component emphasizes the focus on risk management, and the quest to reduce volatility and uncertainty associated with the overall performance of the portfolio(Law Juszczuk et al., 2020). After that, many attempts appeared to stop at these determinants and attempt to simplify the complex Markowitz model, the most prominent of which were the efforts made by William Sharpe, which resulted in the Simple Index Model, or what is known as the Market Model(Z. Chen, 2024). The model is based on the assumption that the fluctuations in the value of a stock compared to other stocks do not depend only on the characteristics of these two securities, and instead, the price of the security will be subject to fluctuations that are in line with the price of the market index (Nandan & Srivastava, 2017).

3.4. The Single –Index Model:

Despite the popularity of the Markowitz model, it has been subjected to a wave of criticism during practical application, due to its high requirements of effort and time, which are required by the large number of estimates needed to fill the covariance matrix, in addition to the model's shortcomings in providing suggestions that guide the prediction of securities risk premiums, which is necessary to build the efficient limit of risky assets(Mary, 2015). Therefore, many attempts have emerged to address these determinants and attempt to simplify them, the most prominent of which were the efforts made by William Sharpe, which resulted in the Simple Index Model, or what is known as the Market Model. The model is based on the assumption that fluctuations in the value of a stock compared to other stocks do not depend only on the characteristics of these two securities, and instead, the price of the security will be subject to fluctuations that are in line with the price of the market index (Nandan & Srivastava, 2017), one of the most important features of the single-index model, as there is a linear relationship between the returns of securities and the market factor that can be expressed by adopting the simple linear regression model, The equation for the single-index model is formulated according to the following(Oseremen Egbele et al., 2021)(Kaluge et al., 2024):

$R_i(t) = \alpha_j + \beta_i R_m(t)(e_{it}) \cdots (1)$

Where: $R_i(t)$: stock returns (i) in time period (t), α_j: security alpha coefficient (i), β_i: beta coefficient (Beta) is a measure of the change in stock returns as a result of changes in market returns, which is a measure of systematic risk attributed to market factors that affect all companies equally, $R_m(t)$: market index returns in time period (t), and e_{it}: is the error term at time *t* with an expected value of zero and variance of σ_{ei}^2.

3.5. Efficient portfolio-building steps according to the Simple Ranking Model:

Calculating the return on the security according to equation 1 is the first step in building an efficient investment portfolio based on the Single-Index Model, which is unique in containing the alpha coefficient (α) as one of the most important pillars on which the model is based, and which was derived by Jensen in (1968) from the regression equation of the Capital Asset Pricing Model (CAPM)(Leković, 2017).

The variance of the security and the variance of the portfolio are calculated according to the following two equations, respectively(Z. Chen, 2024):

$$\sigma_i^2 = \beta_i^2 \sigma_m^2 + \sigma_{ei}^2 \cdots \quad (2)$$

$$\sigma_p^2 = \beta_p^2 \sigma_M^2 + \sigma^2(e_p) \cdots (3)$$

Where: σ_i^2, σ_p^2:The variance of the security (i) and the variance of the portfolio(p) respectively,β_i^2, β_p^2:the beta of the security (i) and the portfolio(p) respectively, σ_m^2:the variance of the market index, $\sigma_{ei}^2, \sigma^2(e_p)$: The unsystematic risks of both the security (i) and the portfolio respectively.

The second step in building the portfolio is to classify the stocks for inclusion in the portfolio based on the excess return on its beta, to simplify the selection of the portfolio by reducing complex calculations without dispensing with the levels of accuracy required by the process of building investment portfolios. This model thus helps analysts evaluate the relative desirability of stocks, by making a comparison of the attractiveness of the stock, by measuring the returns earned that exceed those that could have been earned from an investment that does not involve diversifiable risks such as treasury bills, by using the Treynor Model, or what is called (The Reward-to-Volatility Ratio), which is named after the economist Jack Treynor(Agustinus, 2021). The equation is mathematically represented as follows (Hasanov, 2021).

$$TR = \frac{\bar{R}_i - R_f}{\beta_i} \cdots (4)$$

Whereas: $\bar{R}_i$: Average stock return, R_f: Risk-free rate of return, β_i: stock beta.

Step Three: The process of selecting the stocks to be included in the investment portfolio depends on the cut-off rate, which must be unique, so that all stocks that achieved ratios exceeding the Treynor ratio are included, and in contrast, securities that failed to exceed the ratio are excluded (Najamuddin et al., 2022). The cut-off point is indicated by the symbol C*, which represents the largest Ci value from the value series of securities, and the cut-off rate is calculated according to the following equation (Mistry & Khatwani, 2023):

$$\text{Ci}=\frac{\sigma_m^2 \sum_{t=1}^{j} \frac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}}{1+ \sigma_m^2 \sum_{t=1}^{j} \frac{\beta_i^2}{\sigma_{ei}^2}} \cdots \quad (5)$$

Where: Ci: Cutoff rate, σ_m^2 : market index variance, σ_{ei}^2: security variance(i), R_i:security rate of return(i), R_f:risk-free rate of return, β_i^2:beta(i).

The last step in building the portfolio focuses on determining the ratio that should be invested in each security nominated for the portfolio(Reddy et al., 2023). Which is done according to the following equation(Manurung et al., 2023):

$$W_i = \frac{Z_i}{\sum_{j=1}^{k} Z_i} \cdots (6)$$

Where: W_i: The relative weight of the security in the investment portfolio, Z_i:the weight of the security in the portfolio, and is determined by the following equation(Rout & Panda, 2020).:

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left[\frac{\bar{R}j - Rf}{\beta_i} - C^*\right] \cdots (7)$$

Where: Z_i :The weight of the security in the portfolio, β_i:the beta coefficient, the variance of the security return, Rj: The rate of return on the stock, Rf: The risk-free rate of return, C^*: The optimal cut rate.

3.6. Efficient investment portfolio performance evaluation:

Both the Sharpe ratio and the Treynor ratio have been used to evaluate the efficiency of investment portfolios, as they provide objective methods for measuring risk-adjusted returns. The Sharpe ratio takes into account total risk by measuring standard deviation, which gives it the advantage of being able to compare multiple portfolios. The Treynor ratio, on the other hand, is based on systematic risk through beta, which allows for the evaluation of market-linked investments. Using both indicators, they help investors determine whether a portfolio's returns justify the level of risk taken, thus enabling them to compare different portfolios objectively and make informed decisions regarding asset allocation and risk management.

3.6.1. Sharpe ratio:

The Sharpe ratio represents the trade-off between return and risk, as well as takes into account the desire to achieve returns that exceed the returns achieved by risk-free investments, it is one of the methods of measuring the parameters that include both the return remaining from subtracting the risk-free return from the return of the investment portfolio, and the risk measured by the standard deviation of the portfolio(Atmaca, 2022). Therefore, the higher the ratio is positive, the better performance it translates into, achieving higher profits in exchange for taking additional risks, while the negative ratio reflected by the Sharpe indicator is evidence of the superiority of the risk-free interest rate over the returns achieved by the portfolio(Sandu, 2023). The percentage is calculated according to the following equation (Ningrum & Risman, 2022):

$$\text{Sharpe ratio} = \frac{R_p - R_f}{\sigma_p} \cdots \quad (8)$$

Since: R_p:The rate of return of the investment portfolio, R_f: The risk-free rate of return, σ_p: The standard deviation of the portfolio.

3.6.2. Treynor ratio:

The Treynor performance measure is defined as the risk premium gained per unit of risk taken, and is calculated as the average portfolio return over the risk-free return divided by the portfolio beta, A higher Treynor ratio indicates that the portfolio has earned a higher risk-adjusted return for the amount of market risk it has taken on, making it more efficient from a risk-reward perspective. Conversely, a lower ratio indicates that the portfolio may not be adequately compensated for the level of risk assumed(*Maheswari& Dineshkumar,2019*, n.d.). The percentage is calculated according to the following equation:(Yuliana et al., 2024).

$$TR = \frac{\bar{R}_p - R_f}{\beta_p} \cdots (9)$$

Whereas: $\bar{R}_p$: Average portfolio return, R_f: Risk-free rate of return, β_p: Portfolio beta.

3.7. The concept of investment portfolio insurance strategies:

The origins of portfolio insurance strategies go back to Leland and Rubinstein (1976), who stimulated and encouraged the development of investment portfolio insurance by observing the market decline between (1973) and (1974) and the emergence of their idea that if insurance were available, money could be attracted back to the market(Zieling et al., 2014). The portfolio insurance strategy has been defined as a strategy whereby the total (or partial) part of the initial investment level is insured in the future on several dates specified in advance (Al Hassan & Maktou, 2022), and this guarantee can be valued either in real or nominal value depending on the investor's preferences in facing the risks that he may be exposed to (Bouyé, n.d.).

3.7.1. Value at risk (VaR) Based Portfolio Insurance (VBPI):

Value at risk (VaR) is the maximum loss that a portfolio could incur as a result of adverse market movements over a specified time horizon, at a specified level of probability known as a confidence level. There is a predetermined low probability that the actual loss will exceed it, thus incorporating two quantitative factors, the horizon and the confidence level.

The great popularity of this tool is due primarily to its conceptual simplicity: VaR reduces the market risk associated with any portfolio to a single number representing the loss associated with a given probability(Engle & Manganelli, 2001).

3.7.1.1. Methods of calculating the value at risk (VaR):

Parametric Estimation: One of the most important approaches to this method is the Variance-Covariance Approach, which calculates the VaR using the mean and variance, to deal with investment portfolios as linear groups of risky factors that are normally distributed. This method is based on a package of data that is characterized by its simplicity, such as averages, standard deviations as a measure of risk and correlations, as well as the level of confidence(Gourieroux et al., 2000). VaR is calculated according to the following equation(Gül, 2010):

$$VaR_P = -\mathrm{Za} * \mathrm{\sigma p} * \mathrm{p} \cdots (10)$$

Whereas: a: normal cumulative distribution at a specific confidence level, P: Initial value of the investment portfolio, σ: Portfolio standard deviation.

Non-parametric Estimation: The non-parametric method (Historical Simulation Method) is based on the fact that the past is a good indicator of future estimates, to rely on past performance and build results according to historical events. Hence, the historical simulation method derives the value of risks by taking a historical time series to estimate the losses of the investment portfolio(Huang, 2014). Monte Carlo simulation method: A non-parametric method in which a series of pseudo-random numbers are generated through Monte Carlo simulation, which attempts to predict the maximum possible loss for a certain confidence period over a pre-specified holding period on a distribution of pricing paths based on arbitrarily generated data, to simulate possible outcomes in the future to generate the value of the investment portfolio and estimate the risk it faces (Baesens & van Gestel, 2009).

3.7.1.2. VaR as a Portfolio Insurance Strategy:

VaR-based portfolio insurance is a strategy that permanently controls the portfolio's default risk, which is the probability that the portfolio will achieve a return less than a predetermined limit at the end of the investment period, by continuously adjusting the allocation of risky assets so that the default probability does not exceed the target value(Ho et al., 2011). (VBPI) includes dynamic control of the previously defined constraints represented by the value at risk (VaR) which reflects the investor's ability to bear risks during the protection horizon, by adjusting the investment weights between risky and risk-free assets of the portfolio to be insured(Trieu, 2017). The VBPI strategy requires the identification of two parameters that play a crucial role in establishing and implementing this strategy, namely the guarantee value and the level of confidence. When these two parameters decrease, the strategy is described as more risk-tolerant, as the investment is allocated to the risky asset in proportions that exceed the allocation to risk-free assets. It also requires estimating the expected return and volatility of risky assets. Therefore, its effectiveness depends on the accuracy of the estimation. The percentage of risk-free assets is determined according to the following equation (Jiang et al., 2009)(Jonasardottir & Lavstrand, 2011):

$$W = \frac{G - V_0 \exp\left(\mu - \frac{1}{2}\sigma^2\right)(T) - z_p \sigma \sqrt{T}}{V_0 \exp(r(T)) - V_0 \exp\left(\mu - \frac{1}{2}\sigma^2\right)(T) - z_p \sigma \sqrt{T}} \cdots (11)$$

Where: W: Risk-free asset ratio, G: Insured value, V_0:Initial portfolio value, μ: Expected rate of return, σ^2: Volatility of risky assets measured by portfolio variance, T:Investment time horizon, z_p: Standard value representing standard deviations from the mean centered on the left side at a given confidence level, σ: Volatility of risky assets measured by standard deviation, r: Risk-free rate of return.

4. Results:

This section aims to demonstrate the extent to which VBPI can be applied to ensure efficient dynamic portfolios, and their ability to reduce the risks caused by the downside while maintaining their ability to benefit from the upward potential of the financial market. Table 2 shows the efficient investment portfolios for the period from 2022 to 2024, and the ISX60 companies that qualified to form them according to the Simple Ranking model, the sample size varies from one year to another, as only two companies were able to qualify to form an efficient investment portfolio, while the 2023 sample amounted to 10 companies belonging to various Iraqi economic sectors, and only three banks qualified to form the efficient portfolio.

Table 2: Building three efficient annual investment portfolios according to the Simple Ranking Method

Company	TR	$\sigma_m^2 \sum_{t=1}^{j} \frac{(R_i - R_f)}{\sigma_{ei}^2}$	$1 + \sigma_m^2 \sum_{t=1}^{j} \frac{\beta_i^2}{\sigma_{ei}^2}$	**Ci**	$[\frac{(R_i - R_F)}{\beta_i}] - C^*$	$\frac{\beta_i}{\sigma_{ei}^2}$	Z_i	W_i
Efficient Investment Portfolio for (2022)								
AIPM	0.007	0.003	1.151	0.002	0.003	104.1	0.305	0.85
BMFI	0.005	0.006	1.443	0.004	0.0004	143.9	0.054	0.15
Efficient Investment Portfolio for (2023)								
IIDP	0.439	0.001	1.003	0.001	0.38	8.718	3.315	0.14
SAEI	0.289	0.004	1.011	0.004	0.23	3.226	0.743	0.031
SKTA	0.165	0.012	1.060	0.011	0.106	49.37	5.238	0.221
BMNS	0.15	0.026	1.155	0.023	0.091	42.04	3.824	0.161
IMOS	0.096	0.037	1.266	0.029	0.038	67.15	2.549	0.108
BROI	0.085	0.066	1.614	0.041	0.026	57.33	1.51	0.064
BBOB	0.08	0.12	2.251	0.053	0.027	95.25	2.57	0.108
BNOI	0.077	0.156	2.712	0.058	0.02	86.18	1.748	0.074
TASC	0.072	0.16	2.759	0.058	0.015	76.67	1.1367	0.048
SBPT	0.064	0.196	3.324	0.059	0.007	162	1.071	0.045
Efficient Investment Portfolio for (2024)								
BEFI	0.1036	0.0039	1.0374	0.004	0.0975	21.6	2.11	0.436
BNOI	0.0656	0.0066	1.0786	0.006	0.0595	22.87	1.36	0.282
BIIB	0.0302	0.114	4.6303	0.025	0.0595	22.87	1.36	0.282

Source: Prepared by the researchers based on data from the annual bulletin of the Iraq Stock Exchange.

Table 3 shows the rates of return (R_P) achieved by the three efficient portfolios, along with the amount of Systematic risk (β_P) measured by the Beta coefficient, the Unsystematic risk (σ_{eP}^2) measured by the Error variance, and the total risk of the portfolio (σ_p^2).

Table 3: Rates of Return and Risk of Efficient Investment Portfolios.

portfolio	R_P	β_P	σ_{eP}^2	σ_p^2
2022	0.056969	3.275010	0.029726	0.034758
2023	0.082769	0.713317	0.018553	0.020395
2024	0.029186	0.320953	0.014386	0.014954

Source: Prepared by the researchers based on data from the annual bulletin of the Iraq Stock Exchange.

The investment portfolio insurance strategy based on the value at risk was applied to the three dynamic portfolios in Table 4, with an amount of 15 million Iraqi dinars as the initial investment amount, a percentage of 0.4% as transaction costs, and a confidence level of 95% and a percentage of 98% as the guaranteed value percentage, thus determining the optimal investment percentage in risk-free assets, and allocating the remainder to investment in risky assets represented by the shares of the efficient investment portfolio, VBPI Strategy recommends investing in risk-free assets at a rate of 82.72%, 72.21%, and 87.76% for the years (2022), (2023), and (2024) respectively.

Table 4: VBPI Strategy Implementation.

$\boldsymbol{V_0}$	15612300	16373518.17	17602604
$\exp\left(\mu - \frac{1}{2}\sigma^2\right)(T)$	1.047311083	1.049629422	1.0199242
$\exp\left(r(T)\right)$	1.002920958	1.023607685	1.002921
$z_p \sigma \sqrt{T}$	0.1770649	0.18294858	0.2011616
$G - V_\tau \exp\left(\mu - \frac{1}{2}\sigma^2\right)(T) - z_p \sigma \sqrt{T}$	1713509.507	1855433.257	2838196.6
$V_\tau \exp\left(r(T)\right) - V_\tau \exp\left(\mu - \frac{1}{2}\sigma^2\right)(T) - z_p \sigma \sqrt{T}$	2071358.375	2569444.483	3241665.1
$\boldsymbol{V_0}$	0.82723952	0.722114554	0.8755366

Source: Prepared by the researchers based on data from the annual bulletin of the Iraq Stock Exchange.

Table 5 gives a clear example of the principle of the trade-off between the rate of return and the risk, as it is noted that the rates of return recorded by the insurance strategy based on the value at risk are lower than the returns of the portfolio before insurance, which are shown in Table 3. Thus, this strategy achieves the most important purpose of insurance, which is to reduce the severity of the risk faced by the investor.

Table 5: Return and Risk Rates for the Investment Portfolio Insured under VBPI.

VBPI	R_P	β_P	σ^2_{eP}	σ^2_p
2022	0.0242295	0.540480	0.005128	0.005265
2023	0.0192967	0.21734	0.00361	0.0037846
2024	0.005646	0.040556	0.001778	0.00179

Source: Prepared by the researchers based on data from the annual bulletin of the Iraq Stock Exchange.

Table 6 shows that the efficient investment portfolio before insurance achieved a performance rate that outperformed the performance of the portfolio insured using VBPI according to the Sharpe index, which evaluates performance by dividing the excess return by the standard deviation of the portfolio, by recording a rate of 0.415851 compared to the performance of the portfolio insured according to VBPI, which recorded (0.356532), while the Treynor index came out with different performance evaluation results, in which the portfolio insured according to VBPI achieved an excess return rate relative to its beta (0.113461) that exceeded the performance of the efficient portfolio before insurance, which recorded (0.069059).

Table 6: Portfolio Performance Evaluation according to Sharpe and Treynor Index.

	Efficient portfolio	Efficient portfolio with VBPI
Sharpe ratio	**0.415851**	0.356532
Treynor ratio	0.069059	**0.113461**

Source: Prepared by the researchers.

5. Conclusions:

The research applied the insurance strategy based on the value at risk on three efficient dynamic investment portfolios, in order to reduce the risk that the investor may face, and at the same time enhance his ability to exploit the opportunities generated by the upward potential of the financial market, as the results showed the possibility of applying this strategy to the Iraq Stock Exchange Index ISX60, as well as its effectiveness in reducing the risk, which showed the superiority of this strategy over the investment portfolio before insurance according to the Treynor Performance Evaluation Index.

Despite the proven effectiveness of this strategy in reducing the losses that may be exposed, it is necessary to study and carefully analyze the estimated parameters chosen by the investor that are appropriate to his position on risk and his ability to bear it, represented by both the level of confidence and the insured value.

Based on the above, the research recommends the necessity of adopting an integrated approach that combines both insurance strategies and advanced risk management to achieve the optimal combination of return and risk. The research also opens the door to future studies to explore the impact of other insurance strategies on dynamic portfolios that are rebalanced at different intervals, especially in light of the volatility of global financial markets.

Authors Declaration:

We Hereby Confirm That All the Figures and Tables in The Manuscript Are Mine and Ours. Besides, The Figures and Images, which are Not Mine, Have Been Permitted Republication and Attached to The Manuscript.

- Ethical Clearance: Research Was Approved by The Local Ethical Committee in The University of Baghdad.

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