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Theory Modeling and Empirical Evidence for Value-at-Risk based Assets Allocation Insurance Strategies

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Abstract

Constant Proportion Portfolio Insurance (*CPPI*) is the most popular portfolio insurance strategy using hedging strategy to protect principal while a wave upward or downward trend in the market is noted. Nevertheless, since the original *CPPI* was proposed, its performance has been limited to relevant parameters of strategy. And since there is no clear, definite and systematic rule of decision has get been proposed, it also has unstable performance and worse upside capture, especially for the multiplier (M_v) in model parameters, it has far great influence to end-of-period return. If M_v can be decided with its initial value setting and dynamic tuning via certain appropriate approach, under a decent mechanism of market timing selection, the strategy can therefore acquire excess return of min-max operation due to sharp improvement of upside capture, and also can provide hedging function within the insured volume when the market declines. This paper presents a systematic method using the value-at-risk control method to dynamically adjust the *CPPI* strategy parameter M_v, called asset allocation insurance strategy value-at-risk based asset allocation insurance strategy model (*VALIS*). We proof that the proposed model is a dynamic asset allocation insurance strategy, which is conservative but also aggressive; and shows that it is in compliance with the characteristics of idea portfolio insurance strategy, and is feasible and effective. From an empirical study of the Pan-Pacific market, we found that in any type of market or trend it is clearly better than the major benchmark indices, and it outperform other traditional portfolio insurance strategy.

1. Introduction

In general, portfolio insurance strategies can be categorized into two types: the first type is the portfolio insurance strategies which do not involve underlying options including Buy and Hold, *B&H* [1], Constant Mix, *CM*, Constant-Proportion Portfolios Insurance, *CPPI* [2],Time-Invariant Portfolio Protection, *TIPP*, [3] etc. The second type is the Option-Based Portfolio Insurance (OBPI) which is derived from the basis of option pricing formulas, such as *PBPI* (Participation-based Portfolio Insurance), *CBPI* (Capped-Based Portfolio Insurance), Covered Put, Synthetic Put and Dynamic Hedging, etc. In the aforementioned portfolio insurance strategies, based on the considerations to avoid the misallocation effect, mispricing effect, insurance performance uncertainty effect [4], inadequate substitution of financial instruments and sour liquidity, etc., which are derived from over dependence on complicated option evaluation models [5], basis risk and risk of missing pricing of derivatives, interest rate and transaction cost modified bias [6], variance estimation error, etc., though the constant superior strategy is not concluded yet, the proportion protection insurance strategy, which is relatively simple and easy to operate and maintain, has become the rebalance strategy which is preferred by the majority of conservative fund managers and asset allocation management institutions [7].

The constant proportion protection insurance strategy features the effects of buy-low and sell-high. If there is sign of the trend and when there is judgment on whether there is rise or fall in the market, it outperforms other similar insurance strategies. However, since the constant proportion protection insurance strategy mode was proposed, its performance has been limited the parameters of model which lack precise and systematic determinant rules, thereby leading to instability and poor upside capture. Especially, the parameter in model of strategies, Multiplier, M_v, affect the entire accumulated profit of the rebalance strategy of enormously. If M_v can be applied via suitable method to determine its initial value and dynamic tuning, then because of the large enhancement of upward catching rate, it will enable that strategy to obtain excess return of Min-Max operation. At the same time it also possesses risk prevention function provided under insured amount when the market drops.

Thus, the original constant proportion protection insurance strategy assumes that M_v is a constant value. For works of later related scholars, practical market operators and research reports etc, mostly they based on experience to conduct rough estimate so as to establish the

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parameter setting of strategy model. Till now there is still not one (General) setting or adjustment method [8]. As the portfolio insurance strategy must possess both capital insurance and profit making property, therefore the consideration of this property is to bring in estimation on the maximum loss of a certain future period to assets allocation strategy. Then by means of Value-at-Risk control model dynamic tuning M_v, and by proving that the proposed dynamic tuning strategy model possesses also excess return obtained from active operation as well as essentials of insurance for avoidance of downside risk insurance.

This research combines risk metric method and historical data simulation method as the Value-at-Risk estimating model. In empirical research, the result proves the robustness and validity of the proposed strategy model. The conclusions of results also show proof and discussion that supports this paper and the same time it is discovered that it also possess considerably high real world market operation feasibility.

This paper is organized as follows: in the first section, we describe the research background and motives of this research, and present a complete paper review; in the second section, we first introduce the Value-at-Risk control model, which is quoted in the paper, as the deductive theory basis of the proposed model and as the basic concept of the empirical study; from the third section, we start to conduct the deduction and verification of the proposed Value-at-Risk assets allocation insurance model, and also begin to introduce the Value-at-Risk concept into the portfolio insurance model; We then apply the deduced model in the fourth section and conduct market empirical study and analysis; finally, in the fifth section, we present the conclusions and discussions of this research; in the final part, we present our views in the future developments and visions, offering an arena to be further developed and discussed by subsequent researchers. In the following we begin by explaining the Value-at-Risk estimation method adopted by this research.

2. The Adoption of the Value-at-Risk Measurement and Evaluation Methods

2.1 The Value-at-Risk Measurement

In 1730, Abraham de-Moivre first proved: "Within a preset error range, the observation values of a random sampling are presented in a bell-shape curve, with the right and left wings being symmetrical and the values averagely being distributed in the both sides of the mean. It is so called the Normal Distribution." And de-Moivre further established the concept of standard deviation. The two concepts are now generally referred to the Law of Average, which has placed a significant foundation for the development of the modern quantitative risk.

The Value-at-Risk is the methodology proposed by modern statistics, and has been widely applied as a tool to measure risk of late. Its main concepts are also originated from the Law of Average. Its definition is stated as follows:

The approaches adopted by the study are briefly illustrated as follows:

2.2 Parametric Form (Analytic Variance-Covariance)

Currently the most frequently used by the industries and the most well known solution is the Risk Metrics developed by JP Morgan. The assumption premise is the portfolio return is a normal probability distribution, and its relation with the change of risk factors is linear. Thus, the Value-at-Risk of the portfolio can be obtained by calculating the standard deviation and the association degree of the risk factors. Consequently, with only two presumed simple linear portfolios, which are in accordance with the aforementioned such as negotiable securities, spot and forward exchanges and notes etc., a crisp value can be generated through the said method. Its advantages are: (1) there is no need of any pricing model; (2) market data can be accessed at any time. And its disadvantages include the difficulty to conduct a sensitivity analysis etc.

Assuming the assets in a portfolio features a normal distribution return, the combination of the normal distribution variables can be defined by

$$aX + bY \quad (1)$$

Where, a, b are the Mark to Market, MTM, of the assets X, Y ; and X, Y are the securities which feature a normal distribution return, hence the standard deviation of the combination can be defined by

$$\sigma_p = \sqrt{a^2\sigma_X^2 + b^2\sigma_Y^2 + 2ab\rho_{XY}\sigma_X\sigma_Y} \quad (2)$$

3. The Theory Modeling and Verification of Dynamic Asset Allocation Strategy

In this section, we first introduce the Value-at-Risk theorem into the insurance strategy, and then verify whether the strategy formed by the established model is in compliance with the two properties of an ideal investing portfolio insurance strategy proposed by Rubinstein.

3.1 The introduction process of *VALIS* risk model

Let M_v be multiplier. In time t, the insurance premium F can be demonstrated as

$$F = F_0 e^{rt} \quad (3)$$

where r represents the risk free rate or treasure bond (or notes); F_0 is the initial insurance premium. If we calculate the payoff in time t, then

$$W(t) = F + [W(t) - F_0](S/S_0)^{M_v(t)} e^{(1-M_v(t))(r+0.5M_v(t)\sigma(t)^2)} \quad (4)$$

Where, $W(t)$ is the wealth in time t; W_0 is the initial wealth; S is the stock price in time t; S_0 is the initial stock price level. Then the exposure, $V_s(t)$, of risky assets can be demonstrated as

$$V_s(t) = M_v(t)[W(t) - F(t)] \quad (5)$$

Considering the situation where no leverage is available, then *Equ*. (5) can be demonstrated as *Equ*. (6)

$$V_s(t) = Min\{W(t), M_v(t)[W(t) - F]\} \quad (6)$$

Considering the market risk [9], if $\Delta P(\Delta t)$ is the asset position price volatility volume during time length Δt, then if we demonstrate the Cumulative Distribution Function, *CDF,* of $\Delta P(\Delta t)$ as $F_{\Delta P}(x)$, thus in the Probability, P, the Value-at-Risk of Long Position during Δt can be shown as the following equation:

$$P(t) = P_r[\Delta P(\Delta t) \le VaR(t)] = F_{\Delta P}(VaR(t)) \quad (7)$$

The *VaR* of *Equ*. (7) in this research is based on the RiskMetrics[TM] method developed by J.P. Morgan [10][11]. Assuming the continuously compounded daily return of the assets portfolio possessed follows the conditional normal distribution, if daily log return is denoted as $r(t)$ and the information set acquired in time t-1 as $\varphi(t-1)$, under the hypothesis that there is no drift phenomenon in random walk, then $r(t) \mid \varphi(t-1)$ can be demonstrated as *Equ*. (8)

$$r(t) \mid \varphi(t-1) \sim N(\mu(t), \sigma^2(t)) \quad (8)$$

Where, $\mu(t)$ is conditional mean, and $\sigma^2(t)$ is conditional variance of $r(t)$. $\mu(t)$ and $\sigma^2(t)$ can be described using a simple model as shown in *Equ*. (9).

$$\mu(t) = 0, \sigma^2(t) = \alpha\sigma^2(t-1) + (1-\alpha)r^2(t-1), 1 > \alpha > 0 \quad (9)$$

Where the implied daily spot price $P(t)$ is log value, i.e. $\ln(P(t))$, which satisfies IGARCH(1,1) (Integrated Generalized Autoregressive Conditional Heteroscedastic) (Engle, 1982; Bellerose, 1986, 1992, 1994; Nelson, 1991; Tsay, 1987) Process different equation $P(t) - P(t-1) = a(t), a(t) = \sigma(t)\varepsilon(t)$,where{ $\varepsilon(t)$ }is *iid* (independent and identically distributed) random variable series; and $a_0 > 0$, mean is equal to one and variance is equal to one. From the property of IGARCH model, h period log return from time t to time $t+h$ can be denoted as

$$r_h(t) = r(t+h) + r(t+h-1) + ... + r(t+1) \quad (10)$$

Thus, from *Equ*. (10), we know that $r_h(t) \mid \varphi(t)$ in *Equ*. (9) is a normal distribution, and its mean is equal to be 0. As for $\sigma_h^2(t)$, under the assumption that ε_t is independent, we can acquire as shown in *Equ*. (11)

$$\sigma_h^2(t) = Var[r_h(t) \mid \varphi(t)] = \sum_{i=1}^{h} Var[r(t+i) \mid \varphi(t)] \quad (11)$$

Where $Var[r(t+i) \mid \varphi(t)] = E[\sigma^2(t+i) \mid \varphi(t)]$ can be solved recursively.

Applying $r(t-1) = a(t-1) = \sigma(t-1) = \sigma(t-1)\varepsilon(t-1)$, *Equ*. (9) can be rewritten as below:

$$\sigma^2(t) = \sigma^2(t-1) + (1-\alpha)\sigma^2(t-1)(\varepsilon^2(t-1) - 1), for \forall t \quad (12)$$

Since $E[\varepsilon^2(t+i) - 1 \mid \varphi(t)] = 0, for \quad i \ge 1$, this *Equ*. (12) can be formulated as

$$E[\sigma^2(t+i) \mid \varphi(t)] = E[\sigma^2(t+i-1) \mid \varphi(t)], for \quad i \ge 2 \quad (13)$$

Then from *Equ*. (18), we can estimate $\sigma^2(t+1)$ of next period in *Equ*. (14), and $Var[r(t+i) \mid \varphi(t)] = \sigma^2(t+1), for \quad i \ge 1$, we can conclude as below

$$\sigma_h^2(t) = h\sigma^2(t+1) \quad (14)$$

Referring to *Equ*. (8), we can infer as below

$$r_h(t) \mid \varphi(t) \sim N(0, h\sigma^2(t+1)) \quad (15)$$

Thus, the log return conditional standard deviation of h period can be denoted as

$$h^{1/2}\sigma(t+1) \quad (16)$$

Thus, in Long Position, if the probability is set to be 5%, then we can acquire that λ_l=1.65, where l = 0.05. If we want to estimate the Value-at-Risk after h period, VaR_h, we can denote VaR_h whose mean equal to 0 and standard deviation is $\sigma(t+1)$ as

$$VaR_h(t+1) = \lambda_l h^{1/2} \sigma(t+1) A, A: long \quad position \quad (17)$$

If we hold more than k types of asset positions and the return is likely to feature cross-correlation, then we estimate the overall $VaR_h(t+1)$ as *Equ*. (18)

$$VaR_h(t+1) = [\sum_{i=1}^{k} VaR_i^2(t) + 2\sum_{i<j}^{k} \rho_{ij} VaR_i(t) VaR_j(t)]^{1/2} \quad (18)$$

Where, ρ_{ij} is the correlation coefficient among assets; i, j represent different assets.

If we consider there is a drift phenomenon in random walk, then *Equ*. (17) $\mu_h(t)$ must be modified as

$$\left| \mu_h(t) - \lambda_l h^{1/2} \sigma(t-1) \right| \quad (19)$$

Equ. (18) should be modified as well following *Equ*. (18).

Thus from *Equ*. (5), in time t, holding risky assets, $V_s(t)$ and risk free assets, $V_b(t)$, and set $W(t) = V_s(t) + V_b(t)$, then we can acquire

$$\begin{aligned} V_s(t) &= Min[M_v(t-1) * (V_s(t-1) + V_b(t-1) - F] \\ V_b(t) &= W(t) - V_s(t) \end{aligned} \quad (20)$$

With the introduction of Value-at-Risk into *Equ*. (17) or *Equ*. (19), we can formulate the Value-at-Risk dynamic asset allocation strategy model as shown in *Equ*. (21)

$$V_s(t) = M_v(t)(W(t) - F) \quad (21)$$

$$\begin{aligned} M_v(t) &= [W(t) - VaR(t)] / [(V_s(t) + V_b(t)) - F] \\ &= [W(t) - \lambda_l h^{1/2} \sigma(t) W(t)] / [W(t) - F] \\ &= W(t)[1 - \lambda_l h^{1/2} \sigma(t)] / [W(t) - F] \end{aligned} \quad (22)$$

With the same reason we can prove that risk consideration can be introduced into *Equ*. (18) and we can formulate as per *Equ*. (22)

$$\begin{aligned} M_{v,d}(t) &= W(t)[1 - \sum_{i=1}^{k} VaR_i^2(t) + 2\sum_{i<j}^{k} \rho_{ij} VaR_i VaR_j(t)]^{1/2} \\ &= W(t)[1 - (\sum_{i=1}^{k} \lambda_l h^{1/2} \sigma_i(t) A)^2 + 2\sum_{i<j}^{k} \lambda_l \rho_{ij} h^{1/2} \sigma_i(t) - \lambda_l h^{1/2} \sigma_j(t)]^{1/2} \end{aligned} \quad (23)$$

Readers can also refer to *Theorem* 1, *Chebyshev's Theorem*, to decide λ_l according to confidence interval. Of course, the empirical rule or so-called *68-95-99* rules can also be a rough estimation method.

[***Theorem*** **1**] Proportion (or fraction) of any data gathered together and fell on the mean plus or minus x proportions (or fraction) within the standard deviation shall have at least $(1-1/x^2)$, where x is any positive number larger than one.

3.2 Verification of Rubinstein's Idea Portfolio Insurance Properties of *VALIS*

According to Rubinstein (1985) points out that idea portfolio insurance should feature two properties. We hereby verify *VALIS* proposed by this research as follows:

***Property* 1:**
Under idea portfolio insurance, the probability of suffering loss from bottom breaking is equal to zero.

Proof:
From *Equ*. (20), we introduce *Equ*. (23) into it and it becomes

$$V_s(t) = Min[M_v(t-1) * V_s(t-1) + V_b(t-1) - F, FM_v(t)(M_v(t) - F - 1 - \lambda_l h^{1/2} \sigma(t))^{1/2}] \quad (24)$$

Thus, from *Equ*. (24), investing risky assets in the worst case is equal to the security position of an underlying portfolio plus an insurance policy that is guaranteed not to suffer loss, that complies the property 1. It is hereby proved. (Q.E.D.)

***Property* 2:**
The return of the said position totally depends on the end value of the underlying portfolio, and is irrelative with the spot price before expiration of the underlying portfolio.

Proof:
From *Equ*. (23), we can acquire

$$\begin{aligned} M_v(t)(W(t) - F) &= W(t)[1 - \lambda_l h^{1/2} \sigma(t)] \\ W(t)[M_v(t) - F - 1 - \lambda_l h^{1/2} \sigma(t)] &= FM_v(t) \\ W(t) &= FM_v(t) / [M_v(t) - F - 1 - \lambda_l h^{1/2} \sigma(t)] \end{aligned} \quad (25)$$

From *Equ*. (25), it is proved that in the proposed strategy model, the holding return is irrelative with the spot price before expiration of assets allocation portfolio. (Q.E.D.)

3.3 The property is comparatively traditional that by means of options-basis insurance strategies it possesses *Floor- Breaking* moderation effect and occurrence probability

The operation of static portfolio insurance and dynamic portfolio insurance strategy mainly arises from the Black-Scholes model. Nevertheless, in the Black-Scholes model, one of the important assumptions is the relative price of risky assets, such as stocks. $ln(P_t / P_t\text{-}1)$

must demonstrate the lognormal distribution model and no serial independence under lognormal distribution model, and spot price variation behaviors are continuous, i.e. minimal volatility. Thus, there should also be huge jump spot price variation behaviors. So, the investing portfolio insurance strategy which is options-basis can be effective; on the contrary, if spot price often moves up and down sharply or even comes to a crash, then the function of investing portfolio insurance strategy model will drop down more or even the effect will be lost, *Floor-breaking*. As shown in the below equation, the insured portfolio, *DPI*, under dynamic insurance strategy, is composed by the risky assets, *S*, and the loan fund, *P*.

$$\begin{aligned} DPI &= S + P \\ &= S[-N(-d_1)]S + N(-d_2)Ee^{-rT} \\ &= [1 - N(-d_1)]S + N(-d_2)Ee^{-rT}] \\ &= W_1 S + W_2 Ee^{-rT} \end{aligned} \tag{26}$$

Where, $d_1 = [\ln(S/E) + (r + 0.5\sigma^2)T]/\sigma T^{1/2}$; $d_2 : d_1 - \sigma T^{1/2}$; σ^2: variance of strike assets price; *T*: Put Option contract expiration Annualized length; *r*: continuous compound rate, risk-free Rate; *E*: exercise price; $N(-d_1)$: under accumulated standard normal distribution , the probability from $-\infty$ to $-d_1$. $N(-d_2)$: under accumulated standard normal distribution, the probability from $-\infty$ to $-d_2$.

W_1 and W_2 are the weights, percentage of the risky assets, *S*, and the loan fund, *P*, respectively, and have to be adjusted at any time following the variation of the portfolio value and time. When the downward adjustment variation of *S* is closing to zero, $S \to 0$, then $d_1 \to -\infty, d_2 \to -\infty$. Thus, $N(d_1) = N(-\infty) = 0, N(-d_2) = N(\infty) = 1, W_1 = 0, W_2 = 1$. Therefore, from *Equ*. (26), when $S \to 0, T > 0$, Floor is Ee^{-rT} ; when $T = 0, DPI \geq E$. When there is any major variation to *S*, then *DPI* will not be able to adjust *S* position to *P* in time and thus face the danger that insurance premium breaks bottom in the beginning of the period.

However, in the *VALIS* model proposed in this research, because for the future portfolio value, the risk has been introduced into the insurance model by means of estimating Value-at-Risk. Thus, facing volatile circumstances, the model will be able to provide the protection and enhancement of insurance function against huge variations, and such enhance arises from the risk consideration of portfolio value adjustment to lower the short-term urgent demand on liquidity. For example, on Oct. 19, 1987, the United States stock market indexes dropped sharply, and the traditional portfolio insurance strategies all failed. The main reason is inadequate consideration of portfolio value risk that caused the inability to buy in or sell out, thereby failing to protect the invested principal.

4. Empirical Research and Analysis

The empirical research is composed by two parts. The first part is to conduct test on simulated normal status return data. The second part is to operate based on Taiwan weighted index as the asset portfolio insurance underlying content.

4.1 Simulated Random Normal Return

Firstly, test is conducted based on the simulated return data generated by random method under normal distribution. Total observed return data is 112 sets ((Rand(.)-0.5)*0.5). The descriptive statistical excerpt of return is as Table 1:

Table 1 Statistical excerpt description of return data

	Mean	*Standard Deviation (S.D.)*	*Kurtosis*	*Skewness*	*Mean Confidence Interval (95%)*
Random return	0.003483876	0.12930241	0.031863682	0.031863682	0.024210635

Set wealth as 100, insurance premium is 80, insurance tool including stocks, V_s, and risk free assets, fixed income securities, or bond, V_b, initial weights are set as W_1=0.6, W_2=0.4, $\lambda_l = 0.65$, $h = 3$, rebalance frequency is adjusted daily, data frequency is simulated random daily return data, insurance period is the entire return observations data. Observe the multiplier, M_v, If insurance period based on experience value is set as M_v =2 and M_v =3 respectively, and M_v turning rule of the proposed *VALIS* in this research, then it can be clearly seen that M_v turning rule of *VALIS* is superior than fixed multiplier rules set in *CPPI*. In this case study, in respect of its performance in its insurance period, its rebalance strategy is shown in Figure 1

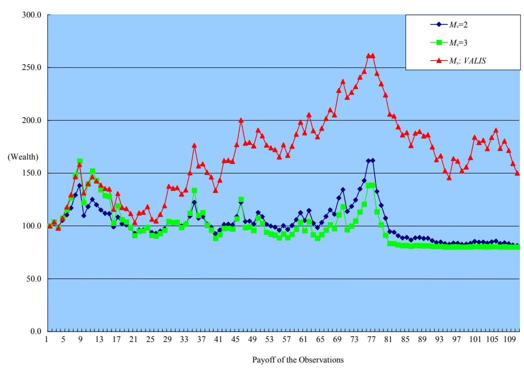

Fig. 1 Comparison of performance of $M_v(t)$ tuning rule of *VALIS* and fixed multiplier rebalance strategy during the insurance period

In Figure 1, it is not difficult to discover that the $M_v(t)$ turning rule of *VALIS* actually went through the estimate on the future Value-at-Risk. In respect of upside, the upside capture can be enhanced and furthermore the insurance performance can be greatly enhanced and that is the main source of excess return. In respect of downside, position can be adjusted earlier through Value-at-Risk estimation so as to avoid loss continuously due to dropping trend. This empirical study also tried comparisons between various random return types and between different kinds of fixed multiplier setting and the results tends to be uniform. That means the method of fixed multiplier has no significant difference and it also shows that there is actual proof and support on the thinking of induction of Value-at-Risk into insurance strategy. Coping with the rebalance performance in Figure 1, M_v turning rule value of tuning process and insurance period return observation data are in Figure 2

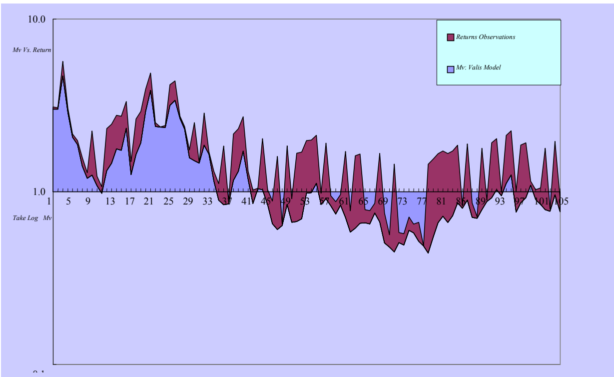

Fig. 2 $M_v(t)$ tuning rule of $M_v(t)$ tuning process and insurance period return observation data display

Contrary to Figure 2.2, $M_v(t)$ tuning rule of Value-at-Risk calculation and $M_v(t)$ tuning process display is in Table 2. Table 2 shows related data of *VALIS* strategy applied in actually proved cases.

Table 2 Summary of *VALIS* strategy relevant parameters adjustment process

VALIS Strategy Model			
Return[$R(t)$]	*VaR*(t) (95%)	$M_v(t)$	*Wealth*[$W(t)$]
0.096548069	--	3.0	100.0
0.063129099	--	3.0	103.8
-0.080851495	0.2	4.7	98.0
0.174454076	0.2	2.9	107.4
0.097807636	0.2	2.1	118.0
0.106811134	0.1	1.9	129.6
0.166378286	0.1	1.4	146.7
0.091646545	0.1	1.2	158.1
-0.244630284	0.4	1.2	131.2
0.144857928	0.3	1.1	140.1
VALIS Strategy Model			
Return[$R(t)$]	*VaR*(t) (95%)	$M_v(t)$	*Wealth*[$W(t)$]
0.088742409	0.3	1.0	146.7
-0.058244264	0.2	1.3	142.5
-0.061619378	0.1	1.5	138.8
-0.041917043	0.0	1.8	135.5
-0.006938966	0.0	1.7	134.9
-0.197190979	0.2	2.3	115.8
0.241696074	0.4	1.3	130.8
-0.112041948	0.4	1.6	117.5
-0.026445139	0.3	1.9	116.3
-0.073885766	0.1	2.9	111.9

Final performance of various types of portfolios insurance strategy model with same properties are shown in Figure 3 and from the results it shows that *VALIS* has quite a good rebalance performance.

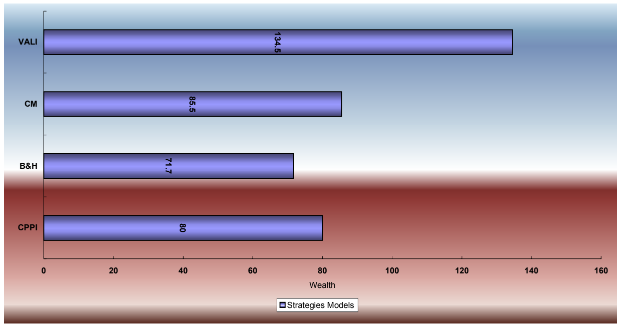

Fig. 3 Final performance comparison between operations of various types of investment group insurance strategy model

4.2. Evidence from Pan-Pacific Markets

This section illustration the performance while investigating various assets in PanPacific markets. The comprehensive results show the proposed *VALIS* model outperforms other insurance strategy models.

The insurance period is 12 months (commencement date: 1994/01/04 ~ expiry date: 1995/01/04) and total number of business day is 244 business days. Wealth is set at 100, insurance premium is 80, insurance instruments including stocks, V_s, and risk -free asset or fixed income securities: bond, V_b, initial weights are set at W_1=0.6, W_2=0.4, $\lambda_l = 0.65$ and rebalance frequency shall be adjusted daily and insurance period covers all return observation material. Comparisons of annualized return between difference strategy models around insurance period is shown in Table 3:

Table 3 Comparisons of annualized return between difference strategy models

Annualized return for various strategy models					
Bloomberg Code		*VALIS*	*CPPI*	*Constant-Mix*	*B & H*
Japan		10.9%*	6.1%	10.1%	9.8%
V_s (NKY)	V_b (JPMUJPN				
Hong Kong		12.2%*	-13.6%	-20%	-18.4%
V_s (HSI)	V_b (JPMUJPN				
Annualized return for various strategy models					
Bloomberg Code		*VALIS*	*CPPI*	*Constant-Mix*	*B & H*
Korea		16.3%*	13.0%	13.4%	12.8%
V_s (KOSPI)	V_b (JPMUJPN				
Taiwan		6.1%*	0%	5.0%	4.2%
V_s (TWSE)	V_b				

PS. 1.Data Resource: Bloomberg (daily).
2. Symbol * denotes outperforms.

5. Conclusions

In respect of theorem model establishment, this research infers the concept of Value-at-Risk into the portfolio insurance strategy model *VALIS* so as to strengthen upside capture and through Value-at-Risk the future can be estimated conservatively and when the market is facing large fall, it will have better bottom breaking protection effect. In the essay, the characteristic of idea portfolio insurance proposed by Rubinstein is utilized to prove that *VALIS* conforms to the requirement of capital insurance strategy. In this empirical research, *VALIS* is being utilized to compare with famous traditional portfolio insurance strategy such as fixed multiplier of *CPPI*, *B&H*, *CM* so as to evaluate its performance.

In regard to the adoption of Value-at-Risk model, as appropriate selection has to be conducted based on investment underlying, amongst present several tens of values in risk calculation methods, each has its merits and demerits. Therefore, this essay has considered the application of the practicality of *VALIS* that the J.P. Morgan guidepost is considered for decision of proceeding. For induction and proof of other various types of Value-at-Risk, it can be based on the induction and proof with same reason in this essay and it can be inferred by investment operation underlying based on separate options, exchange rate, futures, etc as foundation. In addition, in respect of evaluation period and sampling period of Value-at-Risk, they can also be adjusted based on practical requirement. If it is financial institution like bank then it can be based on the suggested number of days and thresholds of standard of Basel Capital Accord in 1988 and other plans in Capital Adequacy Directive, CAD, BIS of Europe in 1996. Then based on these related parameters can be set. If it is the periodical rights department of securities merchants, new financial products department or derivative department or assets allocation management institutions, etc, then it can refer the standard setting suggestion from the G30 meeting of International Derivative Financial Products. As starting from 1997, countries in G10 already adopted the above-mentioned plan, therefore the implementation of assets allocation insurance strategy based on that standard will be able to conform to international trend and standard.

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