

### Application of The Single Index Model to Determine Optimal Portfolio Composition in IDXG30 Stocks (2021-2024)

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#### ABSTRACT

This study investigates optimal portfolio construction using the Single Index Model (SIM) with a focus on IDXG30 stocks in Indonesia, an index known for its high liquidity and market capitalization. In the context of growing investor interest in efficient yet practical portfolio strategies, this research aims to determine the composition of an optimal portfolio, allocate fund proportions accordingly, and assess the expected return and risk associated with the resulting investment. The study adopts a descriptive methodology with a quantitative approach. Secondary data were collected from 30 IDXG30-listed companies during the 2021–2024 period, including monthly stock prices, Jakarta Composite Index (JCI) values, and Bank Indonesia's 7-Day Reverse Repo Rate (BI7DRR) as the risk-free rate. The analysis follows the SIM framework, utilizing Excess Return to Beta (ERB) as the key selection metric. Results show that 15 companies qualified for the optimal portfolio, with the top five weighted stocks being NISP (53.96%), MIDI (7.57%), AUTO (7.53%), BBCA (6.61%), and MAPA (4.86%). The expected return of the constructed portfolio is 1.99%, with an estimated risk of 0.0765%. These findings demonstrate that the SIM can effectively guide investors in identifying high-performing stocks and achieving favorable risk-return trade-offs, particularly in emerging markets. The study provides relevant insights for fund managers and policymakers in designing index-based investment instruments.

#### ABSTRAK

Penelitian ini menginvestigasi konstruksi portofolio optimal dengan menggunakan *Single Index Model* (SIM) dengan fokus pada saham-saham IDXG30 di Indonesia, sebuah indeks yang dikenal memiliki likuiditas dan kapitalisasi pasar yang tinggi. Dalam konteks meningkatnya minat investor terhadap strategi portofolio yang efisien namun praktis, penelitian ini bertujuan untuk menentukan komposisi portofolio yang optimal, mengalokasikan proporsi dana yang sesuai, dan menilai *return* yang diharapkan dan risiko yang terkait dengan investasi yang dihasilkan. Penelitian ini menggunakan metodologi deskriptif dengan pendekatan kuantitatif. Data sekunder dikumpulkan dari 30 perusahaan yang terdaftar di IDXG30 selama periode 2021-2024, termasuk harga saham bulanan, nilai Indeks Harga Saham Gabungan (IHSG), dan suku bunga acuan Bank Indonesia *7-Day Reverse Repo Rate* (BI7DRR). Analisis mengikuti kerangka kerja SIM, dengan menggunakan *Excess Return to Beta* (ERB) sebagai metrik pemilihan utama. Hasil penelitian menunjukkan bahwa 15 perusahaan memenuhi syarat untuk portofolio optimal, dengan lima saham tertimbang teratas adalah NISP (53,96%), MIDI (7,57%), AUTO (7,53%), BBCA (6,61%), dan MAPA (4,86%). Imbal hasil yang diharapkan dari portofolio yang dibangun adalah 1,99%, dengan estimasi risiko sebesar 0,0765%. Temuan-temuan ini menunjukkan bahwa SIM dapat secara efektif memandu investor dalam mengidentifikasi saham-saham berkinerja tinggi dan mencapai pertukaran risiko-imbal hasil yang menguntungkan, terutama di pasar negara berkembang. Studi ini memberikan wawasan yang relevan bagi para manajer investasi dan pembuat kebijakan dalam merancang instrumen investasi berbasis indeks.

#### 1. Introduction

The capital market is crucial in supporting economic growth, particularly as an intermediary between surplus fund owners and entities needing capital. It facilitates the channeling of funds into various financial instruments, including stocks, bonds, and derivatives [1]. In Indonesia, stock indices such as LQ45, JII, and

IDXG30 are commonly used as benchmarks for constructing efficient and optimal investment portfolios. Prior studies also emphasized that financial fundamentals remain key drivers of stock valuation in Indonesia, even as environmental performance begins to play a secondary signaling role in capital market behavior [2].

Gross Fixed Capital Formation (GFCF)—an indicator of national investment activity—grew by 5.05% year-on-year in 2024 [3]. This increase reflects the rising investment activity in the country and underscores the expanding role of the capital market as a conduit for reallocating funds from surplus-holding entities to those requiring capital, primarily through instruments such as equities and bonds [1].

In the capital market, investors are required to make several critical decisions, one of which is the selection of appropriate investment strategies. Investment is the allocation of current funds or resources with the expectation of generating future returns [1]. The investment decision-making process typically consists of five stages: defining investment goals, establishing policies, selecting portfolio strategies, choosing assets, and evaluating portfolio performance [1]. Asset selection is particularly significant among these stages, as it directly influences portfolio outcomes. Several studies on the LQ45 index have investigated fundamental indicators like ROA and ROE, though their influence on return was found to be statistically insignificant during certain periods, highlighting the need for improved selection models such as the Single Index Model [4].

The primary objective of investors is to generate returns, which consist of two components: periodic income (yield) and capital gain/loss, derived from price differentials between buying and selling assets [1]. However, investment decisions also involve risk, which is defined as the uncertainty surrounding the expected outcomes. Risks can be categorized into systematic risk—market-driven and unavoidable—and unsystematic risk, which can be mitigated through diversification strategies [1], [5].

Two models are widely utilized to construct an efficient and optimal portfolio: the Markowitz Model and the Single Index Model. While the Markowitz Model offers a comprehensive analysis of the relationships among all asset returns, it is computationally complex due to the need for numerous covariance estimations. In contrast, the Single Index Model provides a simplified approach by linking an individual asset's return solely to the market index return, making it more practical and easier to implement [1].

The Single Index Model was developed as an alternative to address the limitations of the Markowitz Model. It introduces beta as a measure of an asset's sensitivity to market movements and requires simpler input data, making it more applicable for practical investment decisions [6]. Recent studies have highlighted that the Markowitz and Single Index Model possess distinct yet complementary characteristics. Research by [7] found that the optimal portfolio constructed using the Markowitz Model tends to include a greater number of stocks than the Single

Index Model, which typically selects only a few key stocks most responsive to market index movements. In contrast, [8] demonstrated that the Single Index Model can generate a portfolio with high returns and well-managed risk, particularly when applied to stocks within the Jakarta Islamic Index (JII). Earlier research also confirmed the effectiveness of the Single Index Model in forming an optimal portfolio, which comprised 14 selected LQ45 stocks with specific fund allocation proportions [9]. Similarly, [10] employed the Single Index Model to evaluate manufacturing stocks listed on the Indonesia Stock Exchange during 2012–2014. Their findings revealed that the most optimal portfolio, Portfolio 2, comprised HM Sampoerna Tbk (HMSP) and Indocement Tunggul Prakarsa Tbk (INTP). The selection was based on the Excess Return to Beta (ERB) exceeding the Cut-off Point (C\*), where HMSP, SMGR, and INTP met the optimal criteria; however, the HMSP–INTP combination exhibited superior overall performance.

These findings suggest that the Markowitz Model suits investors seeking extensive diversification. In contrast, the Single Index Model appeals to investors seeking a practical and efficient portfolio construction method. Nevertheless, studies that compare the application of both models specifically to high-performing stocks such as those listed in the IDXG30, especially in recent years (2021–2024), remain limited.

Based on the comparison in Table 1, it is evident that the Markowitz Model provides a comprehensive framework by considering all pairwise covariances among assets. However, it suffers from high computational complexity and substantial data requirements. In contrast, the Single Index Model simplifies the process by relating each asset's return to a single factor—the market return—thereby improving efficiency while maintaining analytical relevance. The Markowitz Model is ideal for investors prioritizing extensive diversification, while the Single Index Model is better suited for those favoring streamlined portfolio construction.

Table 1. Comparison between the Markowitz Model and the Single Index Model

Aspect	Markowitz Model	Single Index Model
Analytical Focus	Covariance among all assets	Relationship between stock and market return
Complexity	High (data-intensive and complex)	Low (efficient and straightforward)
Data Requirements	Variance and all asset covariances	Individual variances and beta coefficients
Investor Suitability	For maximum diversification	For quick and practical strategies

In the Indonesian context, stocks within the IDXG30 Index are recognized for their high liquidity and large market capitalization. These characteristics make IDXG30 constituents strong candidates for constructing efficient and well-performing portfolios

[6]. Therefore, this study focuses on the application of the Single Index Model to determine the optimal portfolio composition consisting of IDXG30 stocks over the 2021–2024 period [10]. Grounded in the aforementioned rationale, this research is titled: “Application of the Single Index Model to Determine Optimal Portfolio Composition in IDXG30 Stocks (2021-2024)”.

**2. Research Method**

This study employs a descriptive research design with a quantitative approach, aiming to systematically describe, analyze, and interpret the characteristics and behavior of stocks listed in the IDXG30 Index in order to construct an optimal investment portfolio using the Single Index Model. Descriptive research is used to objectively explain observable phenomena without extending generalizations beyond the study context [11]. The model is applied to assess individual stocks' risk, return, proportional allocation, and the resulting portfolio from 2021 to 2024.

**2.1. Data Type and Sources**

The study uses secondary data in the form of quantitative financial records. These include (1) Monthly stock price data of companies included in the IDXG30 Index from January 2021 to December 2024; (2) Monthly closing values of the Jakarta Composite Index (JCI) as a proxy for market performance over the same period; and (3) The average BI 7-Day Reverse Repo Rate (BI7DRR) for 2021–2024, which serves as the benchmark for the risk-free rate in all return calculations.

The data were obtained from official and reliable sources. Company listings under the IDXG30 Index were accessed through the Indonesia Stock Exchange’s official website (www.idx.co.id). Daily stock closing prices and historical index data were sourced from www.investing.com, while the BI7DRR data were retrieved from Bank Indonesia’s official website (www.bi.go.id). The list of companies considered constituents of the IDXG30 during the most recent evaluation period (May 6 to August 4, 2025) was used to ensure consistency and sample relevance.

**2.2. Population and Sampling Technique**

The population for this study includes all companies listed on the Indonesia Stock Exchange (IDX). This population employed a purposive sampling technique to select companies that consistently appeared in the IDXG30 Index throughout the 2021–2024 period. A total of 30 companies met this criterion and were used as the research sample. The names of these companies are provided in Table 2.

Table 2. List of Sampled Companies

No	Code	Stock Name
1	AKRA	Akr Corporindo Tbk
2	AMRT	Sumber Alfaria Trijaya Tbk
3	AUTO	PT. Astra Otoparts Tbk.
4	BBCA	Bank Central Asia Tbk
5	BBNI	Bank Negara Indonesia Tbk
6	BBRI	Bank Rakyat Indonesia (Persero) Tbk
7	BMRI	Bank Mandiri (Persero) Tbk
8	BMTR	Global Mediacom Tbk
9	BNGA	Bank CIMB Niaga Tbk
10	BRIS	Bank Syariah Indonesia Tbk
11	CTRA	Ciputra Development Tbk
12	ENRG	Energi Mega Persada Tbk
13	ESSA	Surya Esa Perkasa Tbk
14	HEAL	Medikaloka Hermina Tbk
15	ICBP	Indofood CBP Sukses Makmur Tbk
16	INDF	Indofood Sukses Makmur Tbk
17	INDY	Indika Energy Tbk
18	INKP	Indah Kiat Pulp & Paper Tbk
19	ISAT	Indosat Tbk
20	ITMG	Indo Tambangraya Megah Tbk
21	JPFA	Japfa Comfeed Indonesia Tbk
22	KLBF	Kalbe Farma Tbk
23	LSIP	PP London Sumatra Indonesia Tbk
24	MAPA	MAP Aktif Adiperkasa Tbk
25	MIDI	Midi Utama Indonesia Tbk
26	MIKA	Mitra Keluarga Karyasehat Tbk
27	NISP	Bank OCBC NISP Tbk
28	SSIA	Surya Semesta Internusa Tbk
29	TKIM	Pabrik Kertas Tjiwi Kimia Tbk
30	TLKM	Telkom Indonesia (Persero) Tbk

**2.3. Data Collection and Analysis**

Data collection was conducted using documentation techniques, involving the retrieval, organization, and review of existing financial datasets. The data analysis follows the procedure of the Single Index Model, which allows for efficient portfolio construction by simplifying the computation of return and risk using market-related factors alone. The analysis steps include:

- a) Calculation of individual stock realized returns using the Equation (1)

$$R_i = \frac{P_t - P_{t-1} + D_t}{P_{t-1}} \tag{1}$$

- b) Calculation of expected return (E(R<sub>i</sub>)) for each stock using Equation (2).

$$E(R_i) = \frac{\sum R_i}{n} \tag{2}$$

- c) Calculation of market return (R<sub>mi</sub>) during the observation period using Equation (3).

$$R_{m,t} = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}} \quad (3)$$

- d) Calculation of expected market return (E(R<sub>m</sub>)) using Equation (4).

$$E(R_{m,t}) = \frac{\sum RM}{n} \quad (4)$$

- e) Calculate stock beta (β<sub>i</sub>) and alpha (α<sub>i</sub>) using regression analysis between individual and market returns using Equation (5).

$$\beta_i = \frac{\sigma_{i,m}}{\sigma_m^2} \quad (5)$$

- f) Measurement of investment risk, including: Idiosyncratic (unsystematic) risk (σ<sub>ei</sub><sup>2</sup>) using Equation (6).

$$\sigma_{ei}^2 = \frac{1}{t} \sum_t [R_{it} - (\alpha_i + \beta_i R_{m,t})]^2 \quad (6)$$

- Total variance (σ<sub>i</sub><sup>2</sup>) of the security: using Equation (7).

$$\sigma_i^2 = \beta_i^2 \cdot \sigma_m^2 + \sigma_{ei}^2 \quad (7)$$

- g) Determination of the risk-free rate (R<sub>r</sub>) using the average BI 7-Day Reverse Repo Rate for the 2021–2024.  
h) Calculation of the Excess Return to Beta (ERB<sub>i</sub>) using Equation (8).

$$ERB_i = \frac{E(R_i) - R_{BR}}{\beta_i} \quad (8)$$

- i) Calculation of selection parameters A<sub>i</sub> and B<sub>i</sub> for each stock using Equation (9).

$$A_i = \frac{[E(R_i) - R_{BR}] \cdot b_i}{\sigma_{ei}^2}; B_i = \frac{\beta_i^2}{\sigma_{ei}^2} \quad (9)$$

- j) Cumulative cutoff value (C) calculation\* using cumulative A and B values using Equation (10).

$$C_i = \frac{\sigma_m^2 \sum_{j=i}^i A_j}{1 + \sigma_m^2 \sum_{j=i}^i B_j} \quad (10)$$

- k) Determination of Zi values for selected stocks using Equation (11).

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} (ERB_i - C^*) \quad (11)$$

- l) Computation of portfolio weights (W<sub>i</sub>) for each selected stock using Equation (12).

$$W_i = \frac{Z_i}{\sum_{j=i}^k Z_j} \quad (12)$$

- m) Portfolio expected return calculation using Equation (13).

$$E(R_p) = \alpha_p + \beta_p \cdot E(R_m), \text{ with}$$

$$\alpha_p = \sum_{i=1}^n W_i \cdot \alpha_i; \beta_p = \sum_{i=1}^n W_i \cdot \beta_i \quad (13)$$

- n) Portfolio risk calculation using Equation (14).

$$\sigma_p^2 = \beta_p^2 \cdot \sigma_m^2 \quad (14)$$

Through this systematic application of the Single Index Model, the study aims to construct an optimal stock portfolio that balances expected return and risk, grounded in real market data and theoretically sound methodologies.

### 3. Results and Discussion

This study aims to determine the optimal portfolio composition using the Single Index Model (SIM), which simplifies the assumptions of inter-security correlation by incorporating market return as a single explanatory factor [12]. The model is particularly suitable for emerging markets such as Indonesia due to its computational efficiency and ability to separate systematic and unsystematic risk [6]. The study examines 30 stocks listed in the IDXG30 Index from January 2021 to December 2024. Monthly closing price data were collected from the official website of the Indonesia Stock Exchange (IDX), while market performance was represented by the Jakarta Composite Index (JCI). The risk-free rate was assumed to be 6% annually (or 0.5% monthly), by the methodology outlined by [13]. Expected returns for individual stocks were calculated using the arithmetic mean of monthly returns.

#### 3.1. Expected Returns of Individual Stocks

Table 3. Individual Stock Expected Return E(R<sub>i</sub>)

Stock	E(R <sub>i</sub> )	Stock	E(R <sub>i</sub> )	Stock	E(R <sub>i</sub> )
AKRA	1.59%	CTRA	0.33%	JPFA	1.08%
AMRT	3.26%	ENRG	2.17%	KLBF	-0.06%
AUTO	1.92%	ESSA	4.82%	LSIP	-0.40%
BBCA	0.83%	HEAL	2.06%	MAPA	3.99%
BBNI	1.06%	ICBP	0.55%	MIDI	2.33%
BBRI	0.24%	INDF	0.35%	MIKA	0.06%
BMRI	0.94%	INDY	0.53%	NISP	1.14%
BMTR	-0.65%	INKP	-0.42%	SSIA	3.02%
BNGA	1.38%	ISAT	0.31%	TKIM	-0.39%
BRIS	1.06%	ITMG	2.01%	TLKM	-0.24%

Table 3 indicates that BMTR, KLBF, INKP, LSIP, TKIM, and TLKM exhibit negative expected return values (based on expected return (E(R<sub>i</sub>))), thereby excluding them from the optimal portfolio selection

and disqualifying them from progressing to subsequent stages of analysis [14]. Among the remaining stocks, ESSA recorded the highest expected return at 4.82%, while BMTR posted the lowest at -0.65%. However, the 24 stocks that passed the initial selection process do not constitute an optimal portfolio composition. Therefore, further analysis is required to determine the appropriate weight allocation for each security.

3.2. Selection of Stocks for the Optimal Portfolio

Based on the results presented in Table 4, the highest cut-off value ( $C_i$ ) is attributed to Sumber Alfaria

Trijaya Tbk (AMRT), with a value of 0.002097254. This value is designated as the cut-off point ( $C^*$ ), serving as a threshold to determine which stocks are eligible for inclusion in the optimal portfolio. Only stocks with an ERB greater than this  $C^*$  are selected. Consequently, of the 30 stocks listed in the IDXG30 index, only 20 satisfied this criterion and advanced to the next portfolio construction stage. The next step involves calculating and analyzing the proportion of each selected stock within the optimal portfolio using their respective  $Z_i$  and  $W_i$  values to determine their optimal allocation [15].

Table 4.  $A_i$ ,  $B_i$ , and Highest Cut Off Value  $C_i$

No	Stock	ERB	$A_i$	$B_i$	$C_i$
1	AKRA	0.013612377	1.498239882	160.602841700	0.000946193
2	AMRT	0.020224159	3.400610381	198.621276700	0.002097254
3	AUTO	0.023480383	1.371242276	79.010086390	0.000913037
4	BBCA	0.009901727	1.564389802	394.719068800	0.000860711
5	BBNI	0.005434783	1.522255699	530.924932900	0.000779141
6	BBRI	0.001507929	-0.882805247	539.141760600	-0.000449957
7	BMRI	0.006509505	1.344672381	442.988319000	0.000720685
8	BNGA	0.013194658	1.990059522	236.094464800	0.001199603
9	BRIS	0.008731672	0.530412921	115.197732800	0.000344864
10	CTRA	0.001758819	-0.452486244	500.536923100	-0.000235257
11	ENRG	0.010032134	1.701060162	220.406519800	0.001035185
12	ESSA	0.027731244	1.606909186	64.658694120	0.001080278
13	INDY	0.003442278	0.023401118	135.415806500	1.50175E-05
14	ISAT	0.006427786	-0.039335356	10.177591240	-2.74494E-05
15	ITMG	0.015054617	1.560017667	137.971958000	0.000999493
16	MAPA	0.031239322	2.433540399	89.049398680	0.001609605
17	MIDI	0.029199333	1.292852174	56.385475590	0.000874008
18	MIKA	0.005739063	-0.108735085	2.657025966	-7.62789E-05
19	NISP	0.051506229	0.435752726	15.095021960	0.000303041
20	SSIA	0.036224768	0.714243621	23.622442540	0.000493788

3.3. Proportional Allocation of Selected Stocks

After identifying the stocks eligible for inclusion in the optimal portfolio, the next step involved calculating each stock's proportion ( $W_i$ ). These weights were

derived based on  $Z_i$  values, which reflect the adjusted marginal contribution of each stock to the portfolio's overall performance. Table 5 summarizes each stock's  $\beta_i$ , unsystematic risk ( $\sigma_{ei}^2$ ),  $ERB_i$ , and final weights.

Table 5.  $A_i$ ,  $B_i$ , and Highest Cut Off Value  $C_i$

Stock	$\beta_i$	$\sigma_{ei}^2$	$ERB_i$	$C^*$	$Z_i$	$W_i$	Note (%)
AKRA	1.167262455	0.008483671	0.013612377	0.0020973	0.726611272	0.027515762	2.75
AMRT	1.611301835	0.013071578	0.020224159	0.0020973	0.906152926	0.034314755	3.43
AUTO	0.816312982	0.008433947	0.023480383	0.0020973	1.988199219	0.075290349	7.53
BBCA	0.841973683	0.001796011	0.009901727	0.0020973	1.746033070	0.066119852	6.61
BNGA	1.049191010	0.004662548	0.013194658	0.0020973	1.285614140	0.048684425	4.87
BRIS	1.211445132	0.012739828	0.008731672	0.0020973	0.093483431	0.003540088	0.35
ENRG	2.160477080	0.021177510	0.010032134	0.0020973	0.023660196	0.000895979	0.09
ESSA	1.736672563	0.046645415	0.027731244	0.0020973	0.409236362	0.015497214	1.55
ISAT	0.485781908	0.023186632	0.006427786	0.0020973	0.017638526	0.000667947	0.07
ITMG	1.334100487	0.012899897	0.015054617	0.0020973	0.562536943	0.021302494	2.13
MAPA	1.278334528	0.018350929	0.031239322	0.0020973	1.283767665	0.048614502	4.86
MIDI	0.797382388	0.011276285	0.029199333	0.0020973	1.997734167	0.075651424	7.57
MIKA	0.107152035	0.004321207	0.005739063	0.0020973	0.119026463	0.004507367	0.45
NISP	0.220858628	0.003231432	0.051506229	0.0020973	14.248492930	0.539570677	53.96
SSIA	0.834869375	0.029506131	0.036224768	0.0020973	0.998905451	0.037827165	3.78
Total					26.407092760	1	100

Among the selected stocks, Bank OCBC NISP Tbk (NISP) held the most significant weight in the portfolio at 53.96%, followed by MIDI (7.57%), AUTO (7.53%), BBKA (6.61%), and MAPA (4.86%). These five stocks accounted for a significant portion of the total portfolio allocation, indicating that they offered the most favorable risk-adjusted returns relative to the cut-off threshold.

### 3.4. Expected Return and Portfolio Risk

The expected return of the constructed portfolio represents the anticipated return rate derived from the composition of the selected stocks. Once the portfolio's alpha ( $\alpha_p$ ) and beta ( $\beta_p$ ) coefficients are determined, the expected return can be calculated using the following Equation (15) [16].

$$E(R_p) = 0.015888043 + 1.043541073 \cdot 0.0038698$$

$$E(R_p) = 0.019926295 \text{ or } 1.99 \% \quad (15)$$

Following this, the portfolio risk is computed to assess the variability of returns. Unlike a simple weighted average of individual stock risks, portfolio risk accounts for market correlation through beta. The risk is estimated using the Equation (16) [17].

$$\sigma_p^2 = (1.043541073)^2 \cdot 0.0007028$$

$$\sigma_p^2 = 0.000765357 \text{ or } 0.0765\% \quad (16)$$

These calculations indicate that the constructed portfolio yields an expected return of 1.99% with a relatively low portfolio risk of 0.0765%. This favorable return-to-risk ratio suggests the portfolio is efficiently optimized. It offers a compelling investment option for risk-averse investors, especially within emerging markets. Moreover, the application of the Single Index Model has proven effective in identifying high-performing stocks based on superior Excess Return to Beta (ERB) values, reinforcing its relevance and practical utility in constructing optimal portfolios [18], [19].

## 4. Conclusion

This study demonstrates that the Single Index Model (SIM) is an effective and practical approach for constructing optimal portfolios in the Indonesian capital market, particularly using IDXG30 stocks. Of the 30 stocks analyzed from 2021 to 2024, 15 were included in the final optimal portfolio, with NISP, MIDI, AUTO, BBKA, and MAPA contributing the highest weights based on Excess Return to Beta (ERB). The resulting portfolio offers a favorable balance between return (1.99%) and risk (0.0765%), highlighting SIM's ability to support efficient asset selection and risk-adjusted investment strategies. These findings offer practical insights for fund managers

designing index-based investment products in emerging markets.

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