

INTISARI

PENGEMBANGAN APLIKASI R-SHINY BERBASIS *GRAPHICAL USER INTERFACE* UNTUK OPTIMASI PORTOFOLIO IDXESGL DENGAN *DATA ENVELOPMENT ANALYSIS* DAN *GLOSTEN-JAGANNATHAN-RUNKLE GARCH*

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Penelitian ini dilatarbelakangi oleh peningkatan partisipasi investor dan kebutuhan integrasi aspek keberlanjutan (ESG) di pasar modal Indonesia. Indeks IDX ESG *Leaders* digunakan sebagai semesta awal, namun label ESG tidak menjamin efisiensi finansial atau operasional. Penelitian ini mengembangkan kerangka analitik multi-tahap. Tahapannya meliputi penyaringan awal berdasarkan *return* tahunan positif dan korelasi antarsaham rendah, penilaian efisiensi fundamental menggunakan DEA model VRS berorientasi keluaran (PER dan DER sebagai *input* serta ROE dan EPS sebagai *output*), pemodelan *mean* (ARMA) dan volatilitas bersyarat (GARCH/GJR-GARCH) bagi saham dengan efek ARCH teridentifikasi melalui uji ARCH-LM, serta optimasi *mean-variance* tanpa *short selling*. Seleksi 30 emiten mengidentifikasi 9 emiten dengan *return* positif, yang seluruhnya lolos uji korelasi. Dari jumlah tersebut, emiten BBKA.JK, BNGA.JK, CMRY.JK, PGAS.JK, SIDO.JK efisien secara DEA. Analisis volatilitas lebih lanjut menemukan hanya BBKA.JK dan BNGA.JK yang menunjukkan efek ARCH. BBKA.JK terbukti memiliki *leverage effect* sehingga dimodelkan dengan GJR-GARCH(1,1), sementara BNGA.JK dimodelkan dengan sGARCH(1,1). Pada optimasi portofolio, *Filtered Historical Simulation* (FHS), yang mengintegrasikan model volatilitas tersebut, menghasilkan portofolio *minimum-variance* yang lebih efisien (rasio *sharpe* 1,320) dibandingkan *Historical Simulation* (HS) konvensional (rasio *sharpe* 0,891). Seluruh tahapan diimplementasikan dalam aplikasi R-Shiny berbasis GUI untuk analisis interaktif.

Kata Kunci: Optimasi Portofolio, *Data Envelopment Analysis*, *Filtered Historical Simulation*, Glosten–Jagannathan–Runkle GARCH, *Mean–Variance*.

ABSTRACT

DEVELOPMENT OF AN R-SHINY APPLICATION BASED ON A GRAPHICAL USER INTERFACE FOR IDYESGL PORTFOLIO OPTIMIZATION USING DATA ENVELOPMENT ANALYSIS AND GLOSTEN-JAGANNATHAN-RUNKLE GARCH

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This study is motivated by increasing investor participation and the need to integrate sustainability (ESG) aspects within the Indonesian capital market. The IDX ESG Leaders Index is used as the initial universe, but the ESG label does not guarantee financial or operational efficiency. This research develops a multi-stage analytical framework. The stages include initial screening based on positive annual return and low inter-stock correlation, fundamental efficiency assessment using an output-oriented DEA VRS model (PER and DER as inputs and ROE and EPS as outputs), mean (ARMA) and conditional volatility (GARCH/GJR-GARCH) modeling for stocks with ARCH effects identified via the ARCH-LM test, and mean-variance optimization without short selling. The selection from 30 issuers identified 9 with positive returns, all of which passed the correlation test. From this group, the issuers BBKA.JK, BNGA.JK, CMRY.JK, PGAS.JK, and SIDO.JK were found to be DEA efficient. Further volatility analysis found only BBKA.JK and BNGA.JK showed ARCH effects. BBKA.JK was proven to have a leverage effect and was modeled with GJR-GARCH(1,1), while BNGA.JK was modeled with sGARCH(1,1). In portfolio optimization, Filtered Historical Simulation (FHS), integrating these volatility models, yielded a more efficient minimum-variance portfolio (Sharpe ratio 1.320) compared to conventional Historical Simulation (HS) (Sharpe ratio 0.891). All stages are implemented in a GUI-based R-Shiny application for interactive analysis.

Keywords: Portfolio Optimization, Data Envelopment Analysis, Filtered Historical Simulation, Glosten-Jagannathan-Runkle GARCH, Mean-Variance.