This study examines the relationship between earnings volatility and operational efficiency in Islamic banks in SSA, addressing a key methodological limitation in the Islamic banking efficiency literature. Conventional Data Envelopment Analysis (DEA), widely used in prior studies, produces upward-biased efficiency scores and invalid second-stage inference when efficiency is linked to stochastic variables such as earnings volatility. This limitation is particularly consequential in Islamic banking, where income streams are structurally volatile due to profit-and-loss sharing and asset-backed financing arrangements. Methodologically, this study demonstrates the necessity of bias correction and applies the Simar–Wilson two-stage DEA framework to obtain statistically valid efficiency–volatility estimates. Using a balanced panel of fully-fledged Islamic banks in SSA from 2010 to 2024, operational efficiency is measured as income-generation efficiency based on non-interest revenue streams. First, operational efficiency is estimated under alternative returns-to-scale assumptions using non-interest operating expenses as inputs and Shariah-compliant non-interest income components as outputs. In the second stage, bias-corrected efficiency scores are regressed on earnings volatility—measured as the rolling standard deviation of return on assets (ROA), which captures earnings volatility relative to asset utilization and aligns with operational efficiency—using truncated regression with bootstrapping. The results reveal a statistically significant negative relationship between earnings volatility and operational efficiency, indicating that earnings volatility weakens Islamic banks’ capacity to efficiently transform operating costs into Shariah-compliant income. Robustness checks confirm the stability of the findings across efficiency specifications. Beyond its empirical contribution, the study shows that efficiency levels reported in prior Islamic banking studies relying on conventional DEA may be systematically overstated in volatile-income environments, with important implications for supervision and policy in emerging Islamic finance markets.