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Does Shariah Based Asset Categorization Improve Portfolio Performance

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The paper examines the performance of Shariah compliant and conventional portfolios in Pakistan during the period 2009-19 by using Markowitz minimum-variance framework. Using daily excess returns, we first investigate the impact of Shariah screening criteria on stock returns then we evaluate the overall risk of Shariah compliant and conventional portfolios. The results reveal negative impact of Shariah screening criteria on stock returns' cross-section. Further, unconstrained portfolio investment strategy outperforms faith-based investing. Finally, the findings of the study suggest that induction guidelines employed in PSX for companies to be listed in Shariah compliant index needs to be reviewed to practically attain the objectives of Islamic moral economy such as avoiding Gharar (uncertainty) and Maysir (speculation).

***Keywords*:** Shariah portfolio, conventional portfolio, Markowitz framework, risk, Shariah screening criteria.
***JEL Classification*:** G11, G12.

INTRODUCTION

Islamic financial industry has grown exponentially in last two decades. Since the inception Islamic capital markets have experienced incredible progress around the globe. At the end of 2014 Islamic mutual funds proliferated to 943, twice the number in 2008. According to the data of Thomson Reuters at the end of 2017 the worth of Islamic funds globally reached USD 110 billion in assets. Moreover, the statistics of Islamic Finance Development Report 2018 also reveal that in terms of new mutual funds launched, Malaysia lead with 41, followed by Pakistan with 32 mutual funds. The Islamic Shariah compliant investments are based on Islamic Shariah law and ethics which prohibit interest (Riba), excessive ambiguity and uncertainty (Gharar), speculation (Maysir) and prevention of participating in unethical industries. Following the Shariah guidelines only those stocks are considered for Islamic investment indices which satisfy Shariah screening criteria. Normally, Shariah screening is executed for two categories. First primary class is of sectors screening and the secondary class contains several obedience measurements. Following the screening process, enterprises with non-compliant actions are eliminated while the remaining firms are inspected for obedience by estimating few financial ratios (debt, liquidity, currency exchange rate, etc.). However, few ratios may interfere in compliant estimations, thus Shariah scholars stick to stable minimum compliance conditions as absolute Shariah compliance is hard to achieve.

Despite the overwhelming growth of Islamic capital markets in recent times, there exists a divergent opinion about the success of Islamic Shariah compliant investments. The pessimistic view asserts Islamic stocks underperform as compare two traditional stocks. The view is based on the rational that Shariah guidelines restrict a firm's ability to utilize the other sources of funding (debt), and this ends up affecting the ability of business to grow. Moreover, the underlying restrictions may also result in decreasing the revenue of the business (McGowan & Muhammad, 2010). On the contrary, Miniaoui et al. (2015) argues that Islamic Shariah compliant stocks are less risky as compare to traditional stocks. Consistent with Shariah principles the screening guidelines are directly related to firm's fundamentals such as firm's major business undertakings, riskiness, business procedures, funding sources, profitability, returns, and leverage. For this reason, in efficient Islamic capital market it can be considered that firm's fundamental indicators reflect Shariah guidelines. However, the previous evidence shows lack of consensus about the risk and return performance of Islamic vs. conventional stocks in different stock markets across the globe.

Present-day conventional Markowitz optimization framework is used as a benchmark for investment strategies. Previously, mean-variance optimization framework (1952, 59) was scarcely utilized; instead the primary focus of practitioners was to reveal the assets with higher expected returns. Simultaneously, the focal point of most of the theoretical research was on modeling expected returns, defining equilibrium models of expected returns and documenting the return patterns that are deviant from these equilibrium models. Further, in the past estimating pairwise correlations between large number of securities for efficient portfolio selection was troublesome and infeasible task for asset managers. However, with recent augmentation of technology and computing has enhanced the capability of portfolio managers to use more sophisticated quantitative techniques to improve portfolio optimization. The recent emphasis on asset allocation, international portfolio diversification has spurred interest on risk control among asset managers in investment industry.

Literature reveals two divergent views about the performance of Shariah compliant portfolios. First, Shariah compliant investments can have lower returns due to the Shariah screening criteria (Merdad et al., 2015). This argument is rooted in conventional portfolio theory and mean-variance optimization framework, where subset of unconstrained portfolio underperforms. On the contrary, the view argues that using Shariah screening criteria to exclude highly leveraged companies and discouraging excessive uncertainty reduces portfolio risk (Ghoul & Karam, 2007). In addition, theoretically following the Shariah principles of avoiding uncertainty (Gharar) and speculation (Maysir) imply that Shariah compliant investments should offer diversification opportunity during adverse market condition (Canepa & Ibnrubbian, 2014; Al-Khazali et al., 2014). This study contributes to the existing debate on comparing the performance of Shariah compliant and conventional portfolios. This study investigates the performance of Shariah compliant and conventional portfolios for the period of 2009-19 in Pakistan Stock Exchange (PSX). Unlike, the previous studies we use mean-variance optimization model to compare the riskiness of Islamic and conventional stocks. Using daily excess returns, we first investigate the impact of Shariah screening criteria on the overall risk of Shariah compliant and conventional portfolios. The results reveal negative impact of Shariah screening criteria on stock returns' cross-section. Further, unconstrained portfolio outperforms Shariah compliant portfolio in terms of overall risk. The findings imply that Shariah compliant portfolio has higher volatility than conventional portfolio.

LITERATURE REVIEW

There are numerous studies that examine conventional and Islamic equity investments from the perspective of portfolio optimization. However, the findings are varied. Some studies find that Islamic equities within US and Malaysian stock markets, provide benefits to fund managers through their inclusion in equities portfolios, but institutional investors may not reap the same advantages (Hussein & Omran, 2005; Al-Khazali et al., 2014). Dewandaru et al. (2017) show better results in the Dow Jones Islamic Index even when employing various selection processes. Similarly, Akhtar and Jahromi (2017) examine average variance of Malaysian portfolios to find that at same levels of return there is a lower risk for Shariah stocks. While, Narayan et al. (2017) examine the risk and return effects of Shariah stocks to find that they exhibit elements of momentum and provide a cushion against risk to investors.

Various studies examine the impact of market fluctuations on both conventional and Islamic portfolios. Abdullah et al., (2007) observe higher performance of Shariah portfolios when Malaysian markets are bearish, and vice versa for bullish market states. Likewise, Hussein (2004) uses CAPM and documents that Islamic and FTSE indices perform equally well. However, during bullish market the former shows higher returns, while the traditional index is a winner during bearish markets. Further, Hakim and Rashidian (2004), find no association between Islamic equities index and Wilshire 5000 or with 3-month treasury bills. While, Akhtar et al. (2017) observe that Islamic Sukuk bonds are less sensitive to fluctuations in interest rates in comparison to traditional bonds. However, this advantage is not observed in the stock indices due to similar assimilation of news information in the two equities markets. Furthermore, Kenourgios et al. (2016) find the spillover effects during the global and Eurozone financial crises and observes that both Islamic equity and bond markets are unresponsive to shocks in the world markets. Nevertheless, many studies contend that Islamic indices perform better than their traditional counterparts in terms of risk and return (Dharani & Natarajan, 2011a, b; Jawadi et al., 2014; Al-Kahazali et al., 2014; Narayan & Bannigidadmath, 2015).

Similarly, various studies do not find support for strong performance of Islamic instruments. Mohammad and Ashraf (2015), observe poor market timing strategies for Shariah stock indices on MSCI, Dow Jones, and S&P. The authors attribute this to the conformist Islamic trading strategies that censure investments in companies carrying high debt and interest payments. Merdad et al., (2015) also found negative market yields for Islamic equity portfolios. Further, Hayat and Kraeussl (2011) show conventional stock funds outperform the Islamic equity funds, and the gap was greater during the financial crisis. Furthermore, many others have shown that there is no distinct advantage of including Islamic equities in portfolios (Ahamad & Ibrahim, 2002; Hussein 2005). Moreover, Umar (2017) found Islamic stocks are more attractive to short term investors while conventional stocks have a more long-term attraction. In addition, investors incur greater losses due to the exclusion of non-Islamic equities from their portfolios.

A line of studies also documents no difference in market returns of Non-Islamic and Islamic indices (Ahmad & Mustafa, 2002). Dania and Malhotra (2013) argue that there is a strong relationship between returns for both types of indices in US, Europe, Far East, and Pacific and the macro-economic indicators influencing the stock indices are common. Additionally, Krasicka and Nowak (2012) show negligible differences in financial performance of Islamic and conventional equity indices.

More recently there is an increasing interest in ethical equity portfolios. Ethical assets are those selected on basis of environmental, social and corporate governance considerations which are considered as socially responsible. Many view Islamic investments as ethical since the investment decisions and trading practices are guided by Islamic Shariah regulations and practices and endorse the similarities of Islamic tenets and socially responsible practices (Girard & Hassan, 2008; Williams & Zinkin, 2010). Various studies show Islamic ethical portfolios do not perform negatively on account of the Shariah filters in comparison to non-Islamic portfolios (Hassan et al., 2005; Hoepner et al., 2011). Forte and Miglietta (2011) investigate the relationship between Islamic mutual funds and group of socially responsible conventional mutual funds. The findings show similarities between the two and found that socially responsible investments perform better and with lower costs. Studies also document the superior performance of Islamic funds during the financial crisis and attribute this to the Islamic screening process (Hoepner et al., 2011). On the other hand, Revelli and Viviani

(2015) find that in comparison to traditional portfolios, corporate socially responsible portfolios have no enhancing or reducing impacts on stock returns. While, some studies show higher performance of ESG drove indices with greater filtering (Barnett & Salomon, 2006; Capelle-Blancard & Monjon, 2014). Others have found deficiencies in the selection processes of Islamic indices and suggest that conventional portfolios exhibit superior weighting scheme to enhance risk-adjusted performance (Khatkhatay & Nisar, 2007).

A review of the literature indicates that there appears to be no agreement in respect of the performance of Islamic stocks in relation to the traditional equities. Does screening of equities in line with Shariah principles contribute to more efficient risk and return performance? The question remains largely unanswered.

METHODOLOGY

We collect daily closing prices for Islamic and conventional stocks listed on KSE-100 index from data portal of PSX. The data is collected for time period from 1st January 2009 to 31st December 2019. The distinction between Islamic and conventional stock is based on Shariah screening criteria used by PSX to list stocks in Karachi Meezan Index (KMI-30). The index includes top 30 Islamic compliant stocks. The final sample is reduced to 83 stocks as the data of 17 stocks stock for earlier years was not available. We calculated daily excess returns on each of the 83 stocks using $r_i = \ln (P_t / P_{t-1})$. Additionally, in order to avoid noise in our return's series, we add the daily returns at the end of each month to obtain the monthly excess return for each of the stocks.

Portfolio Construction Scheme

To investigate the impact of Shariah screening on risk-return of the stocks in mean-variance framework, we divide our sample into three categories. The first category includes only conventional stocks which are termed as sin-stocks. The second category includes only Shariah compliant stocks which are named as faith-stocks. The third and last category includes all the sample stocks in our study which are labeled as sin-faith-stocks. Further, we formulate optimum portfolios using our three stock categories in Markowitz optimization framework. Short selling is not allowed as it prohibited in PSX. The optimized portfolios formulated are fully invested and sum of the individual weights is equals to one. Finally, the optimized portfolios constructed from the sets of stocks are evaluated using portfolio performance evaluations measures such as Sharpe ratio, Jensen alpha and Treynor measure.

Global Minimum Variance Portfolio

Markowitz optimization model is a single period mathematical model for efficient portfolio selection. The mean- variance model provides the fundamentals for portfolio analysis and development of efficient portfolio. The model proposes that rational investors will always hold portfolios on efficient frontier depending upon their individual risk and return preferences. The set of portfolios on efficient frontier warrants allocative efficiency through maximization of return for given level of risk or minimization of risk for certain level of expected return. Although, all the efficient portfolios exist on efficient frontier, the Global Minimum Variance (GMV) portfolio denotes the beginning of the frontier with lowest volatility among the efficient portfolios. The mathematical derivation of GMV portfolio is given as follows:

Let's assume an asset universe with (n) number of assets and weight (v) vectors along the covariance matrix defined as (Σ). Using the subjective and objective function the optimization process is defined as:

$^{min}_{v} 1/2 v' \Sigma v$ Subject to v'1 =1; 1' = [1, 1, 1…. 1] ……. **(1)**

The optimal weights of GMV portfolio with minimum variance are estimated as following;

$$v_{GMV} = \frac{\Sigma_1^{-1}}{1'\Sigma^{-1}1} \text{ ……. } \textbf{(2)}$$

Further, the primary component of the equation is the estimation of variance-covariance matrix which is defined as Σ. It is estimated using constant variance and pairwise covariances of the given asset universe.

Let's assume variance-covariance matrix is a square matrix of the variances and co-variances of the given asset universe. It holds the variances of every single asset category as diagonal entries, whereas the off-diagonal entries show the co-variances for all potential combinations of the asset categories. In brief, the variance is squared mean deviation, whereas the covariance specifies the way two asset categories change together. Mathematically, it can be represented in the following way:

$$\sum = \begin{bmatrix} \sum y_1^2/N & \sum y_1 y_2/N & \cdots & \sum y_1 y_i/N \\ \sum y_2 y_1/N & \sum y_2^2/N & \cdots & \sum y_2 y_i/N \\ \sum y_i y_1/N & \sum y_i y_2/N & \cdots & \sum y_i^2/N \end{bmatrix} \text{..... } \textbf{(3)}$$

Where in equation (3):

$\sum$ = variance-covariance matrix of $(i * i)$

n = number of data points in every single asset category

y_i = mean deviation

$\sum y_1^2/N$ = variance of the i^{th} asset category

$\sum y_i y_j/N$ = covariance between asset categories i and j.

Portfolio Performance Evaluation Measures

Sharpe Ratio

Sharpe ratio measures risk premium arising from each unit of risk. To put it simply, the ratio divides portfolio's average excess return by the standard-deviation of returns for a specific period. The higher the ratio, the better the performance of portfolio is considered. The ratio is calculated using following formula:

$$SR = \frac{R_p - R_f}{\sigma_p} \text{……} \textbf{(4)}$$

Where in equation in (4):

R_p = portfolio's expected return

R_f = risk-free-rate

σ_p = standard deviation of portfolio return

Treynor Measure

Treynor index is very similar to Sharpe ratio and the only difference between the two is that Treynor measure uses portfolio beta instead of standard deviation to measure risk of the portfolio. Following formula is used to calculate the ratio:

$$TR = \frac{R_p - R_f}{\beta_p} \text{ ……. } \textbf{(5)}$$

Where in equation (5):

R_p = portfolio's expected return

R_f = risk free rate
β_p = Beta of the portfolio

Jensen's Alpha

Jensen's alpha measures the risk-adjusted performance of a portfolio relative to the market expected return from the market computed using CAPM model. The formula is given below:

$$\alpha_p = R_p - [R_f + \beta_p (R_m - R_f)] \ldots\ldots\ldots \textbf{(6)}$$

Where, in equation (6):
R_p = portfolio's expected return
R_f = risk-free-rate
β_p = portfolio's beta
R_m = market expected return

The formula shows the difference between portfolio's average return [R_P] and average expected return measured using the CAPM approach [$R_f + \beta_p (R_m - R_f)$]. Under the CAPM the link between excess return of a portfolio [$R_p - R_f$] and excess return of the market portfolio [$R_m - R_f$] is directly captured through beta of portfolio (βp). A higher value of the alpha indicates the superior performance of the portfolio.

Empirical Results

As described in the section 3, we divide our stocks in three categories, faith stock, sin stocks and faith-sin stocks. Further, we formulate optimum portfolios separately for each set of stock. The table (1) shows the portfolios formulated using faith stocks, where first portfolio represents GMV portfolio. For each formulated portfolio, expected return, standard deviation (risk) and Sharpe ratio is reported.

Table 1: Efficient Portfolios based on Faith Stocks

Sr. No	Expected Return (E/R)	Risk (Standard Deviation)	Sharpe Ratio
1	**0.391%**	**2.633%**	**0.14852**
2	0.456%	2.930%	0.15546
3	0.506%	3.218%	0.15738
4	0.547%	3.480%	0.15709
5	0.579%	3.778%	0.15333
6	0.580%	3.843%	0.15081
7	0.580%	3.857%	0.15027
8	0.580%	4.234%	0.13708
9	0.581%	4.352%	0.13341

The results in table 1 illustrate that GMV portfolio formulated using faith stocks has an expected return of 0.391 % with standard deviation of 2.633 %. Moreover, the Sharpe ratio of the GMV portfolio of faith stocks is 14. 85 %. Further, we also construct the efficient frontier containing all the optimum portfolios formulated using faith stocks (see figure 2). The results also report that the maximum Sharpe ratio reported for faith portfolios is 15.73 %. Moreover, the expected return ranges between 0.391 % - 0.581 % and standard deviation between 2.633 % - 4.352 %.

Table 2: Efficient Portfolios based on Sin Stocks

Sr. No	Expected Return (E/R)	Risk (Standard Deviation)	Sharpe Ratio
1	**0.790%**	**3.413%**	**0.2313**
2	0.803%	3.525%	0.2278
3	0.806%	3.550%	0.2271
4	0.829%	3.754%	0.2206
5	0.838%	3.852%	0.2176
6	0.844%	3.905%	0.2160
7	0.844%	3.908%	0.2159
8	0.848%	3.951%	0.2146
9	0.855%	4.027%	0.2123

The table 2 shows the optimum portfolios formulated using sin stocks. The results reveal that GMV portfolio has expected return of 0.79 % with standard deviation of 3.413 %. The results imply that as compare to GMV portfolio formulated with faith stocks, the underlying portfolio has higher return and higher standard deviation. However, the Sharpe ratio 23.13 % is almost twice as of the GMV portfolio formulated with faith stocks, which highlights the superior performance of the sin stocks (conventional) over faith stocks (Shariah compliant). Our results are in line with the findings of Derigs and Marzban (2009) and Donia and Marzban (2010), which show the superior performance of conventional portfolios over Shariah compliant portfolios. Further, we also construct the efficient frontier off all optimum portfolios formulated with conventional stocks (See figure 3). The results also report that Sharpe ratio for sin portfolios ranges between 0.212% - 0.231%. In addition, the expected return of the optimum portfolios range between 0.79 % - 0.85 % and the standard deviation between 3.41 % - 4.02 %.

Table 3: Efficient Portfolios based on Faith-Sin Stocks

Sr. No	Expected Return (E/R)	Risk (Standard Deviation)	Sharpe Ratio
1	0.656%	2.633%	0.2491
2	0.714%	2.930%	0.2437
3	0.762%	3.218%	0.2367
4	0.790%	3.413%	0.2313
5	0.798%	3.480%	0.2292
6	0.803%	3.525%	0.2278
7	0.806%	3.550%	0.2271
8	0.828%	3.754%	0.2206
9	0.831%	3.778%	0.21993

The table 3 shows the optimum portfolios formulated using complete sample stocks. The results of unconstrained portfolio show that GMV portfolio has expected return of 0.656 % and standard deviation of 2.63 %. More importantly, the Sharpe ratio of the GMV portfolio is 24.9 %. The results highlight the superior performance of the underlying category from two other set of stocks in terms of portfolio optimization. Our findings follow the standard portfolio theory that stresses subset of unconstrained portfolio underperforms. In both our previous cases, where we use sub-sample of stocks (Islamic and conventional) to optimize portfolios, the strategies underperform as compare to our unconstrained portfolio strategy. Moreover, the findings also follow that the greater the number of stocks in asset universe, the better the optimization solution. The results also report that Sharpe ratio for unconstrained portfolios ranges between 0.219% - 0.249%. Further, the results also reveal that expected return of the optimum portfolios range between 0.65 % - 0.83 % and the standard deviation between 2.63 % - 3.77 %. In addition, we also construct the efficient frontier containing all the optimum portfolios formulated using total sample stocks (see figure 1).

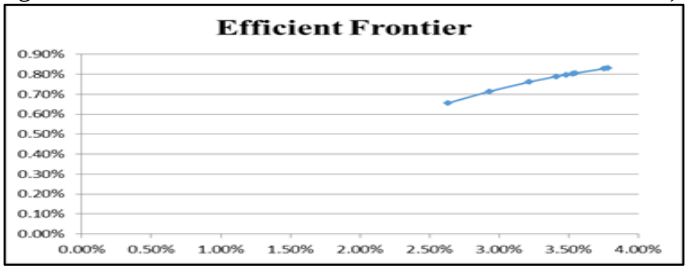

Fig 1. *Efficient frontier of faith portfolios*

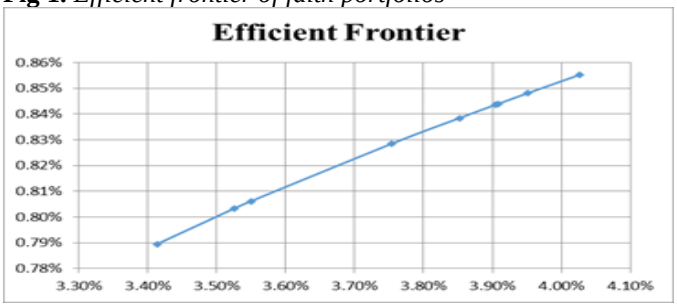

Fig 2. *Efficient frontier of Sin portfolios*

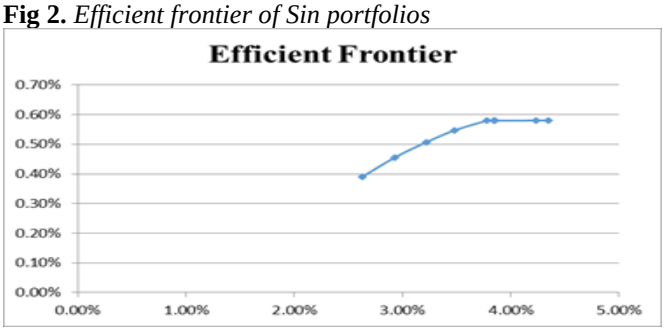

Fig 3. *Efficient frontier of unconstrained portfolios*

Table 4: GMV Portfolios Performance Evaluation

Portfolio Category	Sharpe Measure	Portfolio Beta	Treynor Measure	Jensen's alpha
Faith GMV Portfolio	14.85%	0.9144	0.428%	0.177%
Sin GMV Portfolio	23.13%	0.8206	0.962%	0.598%
Unconstrained GMV Portfolio	24.92%	0.7067	0.928%	0.491%

In addition, to the earlier analysis we also estimate portfolio betas, Treynor measure and Jensen's alpha for GMV portfolios. The results confirm our earlier findings, and stress that Shariah compliant portfolios underperform as compare to conventional portfolios. GMV portfolios based on sin stocks and total asset universe have higher performance ratios as compare to faith based GMV portfolio. Additionally, the higher beta of faith based GMV portfolio highlights that faith-based investing strategy is riskier as compare to conventional investment strategy. In brief, overall findings of this section reveal that Shariah compliance does not have positive impact on portfolio performance in PSX. The findings can be explained in two ways; first Shariah compliance criteria used in PSX does not completely and truly reflect Shariah principles of avoiding uncertainty (Gharar) and speculation (Maysir), which leads to inferior performance of faith-based investing. Second, the investors in PSX do not recognize the notion of faith-based segregation of stocks and consequently Shariah based portfolios receive less investor attention, hence causing low performance.

CONCLUSIONS AND IMPLICATIONS

In this study we compare the performance of Shariah compliant and conventional portfolios using mean-variance framework. More broadly, we investigate whether Shariah based asset categorization can lead to superior portfolio selection? The findings of the study reveal negative impact of Shariah screening on stock returns' cross-section. The findings also show that faith-based portfolios formulated using Markowitz optimization model underperform as compare to conventional portfolios formulated using the same framework. The findings of all of the performance evaluation measures also support the superiority of conventional portfolios over Shariah compliant portfolios. The findings of the study are in line with conventional portfolio theory which suggests that subset of unconstrained portfolio underperforms. Moreover, a large asset universe has a positive impact on portfolio performance. On the contrary, inferior performance of Shariah portfolios highlights the conundrum between theoretical notion and actual phenomena.

The study offers various implications for market participants. Firstly, in order to align the objectives of Islamic moral economy with market outcomes, the regulators should reassess the Shariah screening criteria currently used in PSX. More importantly formulate a criterion that truly reflects Islamic principles of investing. In addition, more could also be done to educate investors about Shariah compliant stocks and enhance the projection of Shariah compliant index. Secondly, our study also indicates that investors that prefer faith-based investing should be aware of the costs of faith investment in PSX. Investors can encounter additional costs while investing in Shariah compliant stocks. Moreover, these additional costs are driven high risk and low performance of faith portfolios.

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