Does the choice of stock selection criteria affect the performance of Sharīʿah-compliant equity portfolios?

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Abstract

Purpose – There are a number of differences in the current Sharīʿah screening guidelines formulated by Sharīʿah scholars associated with world-renowned index providers and financial institutions. The purpose of this study is to highlight the consequences of such differences on the portfolio level outcomes for Sharīʿah-compliant investors. This study also investigates the cost of adopting an alternative stock selection methodology.

Design/methodology/approach – Seven Sharīʿah-compliant equity portfolios (SCEPs) are created from the active constituents of the S&P 500. Size, sector allocation and financial performance of the resulting seven portfolios are evaluated for the period 1984–2019. Style analysis is performed to attribute the difference in financial performance caused by the choice of selection criteria to different risk factors. The cost of switching the selection criteria is evaluated with turnover analysis and break-even transaction cost.

Findings – The choice of stock selection criteria has a significant effect on the size, sector bets and financial performance of the portfolios. Those portfolios which are constructed with market capitalization-based screens outperform portfolios constructed with total assets-based screens. The turnover analysis revealed that SCEPs are relatively costly in practice.

Originality/value – This study investigates the performance of Sharīʿah-compliant portfolios in the context of seven different screening guidelines. The effects of transaction cost and performance attribution to different risk factors represent the key contributions of this study.

Keywords Performance evaluation, Portfolio construction, Screening guidelines, Sharīʿah-compliant equity portfolios, Sharīʿah investment principles

Paper type Research paper

Introduction

Socially responsible investments incorporate non-financial criteria in the construction of financial portfolios. Their investment decisions can be categorized into primary and secondary objectives. The primary objective is to invest in firms that have a positive impact on social, ethical and environmental values (Boudt *et al.*, 2019; Raza *et al.*, 2020). Profit maximization is the secondary objective of such investors (Arslan-Ayaydin *et al.*, 2018).

A special case of a socially responsible investor is the Sharīʿah-compliant investor (SCI) (Sairally, 2015). These investors follow the Sharīʿah (Islamic law), which governs all aspects of the life of Muslims. The SCI is relatively more demanding due to the additional constraints that stem from Islamic law. For example, the prohibition of investment in interest (*ribā*), gambling (*maysir*), speculative financial products (*mujāzafah*) and excessive risk under uncertainty (*gharar*) (Bhatti, 2020; Raza and Ashraf, 2020) [1].

The complex nature of financial markets makes it very difficult for firms to keep their operations free from the effect of non-compliant operations such as interest revenue (Arslan-Ayaydin *et al.*, 2018). Therefore, in its ideal form, the SCI will always be left with none or very few investment opportunities. This confronts the SCI with a more demanding situation, to choose stocks among the assets universe that provide attractive economic benefits and adherence to their religious beliefs. To cope with such challenges, Sharīʿah scholars have formulated Sharīʿah-compliant investment guidelines (Derigs and Marzban, 2008).

The objective of these guidelines is to ensure the Sharīʿah-compliance of equity portfolios (Arslan-Ayaydin *et al.*, 2018; Raza *et al.*, 2020). The stocks in a Sharīʿah-compliant equity portfolio (SCEP) are selected by following a two-step screening process, notably qualitative (sectoral) and quantitative (financial) screens. The former investigates the core operations of firms whilst the latter evaluates the level of financial leverage, liquidity and interest income of a firm. These screens are not explicitly stated in the religious scriptures but are the result of analogical reasoning by Sharīʿah scholars (Khatkhatay and Nisar, 2007). The liberty in analogical approaches and the absence of single decision-making authority in Islam lead Sharīʿah scholars associated with index providers (e.g. S&P and Financial Times Stock Exchange [FTSE]) and financial institutions (e.g. Hong Kong and Shanghai Banking Corporation [HSBC] and AMIRI Capital) to formulate diverse investment guidelines.

The diversity in Sharīʿah screening guidelines extends the choices of stock selection but confronts the SCI with numerous issues. Firstly, the diversity in screening criteria itself is a problem, and the selection decision has a unique opportunity cost. Secondly, the lack of mutual agreement on the use of proxies and threshold levels is also a debatable issue. For example, in the case of liquidity screens, the Dow Jones Islamic Market (DJIM) follows a threshold level of 33% whilst Morgan Stanley Capital International (MSCI) follows a threshold level of 70%. Thirdly, the different interpretations of a firm's value result in different divisors in the financial ratios, which also affect the overall screening process (Obaidullah, 2005; Derigs and Marzban, 2009).

The heterogeneity in Sharīʿah screens is a serious issue as it affects the number of stocks within a SCEP and can lead to different sector allocations and financial performance (Boudt *et al.*, 2019). Numerous studies (Derigs and Marzban, 2009; Ashraf, 2016; Boudt *et al.*, 2019) have compared the performance of a SCEP with conventional portfolios. Most of the previous studies are based on a single set of screening criteria or fund-level data, and the focus is on performance comparison with conventional portfolios. On the contrary, this study answers the following important question: does the choice of stock selection methodology matter for SCIs?

To answer this question, this study constructs seven SCEPs from a unified investment universe by following seven different screening guidelines. The weights of all the SCEPs sum to unity, which ensures that these portfolios are fully invested. Furthermore, due to Sharīʿah restrictions, no short sales are allowed. The selection bias is addressed by adopting a more advanced portfolio construction methodology. All seven SCEPs are constructed from the constituents of the S&P 500 for the time period 1984–2019.

A review of the literature shows that most of the studies on performance evaluation ignored the effect of transaction cost on the overall performance of SCEPs. In practice,

SCEPs result in a higher turnover as compared to conventional portfolios (Boudt *et al.*, 2019). This is because in addition to the routine rebalancing of weights, an SCI has to monitor the portfolio frequently and exclude any firms immediately if their interest income exceeds the maximum allowed threshold. This study also addresses the following question: are SCEPs able to compensate for the additional transaction cost?

In the coming sections, this study presents the discrepancies in the current Sharīʿah screening methods, literature on SCEPs, data composition and methodology, empirical results and performance attribution to risk factors. The last two sections present the robustness analysis and conclusion of this study.

The need for Sharīʿah screens

The Sharīʿah in its ideal form does not allow investing in a firm with even a minor portion of the income from non-compliant sources (Khatkhatay and Nisar, 2007; Hashim *et al.*, 2017). In practice, the nature of operations in financial markets and the presence of complex financially engineered products make it almost impossible for firms to operate at zero-level interest. Following the ideal structure, Sharīʿah scholars initially consistently opted to rule out investment in equities. However, to represent SCIs and to provide them an investment opportunity in stock markets, the Sharīʿah board of S&P Shariah Index, DJIM indices, FTSE Shariah indices and MSCI Shariah indices introduced Sharīʿah screens. The same is also true for financial institutions; e.g. HSBC, Dubai Islamic Bank (DIB), Meezan Bank Pakistan (Meezan) and AMIRI Capital (AMIRI). Under these guidelines, the SCI is allowed to invest if the equity-issuing firm passes a series of qualitative and quantitative screens.

The qualitative guidelines exclude all those firms whose core operations are non-compliant (Hashim *et al.*, 2017; Habib and Faruq Ahmad, 2017). Although there are minor differences in these guidelines, Sharīʿah scholars mostly agree on the general theme of qualitative screens. For example, S&P 500 Shariah Index and DJIM are stricter and exclude a firm even if a minor portion of its revenue is generated from non-compliant operations. On the other hand, FTSE considers only the major operations of firms and tolerates non-compliant revenue from minor operations (Derigs and Marzban, 2008).

Fluctuations in working capital; i.e. the draining of liquidity, short-term trade cost and the ready availability of short-term financing are key factors for a firm's dependence on banks and other financial institutions. There is always a possibility that the revenue of a Sharīʿah-compliant firm is affected by interest (Habib and Faruq Ahmad, 2017). The concerns related to participation in non-permissible activities and the maximum allowable tolerance level is the key motivation for designing quantitative screens. However, the leniency in the approach of analogical reasoning results in diverse quantitative guidelines. As the Sharīʿah comprises various schools of jurisprudence, there is an absence of a single decision-making authority, which also contributes to such diversity (Bhatti, 2020). The remarkable differences in the quantitative screens (Table 1) are the key motivation for this study.

Discrepancies in quantitative screens

Quantitative screens assess the level of a firm's interest income, liquid assets and financial leverage relative to the firm size and compare it to a pre-specified threshold level (Hashim, 2017). Though Sharīʿah scholars agree to use three types of financial screens, disagreement exists in the use of proxies to measure interest revenue, liquid assets and financial leverage. Sharīʿah screens also show variation in the maximum allowable threshold level.

The issue of *ribā* is always a priority concern for SCIs (Bhatti, 2020). Money is considered a medium of exchange and is not a commodity in the Islamic economic system. Therefore, any unjust incremental gains associated with the use of money – either in the form of loans

	S&P (%)	DJIM (%)	FTSE (%)	MSCI (%)	HSBC (%)	AMIRI (%)	AZZAD (%)	DIB (%)	Meezan (%)
Panel A: interest screens									
TI/TR			5		5				5
CSI/MC	33	33							
CSI/TA			33	33		33			
Panel B: liquidity screens									
(AR+CSI)/TA				50					80
(AR+C)/TA			50			50			
AR/TA				70					
AR/MC	49	33					45		
Panel C: leverage screens									
TD/TA			33	33	30	33		30	40
TD/MC	33	33					33	30	

Notes: Sharīʿah screens use both balance sheet and income statement information. TI and TR refer to total interest income and total revenue, respectively. C, CSI, AR, TD and TA are balance sheet items and represent cash, cash and short-term investments, account receivables, total debt and total assets, respectively. MC stands for market capitalization
Source: Author's own

Table 1.
Discrepancies in
quantitative
screening guidelines
of world leading
index providers and
financial institutions

or on spot trading – are strictly prohibited. Even in the presence of very strict parameters in the Qurʾān and *ḥadīth* (Prophet's sayings) regarding interest, Sharīʿah scholars show disagreement on a mutually agreed solution for interest-based revenues (Bin Mahfouz and Ahmed, 2014). It can be observed in the first panel of Table 1 that FTSE and HSBC are using the ratio of total interest to revenue of a firm with a maximum tolerance level up to 5%. On the contrary, DJIM and the S&P Shariah Index consider a threshold level of 33%. Another noticeable discrepancy is that, instead of emphasizing directly on interest, DJIM and the S&P Shariah Index focus on the potential sources of interest and use cash and short-term investments (CSI) as a proxy to measure interest revenues (Derigs and Marzban, 2009).

The strict rules for interest extend the circle of restrictions to potential sources that can generate interest revenue or interest liabilities; i.e. financial leverage and current assets. Therefore, in addition to interest screens, Sharīʿah scholars use two more screens (Khatkhatay and Nisar, 2007). Liquidity screens are used to monitor interest income generated from current assets and financial leverage screens are used to keep an eye on interest payments on loans. Apart from the potential source of interest, the Sharīʿah preference for fixed assets as a source of income generation is the key motivation for liquidity screens. In terms of proxies, the financial leverage screen shows consistency; however, our observations regarding variation in the proxies and threshold level hold true for liquidity screens.

Another major discrepancy is the choice of the divisor in the financial ratios (Derigs and Marzban, 2008). The existing Sharīʿah screens measure the replacement value of a firm in two ways (Obaidullah, 2005). Table 1 shows that DJIM, S&P Shariah and AZZAD use market capitalization as the divisor in quantitative screens. In this study, portfolios constructed with these screening guidelines are referred to as market capitalization-based SCEPs. On the other hand, FTSE, HSBC, MSCI and AMIRI prefer to use total assets as the true measure of a firm's replacement value, and hence, are referred to as total assets-based SCEPs.

Market capitalization reflects the market value of a firm but is highly exposed to volatility caused by mispriced securities, market cycles and speculation (Boudt *et al.*, 2019). In practice, the short-term variations in market capitalization are smoothened by using 24–36 months trailing averages. A prominent advantage of using the total assets of a firm as a proxy for replacement value is that it is independent of market volatilities. However, its sensitivity to the choice of accounting practices is a major drawback (Derigs and Marzban, 2008).

The threshold level for comparison in the financial screens is also debatable as it ranges between 5% and 70%. The one-third rule followed in most of the cases is based on a *ḥadīth* and on *fiqhi* (Islamic jurisprudence) rules derived from it (Levy and Hennessy, 2007). This measure is arbitrary and is often subject to criticism due to its out-of-context use (Obaidullah, 2005). The 5% threshold is based on the opinion of some Sharīʿah scholars and no mention of it can be found in the Qurʾān and *ḥadīth*. The discussion concludes that the use of threshold levels is arbitrary and can be altered in the light of *maṣlaḥah* (public interest) and *maqāṣid al-Sharīʿah* (objectives of Islamic law).

The lack of mutual consensus on a single set of selection criteria and the apparent discrepancies in Sharīʿah guidelines make it very difficult to choose an equally acceptable alternative. It is important to mention that the acceptability stated is reflected purely from the perspective of faith. The extent of individual acceptability in terms of portfolio outcomes may vary significantly depending on the risk and return preferences.

Review of literature on Sharīʿah-compliant equity investments

Although the Islamic mutual fund industry is relatively new, there has been tremendous growth in the size of the market share of Islamic investment vehicles. Right from the time when DJIM was introduced in February 1999, numerous studies have highlighted two major aspects of SCEPs.

The first group of studies discusses the differences in current screening guidelines and provides analogical justification behind such discrepancies in the Sharīʿah screens (Obaidullah, 2005; Khatkhatay and Nisar, 2007; Derigs and Marzban, 2008; Bin Mahfouz and Ahmed, 2014; Habib and Faruq Ahmad, 2017; Hashim *et al.*, 2017). The sole purpose of these studies is to highlight the theoretical justification of Sharīʿah screens whilst ignoring their effect on the financial performance of SCEPs.

In terms of the difference in performance, evidence is provided either from the mutual funds' industry or broad market indices. For mutual funds comparison; see, for example, as follows: Hoepner *et al.* (2011), Ashraf (2013), Nainggolan *et al.* (2015), El-Masry *et al.* (2016), Makni *et al.* (2016) and Hammamia and Oueslati (2017). For comparison of Sharīʿah-compliant indices with conventional indices; see, for example, as follows: Hussain and Omran (2005), Alam and Rajjaque (2010), Walkshausl and Lobe (2012) and Clarke (2015). The findings in these studies lead to mixed conclusions; some studies suggest that Sharīʿah restrictions improve overall portfolio performance whilst others argue that such restrictions have a negative effect on diversification opportunities and affect performance negatively.

The studies mentioned here suffer from a few serious shortcomings. Firstly, in the case of mutual funds, the constituents are unknown. Therefore, the difference in performance, if any, cannot be attributed to different sectors or equity factors. On the other hand, stock indices are not investable. Secondly, these studies cannot be generalized because of the relatively small sample periods. Some of these studies suffer from survivorship bias and look-ahead bias. Thirdly, the performance evaluation is carried out in the absence of transaction costs. Fourthly, the SCEPs are evaluated against a broader index (conventional benchmark). Such a comparison shows the effect of Sharīʿah restrictions on the performance

of unrestricted portfolios but fails to provide enough evidence to conclude that differences in Sharīʿah investment guidelines matter for SCIs.

Recent studies by Raza and Ashraf (2019) and Boudt *et al.* (2019) address the issue of look-ahead bias and limited time span and present empirical evidence for extended time periods. However, these studies highlight the effect of the weighting method and not the effect of stock selection criteria.

Data and methodology

This study restricts the investment universe to the month-end constituents of the S&P 500. The Sharīʿah screens are implemented with the help of fundamental data of firms; e.g. cash, account receivables (AR), short-term securities, total assets, total debt and number of common shares outstanding. The time period of analysis ranges from January 1984 to December 2019.

This study constructs seven SCEPs by following the qualitative and quantitative guidelines of S&P, DJIM, AZZAD, FTSE, HSBC, MSCI and AMIRI. The sectorial division of the Global Industrial Classification Standard (GICS) is used to implement the qualitative screens. The 24-month trailing average of market capitalization is used in the financial screens.

Each SCEP is rebalanced at time $t = 1, \ldots, \text{T}$. The reference investment universe for this study is all stocks listed in the S&P 500. To ensure that the stock i is an active constituent of S&P 500 at time t, a dummy variable $I_{i,t}$ is introduced. In the second step, the Sharīʿah screens are implemented on the investment universe. For this purpose, this study uses another dummy variable $S_{i,t}$ to ensure the Sharīʿah-compliance of each stock within the portfolio. This process is repeated for all the seven types of Sharīʿah screens, and thus seven SCEPs are obtained. The portfolios are fully invested. Furthermore, due to Sharīʿah restrictions, short selling is not allowed in any portfolio. The US market is composed of 10 major sectors; therefore, this study also reports the average allocation to each sector by each respective SCEP.

This study evaluates the raw performance by using the annualized average return (compounded with geometric mean). Standard deviation is used as a measure of risk. This study reports the risk of monthly losses at a 95% confidence interval through value at risk (VaR), computed as the 5% quantile of monthly returns. The SCEPs are also investigated for maximum loss in the given time period by reporting the value of maximum drawdown (MDD). The MDD is measured as the percentage loss at time t from the previous highest peak to the lowest trough in historical returns. To provide better insight on the effect of risk factors, this study also reports the Sharpe ratio (SR) and the Jensen's alpha (estimated with four factor model of Carhart [1997]).

The SCEPs are constructed with monthly rebalancing. The above-mentioned statistics are based on raw performance. Trading is not free and each transaction affects the raw performance of SCEPs. Therefore, it is important to measure the turnover of all portfolios. This study estimates the turnover as follows:

$$Turnover_{t+t} = \sum_{i=1}^{N}(|W_{i,t} + 1 - W_{i,t} + |)$$

In the above equation $W_{i,t+1}$ is the amount invested in a particular security i at time $t + 1$. $W_{i,t}+$ is the actual weight of that particular security i before rebalancing at $t + 1$. For break-even transaction cost (BETC), this study follows the methodology mentioned in Boudt *et al.* (2019).

Results

This study starts the analyses by presenting the effect of stock selection criteria on the cardinality of SCEPs. All the SCEPs are divided into two groups. Market capitalization is used as a divisor in the financial screens of S&P 500 Shariah, DJIM and AZZAD. Therefore, this study refers to them as market capitalization-based guidelines. FTSE, MSCI, HSBC and AMIRI use total assets as divisors; therefore, this study refers to them as total assets-based guidelines.

Differences in screening guidelines and the number of stocks in Sharīʿah-compliant equity portfolios

The results show that Sharīʿah screens have a negative effect on the number of stocks in a SCEP. For example, the total assets-based screens (FTSE, HSBC, MSCI and AMIRI) show less variation and result in an average of 246, 244, 250 and 257 stocks in each SCEP, respectively. The market capitalization-based screens (DJIM, S&P and AMIRI) are more volatile across time and result in an average of 202, 225, 238 stocks in each SCEP, respectively.

The variation in the number of stocks in a SCEP is interesting. The market capitalization-based strategies were more restrictive at the beginning of the analysis period; i.e. around Black Monday. In comparison to total assets-based strategies, the market capitalization-based strategies improve the diversification opportunities over the time period 1984–2019. These results are the same as those in the study of Boudt *et al.* (2019) [2].

As discussed by Boudt *et al.* (2019), the difference in screening guidelines results in a heterogeneous weight allocation to different sectors. Table 2 shows that the choice of selection criteria in a SCEP affects the sector allocation. The total assets-based screens show a relatively higher tilt towards value sectors (materials, industry and telecommunication sectors) whilst the market capitalization-based strategies invest more in growth sectors (for example, energy and information technology stocks). A very important finding is that

	MKT port	DJIM	S&P	AZZAD	FTSE	HSBC	MSCI	AMIRI
Energy	10.36	13.23	14.88	14.98	9.54	11.43	15.75	14.68
Material	5.12	5.32	6.59	4.78	8.20	6.43	5.89	8.42
Industry	12.01	9.80	8.26	8.34	9.34	8.32	8.43	9.46
Cons.Disc	13.31	9.98	10.78	11.43	11.58	11.22	13.54	13.96
Cons.Stap	10.45	15.80	17.97	16.98	15.83	14.76	14.63	11.63
Health.Cr	12.04	18.67	16.76	18.56	19.10	21.46	16.81	12.17
Financial	12.45	0.79	0.45	0.98	0.85	0.46	0.64	0.53
Info.Tec	12.67	19.31	16.78	18.40	14.76	18.32	15.76	18.42
Tele	5.67	5.40	6.32	4.22	8.54	5.55	6.78	5.78
Uti	5.92	1.70	1.21	1.33	2.26	2.05	1.77	4.95

Notes: The first column shows the unrestricted portfolio, which includes all active constituents of the S&P 500. The rest of the columns show the sector allocation of SCEPs. Average weights of each sector are obtained for the time period 1984 to 2019. The sector-wise classification is carried out with the GICS system. This standard provides a unique code for each company which shows its sector and subsector. Cons.Disc, Cons.Stap, Health.Cr represents consumer discretionary, consumer staples and health care sectors, respectively. Whilst Info.Tec, Tele and Uti represent information technology, telecommunications and utilities sectors, respectively
Source: Author's own

Table 2.
Sector allocation of the SCEPs

Sharīʿah screens exclude all stocks of the financial sector from the SCEPs (Raza and Ashraf, 2019).

Choice of stock selection criteria

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Performance evaluation
Sharīʿah screens restrict the investment universe and result in different sectoral bets. This heterogeneity in sectoral bets results in different factor loadings, and thus shapes the performance of SCEPs. This study tests the effect of Sharīʿah restrictions on the performance of unrestricted portfolios. Then, it addresses the following main question: does the choice of selection criteria matter for Sharīʿah investors?

The effect of Sharīʿah screens on the financial performance of unrestricted portfolios
The debate on the performance evaluation of SCEPs remains the focus of many studies. The results in Table 3 are not redundant as the comparison is among seven different SCEPs. The out-of-sample performance shows that the unrestricted market portfolio (S&P 500 all stocks) over the period 1984–2019 has an annualized mean return of 8.43%. It is interesting to see that, in comparison to unrestricted portfolios, the SCEPs not only improve the annualized returns but also enhance the stability in returns by demonstrating relatively lower volatility. These results are consistent with Derigs and Marzban (2009), Walkshausl and Lobe (2012), Ashraf (2013, 2016), Raza and Ashraf (2019) and Boudt *et al.* (2019).

Does the choice of selecting specific Sharīʿah screening criteria matter?
An SCI's primary objective (adherence to faith) is satisfied if he/she filters all the available stocks with any of the existing Sharīʿah screens. So, in terms of adherence to faith, the choice of stock selection criteria does not matter. However, in terms of portfolio level outcomes, the stock selection criteria are very critical. The results in Table 1 present evidence of this. Each Sharīʿah screen results in a different number of compliant stocks and heterogeneous sectoral bets. This means that a portfolio constructed with specific Sharīʿah screens will result in different financial performance as compared to other SCEPs. To provide conclusive evidence for this claim, this study compares the performance of seven SCEPs constructed with different screening guidelines. Table 3 reports the annualized

	Mean (%)	Vol (%)	SR	MDD	VaR	Skew	Kurt	TO (%)	BETC
Panel A: unrestricted portfolio									
MKT port	8.43	14.87	0.57	52.5	7.09	−0.78	5.39	3.01	NA
Panel B: SCEPs									
DJIM	12.23	13.98	0.87	47.0	6.74	−0.64	4.54	4.67	13.97
S&P	11.87	14.21	0.84	46.1	6.16	−0.58	4.17	3.98	14.69
AZZAD	10.01	15.03	0.67	46.8	6.89	−0.76	4.84	4.25	9.90
FTSE	8.66	13.97	0.62	53.1	6.13	−0.7	5.11	4.01	1.89
HSBC	9.45	14.56	0.65	57.3	6.89	−0.6	4.83	4.13	3.08
MSCI	8.61	13.69	0.63	47.3	6.34	−0.64	4.89	3.01	5.23
AMIRI	8.96	14.63	0.61	52.5	6.6	−0.61	4.45	4.69	2.78

Notes: The mean and volatility are reported on annualized bases. SR and MDD represent the Sharpe ratio and maximum drawdowns, respectively. The VaR is estimated with a 95% confidence interval. TO and BETC denote the turnover and BETCs in cents per dollar traded, respectively. Skew and Kurt represent skewness and kurtosis, respectively
Source: Author's own

Table 3.
Effect of Sharīʿah screens on financial performance

returns, annualized risk and the SR of all the portfolios. The downside risk is also reported in the same table.

It can be seen that the risk and return characteristics of a SCEP depend on the choice of stock selection criteria; i.e. each SCEP results in different annualized returns and volatility. The highest annualized returns are achieved by the SCEP constructed with the screening guidelines of DJIM whilst the lowest risk in terms of volatility is achieved by the SCEP constructed with screening guidelines of MSCI. To grasp a more generalized view of performance difference between different SCEPs, the raw performance of market capitalization-based SCEPs was compared with that of total assets-based SCEPs.

It is interesting to see that all the market capitalization-based SCEPs (S&P, DJIM and AZZAD) result in higher annualized returns and outperform the best performing total assets-based SCEP (HSBC) by 278, 242 and 56 basis points, respectively. The market capitalization-based SCEPs also show lower volatility and VaR as compared to the total assets-based SCEPs. This favourable risk and return trade-off of market capitalization SCEPs can better be reflected in terms of risk per unit of reward (SR). The Sharīʿah guidelines of DJIM, S&P and AZZAD resulted in increased SRs over that of HSBC (0.65) to 0.87, 0.84 and 0.67, respectively. All the SCEPs tend to display different values for skewness and excess kurtosis. Such results are also documented by previous studies; see, for example, Boudt *et al.* (2019) and Raza and Ashraf (2019).

Table 3 also reports the downside risk of all SCEPs. A higher value of drawdown indicates a higher probability of fund redemption. Among all the SCEPs, the worst drawdown is experienced by a SCEP constructed with the screening guidelines of HSBC whilst the lowest drawdown is achieved by a SCEP constructed with the screening guidelines of S&P 500 Shariah.

Turnover analysis
The performance evaluation in the above sections is carried out in the absence of transaction costs. SCEPs by design result in a higher turnover as compared to an unrestricted portfolio. The portfolio manager has to monitor the investment vehicle on a regular basis for Sharīʿah-compliance. Thus, he/she has to liquidate non-compliant stocks and buy new stocks to rebalance the SCEP. In practice, transactions are not without cost. Thus, it is very important to revisit the superior performance hypothesis of SCEPs because higher turnover leads to performance drag. The turnover analysis is presented in the second to last column of Table 3. The first major finding is that the unrestricted market portfolio has the advantage of the lower turnover as compared to all SCEPs. The increase in turnover is due to the additional transactions that an SCI has to perform for the supervision of Sharīʿah-compliance of the portfolio.

Now, let us compare the turnover of SCEPs with each other. Results show that within the SCEPs, the market capitalization-based SCEPs (DJIM, S&P and AZZAD) have a slight turnover advantage over total assets-based SCEPs (FTSE, HSBC, MSCI and AMIRI). In addition to the average turnover statistics, this study also presents in Figure 1 the historical turnover of the market portfolio and the SCEPs at each rebalancing period. To estimate the effect of turnover on the net returns, it is important to deduct the transaction cost from the gross returns. Transaction cost does not remain the same throughout the sample period of this study. According to DeMiguel *et al.* (2009), a realistic value for transaction cost is 50 basis points transaction cost, which is 0.5 cents per dollar traded. They refer to studies in the nineties. However, as then the transaction cost has diminished significantly. Therefore, this study penalizes each transaction with 10 basis points transaction cost. Such analysis enables us to see clearly the effect of
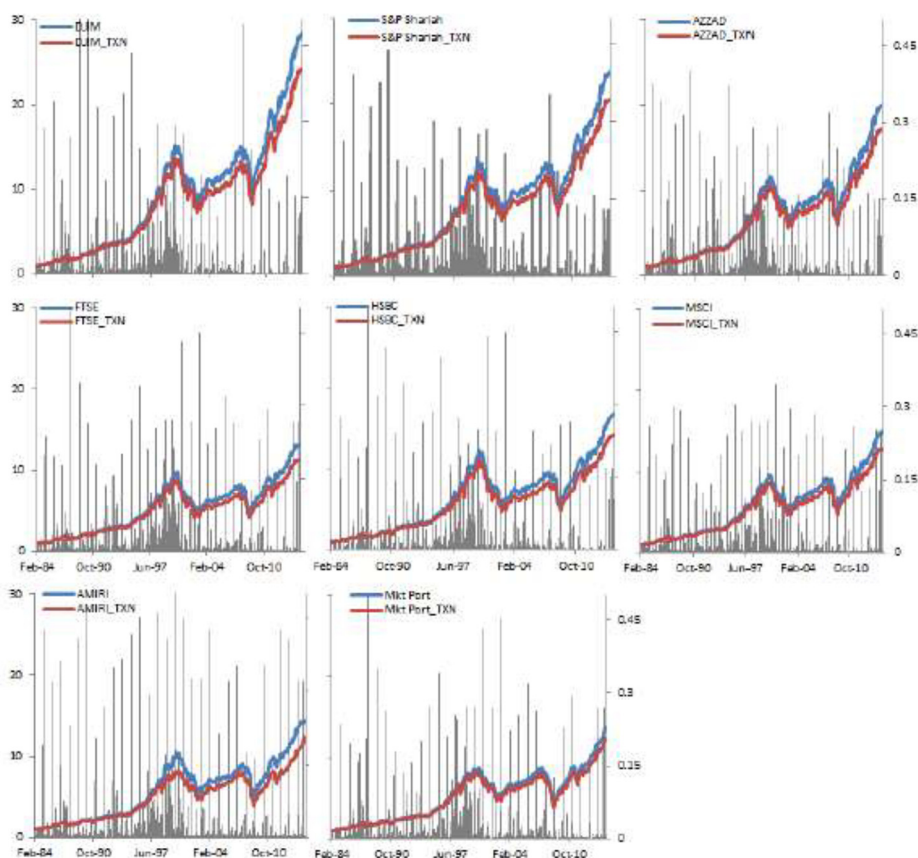
Notes: The black bars (secondary axis) show the monthly turnover of each SCEP. The blue line
(primary axis) represents the cumulative returns when US$1 is invested in each SCEP in the
absence of transaction costs. The red line (primary axis) in each graph represents the effect of
transaction cost on the gross returns of each SCEP. We penalize each transaction with 10 basis
points transaction cost (TXN represents transaction cost). The upper panel of the graph
represents market capitalization-based Sharīʿah guidelines whilst the lower part of the graph
represents total assets-based Sharīʿah guidelines

Source: Author's own

rebalancing costs on the net returns. Figure 1 shows both gross returns (blue lines) and net
returns (red lines) of each SCEP and the unrestricted market portfolio on each rebalancing date. It
can be seen that the high cost of rebalancing for SCEPs causes a relatively larger drag on the net
returns of SCEPs as compared to the unrestricted market portfolio.

Now it is known that the SCEPs with higher SRs has higher turnover, and this causes a
relatively larger drag in net returns. In the above analysis, this study assumes a specific
transaction cost. In practice, the transaction cost varies. Therefore, following Kritzman *et al.*
(2012) and Boudt *et al.* (2019) this study computes the BETC in terms of cost per dollar

traded. This shows the equilibrium cost per dollar at which the SR of SCEPs is in balance with its counterpart (SR of unrestricted market portfolios in our case). The interpretation of this statistic is interesting. If the BETC is higher for a SCEP as compared to its counterpart, then the more robust the outperformance is with respect to transaction costs.

The analysis shows that the BETC is always positive and greater than one for all SCEPs. More specifically, it can be inferred that the net returns of SCEPs are robust to the presence of transaction costs. An alternative inference that can be drawn is that the SR of SCEPs will always be positive even if these portfolios are penalized with transaction cost up to 13.97, 14.69 and 9.90 cents per dollar traded. Thus, the main conclusion is that the SCEPs as a whole have higher turnover as compared to unrestricted portfolios but the SCEPs have the ability to compensate for the additional cost.

The last column of Table 3 shows that the BETC of total market capitalization-based strategies is less than that of total assets-based strategies. This means that the SCI should consider the screening discrepancies seriously. There are higher economic benefits associated with market capitalization-based screens whilst the investor has to bear a higher cost if he/she screens the investment universe with total assets-based screening guidelines. Boudt et al. (2019) provided a detailed discussion on the transaction cost and relatively high turnover of SCEPs.

Performance attribution of Sharīʿah portfolios

The analysis so far shows that the market capitalization-based SCEPs outperform not only the unrestricted benchmark but also the total assets-based SCEPs. However, the reason for such superior performance is still not known. One way to tackle this question is to analyse the cross-sectional variation of the returns of SCEPs. This goal is achieved by using the multi-factor model of Fama and French (1992) and Carhart (1997). The results from such models can be used to attribute the performance of SCEPs to different risk factors. Specifically, the coefficient from the regression model shows the proportion of the mean returns to the market risk premium, size, value/growth and momentum factors. This study estimates the performance attribution model as follows:

$$R_{i,t} - R_{ft} = \alpha_i + \beta_1(R_{mt} - R_{ft}) + \beta_2(SMB_t) + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_{it}$$

where SMB_t represents small minus big; it shows the difference in return between a small-stocks portfolio and a big-stocks portfolio. HML_t is the value/growth factor. The fourth factor is used to measure the momentum factor. R_{ft} and R_{mt} represent the risk-free rate and market returns, respectively.

Results in Table 4 show that the Jensen's Alpha (intercept from the four factor regression) increases when a portfolio is constructed following the Sharīʿah guidelines. More specifically, the Sharīʿah restrictions of DJIM and S&P result in the positive and significant alpha of 0.56 and 0.021, respectively. Previous studies; i.e. Boudt et al. (2019) and Raza and Ashraf (2019) also attributed the financial performance of SCEPs to different risk factors.

The results in Table 4 show that the Carhart (1997) factors explain at least 87% of the return variation for all the SCEPs. The negative beta (β) loading for small minus big returns (SMB) suggests a strong tilt towards big stocks. This is intuitive because SCEPs invest in firms with relatively high market capitalization or total assets. A major finding is the obvious tilt of SCEPs towards growth stocks. By construction, the SCEP shows almost no exposure to the financial sector, which shapes the factor exposure and can be used as a possible explanation for the growth tilt. The growth tilt is more prominent in market capitalization-based SCEPs as compared to total assets-based SCEPs.

	Alpha	MKT	SMB	HML	MOM	R^2
DJIM	0.056[***]	0.92[***]	−0.16[***]	−0.25[***]	0.00	0.91
S&P	0.021[***]	0.86[***]	−0.21[***]	−0.12[***]	0.01	0.89
AZZAD	0.027[***]	0.89[***]	−0.17[***]	−0.16[***]	0.02	0.87
FTSE	0.028[***]	0.86[***]	−0.17[***]	−0.18[***]	0.01	0.91
HSBC	0.039[**]	0.82[***]	−0.17[***]	−0.26[***]	−0.04	0.93
MSCI	0.017[**]	0.84[***]	−0.27[***]	−0.16[***]	0.03	0.91
AMIRI	0.013[*]	0.82[***]	−0.17[***]	−0.19[***]	−0.04	0.90

Notes: The intercept and β coefficients are estimated by considering the monthly excess returns of the considered portfolios as an independent variable whilst the dependent variables are market excess returns (MKT), SMB, high minus low returns (HML) and Momentum Factor "Winners Minus Losers" (MOM); [***]; [**] and [*] represent the significance levels at 1%, 5% and 10%, respectively. The significance level is estimated with t-test and considering Heteroskedasticity- and autocorrelation-consistent (HAC) standard errors test
Source: Author's own

Table 4.
Performance
attribution of SCEPs

The growth tilt has two implications for SCEPs. The absence of the financial sector in a SCEP provides hedging benefits, and thus the SCEP shows resistance to overall market drawdowns caused by financial turmoil. Secondly, the tilt towards growth stocks creates inertia in SCEPs to grow at a faster rate in bullish markets (i.e. during tech bubbles). The SCEPs can suffer significant losses when the market rallies end; for example, at the burst of the dot-com bubble in 2000. The growth tilt in SCEPs is consistent with the findings of Hoepner *et al.* (2011) and Boudt *et al.* (2019). It is also interesting to see that total assets-based SCEPs are more exposed to market risk premiums as compared to total market capitalization-based SCEPs.

Robustness analysis
The main objective of this study is to highlight the effect of stock selection criteria on the performance of SCEPs constructed with diverse screening guidelines. The results so far provide evidence that the choice of stock selection affects the portfolio performance and that SCIs can gain more economic benefits if they construct their portfolios by following market capitalization-based stock selection guidelines. However, the back-tests carried out are based on a time period of more than 30 years. The market structure has changed significantly within this span of time.

Furthermore, the following still cannot be concluded: is the performance of market capitalization-based SCEPs significantly different from portfolios constructed with total assets-based selection criteria? For this purpose, this study conducts the robustness test to see if the difference in performance has developed over time.

Development of performance gap through time
The performance of SCEPs can vary with macroeconomic regimes (Boudt *et al.*, 2019). The time-based trend in cardinality and sectoral bets are key factors that shape the performance of SCEPs in periods of economic turmoil. Therefore, this section investigates the development of the relative performance of SCEPs in different time periods. For this purpose, this study classifies the full sample period 1984–2019 into pre-crisis, crisis and post-crisis periods. Since 1984 the US market has experienced three major crises as follows: Black Monday, the burst of the dot-com bubble and the global financial crisis.

The two groups of SCEPs (market capitalization-based and total assets-based portfolios) result in different sectoral bets (Table 2) and their constituents are time dependent. Recall, SCEPs constructed with market capitalization-based screens show a high exposure to growth stocks. Therefore, this group of SCEPs outperforms total assets-based SCEPs in the market rally of 1988–2000 but then suffers a visible performance drag at the burst of the dot-com bubble (2000–2002). In the same time period, total assets-based SCEPs suffer relatively less losses.

These findings are in contrast with the general perception that SCEPs provide hedging benefits in market crises. This is true only if the crisis is caused by fluctuations in the financial sector. See, for example, the results in the sixth column of Table 5, which show that the financial performance of all SCEPs in the global financial crisis of 2008–2009 is much

	January 1984– August 1987	September 1987– August 1988	December 1988– August 2000	September 2000– September 2002	October 2002– October 2007	November 2007– February 2009	March 2009– December 2019
Panel A: unrestricted market portfolios (S&P 500 all stocks)							
Ann Mean (%)	19.30	−15.80	15.20	−24.80	12.20	−42.30	21.46
Ann Vol (%)	15.50	24.10	13.40	17.40	9.55	19.20	12.10
SR	1.24	−0.65	1.13	−1.42	1.27	−2.19	1.77
Panel B: Sharīʿah restricted portfolios							
Sharīʿah-compliant portfolio based on DJIM criteria							
Ann mean (%)	24.20	−17.30	18.60	−32.90	13.10	−28.60	20.35
Ann vol (%)	15.00	24.10	13.20	29.00	10.10	16.80	12.10
SR	1.61	−0.72	1.42	−1.13	1.30	−1.70	1.68
Sharīʿah-compliant portfolio based on S&P criteria							
Ann mean (%)	24.00	−16.40	17.40	−35.20	12.80	−30.50	21.83
Ann vol (%)	15.00	23.40	12.80	28.60	10.00	17.30	12.20
SR	1.60	−0.70	1.36	−1.23	1.27	−1.76	1.78
Sharīʿah-compliant portfolio based on AZZAD criteria							
Ann mean (%)	19.50	−18.80	16.70	−36.80	12.70	−30.60	19.99
Ann vol (%)	16.70	24.40	13.10	26.50	10.20	17.50	12.18
SR	1.17	−0.77	1.28	−1.38	1.25	−1.74	1.64
Sharīʿah-compliant portfolio based on FTSE criteria							
Ann mean (%)	18.20	−16.40	14.70	−24.70	11.80	−21.30	22.89
Ann vol (%)	16.20	23.70	13.10	18.60	9.90	18.30	09.13
SR	1.12	−0.69	1.12	−1.32	1.19	−1.16	2.50
Sharīʿah-compliant portfolio based on HSBC criteria							
Ann mean (%)	18.60	−17.60	13.90	−23.30	12.50	−22.30	21.89
Ann vol (%)	16.10	24.00	13.70	20.40	10.50	18.70	11.98
SR	1.15	−0.74	1.03	−1.14	1.19	−1.19	1.82
Sharīʿah-compliant portfolio based on MSCI criteria							
Ann mean (%)	18.80	−16.69	14.70	−19.90	12.60	−19.70	20.16
Ann vol (%)	15.70	24.00	12.70	17.90	9.60	17.70	12.70
SR	1.2	−0.69	1.16	−1.11	1.32	−1.11	1.58
Sharīʿah-compliant portfolio based on AMIRI criteria							
Ann mean (%)	17.50	−15.10	12.20	−18.10	11.50	−20.10	22.15
Ann vol (%)	15.70	23.60	12.60	16.60	9.80	17.80	10.16
SR	1.11	−0.64	0.96	−1.09	1.17	−1.12	2.18

Notes: The above table reports all the major crises, the bullish markets, pre-crises and post-crises. The crisis periods are estimated with the help of MDD statistics as shown in Boudt *et al.* (2019)
**Source:** Author's own

Table 5.
Performance of SCEPs in different time periods since 1984 till 2019

better than that of market portfolios. The resistance to financial crises is due to the fact that SCEPs do not invest in the interest-based financial sector. The under-performance in the dot-com crisis is consistent with the findings of Nainggolan *et al.* (2015). On the other hand, the superior performance in the global financial crisis is also documented by Alam and Rajjaque (2010), Ashraf and Mohammad (2014) and Boudt *et al.* (2019).

This time variation in the performance statistics can also be seen in a relative performance plot reported in Figure 2. This plot reports the ratio of the cumulative value of US$1 invested in each portfolio. Whilst interpreting results, the slope of the line is important. An upward slope indicates outperformance for a SCEP relative to the benchmark strategy. The relative performance of the SCEPs is relatively stable over time. Though there are a few correction periods, the SCEPs lead to the highest end-value. The SCEPs created with the screening guidelines of DJIM, S&P and AZZAD show under-performance in the dot-com crisis whilst over-performance is reported in the global financial crisis. In terms of cumulative value for the time period 1984–2019, the Sharīʿah guidelines of DJIM generate additional benefits as compared with the S&P and AZZAD criteria.

Conclusion

SCEPs avoid investing in non-compliant business activities through a rigorous screening process. The stocks are screened for Sharīʿah-compliance by following qualitative (sectoral) screens and quantitative (financial) screens. Sharīʿah scholars show consensus on the sectoral screens.
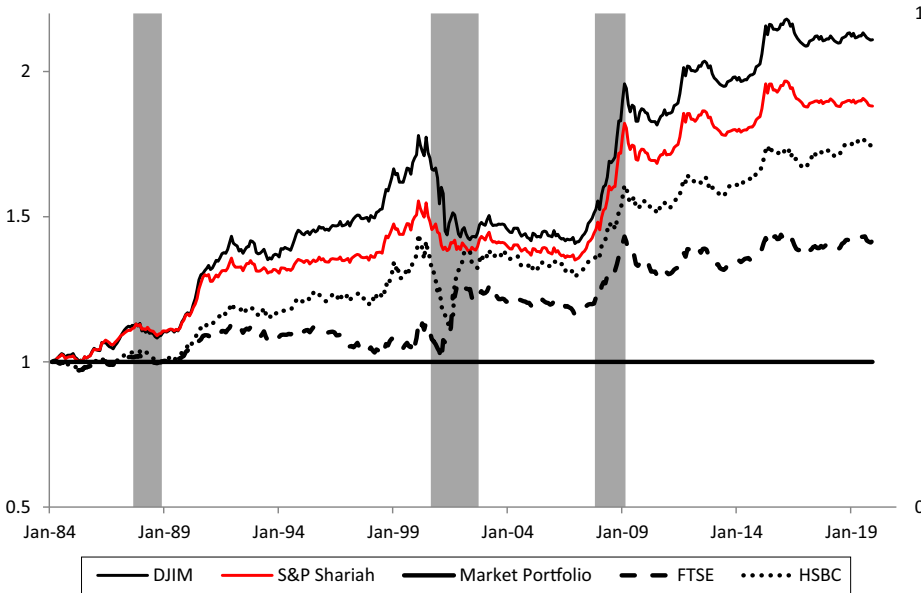
Notes: The ratio is calculated with cumulative US$1 invested in market cap-based SCEPs (DJIM and S&P Shariah) and total assets-based SCEPs (FTSE and HSBC) compared to unrestricted portfolios. Shaded areas show the three major financial crises for the period 1984-2019. The crisis periods are identified with the help of MDD analysis

Source: Author's own

However, there is a number of discrepancies in financial screens. This study highlights some of the discrepancies in the current Sharīʿah screens. Then, the impact of such discrepancies on the portfolio level outcomes is investigated. For this purpose, this study constructed seven SCEPs from a unified investment universe; i.e. S&P 500 all stocks, by implementing the screening guidelines of S&P 500 Shariah, DJIM, AZZAD, FTSE Shariah Index, HSBC Amanah, AMIRI Capital and MSCI Shariah indices. The portfolios are classified in two groups, market capitalization-based portfolios (S&P Shariah, DJIM and AZZAD) and total assets-based portfolios (FTSE, HSBC, MSCI and AMIRI). The classification is carried out on the basis of the divisor in the financial screens.

The analyses revealed that the two groups of portfolios result in different cardinality and sector allocation. All SCEPs by design shows almost zero exposure to the financial sector. The market capitalization-based SCEPs are tilted towards growth stocks whilst total assets-based SCEPs are invested more in the value sector. The heterogeneous sectoral bets shape the performance of SCEPs, and total market capitalization-based SCEPs outperform total assets-based SCEPs for the period 1984–2019. The performance of SCEPs during periods of economic turmoil also depends on the choice of stock selection. For example, the market capitalization-based SCEPs experience relatively larger performance drags as compared to total assets-based SCEPs.

It was also found that the superior performance of SCEPs comes at a relatively higher cost due to high turnover. Though the analyses based on BETCs show that SCEPs generate enough returns to compensate for the high turnover cost, still it is recommended that the SCI should consider the choice of stock selection and the relatively high turnover of SCEPs seriously.

The empirical findings of this study show that the discrepancies in the selection guidelines have serious consequences for SCIs in terms of diversification opportunities and sector allocation. The performance of SCEPs depends on both the choice of stock selection criteria and the intensity of particular screens. A switch from a more liberal strategy to strict guidelines has negative effects on the size of the portfolio but such a tilt positively affects the financial performance. It is also interesting to note that SCEPs show a strong exposure to information technology and energy stocks and these sectoral bets shape the performance of SCEPs during periods of market turmoil. Future studies are required to further highlight the effect of stock selection guidelines with different asset universes from different geographical locations and extended time frames.

Notes

1. Non-compliant activities are production or selling of alcohol, tobacco, weapons, pornography, media (except news), interest-based activities, gambling, excessive risk under uncertainty and speculative trading.

2. One of the possible reasons for this behaviour is the growth in all the fundamental variables that are used in financial screens. The growth rate estimation shows that all the fundamental variables had positive growth in the past three decades. However, average market capitalization of US equities experienced more growth as compared to total assets. Such a high growth in market capitalization is intuitive and could better be explained in relation to the Tobin's Q explanation of market equilibrium. As expected, the intensity in screens of the market capitalization group shows a negative relationship with Tobin's Q and gets relaxed as the Q ratio approaches its peak level in tech bubbles.

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