The cost of constituent-rebalancing of Sharīʿah-compliant indexes: lessons for future crises

Ahmed Badreldin
Finance and Banking Research Group, Philipps Universitaet Marburg, Marburg, Germany

Received 26 February 2021
Revised 22 April 2021
8 July 2021
17 May 2022
17 June 2022
Accepted 18 June 2022

Abstract

Purpose – This study aims to quantify the cost of rebalancing Sharīʿah-compliant indexes, both economically and statistically.

Design/methodology/approach – An empirical approach is employed where the rebalanced Sharīʿah-compliant index is calculated numerous times with different lags in rebalancing, and the number of stocks and their cost across time are determined in order to identify the optimal rebalancing frequency.

Findings – This paper finds that annual Sharīʿah rebalancing does not lead to significant differences in portfolio returns, even though it does bring some advantages in cumulative wealth starting from the third year onwards and brings about better risk-return characteristics measured in terms of the Sharpe ratio. However, these advantages involve an average annual shifting between 30 and 60% of the portfolio market capitalization, which would be costly at any level of transaction costs.

Practical implications – A private investor may be better off holding a constant portfolio and only rebalancing in three-year intervals since this was shown to possess similar portfolio returns and cumulative wealth results. Any advantages of annual rebalancing in terms of risk-return characteristics may be offset by transaction costs of rebalancing. Sharīʿah scholars and practitioners are to determine when the correct time for rebalancing really is, taking into consideration the cost of rebalancing *vis-à-vis* the advantages in cumulative wealth and risk-return characteristics of the portfolio.

Originality/value – Predictions that Islamic indexes will perform well during financial crises, such as the COVID-19 pandemic, miss the cost of frequent rebalancing. This paper addresses this issue in an empirical manner learning from the previous crisis in 2008.

Keywords Financial crisis, Index constituents, Sharīʿah compliance

Paper type Research paper

Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic, referred to by the United Nations (UN) in its resolution A/74/L.92 as "one of the greatest global challenges in the history of the United Nations" (United Nations, 2020), has caused increased volatility in global equity markets to an extent not seen since the global financial crisis (GFC) 2007/2008. It resulted in volatility in indexes based on the Standard and Poor's (S&P) 500 rising more than six-fold between February and March 2020 (Ashraf *et al.*, 2020; Quinsee, 2020; Brown, 2020). Already a number of studies and analyses are predicting that Islamic equity indexes will outperform their conventional benchmarks during the COVID-19 pandemic due to their Sharīʿah-compliance filtering criteria (Welling, 2020; Tahir and Ibrahim, 2020; Damak *et al.*, 2020). This prediction is based on findings during the GFC 2007/2008 (Andreas *et al.*, 2011; Ashraf, 2013; Salem and Badreldin, 2014; Saiti *et al.*, 2014; Alam and Rajjaque, 2016; Masih *et al.*, 2018; Touiti and Henchiri, 2018).

ISRA International Journal of Islamic Finance
Vol. 14 No. 3, 2022
pp. 241-255
Emerald Publishing Limited
e-ISSN: 2289-4365
p-ISSN: 0128-1976
DOI 10.1108/IJIF-02-2021-0038

Such a comparison assumes both crises have comparable effects on equity holdings, even though their causes may differ. Ashraf *et al.* (2020) pointed out that the GFC 2007/2008 was a result of an endogenous shock attributed to market players, bankers and speculators while the COVID-19 crisis is exogenous and directly affects the real economy (Roy and Kemme, 2020). Furthermore, these historical findings regarding Islamic equity index performance tell us little about what will happen during and after the COVID-19 crisis since the literature has still not addressed a number of key questions with regard to the reasons behind previous superior Islamic equity index behavior witnessed during the 2007/2008 financial crisis.

The first aspect missing from the literature is that the comparisons being conducted to determine superior behavior have focused on comparing the Islamic index's performance with its conventional benchmark counterpart. Although this approach is fair, it does not reflect the whole picture since it does not takes into consideration the (possibly high) cost of frequent rebalancing of a portfolio to reflect Sharīʿah (Islamic law)- compliance. The extent of rebalancing is much higher than that of the benchmark index since rebalancing for Sharīʿah-compliant indexes tends to be quite frequent given that most of these companies are only Sharīʿah-compliant by coincidence and not by design. That is, the company management does not usually keep an eye on how well it fits the Sharīʿah-compliance criteria as opposed, for example, to how well it fits sustainable and responsible investments (SRI) or environmental, social and governance (ESG) criteria. By looking at the size of Morgan Stanley Capital International (MSCI) World Islamic Equity Index over time – the authors conducted empirical observations of the stocks of the index over the period 2004–2019 – one finds that the number of constituents in the index have fluctuated considerably.

For these stocks, it can be observed that the GFC broke an upward trend in the number of Sharīʿah-compliant stocks, which resumed after 2009 when the overall number of Sharīʿah-compliant stocks rose to a sustained level of 350+ stocks until the end of the analysis period. It was found that only 5% of the stocks that have appeared on the index have remained Sharīʿah-compliant throughout the entire analysis period of 16 years. On the other hand, 29% of stocks on the benchmark index were never Sharīʿah-compliant during that same period.

This implies that during a 16-year period – with the GFC occurring within its first five years – the Islamic equity index would have witnessed a large amount of stock turnover and rebalancing. In fact, an Islamic investor would have had to add and remove between 70 and 100 stocks per year, not to mention the rebalancing among the stocks that remained in the index in terms of readjusting their weights by buying more or less of each stock as required. Such rebalancing involves potentially high transaction costs that an Islamic investor would incur to maintain the over-performance witnessed during crisis periods that has been shown in the literature. Taking these costs into consideration may undermine the over-performance of Islamic equity indexes.

These costs also bring up the question of the timing of rebalancing: should a stock be removed from the index immediately when determined to be Sharīʿah non-compliant, or is a delayed rebalancing a wiser choice? The requirement to frequently rebalance involves recurring transaction costs and is expected to lead to potentially more losses or missing out on increases in prices of well-performing stocks that are deemed Sharīʿah non-compliant.

Ashraf and Khawaja (2016) mention the problem of rebalancing costs and getting rid of stocks in inconvenient times but instead propose using trailing averages of the Sharīʿah criteria to smoothen the return and lower the turnover of securities. Though this may practically smoothen the return, it does not solve the problem of correctly calculating the performance of Islamic equity indexes, taking into consideration rebalancing costs, nor do they determine what specific delay in rebalancing would lead to the best performance results.

It is important to note that this problem is most prominent in Islamic equity indexes and does not appear as much in benchmark indexes or SRI indexes. That is because the latter two only rebalance based on market capitalization developments or changes in activities and not

on annually fluctuating accounting ratios. This highlights the second problem being overlooked.

The second aspect missing from the literature is an in-depth analysis of the criteria resulting in superior performance. The Islamic finance literature explains the superior performance of Islamic indexes during high volatility market phases and crises as being attributable to the Sharīʿah filtering process. This process revolves around Sharīʿah-compliant filtering and screening: first, screening occurs at an activity/business model level to ensure that all Sharīʿah non-compliant activities are categorically excluded. Second, filtering occurs at the level of financial ratios, an accounting matter, to ensure that firms which conduct Sharīʿah-compliant activities do so in a Sharīʿah-compliant manner. Different interpretations of Sharīʿah have yielded different forms of filtering and screening criteria (Obaidullah, 2005), even though they all share some common values and have been shown not to have any statistically significant effects on the performance of the resulting Islamic equity index (Ashraf and Khawaja, 2016). The literature does not offer deeper analysis of the reasons behind inclusion/exclusion in the index. In-depth analysis into Sharīʿah criteria can offer some predictability as to whether a stock will be a candidate for inclusion/exclusion from the index at the next Sharīʿah-compliance revision, especially during or after a financial crisis.

Given these two gaps in the literature, the aims of this study are as follows: first, to determine which of the screening criteria are most often responsible for exclusion from the Islamic equity index and whether these results differ before, during and after the GFC, second, to quantify the economic and statistical cost of rebalancing the Sharīʿah index in order to determine whether the superior performance of Sharīʿah equity indexes surmounts the costs of rebalancing. The latter objective can have serious implications for issues of transparency when reporting costs of investing in Sharīʿah-compliant indexes.

By achieving the above aims, this paper hopes to contribute by being the first study to provide in-depth analysis of the exact reasons for exclusion of stocks from a Sharīʿah-compliant index. This can be helpful in determining which single criterion or combination of criteria is most responsible and therefore allows for a level of predictability for future stock exclusions. It also suggests that future reporting of the index's constituent-rebalancing should more transparently include the reasons for exclusion from the index.

Furthermore, determining the statistical and economic significance of performance differences between immediate or delayed rebalancing among Islamic equity indexes can enable practitioners and scholars to gain a more transparent picture of the performance of Islamic indexes during and after financial crises. To the best of the author's knowledge, this is the first study to provide insights into constituent-rebalancing of Sharīʿah-compliant indexes on the individual criterion level as well as the first study to determine the cost of rebalancing, i.e. the cost of applying Sharīʿah-compliance to achieve superior performance in high-volatility periods.

The remainder of the paper is divided into six sections. The second section presents a short literature survey aiming to highlight the gap being addressed by this research. The third section describes the design of the analysis and the collected data used. The fourth section is devoted to presenting and discussing the results, while the fifth section draws important lessons from the study for future financial crises. The final section concludes the paper.

Literature review

The Islamic finance literature on performance of Islamic equity indexes is vast, especially those studies focusing on index performance during the GFC. This section presents a nonexhaustive survey of these studies – along with those already mentioned in the introduction. This paper shows that no study has yet investigated the cost of rebalancing or the reason for constituent changes on a criterion level.

Studies of performance changes due to Sharīʿah-compliance

This section views some of the latest literature tackling performance of Sharīʿah equity indexes. Ashraf *et al.* (2020) study the performance of Sharīʿah and non-Sharīʿah index portfolios using S&P Dow Jones Islamic Indexes for US and European markets and find that they outperform conventional counterparts in the first quarter of 2020, i.e. during the beginning of the COVID-19 crisis. The outperformance is exhibited in hedging behavior during crisis periods at the cost of higher systematic risk. They explain the reason behind this over-performance as the benefits of stringent screening providing hedging benefits during market downfalls. They do not mention or attempt to quantify the cost of screening or rebalancing. One oversight of this paper is the use of a Capital Asset Pricing Model (CAPM)-based regression model as a performance measure, which does not fit the settings of a segmented market as should be the case in US and European markets where both Islamic and conventional investors exist in the same market and can demand many of the same assets. A more appropriate model would follow the lines of Heinkel *et al.* (2001). Furthermore, it is unclear to what extent the time period of their study is appropriate to answer their research question since they end their data set in May 2020, which does not leave enough time for the respective index providers to rebalance their Sharīʿah-compliant indexes.

Abdulhadi *et al.* (2019) study the performance of Sharīʿah and non-Sharīʿah index portfolios at Bursa Malaysia during the GFC 2007/2008. Using risk-return profiles in the form of return on equity (ROE) and earnings per share (EPS) for 558 firms, they find no significant differences in performance across both indexes. However, they do not focus on the changes in constituents during or after the crisis years, nor do they refer to the cost of rebalancing affecting performance.

Boudt *et al.* (2019) compare the method of weighting Sharīʿah-compliant portfolios, arguing that the commonly utilized market capitalization weighting is less than optimum. They test the S&P500 Sharīʿah index and show alternative weighting methods improve risk-adjusted performance over their sample period. Although their work correctly points out the drawbacks of following a simple market capitalization weighting method, it remains the most prominent method used in constructing market indexes. Furthermore, their study does not focus on the changes in constituents but, rather, how the given constituents should be weighted within a given index.

Ashraf and Khawaja (2016) compare portfolio composition based on Sharīʿah-compliance screening intensity in data from the USA, Canada, the Gulf Cooperation Council (GCC) and Japan using five different Sharīʿah-compliance standards. They conduct their screening manually instead of relying on ready-made index-provider data, which greatly increases the reliability of their results since they are able to avoid rebalancing differences among index providers or different equity universes being used as the basis for filtering. Nevertheless, this does not avoid or solve the problem of rebalancing costs incurred. They construct portfolios from monthly price data using the Sharīʿah screening criteria of MSCI, FTSE (Financial Times Stock Exchange), Dow Jones, Standard & Poors (S&P) and the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI). They find that although portfolios based on different screening criteria end up having different constituents, this does not significantly affect performance.

Performance studies on indexes are not only conducted for benchmark or Islamic indexes, but also for SRI indexes. Managi *et al.* (2012), using two distinct regimes (bull and bear), find that SRI indexes showed no significant difference from their conventional counterpart indexes. Park and Lee (2018) investigate stock price and volume effects with changes in the composition of an SRI governance index over the years 2003–2012 and find that inclusion has a positive effect on the stock being added while exclusion has a negative effect on the stock being removed. Although these studies do look at changes in index constituents, they focus on the effect of joining or leaving an index on the individual stocks, and not on the index itself. Once again, they do not refer to costs of rebalancing since it falls outside the scope of their

analysis. It is important to note that Islamic indexes, unlike SRI or ESG indexes, tend to be highly affected by financial crises due to their reliance on accounting ratios in their screening criteria. Meanwhile, SRI or ESG indexes tend to focus solely on activities and are therefore likely to remain more or less constant during a crisis.

As can be seen from the conducted literature survey, no analysis has been conducted as to the exact criterion-level cause of Sharīʿah-compliant exclusion of stocks; nor have any studies focused on the economic cost of rebalancing and its appropriate frequency. The focus has been on the Islamic finance literature since SRI and ESG indexes, although they involve rebalancing, only filter based on activity and not based on frequently fluctuating accounting data, which is the case in Sharīʿah-compliance filtering.

Studies of performance changes due to index constituent changes

Ng and Zhu (2016) and Kassim *et al.* (2017) analyze performance in another manner, focusing on the effect of changes in index constituents on the individual stock prices and trade volume. Both of these studies focus on the Malaysian market and cover roughly the same time period. Interestingly enough, the latter does not cite the former.

Nor *et al.* (2019) conduct their study against the backdrop of Securities Commission Malaysia's revision of Sharīʿah standards, the result of which were some stocks being added and others removed from the Islamic equity index. They investigate the effects on stocks added and removed and find only a short-lived negative impact from exclusion but no significant impact from inclusion in the newly formed equity index. Once again, the focus is on the added and removed stocks and not the index performance or the costs of its rebalancing.

The literature on performance of additions and deductions from a stock index is abundant and very well documented in Afego (2017) albeit without any reference to studies that focus on Islamic equity indexes. Afego (2017) also rightly highlights the problem in many of these studies, namely that scholars do not test whether the observed patterns in performance are also economically significant when taking into consideration the effect of transaction costs incurred when a stock is added or removed from an index, i.e. cost of rebalancing. Furthermore, Afego (2017) states that understanding what causes a stock to be included or excluded can allow a degree of index rebalancing predictability, especially in the case of indexes that solely depend on market capitalization as a criterion. Our analysis's focus on the causes of inclusion/exclusion will hopefully allow the same to be done in the case of Islamic equity indexes, even though they are not solely based on market capitalization as a criterion.

Design of the analysis and data set

In order to determine which criterion is most responsible for Sharīʿah noncompliance in stocks, in this paper the Sharīʿah-compliance screening and filtering process for a global sample of stocks were manually conducted. To ensure that the widest possible sample scope is covered, the MSCI World Index is used as the stock universe. The MSCI World Index at the end of 2019 included 23 markets (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom (UK) and the United States (US)) with 1,607 constituents covering approximately 85% of the free float-adjusted market capitalization in each country (MSCI, 2020). The analysis conducts Sharīʿah-compliance filtering and screening based on the MSCI Islamic index series methodology according to its latest update in November 2018 (MSCI, 2018) and uses company Global Industry Classification Standards (GICS) to screen industries and subindustries as recommended by MSCI (2018). This paper believes it is sufficient to only use one set of Sharīʿah criteria given that the findings of Ashraf and Khawaja (2016) show no significant difference when using different Sharīʿah-compliant methodologies.

Industry filtering brings down the number of stocks from 1,607 to 1,221. Then each company's annual financial data as available from Thomson Reuters DataStream is used to conduct the accounting ratios filtering. Since 69 stocks did not have data available for the entire analysis period (2004–2019) the global sample of this analysis ends up with 1,152 stocks.

It should be noted that entry and exit into the Sharīʿah index occur with a double lag: The first lag exists with regard to time of financial data publication. Arslan-Ayaydin *et al.* (2018) highlight the fact that Sharīʿah screening is always conducted in a lagged fashion, yet effects are forward looking, i.e. if a company is reported to have received too much interest income in the previous quarter, it is excluded from the index so that investors stop holding it in the future quarter, even though nothing is known about its interest income in the future. This lag bias is unavoidable.

Another level of lag bias occurs when a new stock entry requires a benchmark-index revision to enter the benchmark index before eventual inclusion in the Sharīʿah index (MSCI, 2018). This implies that a stock may be Sharīʿah-compliant (and worthy of entry in the Islamic index) but ends up delayed by two revisions until it is included in the index. This lag bias is avoidable by holding the constituents constant and thus avoiding the latter bias since no revisions are conducted to the benchmark index. Thus, the equity universe across time is unified by holding constant the 1,152 MSCI World Index constituents as at the end of 2019. All stocks that were part of the MSCI World universe but exited the index before 2019 are not taken into consideration.

The accounting ratio filtering on an annual basis is conducted, starting at the year ending 2004 till the year ending 2019 using MSCI's (2018) methodology which states that "Debt as a percentage of Total Assets", "Cash and Interest-bearing securities as a percentage of Total Assets" and "Cash and Accounts Receivables as a percentage of Total Assets" must not exceed 33% in order for a stock to be considered Sharīʿah-compliant. After that the criterion-level results for each year are used to obtain much better insight and in-depth analysis as to which criterion or criteria caused exclusion of the 1,152 constituents at the end of each financial year.

As for addressing the second aim of the study – determining the cost of rebalancing of the Sharīʿah index – the index is computed twice, once if rebalancing occurs to reflect the newest accounting ratios and Sharīʿah-compliance, and another time if the index constituents remained constant (no rebalancing).

Such a constituent-constant portfolio would reflect the performance of an index containing Sharīʿah non-compliant stocks and would have different weights than required for the Sharīʿah-compliant stocks remaining. This is meant to reflect an intentional delay in rebalancing in order to fairly quantify the cost of rebalancing as opposed to holding the portfolio constant.

The analysis quantifies the cost of rebalancing in four ways: first, it compares the performance of the rebalancing and the constant index portfolios in terms of their returns until the end of 3rd quarter 2020. Daily returns on stocks and the index's market capitalization weighted returns are used. The analysis tests the statistical significance of rebalancing by running a simple *t*-test for the parallel time series of returns of both portfolios assuming unequal variances and using a confidence level of 95% (i.e. using assumptions of heteroscedasticity). Second, it determines cost of rebalancing in terms of risk-return characteristics by comparing the Sharpe ratios of each portfolio taking the riskless rate being equal to zero as it is dictated by Sharīʿah principles, i.e. Islamic investors should not be comparing their risky returns to a riskless interest rate. Third, it further captures economic significance of rebalancing in terms of cumulated wealth if a single currency unit, e.g. $1, is invested at the beginning of the year before rebalancing, i.e. if rebalancing is to occur at the end of 2005, it is assumed one currency unit is invested at the beginning of 2005 – thus the

cumulative performance during 2005 of the "with rebalancing" and "without rebalancing" portfolios are identical, and only begin to diverge at the start of 2006. The analysis is repeated using nonoverlapping weekly returns as a robustness check. Fourth, it quantifies the cost of rebalancing in terms of shifting market capitalization of the portfolio to gain insights into the potential transaction costs incurred to buy, sell and rebalance stocks in the index.

Results and discussion

Criterion-level in-depth analysis of Sharīʿah-compliant stock exclusion

The results differentiate between single causes and combinations of causes for Sharīʿah non-compliance in stocks, since a stock can be considered Sharīʿah non-compliant as soon as at least one criterion is not met. The study finds that the most common single cause for Sharīʿah non-compliance was the "Debt ratio" followed by "Cash and Account Receivables" and finally "Cash and Interest-bearing Securities". It should be noted that since the total number of stocks in the universe is held constant at 1,152 the number of stocks is comparable across the different years.

Furthermore, it can be seen that during the GFC, the prevalence of the debt ratio as a cause of Sharīʿah non-compliance rises and peaks in 2009 with a total of 217 stocks being excluded from the index as they failed to meet this criterion. This may likely be due to equity shortages during crisis periods that are usually solved by credit, leading to a higher debt ratio. In comparison, the two other ratios show a relatively constant development over time, even across crisis periods.

This finding offers important insights for future financial crises, including the ongoing COVID-19 crisis, namely that if it is expected that many stocks will take on credit to facilitate their finances during and after the crisis, it can be predicted that a large number will become Sharīʿah non-compliant because their debt ratio criterion will no longer be met. On the other hand, developments in cash, accounts receivable and interest-bearing securities appear to affect exclusion for a total of up to 120 stocks on average and should be monitored during the COVID-19 crisis as well. Models for predicting future debt, cash, accounts receivable and interest-bearing security positions could be quite useful in this instance since they may allow regulators to accurately predict a company's upcoming financial positions with regard to these four figures.

This study also offers further insights into firms which failed to meet more than one Sharīʿah-compliance criteria. In the conduct of such analysis, the cases which failed to meet only one criterion were excluded, i.e. there was no double counting in the analysis. It was found that fewer firms are excluded for failing more than one criterion. In fact, across the entire sample period of 16 years, the total number of stocks that were excluded for combination of failures to meet criteria was always below 100 stocks each year. It should be noted that there is no clear trend in the crisis period 2007–2009 when it comes to combined failures to meet Sharīʿah-compliance. The final interesting point to note here is that very few firms end up not meeting all three criteria simultaneously. This may indicate that the criteria are lenient, but this debate falls beyond the scope of this research.

Cost of rebalancing in terms of portfolio returns

As for the second research aim, the analysis tests whether an annually rebalanced portfolio following Sharīʿah-compliance shows significantly different returns than that of a portfolio with constituents held constant as at a specific year. The analysis began with holding constant portfolio returns for the year 2004 and compared its counterpart's annually rebalanced portfolio. The exercise was repeated using constant portfolios at the end of every year. The results show no evidence of statistically significant differences in the returns of the

portfolio, neither over the full-sample till Q3–2020, nor on a year-by-year basis, i.e. testing the returns of each year separately, as can be seen in Table 1.

Cost of rebalancing in terms of cumulative wealth

However, the overall effect on the cumulative wealth of the portfolio shows a different picture. An analysis of 2004 constant portfolio's cumulative wealth vs its counterpart's annually rebalanced portfolio shows that both portfolios possess more or less similar wealth at the start that only begins to diverge in 2013. Initial investment is standardized at $1.

Results for testing for statistical significance of difference in cumulative wealth can be found in Table 2, which shows for the full-sample that keeping constituents constant leads to statistically significant differences in cumulative wealth in 9 out of the 16 cases (at 95% confidence level). More importantly, for the GFC years 2007–2009, the full-sample shows statistically significant differences in wealth with the constant portfolio showing higher wealth in 2007 and 2008, while the rebalanced portfolio showing higher wealth in 2009. It should be noted that the full-sample is not equally comparable since the full-sample size changes for each constant portfolio, i.e. the number of years covered by the full-sample for the 2004-constant constituents portfolio is much larger than the number of years remaining in the full-sample for the 2010-constant constituents portfolio. It is for this reason that the year-by-year comparisons shown in Table 2 are also reported. These differences in number of available years explain the downward trend in overall cumulative wealth levels over the studied period.

Additionally, Table 2 shows that cumulative wealth differences during the GFC tend to become significant at the 95% confidence level starting from the third or fourth year after using constant portfolio constituents. This is opposed to a clear exceptional case in 2010 where differences became statistically significant only at the eighth year, and even then, remained only for the eighth and ninth year, and then became insignificant once more. This seems to indicate that annual rebalancing is not of the utmost importance immediately after a Sharīʿah-compliance revision. In other words, adding the newly determined Sharīʿah-compliant stocks, or removing the no longer Sharīʿah-compliant stocks from the portfolio does not have a determinantal effect on cumulative wealth except three to four years after the revision. However, it should be noted that the difference in wealth tends to more often be in favor of the annually rebalanced portfolio.

Cost of rebalancing in terms of risk-return characteristics of the portfolios

Another aspect to be compared is whether this cumulative wealth improvement of the annually rebalanced portfolio also affects the overall risk–return relationship. By looking at the Sharpe ratio of each portfolio using the full-sample, it can be concluded that the annually rebalanced portfolio tends to have higher Sharpe ratios in 11 of the 16 cases, including two of the three years of the GFC. This supports the finding of the literature that Sharīʿah-compliant indexes that are annually rebalanced tend to perform better than their benchmark indexes in terms of their risk-return attributes. As a result, it can be concluded that they perform better than a constant-constituent's portfolio as well.

Cost of rebalancing in terms of shifted market capitalization

Having determined that annual rebalancing may be somewhat advantageous for an investor, both in terms of risk-return characteristics of the portfolio (the Sharpe ratio) as well as in terms of terminal cumulative wealth (at least starting from the third or fourth year), what remains to be determined is the overall cost of such rebalancing in terms of market capitalization. Since transaction costs differ across stock markets, the best way to quantify

Statistically significant differences in portfolio returns – daily returns																		
Constituents	Full-sample	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	
2004	0.856	0.965	0.803	0.918	0.851	0.756	0.621	0.898	0.769	0.994	0.923	0.898	0.959	0.986	0.762	0.996	1	
2005	0.786	0.880	0.998	0.953	0.977	0.967	0.857	0.995	0.764	0.802	0.943	0.891	0.906	0.906	0.949	1		
2006	0.992	0.960	0.911	0.975	0.959	0.965	0.967	0.983	0.991	0.987	0.943	0.946	0.950	0.978	1			
2007	0.945	0.906	0.973	0.970	0.914	0.982	0.929	0.925	0.907	0.935	0.984	0.950	0.995	1				
2008	0.939	0.864	0.973	0.884	0.814	0.978	0.974	0.936	0.838	0.932	0.957	0.954	1					
2009	0.843	0.865	0.882	0.975	0.897	0.975	0.928	0.932	0.831	0.816	0.963	1						
2010	0.958	0.826	0.957	0.973	0.933	0.964	0.987	0.973	0.986	0.989	1							
2011	0.980	0.873	0.879	0.980	0.997	0.986	0.986	0.972	0.966	1								
2012	0.923	0.836	0.928	0.980	0.939	0.990	0.996	0.978	1									
2013	0.908	0.821	0.967	0.945	0.962	0.936	0.992	1										
2014	0.970	0.865	0.954	0.900	0.996	0.984	1											
2015	0.929	0.823	0.951	0.956	0.950	1												
2016	0.850	0.789	0.953	0.997	1													
2017	0.761	0.718	0.990	1														
2018	0.843	0.825	1															
2019	1	1																

Table 1.
p-value results of *t*-tests showing statistically significant difference in portfolio returns using a constant portfolio with weights as taken from year shown in the first column across individual years and full-sample as shown in the first row

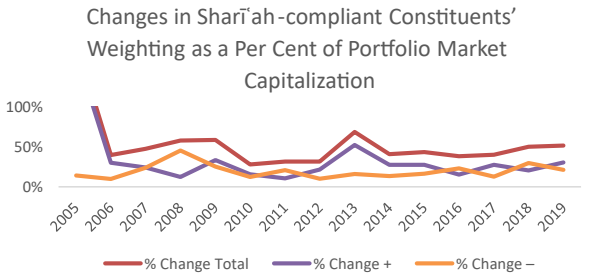
Table 2.
p-value results of *t*-tests showing statistically significant difference in cumulative wealth using a constant portfolio with weights as taken from year as shown in the first column across individual years and full-sample as shown in the first row

Statistically significant differences in wealth – daily returns																				
Constituents	Full-sample	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005			
2004	0	0	0	0	0	0	0	0	0	0	0.578	0	0	0	0	0.083	1			
2005	0	0	0	0	0	0	0	0	0	0	0.139	0.504	0.067	0.328	0.396	1				
2006	0.015	0	0	0	0	0	0	0	0.003	0	0	0	0.276	0.583	1					
2007	0	0	0	0	0	0	0	0	0	0	0.004	0.001	0.766	1						
2008	0	0	0	0	0	0	0	0	0	0.195	0.366	0.121	1							
2009	0	0	0	0	0	0	0	0	0	0.350	0.113	1								
2010	0.462	0.492	0	0	0.901	0.184	0.149	0.434	0.825	0.492	1									
2011	0.040	0.009	0	0	0.096	0	0	0.002	0.784	1										
2012	0.783	0.094	0.021	0.252	0.060	0.223	0.416	0.931	1.000											
2013	0.325	0.038	0.205	0.570	0.001	0.014	0.820	1												
2014	0.004	0.024	0.000	0.000	0.734	0.011	1													
2015	0.067	0.359	0.000	0.000	0.790	1														
2016	0.827	0.017	0.001	0.003	1															
2017	0.000	0.000	0.987	1																
2018	0.001	0.000	1																	
2019	1	1																		

the cost of rebalancing is to analyze the overall changes in market capitalization of the portfolios. This would allow determining the amount of wealth that must be added and removed in the case of entry or exit, as well as the wealth to be rebalanced in the case of stocks that remain in the index.

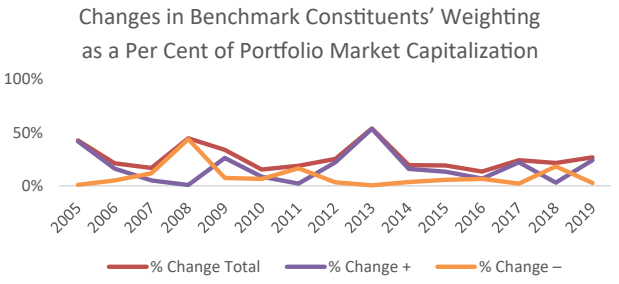
The results show that the total market capitalization of both the benchmark index MSCI World and the Sharīʿah-compliant filtered index have fluctuated in tandem across the years. However, by looking at the changes an investor must make in terms of currency value (or percentage of wealth when taken as a weight of the market capitalization); Sharīʿah-compliant investors must modify on average between 30–60% of their portfolio value (ignoring the over 100% case in 2005 which is not shown due to scaling), whether through adding, removing or rebalancing existing stocks as shown in Figure 1. The figure shows the percentage market value change required to obtain the new rebalanced portfolio, whether these changes are additions or deductions to portfolio market value.

Meanwhile the benchmark index only requires changes within the average range of 20–40% of portfolio value as shown in Figure 2. It is also worth noting that the benchmark index witnessed deductions of less than 10% of market value in 11 of the 16 years, as opposed to the Sharīʿah-compliant portfolio having no deduction of less than 10% in any year. This reflects our previous finding that Sharīʿah-compliant rebalancing involves a considerable amount of turnover, not only in terms of the number of stocks but in terms of the market value. If transaction costs are taken as a percentage of the volume being added or deducted during rebalancing, it would constitute a considerable sum that must be taken into consideration to portray a more transparent picture of Islamic equity indexes' superior market performance, whether it is during high or low volatility periods.



Source(s): Author's Own

Figure 1.
Changes in Sharīʿah-compliant constituents' weighting as a percent of total Sharīʿah-compliant portfolio market capitalization as at previous year end



Source(s): Author's own

Figure 2.
Changes in benchmark constituents' weighting as a percent of the total benchmark portfolio market capitalization as at the previous year end

When combined with the previous findings, it seems that an investor who does not rebalance, but in fact holds the portfolio constituents constant may not be worse off than investors who choose to annually rebalance their portfolios. Rebalancing brings no significant differences in terms of portfolio returns and brings some advantages in cumulative wealth starting from the third year prior to rebalancing. Furthermore, rebalancing does indeed result in better risk-return characteristics of the rebalanced portfolio, yet reaching these advantages involves shifting between 30 and 60% of the portfolio market capitalization, which would be quite costly at any level of transaction costs.

Robustness check

For the sake of robustness, the analysis is repeated once more using weekly returns. The results are confirmed there as well, with the rebalancing portfolio having higher cumulative wealth in 13 out of 16 cases, and possessing a higher Sharpe ratio in 14 out of 16 cases, including all three GFC years. However, the full-sample statistical significance of cumulative wealth differences is confirmed in only five out of the 16 cases.

Lessons for future financial crises

The focus on the GFC years is meant as a test whether investors should have immediately reacted and rebalanced their portfolio during the crisis – possibly incurring significant losses from having to sell stocks at a less than favorable valuation – or maintain the constituents as they were until a few years after the crisis (till a maximum of 13 years after the crisis in the full-sample case; i.e. till Q3–2020). The findings of this paper show that portfolio returns in both cases are not statistically different, and cumulative wealth differences only appear around the third or fourth year after rebalancing during and after a financial crisis.

This paper also finds that the debt ratio becomes more salient as the most common cause for exclusion from the Sharīʿah-compliant index before, during or after financial crises, while all other criteria tend to remain the same.

Conclusion

Studies are already predicting that Islamic equity indexes will outperform their conventional benchmarks during the COVID-19 pandemic due to their Sharīʿah-compliance filtering criteria, basing this prediction on findings during the GFC 2007/2008. Unfortunately, this claim of over-performance does not take into consideration the cost of frequent Sharīʿah-compliance rebalancing. It was therefore the aim of this study to quantify the cost of rebalancing of the Sharīʿah index both economically and statistically in order to determine whether the superior performance of Sharīʿah equity indexes overcomes the costs of rebalancing. Additionally, it was aimed to determine which of the screening criteria are most often responsible for exclusion from the Islamic equity index.

First, this paper finds that the majority of stocks excluded from the Sharīʿah index fail to meet a single criterion rather than a combination of criteria. The most common cause of exclusion using the MSCI Sharīʿah methodology was failure to meet the debt ratio requirement of one-third, followed by cash and accounts receivable, and finally cash and interest-bearing securities. To the author's knowledge, this is the first study to provide in-depth analysis of the exact reasons for exclusion of stocks from a Sharīʿah-compliant index and thus allows for a level of predictability for future stock exclusions.

Second, this paper finds that the decision to annually rebalance a Sharīʿah index portfolio does not lead to statistically significant differences in terms of portfolio returns. Rebalancing does bring some advantages in cumulative wealth starting from the third year after rebalancing and does bring about better risk-return characteristics measured in terms of the

Sharpe ratio. However, these advantages involve on average shifting between 30% and 60% of the portfolio market capitalization every year, which would be quite costly at any level of transaction costs.

Having determined the statistical and economic significance of Sharīʿah-compliant rebalancing, the following practical recommendations can be developed. First, index performance, especially in the case of Sharīʿah-compliant indexes that witness above average rebalancing frequency, should transparently report the size of market capitalization rebalancing involved. This should then be appended by a general range of transaction costs that would be incurred to reflect this rebalancing as per the country's financial market transaction costs. This can be broadly estimated on the basis of changes in number of stocks at rebalancing and/or on the basis of the changes in market capitalization due to rebalancing, depending on the transaction cost structure of the respective financial market. Second, a private investor may be better off holding a constant portfolio and only rebalancing in three-year intervals since doing so was shown to possess similar portfolio returns and cumulative wealth results. Any advantages of annual rebalancing in terms of risk-return characteristics may be offset by transaction costs of rebalancing.

Third, it becomes important for Sharīʿah scholars and practitioners to determine when the correct time for rebalancing really is, taking into consideration the cost of rebalancing *vis-à-vis* the advantages in cumulative wealth and risk-return characteristics of the portfolio. Since it has already been suggested to take moving averages of Sharīʿah criteria to smoothen out returns (Ashraf and Khawaja, 2016), it may be better to base such decisions on the findings of this analysis when applied to specific financial markets. This would serve investors well and ensure that they do indeed benefit from the much-advertised financial advantages of Sharīʿah-compliant indexes.

Applying these findings to future financial crises, such as the ongoing COVID-19 crisis, it can be predicted that a rise in the debt ratio is expected for a significant number of stocks that are currently Sharīʿah-compliant, which would trigger massive rebalancing requirements for Sharīʿah-compliant indexes. Islamic investors would be advised to delay rebalancing for up to three years to ensure the best performance of their index-mimicking portfolios in practice.

This paper considers the study's scope sufficient since it involved a global sample, yet it is possible that replicating this study on the level of local indexes may show different results. Furthermore, it was seen that there is no need to apply different Sharīʿah criteria since Ashraf and Khawaja (2016) find no significant difference in performance when applying different criteria. Finally, both daily and weekly returns were used when testing portfolio returns, the Sharpe ratio and cumulative wealth. Replicating the analysis using monthly or quarterly returns may also be tested in further research.

References

Abdulhadi, A.R., Iqbal-Hussain, H. and Rehan, R. (2019), "Analyzing performance of Shariah and non-Shariah portfolios during the global financial crisis 2007-2008: Malaysia's experience", *International Journal of Innovation, Creativity and Change*, Vol. 6 No. 9, pp. 145-157.

Afego, P.N. (2017), "Effects of changes in stock index compositions: a literature survey", *International Review of Financial Analysis*, Vol. 52, pp. 228-239, doi: 10.1016/j.irfa.2017.06.004.

Alam, N. and Rajjaque, M.S. (2016), "Shariah-compliant equities: empirical evaluation of performance in the European market during credit crunch", in Harrison, T. and Ibrahim, E. (Eds), *Islamic Finance*, Palgrave Macmillan, Cham, pp. 122-140, doi: 10.1007/978-3-319-30918-7_8.

Andreas, G.F., Rammal, H.G. and Rezec, M. (2011), "Islamic mutual funds' financial performance and international investment style: evidence from 20 countries", *The European Journal of Finance*, Vol. 17 Nos 9/10, pp. 829-850.

Arslan-Ayaydin, Ö., Boudt, K. and Raza, M.W. (2018), "Avoiding interest-based revenues while constructing Shariah-compliant portfolios: false negatives and false positives", *Journal of Portfolio Management*, Vol. 44 No. 5, pp. 136-143.

Ashraf, D. (2013), "Performance evaluation of Islamic mutual funds relative to conventional funds: empirical evidence from Saudi Arabia", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 6 No. 2, pp. 105-121.

Ashraf, D. and Khawaja, M. (2016), "Does the Shariah screening process matter? Evidence from Shariah compliant portfolios", *Journal of Economic Behavior and Organization*, Vol. 132, Supplement, pp. 77-92.

Ashraf, D., Rizwan, M.S. and Ahmad, G. (2020), "Islamic equity investments and the COVID-19 pandemic", available at: https://ssrn.com/abstract=3611898 (accessed 14 April 2021).

Boudt, K., Raza, M.W. and Wauters, M. (2019), "Evaluating the Shariah-compliance of equity portfolios: the weighting method matters", *International Review of Financial Analysis*, Vol. 63, pp. 406-417, doi: 10.1016/j.irfa.2017.12.003.

Brown, S. (2020), "How COVID-19 will reshape Islamic finance markets", *The Jakarta Post*, available at: https://www.thejakartapost.com/academia/2020/06/05/how-covid-19-will-reshape-islamic-finance-markets.html (accessed 14 April 2021).

Damak, M., Roy, D. and Mensah, S. (2020), "Islamic finance 2020-2021: COVID-19 offers an opportunity for transformative developments", available at: https://www.spglobal.com/ratings/en/research/articles/200615-islamic-finance-2020-2021-covid-19-offers-an-opportunity-for-transformative-developments-11533355 (accessed 14 April 2021).

Heinkel, R., Kraus, A. and Zechner, J. (2001), "The effect of green investment on corporate behaviour", *The Journal of Financial and Quantitative Analysis*, Vol. 36 No. 4, pp. 431-449.

Kassim, N.S., Ramlee, R. and Kassim, S. (2017), "Impact of inclusion into and exclusion from the Shariah index on stock price and trading volume: an event study approach", *International Journal of Economics and Financial Issues*, Vol. 7 No. 2, pp. 40-51.

Managi, S., Okimoto, T. and Matsuda, A. (2012), "Do socially responsible investment indexes outperform conventional indexes?", *Applied Financial Economics*, Vol. 22 No. 18, pp. 1151-1527.

Masih, M., Kamil, N.K.M. and Bacha, O.I. (2018), "Issues in Islamic equities: a literature survey", *Emerging Markets Finance and Trade*, Vol. 54 No. 1, pp. 1-26.

MSCI (2018), "MSCI index methodology", available at: https://www.msci.com/index-methodology (accessed 14 April 2021).

MSCI (2020), "MSCI World Index (USD): index fact sheet", available at: https://www.msci.com/documents/10199/149ed7bc-316e-4b4c-8ea4-43fcb5bd6523 (accessed 14 April 2021).

Ng, S. and Zhu, X. (2016), "Do changes in index composition affect the stock prices and trading volume? The case of Shariah-compliant index in Malaysia", *Capital Markets Review*, Vol. 24 No. 2, pp. 14-39.

Nor, F.M., Shaharuddin, A., Marzuki, A. and Ramli, N.A. (2019), "Revised Malaysian Sharīʿah screening: its impact on Islamic capital market", *Research in World Economy*, Vol. 10 No. 1, pp. 17-30.

Obaidullah, M. (2005), *Islamic Financial Services*, Scientific Publishing Center, King Abdulaziz University, Jeddah.

Park, J.W. and Lee, C.W. (2018), "Performance of stock price with changes in SRI governance index", *Corporate Social Responsibility and Environmental Management*, Vol. 25 No. 6, pp. 1121-1129.

Quinsee, P. (2020), "Global equity views", *JP Morgan*, available at: https://am.jpmorgan.com/us/en/asset-management/gim/adv/insights/portfolio-insights/global-equity-views (accessed 14 April 2021).

Roy, S. and Kemme, D.M. (2020), "The run-up to the global financial crisis: a longer historical view of financial liberalization, capital inflows, and asset bubbles", *International Review of Financial Analysis*, Vol. 69, doi: 10.1016/j.irfa.2019.101377.

Saiti, B., Bacha, O.I. and Masih, M. (2014), "The diversification benefits from Islamic investment during the financial turmoil: the case for the US-based equity investors", *Borsa Istanbul Review*, Vol. 14 No. 4, pp. 196-211.

Salem, R. and Badreldin, A. (2014), "Assessing the resilience of Islamic banks: an empirical analysis", in Ahmed, H., Asutay, M. and Wilson, R. (Eds), *Islamic Banking and Financial Crisis: Reputation, Stability and Risks*, Edinburgh University Press, Edinburgh, pp. 40-57.

Tahir, M. and Ibrahim, S. (2020), "The performance of Sharīʿah-compliant companies during and after the recession period – evidence from companies listed on the FTSE All World Index", *Journal of Islamic Accounting and Business Research*, Vol. 11 No. 3, pp. 573-587.

Touiti, M. and Henchiri, J.E. (2018), "Risk and performance of Islamic indexes during subprime crisis", available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2917060 (accessed 14 April 2021).

United Nations (2020), "Comprehensive and coordinated response to the coronavirus disease (COVID-19) pandemic", available at: https://documents-dds-ny.un.org/doc/UNDOC/LTD/N20/231/11/PDF/N2023111.pdf?OpenElement (accessed 14 April 2021).

Welling, J. (2020), "S&P and Dow Jones Islamic indices continue outperformance in Q1 2020", available at: https://www.spglobal.com/en/research-insights/articles/sp-and-dow-jones-islamic-indices-continue-outperformance-in-q1-2020 (accessed 14 April 2021).

About the author

Ahmed Badreldin, PhD, is a lecturer at the Department of Finance and Banking and the Department of Economics of the Middle East at the Philipps-Universität Marburg in Germany. He completed his PhD in asset pricing and Islamic finance in 2018. Ahmed Badreldin can be contacted at: ahmed.badreldin@uni-marburg.de