

# Performance of Values-Driven and Profit-Seeking Investment Strategies

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## INTRODUCTION

Two of the core alternative investment strategies today are faith-based and socially responsible investing (SRI). Faith-based investing (also closely related to morally responsible investing, or MRI) sets religiously motivated moral standards that guide an investor's choice of investing in a particular stock index,<sup>1</sup> screening for stocks, or mutual funds that cater to a particular style or theme.<sup>2</sup> Among the three Abrahamic religions (Christianity, Islam, and Judaism), there are a lot of similarities when it comes to setting a moral standard for work, living, property, investment, and personal relationships. In fact, a set of common unifying themes bind these religions together, especially for investment and economic functions. All three religions prescribe screening investments for certain social, moral, and personal values, in addition to profit motives (see Table 1).

For designing mutual funds, a portfolio manager needs to identify what really motivates a certain type of investors. From the perspectives of risk and return trade-off, it is important to identify whether investors care about values or profits. For example, one may wish to identify the segment of shari'a-compliant investors that is values-driven and the segment that responds more to profit motives. A study by Derwall, Koedijk, and Horst suggests that SRI investors<sup>3</sup> are not homogenous with respect to their shared expectations and goals for their investments. According to the authors, the market is divided into values-driven and profit-seeking SRI investors. As witnessed recently, SRI performance is usually viewed through the lens of corporate social responsibility (CSR). Values-driven investors invest in SRI stocks with the primary objective of adhering to values that typically

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**Table 1. Similarities among Religiously Sensitive Investment Strategies**

Category	Judaism	Christianity	Islam	Hinduism/ Buddhism	SRI
Adult entertainment	X	X	X		X
Music			X		
Alcohol		P	X	P	X
Companies open on Sabbath	X				
Contraceptives/abortion		P			
Gambling	X	X	X	P	X
Highly indebted companies			X		
Interest	P	P	X	X	
Killing of animals				X	
Labor relations					P
Non-kosher food	X		X		
Nuclear power		X			X
Pork	X		X		
Stem cell		P			
Tobacco		X	X	P	X
Violence		P		X	X
Weapons and defense	X	X	X	X	X
Corporate social responsibility				X	
Environment					X
Corporate governance					X
Human rights					P

Note: X indicates no investment and P indicates partial investment.  
 Source: Compiled from various Internet sources including Credit Suisse (2011) and Ghoul and Karam (2007).

include ethical, moral, religious, environmental, and human rights issues. The second segment of investors’ primary motivation is monetary return, suggesting that they care more about the profitability of investments than about deriving utility out of nonmonetary objectives. Rather, they expect SRI investments to provide better returns, especially over the long term, than comparable investments. This segment of investors mandates that these investments should provide additional profits because firms in this category have lower externalities, lower legal costs, and have a committed customer base interested in investing in firms that do good for society in general.<sup>4</sup>

Other explanations of SRI stocks providing superior returns include shunned stocks and the errors-in-expectations hypothesis. Accordingly,

socially controversial stocks (shunned stocks) trade at relatively lower prices in order to offer investors higher expected returns. In contrast, the errors-in-expectations hypothesis predicts that SRI stocks can deliver superior returns due to the fact that investors do not incorporate CSR in valuing SRI stocks, especially in the short run. Over time, prices fully reflect all CSR practices.

Based on the preceding discussion, there are three distinct investment strategies that financial managers can incorporate into the design of financial products: values, shunned stocks, and profit motives. This study investigates the performance of mutual funds that promote values, irresponsible stocks (shunned stocks), and profit. While we focus our attention on shari'a-compliant investors, we also compare their performance with both conventional and SRI groups of investors. Specifically, we use the shari'a-compliant universe of stocks to design investment products that respond to values, shunned stocks, and profit screens. Subsequently, we evaluate the performance of these strategies using two other universes of stocks: conventional and SRI.

The remainder of this paper is structured to provide details about the framework of segmenting shari'a-compliant investors into profit-seeking and values-driven categories to examine whether their behavior confirms the shunned stocks or errors-in-expectations hypothesis.

## **BACKGROUND AND LITERATURE REVIEW**

It is interesting to note that the lines separating religious and socially motivated investment strategies are slowly disappearing. In other words, capital markets are slowly combining diverse religious and social principles for attracting various groups of investors interested in the social, religious, and moral aspects of investments. Jewish guidelines for investing are very similar to SRI and shari'a-compliant investing. Foremost, there is a prohibition of interest-based lending among fellow men, which has been classified as the worst form of sin in the Torah, the holy book. Talmud encourages investments for community development. Furthermore, the Jewish investment principles discourage investment in pork, weapons, adult entertainment, and the non-kosher food industry, among others.

Christianity has always prescribed how its followers should live, work, and pray. A close examination of the teachings of the Christian religion reveals a number of familiar concepts that are also embedded in other religions, such as dignity toward human beings, doing good for society, sharing material possessions with those less fortunate, and living morally. There is an emphasis on prohibiting investment in morally reprehensible activities. In particular, the Catholic religion discourages investing in companies that promote pornography and alternative lifestyles, contraceptives (which violate the right to life), stem cell research, social

injustice, inhuman treatment of animals, and anti-family entertainment. As Latkovic indicates, these activities are contrary to both Catholic moral teachings and the preservation of human dignity.<sup>5</sup>

The unitary perspective of life in Islam, which includes an economic system, essentially strives to establish harmony, equality, and balance between the individual and society as a whole in a worldly context, but also between the individual and God in a spiritual sense. Since the “rules governing permissible and forbidden economic behavior [. . .], as well as questions of property rights and of production and distribution of wealth, are all based on the fundamental Islamic concept of justice,” it becomes evident that the notions of economic justice and equitable distribution of wealth represent two fundamental pillars of the Islamic economic system.<sup>6</sup> Islamic investment principles, governed by the teachings of the Qur’an and the *sunna*, promote social justice, fairness in business transactions, and personal moral responsibility. According to shari‘a-compliant investing, there are prohibitions against investing in highly levered firms, firms earning income from interests, firms that promote pornography, firms producing weapons, and firms engaged in the business of pork, gambling, and tobacco (Credit Swiss, 2009). Since 1999, major Western stock exchanges have initiated listing Islamic indices, such as the Dow Jones Islamic Market Index (DJIM) and the FTSE Global Islamic Index Series, to promote the industry’s development. In the US, the Shari‘a Supervisory Board of the DJ Islamic Market Index (listed in 1999) ensures that the security universe is only composed of shari‘a-compliant companies. As of January 24, 2012, the index included 2,599 companies from 55 countries with a total market capitalization of \$16,476 billion.<sup>7</sup> According to a survey by Ernst and Young, by the end of 2010, while global assets under management (AUM) by mutual funds reached a level of \$25.6 trillion (1st quarter, 2011), shari‘a-compliant investment (SC) funds are estimated to manage about \$52.3 billion.

Other than the aforementioned religions, Hinduism, Shintuism, Buddhism, Jainism, and Sikhism, to name a few, have similar goals with respect to investing ethics and norms that can be broadly classified as MRI. For example, Dharma, the code of religion for followers of Buddhism and Hinduism, calls for a “karmic” way of investing and managing wealth in an honest manner. According to the Hindu religious scripture (the Vedas), the four goals of life are *dharma* (religion), *artha* (wealth), *karma* (work), and *moksha* (spiritual freedom). All four goals are intertwined, contributing toward achieving *moksha* (spiritual freedom). Specifically, investment strategies as shaped by adherence to Hindu and Buddhist religions stress that the maximization of wealth should not come at the expense of *daan* (giving) and *daya* (compassion). For instance, the “dharmic way” of investing encourages investments in firms emphasizing *ahimsa* (non-violence) as popularized by Mahatma Gandhi. A variant of such a style of investing would demand that firms maximize profit without sacrificing employee welfare.<sup>8</sup>

Other non-religiously sensitive investment strategies eschew investing in firms that go against personal and social norms, shaped by adherence to a particular religion. For instance, an investment strategy that has gained wide acceptance is SRI that prescribes investing in firms that do not violate social norms or personal beliefs. According to recent estimates, total assets under management in the SRI industry is about \$3.07 trillion out of a total \$25 trillion investible funds in the US.<sup>9</sup> To a large extent, the SRI investment strategy has been shaped by religion, especially by the teachings of Christianity. SRI has its roots in the teachings of religious groups in the US dating back to the 1700s, when religious leaders and investors decided not to invest in companies involved in religiously questionable businesses like alcohol, tobacco, and gambling<sup>10</sup>. Over the subsequent years, however, SRI has attracted a diverse investor base with wide-ranging motivations and objectives.<sup>11</sup> In the recent past, the focus has shifted more to ESG (ethical, social, and governance) and CSR (corporate social responsibility) while traditional religion-based investing vehicles are more tagged as MRI<sup>12</sup> that are based on permissible investing.<sup>13</sup>

Overall, religiously motivated investments are intertwined with MRI and SRI investment strategies in the capital market by a new breed of investors who are motivated to work, live, and invest in a morally responsible way. Table 1 offers unique similarities among the negative screens employed by these SRI and MRI strategies (X indicates no investment and P indicates partial investment).<sup>14</sup> Note that the MRI and SRI investment strategies are in large part strikingly similar. As noted above, the addition of labor relations, human rights, CSR, and ESG makes SRI different from MRI.<sup>15</sup> Although the diversity of nonpecuniary objectives from such a diverse investor base seems great, conceptually it is thought that there is a common thread in terms of their nonmonetary objectives. All such investors opt for MRI and SRI investments to achieve far more than the monetary return on investment.

Traditionally, all these investors have been lumped together to form a group whose motivation is to obtain the best possible bundle from a three-dimensional space of risk, return, and values. Recent work by Derwall, Koedijk, and Horst<sup>16</sup> and references therein suggest that not all investment motives are alike. Discriminating among distinct investment motives creates a clientele effect on designing various styled investment products.

Several hypotheses have been advanced in the literature to explain the actual performance of values- vs. profits-driven SRI investment strategies. These include the shunned stocks and errors-in-expectations hypotheses.<sup>17</sup> The shunned stock hypothesis states that values-driven SRI investors tend to maximize non-pecuniary aspects of their investment goals and therefore create an excess demand for responsible stocks by investing only in these stocks. A consequence of such altruistic investment behavior is that socially controversial stocks (shunned stocks) trade at relatively lower prices in order to offer investors higher expected returns. In contrast, the errors-in-expectations

hypothesis predicts that SRI stocks can deliver superior returns due to the fact that the market consistently fails to appreciate the importance of CSR in valuing stocks, especially in the short run. As the values and non-monetary objectives of today's SRI investors are more in line with environmental/human-rights issues than moral or religious motivations, CSR measures and metrics are the main contributors to and indicators of SRI performance. As a result, the errors-in-expectations hypothesis suggests that SRI investments are in general undervalued in the short run, but these investments appreciate to their true value in the long run as investors slowly come to terms with the benefits of good CSR practices. So, in the long run, both of these effects cancel each other out such that SRI funds and conventional funds offer similar returns.<sup>18</sup>

As noted previously, shari'a-compliant investment (SC) is an alternative investment strategy that has a number of features similar to SRI. Investors of both SRI and SC may maximize nonpecuniary objectives, in addition to maximizing profit motives. There are many similarities between the SRI and SC strategies (see Table 1). In particular, SRI stresses the "three P's rule":

Socially responsible investing (SRI) is an investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis . . . It is a process of identifying and investing in companies that meet certain standards of Corporate Social Responsibility (CSR).<sup>19</sup>

Therefore, SRI fund management emphasizes financial profit, without sacrificing responsibility toward our society and environment.

In other words, both Islamic and SRI investment strategies stress profit-based investing, without disregarding the paramount objective of the betterment of society. Traditionally, in the context of Islamic investment, profit motives are expected to follow the religious responsibilities and regulations outlined in shari'a. Again, the objective is to promote the betterment of the moral Islamic economic system and a just society. As of today, shari'a SCI<sup>20</sup> is a fast-growing segment of the capital markets (currently around \$1.3 trillion, and expected to reach \$2 trillion by 2014). The objective of looking at shari'a-compliant investing through the lens of an SRI framework is twofold: first we examine if the shari'a-compliant financial products also attract two investor classes with different motivations, and second, whether it is possible to generalize this segmentation to any investment decisions which aim to optimize both pecuniary and non-pecuniary objectives. Most shari'a-compliant investing selects assets that yield the best possible return for a given level of risk, as long as the investment choices are shari'a-compliant. Such edicts manifest as investment constraints for certain activities like the disallowance of interest, investment in morally questionable businesses like alcohol, pork, tobacco, excessive uncertainty, gambling, etc. So the majority

of such investors and their investment behavior is similar to the behavior of the values-investor segment of SRI, which considers the values aspect of investment at least equally important if not more so.<sup>21</sup>

However, shari‘a-compliant investing exhibits few structural differences from both the conventional and SRI investments that make shari‘a investing and sin stocks perform like shunned stocks only during tranquil periods when general market volatility is low. During high volatility periods, shari‘a-compliant investors are expected to perform better because they avoid risky investments.<sup>22</sup> Empirical analysis of portfolios made of conventional, SRI, and shari‘a-compliant stocks would most likely offer support to the conjecture that shari‘a-compliant stocks’ performance lags during low to moderate volatility but outperforms during times of high volatility.

It is conceivable that a segment of shari‘a-compliant investors, smaller than the aforementioned segment, is primarily motivated by profits—to earn higher returns for a given level of risk, as compared to conventional finance. Tying this with the outcomes of the shunned stocks and errors-in-expectations hypotheses, the majority of shari‘a-compliant investing attracts values-driven investors and hence is consistent with the shunned stocks hypothesis. This might be especially applicable to markets where SC investors are a significant part of the capital market, like some of the Muslim countries with a vibrant Islamic finance industry. So shari‘a-compliant investing is expected to earn less than irresponsible investments in terms of pecuniary returns in those markets, because the shunned stocks hypothesis predicts that the less diversified ownership investor base for controversial assets results in expectations of higher returns to compensate for the reduced level of diversification.<sup>23</sup>

Considering that there may be more than one segment of shari‘a-compliant investors, an analysis of investment performance yields deeper insights into the forces of demand for such investments and the resultant impact on asset prices. As noted earlier, our analysis is similar in spirit to the work by Derwall, Koedijk, and Horst.<sup>24</sup> The authors look at the demands of SRI investments from different groups of investors as well as the contribution of concepts like ESG and CSR to the performance of SRI investments. Specifically, the authors create two portfolios. Portfolio one includes shunned stocks (sin stocks) classified as such by the KLD STATS database.<sup>25</sup> Sin stocks are those that are not permissible under the SRI screening. Portfolio two is made up of the top 30% of stocks that are ranked high on the KLD employee relationship index. Next, the authors estimate the following Fama-French (1992) three-factor model

$$(1) r_t - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2R_{t,SMB} + \beta_3R_{t,HML} + \varepsilon_t$$

where  $r_t - r_{ft}$  in equation (1) is the weekly excess return on the portfolio,  $r_{ft}$  is the weekly risk-free rate (US T-bill),  $r_{mt} - r_{ft}$  is the market risk premium ( $MktRf$ ), the difference between the return on a portfolio of small stocks and

the return on a portfolio of large stocks (*SMB*, small minus big), and the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (*HML*, high minus low). The intercept term ( $\beta_0$ ) is the excess return (alpha) and  $\beta_{1,3}$  are factor loadings on the familiar risk factors.

Equation (1) was estimated for a number of sub-periods dating from 1992–2008. The results indicate that the time varying excess return on a values-driven portfolio (a portfolio based upon stocks scoring high on employee relations) decline over time, supporting the hypothesis that valuation mistakes do not persist in the long run. In contrast, their results show that shunned stocks portfolio abnormal return stays fairly stable over the period.

We also believe that the presence of shari‘a-compliant investors increases the demand for responsible investments in the marketplace, as these investors are motivated by reasons other than pure profit motives. Values-driven investors value SC investing by partially assessing the firms’ future cash flows and partially examining the compliance of the investments with the values investors are concerned with. The preference for responsible investments allows for a transfer of wealth from non-responsible investments. In other words, the values investors shun stocks that are socially controversial. This split in demand for different kinds of investments impacts asset prices in a manner consistent with Merton’s incomplete information and segmented capital markets model.<sup>26</sup> This model implies that information asymmetry is largely responsible for market segmentation, which eventually leads to nonvisibility of stocks by a segment of investors. This creates a downward pressure on the prices of these assets. Reduced investor base also causes limited risk sharing among the small investor base. All these effects make it difficult for the socially controversial asset to trade at close to its intrinsic value. However, investors with a longer investment horizon can enjoy the true value growth of such an asset as over the period actual cash flows outperform the expected cash flow and push the stocks to trade at their intrinsic values. So according to this hypothesis of shunned stocks, socially controversial investments outperform shari‘a stocks due to the differences in demand from investors’ groups.

However, this conclusion is more relevant in markets where shari‘a-compliant investors constitute a substantial part of the market to impact prices of underlying investments by collectively participating in trading. In most of the world capital markets, especially the ones in developed economies, the shari‘a-compliant investors bloc is not a large enough group to cause the downward pressure on shunned stocks prices. So for SC investing, the errors-in-expectations hypothesis seems to hold. This would imply that SC investing provides excess return in the short run, but over a longer time horizon these excess returns disappear.



## EMPIRICAL ANALYSIS

We use weekly data for approximately 4000 stocks from 55 countries from January 2000 to June 2011. Our sample of conventional and SRI stocks includes both financial (banks, S&Ls, credit unions, mortgage financing companies, real estate firms, and insurance companies) and non-financial firms. In contrast, the shari‘a-compliant universe of stocks specifically excludes the above stocks. In the end, the universe of stocks designated as shari‘a-compliant is carefully selected by the Dow Jones shari‘a board. We test four different investment strategies: benchmark (passive indexing), values, sin stocks, and profit motives. These strategies are described next.

### Investing Style: Benchmark

The benchmark investment returns are based upon all stocks included in each of the three distinct universes of stocks: the Dow Jones Global Index, the Dow Jones Islamic Index, and the Dow Jones Sustainability Index. Based on these three universes, we form three equally weighted portfolios—conventional, shari‘a-compliant (SC), and SRI—and examine their performance over multiple investment horizons.

### Investing Style: Values (Low Debt/Market Cap)

The second investment strategy examines whether investors maximize their non-pecuniary objectives, in this case, by investing in firms that rank high on some measures of CSR. Several studies have considered KLD employee relations as an indicator of CSR in valuing investment performance. In addition, firms can be also ranked using alternative indicators such as the Gompers, Ishii, and Metric index of corporate governance.<sup>27</sup>

Unfortunately, none of these measures reflects one of the most important taboos in Islamic finance: the prohibition on interest or *riba*. We consider the debt ratio ( $[\text{short-term debt} + \text{long-term debt}] / \text{market capitalization}$ ) as a measure of a firm’s exposure to the credit market as well as the extent to which the firm is involved in interest-based borrowing activities. The decision to exclude stocks on the basis of the debt-equity ratio has been contentious. Note that while the Dow Jones Islamic Index sets the maximum debt ratio for firms included in the index at 33%, critics claim that there is no scientific or religious basis for deciding on 33% as the maximum leverage for a firm to be classified as shari‘a-compliant.<sup>28</sup> Several studies have traced the origin of the rule to the times of the Prophet Muhammad when he advised Abu Bakr that donating one third of one’s wealth may be too much. However, such references to the Prophet Muhammad’s conversation may have been taken

out of context.<sup>29</sup> There are also some issues regarding the impact of the one-third rule. As El-Gamal (2006) suggests, the rule introduces pervasiveness in the way fund managers are forced to buy and sell stocks. For example, fund managers buy stocks when the price is rising (implying that the debt/market cap is low). Subsequently, an increase in the debt/market cap in a falling market would prompt the firm to be excluded from the shari‘a-compliant universe. This would again force fund managers to sell the stock when the price is too low.

Whether the one-third rule is arbitrary or not, the principles behind using this rule as an indicator of values are based upon the fact that a positive debt/market cap ratio suggests firms’ extent of engagement in the debt market and as such the extent of interest expense to service debt. We believe that the debt-equity ratio should be lower, suggesting a lower level of interest expenses. Furthermore, our choice of a *low* debt/market cap stems from the ongoing debate in the literature on the attractiveness of equity financing over debt financing. A voluminous literature exists which firmly establishes the superiority of equity financing over debt financing for a variety of reasons, including fairness, social equity, and reduced exposure to the interest rate volatility, among others.<sup>30</sup>

The formation of annual portfolios on the basis of the leverage ratio is simple. The investor sorts the universe of shari‘a-compliant firms on the basis of the debt/market cap at the end of the current year and selects the top 100 firms with the lowest debt ratio to form a portfolio for the upcoming year, and the process is repeated for successive years. Similarly, we use the conventional and SRI universes of stocks to build similar equally weighted<sup>31</sup> portfolios. The exercise allows us to demonstrate if non-shari‘a-compliant stock universes can produce shari‘a-compliant like returns.

### **Investment Strategy: Shunned Stocks**

The third investment strategy examines the performance of a portfolio based upon stocks that are shari‘a-compliant but are less desirable because of their high leverage. To form the annual portfolio with high leverage firms, the investor sorts the universe of shari‘a-compliant firms on the basis of the debt/market cap at the end of the current year and selects the top 100 firms with the highest debt ratios. Similarly, we screen the conventional and SRI universes of stocks to build similar equally weighted portfolios.

### **Investing Style: Profit Motives**

The fourth investment strategy is based on profitability. We rank stocks on the basis of an index of profitability. We use the methodology presented in

Joel Greenblatt's *The Little Book That Beats the Market* (2005) to sort stocks included in the DJIM Index.<sup>32</sup> Our choice of Greenblatt's methodology to rank stocks reflects the fact that this methodology has been proven successful in extensive back-testing analyses.<sup>33</sup> The investment philosophy basically identifies undervalued stocks and is based upon earnings yield (EY) and return on capital (ROC) ratios. Note that high earnings yield identifies stocks that are selling cheap and the return on capital ratio identifies companies that are capable of reinvesting their earnings at a high rate. Therefore, firms with high ROC result in high earnings growth and are expected to have a competitive advantage. These variables are calculated as follows:

1.  $EY = EBIT/Enterprise\ Value$
2.  $ROC = EBIT/(Working\ Capital + Net\ Plant,\ Property,\ and\ Equipment)$

Thereafter, the EY and ROC ranks are added together for each security to generate its final combined ranking.<sup>34</sup> Stocks scoring high according to Greenblatt's methodology will be included in the first portfolio. The formation of an annually rebalanced portfolio is accomplished by sorting the shari'a-compliant universe of stocks on the basis of basis of the previous year's data on profitability. The top 100 firms are then selected to form an equally weighted portfolio. A similar approach is taken to form two equally weighted portfolios using conventional and SRI stocks.<sup>35</sup>

## Investment Horizons

We select four different investment periods: overall (January 2000–April 2011), low-volatility regime (January 2000–December 2006), financial crisis (January 2007–February 2009), and post-financial crisis (March 2009–April 2011). Our focus is on examining the relative performance of each strategy across various time divides, in particular the financial crisis of 2007–09. According to Batram and Bodnar,<sup>36</sup> the global equity market, which stood at an all-time high of \$51 trillion in October 2007, dropped to \$22 trillion by the end of February 2009. There are several factors responsible for the crisis, and a complete analysis of these factors and the magnitude of their effects on the economy is beyond the scope of this paper. In short, according to a recent report,<sup>37</sup> excessively high leverage ratios among financial institutions, corporations, and mortgage dealers are the principal culprits behind the credit crisis. By the end of the year 2008, the entire global economy experienced massive asset writedowns and the excessive indebtedness essentially stalled the worldwide economy.

Our choice of this high volatility period is related to the selection of leverage in this study as an indicator of "values" according to shari'a-compliant investing. We simply examine to what extent shari'a-compliant stocks were exposed to this period of low liquidity and high volatility.

Especially given that shari'a-compliant stocks are characterized by low leverage, they are expected to have low exposure to such volatility. Furthermore, it would be worthwhile to compare how values- and profit-driven investment strategies performed during the credit crisis. A priori, it would seem that picking stocks with low debt ratio would have offered a substantial level of protection to investors during this period of high volatility. Naturally, we would expect SC investing to perform better than the competing portfolios based upon conventional and SRI universes.

### Data

The data for the weekly stock returns for the period January 2000 to April 2011 are obtained from Bloomberg and Datastream, while data related to economic fundamentals like size, return on capital (ROC), earning yield, debt, and book-to-market equity are extracted from FactSet. Stock returns are in US dollar terms and are based upon log relatives of weekly stock prices. The weekly rate on a one-year Treasury Bill, which is used as a proxy for global risk-free rate, is obtained from the St. Louis Federal Reserve website.<sup>38</sup>

### Sample Characteristics

Table 2 reports the general characteristics of the firms in the sample. Note that the annual rebalancing strategy employed in this study assumes that an investor screens stocks on the basis of publicly available information at the end of the previous year to select stocks for the next year. Annual selection of stocks through sorting on the basis of leverage and profitability adjusts for changes in these ratios given recent volatility in the market. For example, in a falling market, the debt ratio could rise not because firms are leveraging up but simply because the market value of the firm is falling. Furthermore, annual sorting also reduces survivorship bias because the exact composition of the portfolio changes from year to year.

We highlight a few salient observations regarding the progression of these firms with respect to selected fundamentals over the years. First, in terms of assets size, conventional firms were ranked as largest both in 1999 and in 2010. With respect to market cap, the SRI group of stocks was ranked largest in 1999, though the shari'a-compliant group of stocks was ranked largest in 2010. The conventional group of stocks had the highest level of long-term debt both in 1999 and in 2010, but the SRI group of stocks had the highest level of short-term debt in 1999.

As expected, shari'a-compliant stocks had the lowest amount of debt (short term and long term) in both years. Similarly, shari'a-compliant stocks had the lowest debt/equity ratio in both years, indicating the fact that this

**Table 2. Descriptive Statistics Are Reported for Representative Years**

In this setting, the investor selects firms on the basis of firm-specific fundamental data.

Variable	1999			2009			2010		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Assets	2498	558421.12	3146987.95	2622	1421230.49	10854896.14	2582	1551925.65	11766633.58
Market-cap	2646	189662.82	1653617.44	2617	370865.46	3502156.90	2566	556143.04	5902639.30
EBIT	1884	22727.18	168211.77	1980	48527.29	460117.91	1944	61674.55	543511.08
Short-term Debt	2646	70807.74	398918.47	2592	140929.82	888739.61	2545	164292.92	1115594.60
Long-term Debt	2646	107206.90	796339.84	2618	222218.21	1800075.27	2580	228005.04	1721204.87
PE	2062	88.14	2233.91	1950	60.71	762.69	2221	29.57	87.51
EPS	2491	-2311.86	118186.64	2623	260.11	9472.35	2582	405.43	7747.18
Return on Capital	2400	3.36	61.53	2606	3.18	26.04	2572	5.39	19.18
Return on Equity	2375	1.30	235.79	2585	1.22	136.53	2550	6.90	101.54
Return on Assets	2412	2.74	8.65	2614	1.72	9.44	2578	3.09	9.87
Earn-yield	2465	-5.76	723.97	2617	-3.01	48.51	2566	0.50	73.79
Price to Book	2430	5.25	125.95	2582	1.78	7.62	2529	1.78	2.89
Long-term Debt to Equity	2458	140.28	2407.62	2583	100.62	663.71	2542	81.23	151.39
Debt to Equity	2459	255.48	3263.53	2586	150.80	718.58	2544	128.75	233.38
Debt to Assets	2646	27.54	20.38	2621	27.87	19.24	2582	27.15	19.08
Operating Margin	2479	-5.43	622.64	2618	4.89	141.94	2572	5.92	205.05
Dividend Yield	2469	4.98	141.38	2601	2.66	2.66	2529	2.35	2.41
Interest Coverage	1851	15.54	74.95	1953	148.05	3578.04	1917	85.69	2401.10
Current Ratio	1869	1.57	1.29	1977	1.69	1.87	1946	1.67	1.32
Net Profit Margin	2490	0.82	659.99	2619	14.73	611.70	2578	2.08	936.26
Debt to Market Cap	2468	3.30	64.49	2585	1.43	3.70	2527	1.51	11.09

Table 2. Descriptive Statistics Are Reported for Representative Years (continued)

Variable	1999			2009			2010		
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Assets	1200	164266.84	1272810.48	1372	385725.98	4323084.94	1353	437106.73	4762854.10
Market-cap	1390	143209.69	1585801.76	1369	556687.48	6405605.35	1347	683978.11	6670889.04
EBIT	1196	14977.41	184158.95	1360	53519.39	729994.43	1334	66658.04	822142.39
Short-term Debt	1390	24070.80	252236.06	1333	27597.49	376776.31	1328	26773.17	325809.03
Long-term Debt	1390	28418.05	301139.59	1367	33507.19	426174.83	1351	35500.27	475637.90
PE	998	58.37	359.26	1144	33.37	126.13	1222	61.65	995.81
EPS	1202	92.61	1641.90	1372	183.16	8175.24	1351	389.77	6340.75
Return on Capital	1144	7.11	22.65	1362	8.26	18.96	1345	11.29	30.66
Return on Equity	1131	11.39	49.60	1363	9.87	27.68	1345	14.09	40.80
Return on Assets	1147	4.46	12.29	1370	5.21	12.01	1352	7.04	9.54
Earm-yield	1175	2.82	113.70	1369	3.31	15.47	1346	4.01	12.25
Price to Book	1155	4.38	8.04	1360	2.52	2.74	1340	3.13	6.28
Long-term Debt to Equity	1181	44.56	74.20	1358	25.29	37.99	1345	31.81	189.31
Debt to Equity	1182	66.18	101.07	1358	34.52	46.94	1346	41.50	199.83
Debt to Assets	1390	19.51	19.12	1367	14.75	13.68	1353	14.24	13.58
Operating Margin	1190	-4.35	254.96	1356	-9.38	419.93	1328	-31.25	1157.58
Dividend Yield	1181	1.63	2.43	1364	2.34	2.87	1336	2.01	2.13
Interest Coverage	1158	104.19	1045.85	1268	1068.86	15637.10	1242	1098.18	59918.47
Current Ratio	1189	2.16	1.93	1360	2.95	7.41	1340	2.76	4.32
Net Profit Margin	1191	40.84	1765.20	1356	68.14	2861.58	1333	18.65	2042.45
Debt to Market Cap	1173	0.57	1.87	1330	0.18	0.28	1320	0.16	0.24

**Table 2. Descriptive Statistics Are Reported for Representative Years (continued)**

Descriptive statistics are reported for representative years. In this setting, the investor selects firms on the basis of firm-specific fundamental data.

Variable	1999				2009				2010			
	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev	N	Mean	Std Dev
Assets	278	547422.54	2079931.21	278	924995.19	4156820.12	278	1047755.53	5163743.78	278	1047755.53	5163743.78
Market-cap	284	385410.14	2299989.46	277	409726.81	3054882.22	276	426722.37	2531628.66	276	426722.37	2531628.66
EBIT	216	27212.23	158461.49	216	37600.64	297167.37	216	52669.97	412108.06	216	52669.97	412108.06
Short-term Debt	284	83524.70	330895.74	276	130032.15	750216.56	276	155635.33	983201.15	276	155635.33	983201.15
Long-term Debt	284	105349.50	424737.39	278	177373.02	800298.93	278	192157.70	933328.15	278	192157.70	933328.15
PE	246	40.19	86.27	217	25.71	32.28	259	18.74	18.26	259	18.74	18.26
EPS	277	93.45	1032.47	278	231.02	2734.42	278	301.77	3480.80	278	301.77	3480.80
Return on Capital	275	7.50	30.75	278	4.49	13.52	275	8.95	8.25	275	8.95	8.25
Return on Equity	274	14.12	24.62	274	10.61	56.86	275	16.51	26.94	275	16.51	26.94
Return on Assets	275	4.45	5.39	278	2.34	8.69	278	5.27	5.90	278	5.27	5.90
Earn-yield	271	3.80	8.78	277	-0.21	24.59	276	6.99	6.20	276	6.99	6.20
Price to Book	270	4.53	7.86	273	2.70	6.43	273	2.30	2.10	273	2.30	2.10
Long-term Debt to Equity	276	85.32	147.45	274	150.98	578.41	275	94.40	122.43	275	94.40	122.43
Debt to Equity	276	171.74	317.54	274	216.49	696.10	275	146.42	261.62	275	146.42	261.62
Debt to Assets	284	25.21	16.23	278	27.96	15.84	278	26.17	14.94	278	26.17	14.94
Operating Margin	274	13.36	12.62	276	9.07	46.16	276	14.69	13.34	276	14.69	13.34
Dividend Yield	272	2.13	2.14	277	3.11	2.16	276	3.00	2.03	276	3.00	2.03
Interest Coverage	209	16.17	54.96	213	120.41	1149.79	210	77.78	821.36	210	77.78	821.36
Current Ratio	219	1.44	1.10	216	1.48	0.85	216	1.43	0.72	216	1.43	0.72
Net Profit Margin	275	9.09	13.40	276	-4.72	67.63	276	13.15	28.24	276	13.15	28.24
Debt to Market Cap	272	0.74	1.63	275	1.25	3.02	274	1.27	4.30	274	1.27	4.30

**Table 3. Average Weekly Raw Returns from Various Investment Strategies Are Compared**

Panel A has average weekly returns from equally weighted benchmark portfolios. The number of stocks in each stock universe is as follows: 1648 (conventional), 1024 (shari'a-compliant [SC]), and 192 (SRI). Weekly raw returns in Panels B through D are specific to the particular investment strategy chosen. For example, in Panel B (values strategy), we select the top 100 firms with the lowest debt-to-market cap from each universe and calculate the weekly average raw returns. In Panel C, we have returns from shunned stocks portfolios (the top 100 firms with the highest debt ratios). In Panel D, we select the top 100 firms according to Greenblatt's profitability indicator. Greenblatt's investment philosophy identifies undervalued stocks and is based upon earnings yield (EY) and return on capital (ROC) ratios. Note that high earnings yield identifies stocks that are selling cheap and the return on capital ratio identifies companies that are capable of reinvesting their earnings at a high rate. Therefore, firms with high ROC thus result in high earnings growth and are expected to have a competitive advantage. For all investment strategies, stock screening is conducted on the basis of firm-specific fundamentals for the year 1999. Standard deviations are listed in parenthesis.

Stock Universe	2000–2011	2000–2006	Jan. 2007–Feb. 2009	March 2009–April 2011
<b>Panel A: Benchmark Returns (All Firms)</b>				
Conventional	0.0017 (0.0213793)	0.0022 (0.0165246)	-0.0056 (0.0302899)	0.0085995 (0.0234375)
SC	0.0030 (0.0226701)	0.0035 (0.0185176)	-0.0036 (0.0317802)	0.0092 (0.0231473)
SRI	0.0012 (0.0238596)	0.0017 (0.0177633)	-0.0064 (0.0342952)	0.0082 (0.0277276)
<b>Panel B: Investment Strategy: Values (Top 100 Low Debt Firms)</b>				
Conventional	0.0021 (0.0196048)	0.0024 (0.0176159)	-0.0033 (0.0252322)	0.0074 (0.0186966)
SC	0.0024 (0.0236728)	0.0031 (0.0205042)	-0.0049 (0.0321596)	0.0092 (0.0053553)
SRI	0.0008 (0.0216994)	0.0010 (0.0176212)	-0.0047 (0.0305689)	0.0070 (0.0225399)
<b>Panel C: Investment Strategy: Shunned Stocks (Top 100 High Debt Firms)</b>				
Conventional	0.0037 (0.0329147)	0.0056 (0.0261551)	-0.0069 (0.0431321)	0.0092 (0.0402666)
SC	0.0073 (0.0295638)	0.0085 (0.0251441)	0.0016 (0.0384765)	0.0103 (0.0335345)
SRI	0.0026 (0.0031947)	0.0025 (0.0189989)	-0.0082 (0.0396939)	0.0099 (0.0359748)



**Table 3. Average Weekly Raw Returns from Various Investment Strategies Are Compared (continued)**

Panel D: Investment Strategy: Profit (Top 100 Firms)				
<b>Conventional</b>	0.0037 (0.0254328)	0.0048 (0.0201523)	-0.0058 (0.036199)	0.0111 (0.026)
<b>SC</b>	0.0059 (0.0531092)	0.0078 (0.0612534)	-0.0034 (0.0427932)	0.0108 (0.0283)
<b>SRI</b>	0.0016 (0.0240475)	0.0026 (0.017416)	-0.0061 (0.0372126)	0.0073 (0.0251)
Panel C: Investment Style: Shunned Stocks: January 2000–April 2011 In this section, we sort firms on the basis of debt/market cap. We consider low debt ratio as an indicator of values. For each type of portfolio, we include the top 100 firms with the highest debt/market cap ratio.				

group of stocks had lower reliance on debt financing. This is also reflected in interest coverage ratio. Shari‘a-compliant stocks had the highest interest coverage ratio, indicating that this group had traditionally lower levels of debt and interest expenses associated with servicing the debt. In terms of financial performance, conventional stocks had the highest PE ratio in 1999 but shari‘a-compliant stocks were ranked the best in this category in 2010. Net profit margin suggests that the shari‘a-compliant group was ranked the best in both years, indicating higher profitability. In terms of ROE, the SRI group was ranked the best in both years, followed by the shari‘a-compliant group. While the SRI group was ranked the best on return on capital in 1999, the shari‘a-compliant group was ranked the best in 2010. With respect to dividend yield, the shari‘a-compliant group performed worse than the conventional and the SRI groups of stocks. Earnings yield, which indicates the amount of profit as a percentage of the market cap, was the highest for the SRI groups in both years. Finally, as expected, shari‘a-compliant stocks had the lowest debt-to-market cap in both years.

In Table 3, average weekly raw returns of various groups of stocks from various investment strategies are compared. Panel A has benchmark weekly returns from three equally weighted portfolios created by selecting all stocks in each group. The number of stocks in each stock universe is as follows: 1648 (conventional), 1024 (shari‘a-compliant), and 192 (SRI). Weekly raw returns in Panels B and C are specific to the particular investment strategy chosen. For example, in Panel B (values strategy), we select the top 100 firms with the lowest debt-to-market cap from each universe and calculate the weekly average raw returns. In Panel C, weekly returns from the shunned stocks portfolios are presented. Shunned stocks portfolios are created by sorting each stock universe on the basis of debt-to-market cap and selecting the top 100 firms with high debt ratio. In Panel D, we select the top 100 firms

according to Greenblatt's profitability indicator. Greenblatt's investment philosophy identifies undervalued stocks and is based upon earnings yield (EY) and return on capital (ROC) ratios. Note that high earnings yield identifies stocks that are selling cheap and the return on capital identifies companies that are capable of reinvesting their earnings at a high rate. Therefore, firms with high ROC thus result in high earnings growth and are expected to have a competitive advantage. For all investment strategies, stock screening is conducted on the basis of firm-specific fundamentals for the year 1999. Standard deviations are listed in parentheses.

In Panel A, during January 2000–April 2011, shari'a-compliant stocks had the best performance, followed by conventional and SRI portfolios, respectively. For the next three sample periods, January 2000–December 2006, January 2007–February 2009 and March 2009–April 2011, the pattern did not change very much. The shari'a-compliant group was the best performer. The group's performance in terms of risk (standard deviation of portfolio returns) was somewhat similar to the conventional and SRI portfolios. Interestingly, during the financial crisis (January 2007–February 2009), the shari'a-compliant group performed best, followed by the conventional and the SRI group of stocks, respectively. Their post-financial crisis period performance was similar: shari'a-compliant portfolios performed the best. Panel B shows that, with the exception of the financial crisis period, during January 2000–April 2011, January 2000–December 2006, and March 2009–April 2011, values investment (stocks with the lowest leverage [debt/market cap]) strategy-motivated shari'a-compliant portfolios performed the best.

In Panel C, we report the results for the shunned stocks hypothesis. As discussed earlier, shunned stocks are firms with high leverage, and as such an Islamic investor would be less inclined to select them. As previous authors have suggested, these stocks are expected to generate high returns in the short run given the increased perception of riskiness for investing in these stocks. Our results indicate that high leverage translates into high returns. High-leverage shari'a-compliant stocks performed better than low-leverage shari'a-compliant stocks (Panel B) while still conforming to shari'a principles. In addition, compared to the conventional and SRI portfolios, the shari'a-compliant portfolio has higher returns across all periods.

The results have powerful implications for the role of leverage in determining stock returns. Recall that there is a 33% upper limit on the debt ratio for this group, while this restriction does not hold for the conventional and the SRI groups of stocks. Our results suggest that for these two groups, taking on excessive leverage simply does not allow investors to outperform high-leverage shari'a-compliant stocks. So our results offer convincing support for the notion that shari'a-compliant investment can be lucrative to anyone interested in high leverage and at the same time investing within the guidelines of shari'a principles. In other words, despite high leverage, shari'a-compliant stocks also have better financial performance (see Table

2), suggesting that investors are being rewarded for investing in firms that are not involved in activities not permissible under shari‘a constraints.

Panel D reports performance results for the profit-motive driven investments strategy. Recall that Panel D results are based upon screening stocks using Greenblatt’s indicator of future profitability of stocks. Shari‘a-compliant stocks generate better returns across all sample and sub-sample periods than their nearest competitors. Only during the post-crisis period did the conventional portfolio have better performance. Overall, these returns are quite interesting and point to the notion that leverage-based investment strategies using shari‘a-compliant stocks perform well and that shari‘a-compliant investment is a better alternative choice during the financial crisis.

## GARCH REGRESSION RESULTS

The asset pricing model in this section assumes that stock returns can be described by their sensitivity to the Fama-French systemic risk factors.<sup>39</sup> To construct the Fama-French factors, we eliminate stocks with negative book-to-market equity.<sup>40</sup> Also, the number of stocks each year used in the construction of factors varies depending on the availability of data for the corresponding year. This eliminates the problem of survivorship bias in the sample.

The construction of the *global* systemic risk factors is in line with Fama and French. *MktRf* is the market risk premium, *SMB* is the size mimicking portfolio constructed each week by taking the simple average of the returns on small-sized portfolios minus returns on large-sized portfolios, and *HML* is constructed (book to market mimicking portfolios) each week by taking the simple average of the returns on high book-to-market portfolios minus the returns on low book-to-market portfolios.<sup>41</sup> For all three stock universes, the Dow Jones Global Index is assumed to be the benchmark stock index. The dependent variable is the average weekly portfolio return of all firms.

Preliminary diagnostics suggest that the weekly excess returns have time varying variance with volatility clustering and fat tails. To deal with this issue, weekly excess returns are estimated using the following Threshold GARCH model (Glosten, Jaganathan, and Runkle)<sup>42</sup> from hereafter GJR model with traditional Fama-French (Fama and French, 1992) factors

$$(2) r_t - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2R_{t,SMB} + \beta_3R_{t,HML} + \varepsilon_t$$

$$(3) \varepsilon_t | \Psi_{t-1} \sim N(0, \sigma_t^2),$$

$$(4) \sigma_t^2 = \Omega + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{k=1}^k \lambda_k V_t \varepsilon_{t-k}^2 + \sum_{j=1}^p \delta_j \sigma_{t-j}^2$$

where  $r_t - r_{ft}$  in equation (2) is the weekly excess return on the portfolio,  $r_{ft}$  is the weekly risk-free rate (one-month US T-bill),  $r_{mt} - r_{ft}$  is the market risk premium, the difference between the return on a portfolio of small

**Table 4. Weekly Excess Returns Are Estimated Using the Following Threshold Garch Model:**

$$\begin{aligned}
 (2) \quad & r_t - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t \\
 (3) \quad & \varepsilon_t | \Psi_{t-1} \sim N(0, \sigma_t^2), \\
 (4) \quad & \sigma_t^2 = \Omega + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{k=1}^k \lambda_k V_t \varepsilon_{t-k}^2 + \sum_{j=1}^p \delta_j \sigma_{t-j}^2
 \end{aligned}$$

where  $r_t - r_{ft}$  in equation (2) is the weekly excess return on the portfolio,  $r_{ft}$  is the weekly risk free rate (one-month US T-bill),  $r_{mt} - r_{ft}$  is the market risk premium (*MktRf*), the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (*SMB*, small minus big), and the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (*HML*, high minus low). The intercept term is  $\beta_0$  and  $\beta_{1-4}$  are factor loadings on the familiar risk factors. The variance equation (4) models the conditional variance as a GJR ( $p, q$ ) process where  $p, k$ , and  $q$  denote the lag length.  $\Omega$  is the intercept term,  $\alpha$  is the ARCH term,  $\lambda$  is the ARCH term that measures the asymmetric response of the time varying volatility to good news and bad news.  $V_t$  is a dummy variable that takes a value of one if past returns are negative and 0 if past returns are positive. Finally,  $\delta$  is the GARCH term. The GJR specification allows us to avoid placing conditions on the  $\alpha$  and  $\delta$  terms to be positive. Portfolios are rebalanced annually.

Panel A: Benchmark Model: January 2000–April 2011									
Panel A has all firms included in each universe for constructing three equally weighted portfolios. Firms are classified as conventional, Islamic, and SRI by the Dow Jones Indexes. In the conventional portfolio, there are 1648 firms. For the Islamic portfolio, we include 1024 firms. Finally, in the SRI portfolio, there are 192 stocks.									
Stock Universe	Alpha	MktRf	SMB	HML	TARCH0	TARCH1	TARCH2	GARCH1	Information Ratio
Conventional	0.0027 (3.59)	0.1636 (7.41)	0.1414 (3.05)	-0.1071 (-2.16)	0.0001 (4.95)	0.0752 (1.59)	0.2720 (4.95)	0.6327 (10.75)	0.14
SC	0.0041 (5.13)	0.1826 (6.97)	0.1486 (2.88)	-0.1514 (-3.08)	0.0001 (4.59)	0.0581 (1.25)	0.2813 (4.47)	0.5792 (7.12)	0.21
SRI	0.0021 (2.87)	0.1183 (6.37)	0.0351 (0.8)	-0.0476 (-1.03)	0.0000 (4.68)	0.0611 (1.3)	0.3048 (4.69)	0.6978 (14.52)	0.03

Table 4. (continued)

Panel B: Investment Style: Values: January 2000–April 2011									
In this section, we sort firms on the basis of debt/market cap. We consider low debt ratio as an indicator of values. For each type of portfolio, we include the top 100 firms with the lowest debt/market cap ratio.									
Stock Universe	Alpha	MktRf	SMB	HML	TARCH0	TARCH1	TARCH2	GARCH1	Information Ratio
Conventional	0.00309 (4.36)	0.1558 (7.18)	0.1674 (3.76)	-0.1223 (-2.76)	0.0001 (5.50)	-0.123 (-0.32)	0.3809 (5.31)	0.5740 (8.56)	0.16
SC	0.0038 (4.39)	0.1937 (6.63)	0.2324 (4.00)	-0.2415 (-4.78)	0.0001 (4.83)	0.0024 (0.06)	0.3371 (4.87)	0.5348 (7.61)	0.17
SRI	0.0015 (2.10)	0.1515 (6.23)	0.0494 (1.07)	-0.0607 (-1.41)	0.0001 (4.87)	0.00844 (0.21)	0.3259 (5.25)	0.7048 (14.90)	0.07
Panel C: Investment Style: Shunned Stocks: January 2000–April 2011									
In this section, we sort firms on the basis of debt/market cap. We consider low debt ratio as an indicator of values. For each type of portfolio, we include top 100 firms with the highest debt/market cap ratio.									
Stock Universe	Alpha	MktRf	SMB	HML	TARCH0	TARCH1	TARCH2	GARCH1	Information Ratio
Conventional	0.0047 (4.44)	0.1443 (4.49)	0.2216 (3.50)	-0.1126 (-1.66)	0.000001 (3.87)	0.0767 (2.06)	0.2373 (4.89)	0.7451 (19.81)	0.15
SC	0.0078 (7.09)	0.1902 (5.08)	0.2038 (3.05)	-0.0967 (-1.51)	0.00004 (3.63)	0.0371 (2.02)	0.13 (4.30)	0.8464 (51.9)	0.27
SRI	0.003 (3.20)	0.1204 (6.09)	0.0723 (1.45)	-0.0389 (0.72)	0.00004 (4.47)	0.0889 (1.62)	0.2825 (4.27)	0.7010 (14.06)	0.10

**Table 4.** (continued)

Panel D: Investment Style: Profit: January 2000–April 2011									
In this section, we sort firms on the basis of Greenblatt ranking. The investment philosophy ranks on the basis earnings yield (EY) and return on capital (ROC) ratios. Note that high earnings yield identifies stocks that are selling cheap and the return on capital ratio identifies companies that are capable of reinvesting their earnings at a high rate. Therefore, firms with high ROC thus results in high earnings growth and are expected to have competitive advantage. Each portfolio contains top 100 firms ranked high according to the Greenblatt's profitability indicator. *Indicates the model is of type exponential GARCH.									
Stock Universe	Alpha	MktRf	SMB	HML	TARCH0	TARCH1	TARCH2	GARCH1	Information Ratio
Conventional	0.00499 (5.78)	0.1621 (5.64)	0.1480 (2.70)	-0.1281 (-2.45)	0.00007 (4.06)	0.1483 (2.77)	0.1936 (3.39)	0.6096 (8.83)	0.21
SC*	0.011 (17.67)	0.2830 (18.96)	-0.0526 (-1.39)	0.2036 (6.01)	-4.6678 (-21.05)	1.9153 (36.76)	0.3091 (10.33)	-0.4846 (-12.97)	0.21
SRI	0.003 (4.03)	0.1004 (5.05)	0.0403 (0.94)	-0.0217 (-0.54)	0.00004 (4.57)	0.1217 (2.10)	0.2951 (3.86)	0.6273 (11.63)	0.13

stocks and the return on a portfolio of large stocks (*SMB*, small minus big); and the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (*HML*, high minus low). The intercept term is  $\beta_0$  (alpha) and  $\beta_{1-4}$  are factor loadings on the familiar risk factors. If stocks are efficiently priced, the alpha should be zero and statistically insignificant.

The variance equation (4) models the conditional variance as a GJR ( $p, q$ ) process where  $p, k,$  and  $q$  denote the lag length.  $\Omega$  is the intercept term,  $\alpha$  is the ARCH term, and  $\lambda$  is the ARCH term that measures the asymmetric response of the time varying volatility to good news and bad news. A positive  $\lambda$  implies that bad news increases volatility. This is also known as the leverage effect, which suggests that future stock returns tend to have asymmetric response to past signed returns, i.e., past positive returns have a different effect than past negative returns.  $V_i$  is a dummy variable that takes a value of one if past returns are negative and zero if past returns are positive. Finally,  $\delta$  is the GARCH term. The GJR specification helps us avoid placing non-negativity conditions on the  $\alpha$  and  $\delta$  terms.<sup>43</sup>

Panel A, Table 4 reports GARCH results for estimating a multifactor asset pricing equation assuming a passive investment strategy for the January 2000–April 2011 period. The dependent variable is the risk-adjusted return from each universe of stocks. For each model, factor loadings for global

*MktRf*, *SMB*, and *HML* are reported (t-stats in parentheses). We also report the estimates from the variance equation including TARCH0, TARCH1, TARCH2, and GARCH1 parameters. ARCH1 and GARCH1 terms are positive and significant at the 1% significance level. In contrast, TARCH2 terms are negative and significant, suggesting the presence of asymmetry in the effects of positive and negative residuals. Overall, TGARCH modeling provides a parsimonious representation of the data to deal with time varying volatility and non-normality.

The estimated parameters for the *MktRf*, *SMB*, and *HML* are significant in several instances. The intercept terms are all positive and significant at least at the 5% significance level. The SC portfolio has the best performance. The coefficient for *MktRf* is positive and significant for all three universes. *SMB* is significant for both shari'a-compliant and conventional portfolios. The positive sign indicates that funds are leaning more toward small caps. *HML* is also significant for both conventional and SC portfolios. The negative sign indicates that funds are leaning more toward growth than value stocks.<sup>44</sup> It also indicates that, during this period, value stocks were hammered hard. Both *SMB* and *HML* were insignificant for the SRI portfolio.

We calculated the Sharpe ratio as an indicator of risk-adjusted return. It is defined as the intercept term divided by the standard error of the regression. As shown in Panel A, the Sharpe ratio for each portfolio for the period is positive, with the shari'a-compliant portfolio offering the best performance. The conventional portfolio was the second-best performer, followed by the SRI portfolio. Overall, the results clearly indicate that shari'a-compliant investing offers superior performance. For subsequent models, we will concentrate mostly on the Sharpe ratio from each portfolio.

Panel B reports the investment performance of the "values" strategy, where an investor picks the top 100 stocks on the basis of low leverage (debt/market cap). The shari'a portfolio performs the best, followed by conventional and SRI portfolios, respectively.<sup>45</sup> This investment strategy relies on the idea that a positive debt/market cap ratio is harmful to firms because of interest expense to service debt. As noted earlier, shari'a scholars are clear in their choice of low leverage and their reasoning is based on the historical precedence of 33% leverage, as well as on the attractiveness of equity financing over debt financing, fairness, social equity, and reduced exposure to the interest rate volatility. Overall, a portfolio manager would notice that during this period, using low leverage as a stock-picking strategy would have performed quite well.

Results for the shunned stock hypothesis are reported in Panel C. Under this strategy, an investor picks stocks with the highest leverage, which is assumed to be clearly against the basic tenets of the shari'a law prohibiting excessive leverage. Note that while we also include high-leverage shari'a-compliant stocks, these stocks are still shari'a-compliant because of the upper limit of 33% on leverage. For the remaining two groups of stocks,

there is no such limit on the amount of leverage. Again, the shari‘a-compliant portfolio has the highest alpha (intercept term), followed by the conventional and SRI portfolios, respectively. The shari‘a-compliant portfolio has the highest Sharpe ratio. It is comforting to see that while a portfolio of sin stocks (shunned stocks) performed well during this period, the shari‘a-compliant portfolio clearly is a better performer on two accounts—from the perspective of highest risk adjusted returns and from the shari‘a perspective of permissible maximum leverage for a firm.

Finally, how would a portfolio based upon stocks selected on Greenblatt’s index of profitability perform? So a portfolio manager identifies undervalued stocks on the basis of earnings yield (EY) and return on capital (ROC) ratios. In essence, one picks stocks that are selling cheap and the return on capital ratio identifies companies that are capable of reinvesting their earnings at a high rate. Our experiment shows that, compared to the preceding results, the shari‘a-compliant portfolio has the highest alpha. Notice that the coefficient of *SMB* is no longer significant; instead, *HML* is statistically significant and positive, indicating the fact that the portfolio manager is leaning more toward value stocks. Overall, our results for the values and profits motives suggest that the profit-motivated portfolios are clearly superior to shunned stocks and leverage-based strategies. Our results also indicate that the shari‘a-compliant strategy comes out as the best performer with respect to excess returns.

While many of these results hinge on investment periods and the choice of the fundamental variables as a screening tool, the idea presented in this paper clearly indicates that shari‘a-compliant investing is a mainstream investment strategy. We show that shari‘a-compliant investing can be tailored to meet the specific needs of a diverse client base.<sup>46</sup> Clients who prefer low-leverage stocks earn lower returns compared to clients who prefer high-leverage stocks. But the story does not end here. The performance of the shunned stock strategy clearly demonstrates that shari‘a-compliant stocks can offer the best of the two worlds: investing to maximize both values and profit. To this extent, non-shari‘a-compliant stocks do not offer investors a profitable opportunity to maximize non-pecuniary objectives of investing in good companies that are acceptable by moral and religious standards.

## ROBUSTNESS CHECKS

We conducted a series of additional exercises to check on the robustness of these results.<sup>47</sup> First, we used a shorter investment horizon (January 2000–December 2006) to observe ex post the performance (using the Sharpe ratio) of these investment strategies. This period would be categorized as a pre-crisis period when worldwide equity markets were on an upward trajectory. We expect all investment strategies to perform well during this

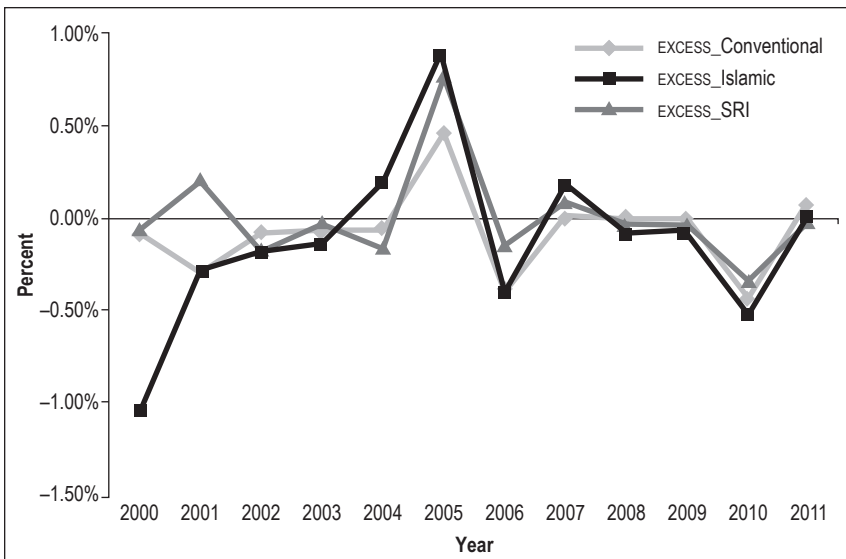


period and the results confirm our priors. All four investment strategies (benchmark, low leverage, high leverage, and undervalued stocks) have statistically significant alphas.<sup>48</sup> The results show that the shari‘a-compliant portfolio is ranked as the best, followed by the conventional and SRI portfolios, respectively. When stocks are picked on the basis of low leverage (values strategy), again, the shari‘a-compliant portfolio dominates the other investment strategies considered here. For the shunned stock hypothesis, the shari‘a portfolio is the clear winner. Finally, when portfolios are constructed using Greenblatt’s undervaluation criteria as a screening device, the shari‘a portfolio is ranked the best.

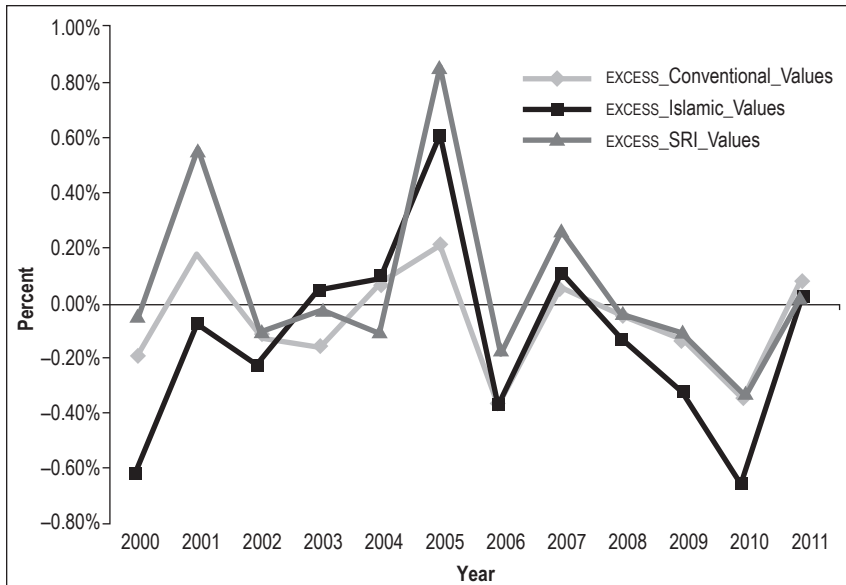
Second, the recent financial crisis has forced many investors to seek safe returns when markets become volatile and experience sustained declines. It would be interesting to see how these investment strategies performed during periods of great instability. We consider the period from January 2007 to February 2009 as the period during which the worldwide financial markets experienced substantial instability and loss of investor wealth. In times of such worldwide financial meltdown, which strategy performed the best?

At the outset, we note that with the exception of the shari‘a-compliant

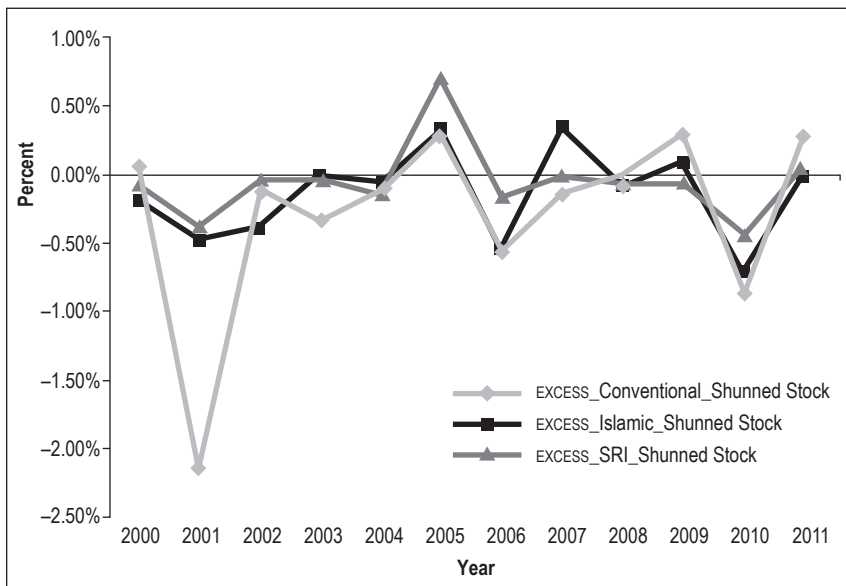
**Figure 1. Annual Excess Return: Benchmark Model**

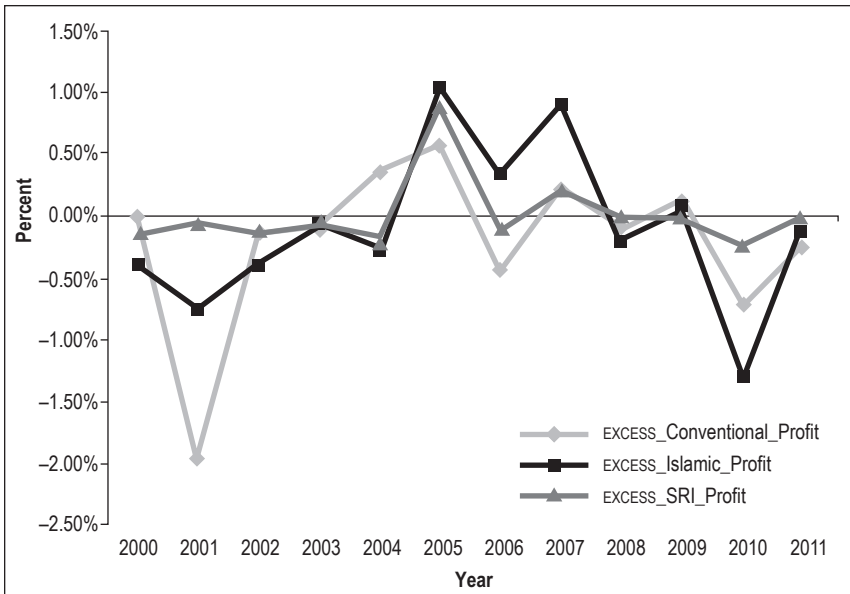


**Figure 2. Annual Excess: Return Investment Strategy: Values**



**Figure 3. Annual Excess Return: Investing Strategy: Shunned Stocks**



**Figure 4. Annual Excess Return: Investment Strategy: Profit**

portfolio constructed using shunned stocks, the alphas are insignificant and negative, suggesting that excess returns disappeared during the period. Individually, there are some interesting results. All three benchmark portfolios have negative alphas during the financial crisis, though the shari‘a portfolio does a better job in the preservation of wealth. It has the smallest negative alpha. This is a key result in this study. The interpretation of this finding is that, by not investing in non-shari‘a stocks, investors are able to weather the global financial crisis. Whether such investment outcomes are a result of shari‘a-compliant stocks having low leverage, having low exposure to the debt market, and being undervalued in general is an issue worth further empirical investigation. These results are indicative of the fact that during the financial crisis, a flight to quality strategy would involve investing in shari‘a-compliant stocks.

Next, when stocks are picked on the basis of low leverage, the conventional portfolio is the winner as it has a positive alpha. For the shunned stock strategy, the shari‘a portfolio is the clear winner with a positive alpha, which is significant at the 5% level. Finally, when portfolios are constructed using Greenblatt’s undervaluation criteria as a screening device, the shari‘a portfolio is ranked the best. Again, the reader is reminded that in most cases, alphas are negative and statistically insignificant.

Third, we also examined investment performance of these stock-picking strategies for the post-crisis period (March 2009 to April 2011). For

the benchmark strategy (each portfolio has all stocks in that universe) both the conventional and shari'a-compliant portfolio perform equally well, with the SRI portfolio a close second. When stocks are picked on the basis of low leverage, the shari'a-compliant portfolio dominates other investment strategies considered here. For the shunned stock hypothesis, the shari'a portfolio is the clear winner, though the alphas are not significant. Finally, when portfolios are constructed using Greenblatt's undervaluation criteria as a screening device, the shari'a portfolio is ranked the best.

Figures 1–4 illustrate the general trends of investment performance for all strategies on an annual basis. Here, we estimate average weekly excess returns (raw returns minus predicted returns) using the ordinary least squares method (ARIMA), thus avoiding convergence issues for estimating GARCH models with only 52 weekly observations each year (for the year 2011, we have only 19 weekly observations). In Figure 1, all three stock universes have weekly excess returns that are remarkably similar. Almost identical results are displayed in the remaining tables. In all the graphs, all the strategies experience a substantial decline in performance during the financial crisis period, though shari'a-compliant strategy may have performed better by losing less than remaining strategies. Towards the second half of 2009, all strategies started to produce better returns, though SRI and conventional portfolios outperformed the shari'a-compliant portfolio.

## CONCLUSION

According to Derwall et al. (2011), it is possible to discriminate among investors in terms of the personal, social, and religious beliefs guiding their investment choices. Broadly speaking, two dominant investment strategies have been identified. The values strategy suggests that values-driven investors are primarily concerned with the non-pecuniary investment objective of achieving some moral or societal goals. The financial return also exists, but as a secondary objective. For this group of investors, there are several choices of investment universes that include the SRI universe of stocks as well as stocks that are classified as being shari'a-compliant. In contrast, profit-motivated investors are primarily motivated to maximize financial return for a given degree of risk. For this group of investors, values play a minimal role in selecting the appropriate investments. Naturally, there are no restrictions as to which stock universes this group of investors picks. But regardless of the personal, social, moral, or profit motives guiding investment choices, the question of what strategy performs best is an empirical question, one that requires a careful analysis of the performances of these disparate investment portfolios.

We examine the relative performance of different investment strategies using three different universes of stocks—conventional, shari'a-compliant,

and socially responsible—during the recent tranquil and turbulent periods. We find that it is possible to discriminate among various universes of stocks to identify various dominant investment strategies. The performance of these strategies using globally listed stocks varies among various universes of stocks subjected to these investment strategies. Broadly speaking, there is room for both values and profits investing using conventional, SRI, and shari‘a-compliant stocks. However, the shari‘a-compliant universe has a unique appeal to Muslims and non-Muslim investors. Values investors can construct portfolios by excluding stocks that do not meet strict shari‘a guidelines. The most surprising result of this study is that among the three universes of shunned stocks, only the shari‘a-compliant portfolio delivers superior performance. In other words, leverage is good, but only up to a certain level. Finally, our results show that profits-driven investors can also find the shari‘a-compliant universe of stocks to deliver attractive returns. In essence, they offer the best of two worlds, without sacrificing returns. The results presented in this study have significant implications for making shari‘a-compliant investment a mainstream investment strategy.

### Endnotes

1. For Islamic investing, for example, there is the Dow Jones Islamic Market Index. The recent introduction of the STOXX Europe 600 Index has been a welcome addition to the finance industry for measuring the performance of Christian faith-based investing. For socially responsible investing, there is Dow Jones Sustainability Index.
2. Credit Suisse, *Faith-based Investing, Harmonizing Religion and Finance* (May 4, 2011).
3. Jeroen Derwall, Kees Koedijk, and Jenke Ter Horst, “*A Tale of Values-Driven and Profit-Seeking Social Investors*,” *Journal of Banking & Finance* 35 (2011): 2137–2147. [http://www.cerag.org/IMG/pdf/Derwall\\_atelier\\_finance.pdf](http://www.cerag.org/IMG/pdf/Derwall_atelier_finance.pdf) (accessed February 5, 2014).
4. Ibid.
5. Mark. S. Latkovic, *Morally Responsible Investing: Why Catholics Must Make Every Effort Not to Fund Immoral Activity* (2004). Available at <http://www.aodonline.org/aodonline-sqlimages/SHMS/Faculty/LatkovicMark/UnpublishedWritings/OnMorallyResponsibleInvesting05Nov.pdf> (accessed March 2012).
6. Zamir Iqbal and Abbas Mirakhor, *An Introduction to Islamic Finance: Theory and Practice* (Singapore: John Wiley & Sons, 2007).
7. Dow Jones & Company, *Dow Jones Indexes* (February 27, 2009). <http://www.djindexes.com/mdsidx/index.cfm?event=showIslamicStats#fund> (accessed March 2012).
8. Vaishanvi Bhatt and Jahangir Sultan, *Leverage Risk, Financial Crisis, and Stock Returns: A Comparison among Islamic, Conventional, and Socially Responsible Stocks*, *Islamic Economic Studies* 20 (June 2012): 87–143.
9. <http://ussif.org/resources/sriguide/srifacts.cfm> (accessed March 2012).
10. R. Sparkes, *Socially Responsible Investment, a Global Revolution* (Chichester, West Sussex: John Wiley, 2002).

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11. For example, the Sullivan Principles were largely responsible for discouraging investments in firms doing business in South Africa in the '70s to protest against apartheid.
12. Eurosif (European Sustainable Investment Forum). European SRI Study, 2010, available at [www.eurosif.org](http://www.eurosif.org) (accessed February 5, 2014).
13. The reader is cautioned that all socially responsible investing is not morally responsible. For example, SRI would permit investing in a scientific firm that does research on stem cells, or produces contraceptives, or promotes alternative lifestyles such as homosexuality, or uses animals for scientific research. All these activities would be deemed immoral according to the Catholic religion.
14. Credit Suisse, 2011.
15. At the firm level, there are a lot of instances where firms that pass the MRI screening also pass the SRI screening. For example, Microsoft, Johnson & Johnson, Intel, Proctor & Gamble, Cisco, and PepsiCo are a few firms that are also identified as both MRI and SRI compliant. Wafica Ghoul and Paul Karam, "MRI and SRI Mutual Funds: A Comparison of Christian, Islamic (Morally Responsible Investing), and Socially Responsible Investing (SRI) Mutual Funds," *Journal of Investing* 16 (2007): 96–102.
16. Jeroen Derwall, Kees Koedijk, and Jenke Ter Horst.
17. James Angel and Pietra Rivoli, "Does ethical investing impose a cost upon the firm? A theoretical perspective," *Journal of Investing* 6:4 (1997): 57–61; H. Hong and M. Kacperczyk, "The price of sin: the effects of social norms on markets," *Journal of Financial Economics* 93 (2009): 5–36.
18. Report on Socially Responsible Investing Trends in the United States. 10–Year Review (Washington DC: Social Investment Forum, 2005).
19. Ibid.
20. Ernst & Young, "World Islamic Banking Competitiveness Report 2012–2013: Growing Beyond: DNA of Successful Transformation." 2012. Available at <http://www.mifc.com/index.php?ch=28&pg=72&ac=21&bb=uploadpdf>.
21. What sets shari'a-compliant investors distinctly apart from conventional or SRI investors is the fact that their investments must be shari'a-compliant. As the divine code of law, shari'a serves as "the guide for human action, which encompasses every aspect of human life and [...] operationalizes the understanding of the Divine Will in terms of human actions." The framework of shari'a is based on the Qur'an, the written revelation of God's Word, and the *sunna*, which is comprised of the teachings and practices of the Prophet Mohammed. Deriving its rulings from the Qur'an and *sunna*, shari'a is instilled with divine authority. Hence, the guidelines set forth in shari'a become imperative to all Muslims and govern all aspects of life, whether they are of a personal, social, political, economic, or financial nature.
22. Jahangir Sultan and Milly M., "Portfolio Diversification during Financial Crisis: Analysis of Faith-Based Investment Strategies," *Building Bridges across Financial Communities: the Global Financial Crisis, Social Responsibility, and Faith-Based Finance* (Cambridge, Massachusetts: Islamic Finance Project, Harvard Law School, 2012).
23. In this regard, it would be interesting to compare the performance of portfolios based upon sin stocks (shunned stocks) across the three universes of stocks considered in this paper. The use of SC stocks to test the shunned stocks hypothesis is unique in the sense that shunned SC stocks are still shari'a-compliant, while the conventional and SRI stocks may not be. We will address this issue in the empirical section.

24. Also see, Jeroen Derwall, Rob Bauer, Nadja Guenster, and Kees C. G. Koedijk, "The eco-efficiency premium puzzle," *Financial Analysts Journal* 61 (2005): 51–63.
25. KLD STATS database ranks publicly traded US firms on social and environmental issues.
26. The values-driven investment strategy has its roots in Merton's incomplete information model. Accordingly, investors' inability to be aware of a particular stock causes its price to be lower in the short run; Robert C. Merton, "A Simple Model of Capital Market Equilibrium with Incomplete Information," *Journal of Finance* 42 (1987): 483–510.
27. Paul A. Gompers, Joy L. Ishii, and Andrew Metrick, "Corporate Governance and Equity Prices," *Quarterly Journal of Economics* 118:1 (2003): 107–155.
28. There are also some issues regarding the impact of the 1/3 rule. As El-Gamal suggests, the rule introduces pervasiveness in the way fund managers are forced to buy and sell stocks. For example, fund managers buy stocks when price is rising (implying D/market cap is low). Subsequently, an increase in the D/market cap in a falling market would prompt the firm to be excluded from the shari'a-compliant universe. This would again force fund managers to sell the stock when the price is too low; Mahmoud El-Gamal, *Islamic Finance: Law, Economics, and Practice* (New York: Cambridge University Press, 2006).
29. Mohammed Obaidullah, *Islamic Financial Services*. Islamic Economics Research Center, King Abdul Aziz University, (Jeddah: King Abdul Aziz University, 2001; Mahmoud El-Gamal, "Interest and the Paradox of Contemporary Islamic Law and Finance," *Fordham International Law Journal* 27:1 (2003): 108–149.
30. Zamir Iqbal and Abbas Mirakhor; M. Nejatullah Siddiqi, "Islamic Banking and Finance in Theory and Practice: A Survey of State of The Art," *Journal of Islamic Economic Studies* 13:2 (2006): 6; Eddy Yusof, Fahmy Ezry, Jhordy Kashoogie, and Asim Anwar Kamal, *Islamic Finance: Debt versus Equity Financing in the Light of Maqasid al-Shari'ah*. Munich Personal RePec Working Paper no. 20722, 2009. <http://mpira.ub.uni-muenchen.de/20722/> (accessed on February 5, 2014).
31. It is critical to note that screening firms on the basis of low debt ratio does not make stocks representing the Dow Jones Global Index and the Dow Jones Sustainability index shari'a-compliant because these firms may be involved in activities not permissible under shari'a law. To this extent, a negative screen to exclude stocks with high debt ratio is interesting because it allows us to examine the performance of the selected stocks with very little exposure to the debt market.
32. As pointed out earlier, stocks classified as shari'a-compliant are selected on the basis of several screens employed by the Dow Jones Islamic Index Sharia Board. Excluded from the universe are stocks representing alcohol, pork-related products, conventional financial services, entertainment, tobacco, and weapons and defense. In terms of financial ratio screens, for each firm, the following ratios must be less than 33%: "Total debt divided by trailing 24-month average market capitalization must be less than 33%, sum of company's cash and interest-bearing securities divided by trailing 24-month average market capitalization, and accounts receivables divided by trailing 24-month average market capitalization. No further screens were utilized to form the universe of shari'a-compliant stocks." See <http://www.djindexes.com/islamicmarket/>.
33. See the appendix in Joel Greenblatt's *The Little Book That Beats the Market* (2006) for a detailed back-test performance analysis. Sultan and Milly (2011)

use Greenblatt’s methodology to conduct performance tests for Islamic, SRI, and conventional investment strategies. Also see <http://seekingalpha.com/article/237970-how-does-joel-greenblatts-magic-formula-investing-hold-up>.

34. As Sultan and Milly (2011) report, higher EY and ROC values are better so that the highest EY stock would receive an EY rank of 1 and the highest ROC stock would get a ROC rank of 1. The EY and ROC ranks are added together—the best stocks will have the “lowest” ranking. For example, if the stock with the highest EY also had the highest ROC, its overall rank would be  $1 + 1 = 2$ .
35. Note that while the debt ratio is capped at 33% for the shari‘a-compliant firms, conventional and SRI stocks are not constrained by this limitation.
36. Söhnke M. Bartram and M. Bodnar Gordán, “No place to hide: The global crisis in equity markets in 2008/2009,” *Journal of International Money and Finance* 28:8 (2009): 1246–1292.
37. This part of the discussion has been adapted from Andy Singh’s “Leverage 101: The Real Cause of Financial Crisis,” September 25, 2008, extracted from <http://seekingalpha.com/article/97299-leverage-101-the-real-cause-of-the-financial-crisis>.
38. Economic Research: Federal Bank of St. Louis. “Federal Reserve Economic Data (FRED)” available at <http://research.stlouisfed.org/fred2/>; We acknowledge that the use of the US risk-free rate as a proxy for global risk-free rate is arbitrary.
39. E. Fama and K. French, “The Cross-Section of Expected Stock Returns,” *Journal of Finance* 47 (1992): 427–465.
40. This is consistent with the portfolio formation procedure as suggested in Fama and French (1992). However, for the purpose of firm-specific analysis, we consider all stocks.
41. See Bhatt and Sultan for more on the construction of the risk factors.
42. Lawrence R. Glosten, Ravi Jagannathan, and David E. Runkle, “On the Relation Between the Expected Value and the Volatility of the Nominal Excess Return on Stocks,” *Journal of Finance* XLVIII:5 (1993): 1779–1801.
43. In cases where a standard TGARCH model did not converge, we estimated the asymmetric GARCH model known as EGARCH, originally in Nelson (1991). The EGARCH model allows one to specifically account for the fact that good news and bad news may have differential impact on the volatility structure. Specifically, the conditional variance equation is:

$$\log(\sigma_t^2) = \omega + \sum_{i=1}^p \alpha_i \left| \frac{\varepsilon_{t-i}}{\sigma_{t-i}} - \sqrt{\frac{2}{\pi}} \right| + \sum_{j=1}^q \beta_j \log(\sigma_{t-j}^2) + \sum_{k=1}^r \gamma_k \frac{\varepsilon_{t-k}}{\sigma_{t-k}}$$

where  $\alpha$  measures the symmetric impact of past innovations and  $\beta$  measures persistence in conditional volatility. The coefficient  $\lambda$  measures asymmetry (or leverage) effect. When  $\lambda$  is zero, the model is asymmetric (good news or bad news have same effect). When  $\lambda$  is negative, good news contributes less to the volatility than bad news. Finally, when  $\lambda$  is positive, good news increases volatility more than bad news. See Nelson (1991) for more on EGARCH models; Daniel B. Nelson, “Conditional Heteroskedasticity in Asset Returns: A New Approach,” *Econometrica* 59:2 (1991), 347–370.

44. The reader is cautioned that the choice of “value” and “values” to describe our portfolios can be confusing. Values portfolios are simply portfolios that include low



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debt/equity firms, while “value” refers to the traditional Fama-French portfolio of return on values stocks minus return on growth stocks.

45. We chose the EGARCH model to estimate the returns for the conventional and SC portfolios to avoid convergence issues.
46. It is important to point out that we do not purify these raw returns by purging impure returns (returns due to interest income). This would involve excluding companies with an impure income of 5% of total income or more. We recognize that this is a limitation of our paper but we hope that a portfolio manager would be able to declare this percentage to all investors in the fund, Muslims and non-Muslims alike, and it is up to Muslim investors to distribute this percentage of income as charity.
47. To conserve space, these results are not reported, but are available upon request.
48. The SRI portfolio constructed using low leverage is an exception. It has a positive alpha but it is insignificant at conventional significance levels.