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Faith-based and sin portfolios

An empirical inquiry into norm-neglect vs norm-conforming investor behavior

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Abstract

Purpose – The purpose of this paper is to investigate relative portfolio performance between sin stock returns and faith-based returns.

Design/methodology/approach – Similar to Hong and Kacperczyk, Jensen's alpha was utilized to conduct tests along with three asset-pricing models and rolling regression technique to reveal that faith-based and sin betas move in opposite directions during most of the sample period.

Findings – Norm-neglect was found, in that Jensen's alpha is positive and significant for the sin portfolio. Further, evidence in favor of norm-conforming investor behavior was found, where Jensen's alpha is negative and significant for the faith-based portfolio. These findings provide evidence that the sin portfolio outperforms the faith-based portfolio relative to the market. A rolling regression technique reveals that faith-based and sin betas tend to move in opposite directions during most of the sample period. The evidence suggests that faith-based beta has an average estimated beta of one, mimicking the market. The sin portfolio, however, has an average estimated beta of one-half. Finally, the reward-to-risk measure, Sharpe ratio, is statistically higher for the sin portfolio relative to the faith-based portfolio.

Originality/value – This paper contributes to the literature in the following distinct ways. First, three asset-pricing models are estimated to examine Jensen's alpha for sin and faith-based portfolios. Second, a rolling regression procedure is used to examine the dynamic behavior relative to the market of the sin and faith-based portfolios. Third, use is made of the Jobson and Korkie test, which allows for statistical comparisons of Sharpe ratios. Lastly, daily instead of monthly data and a different sample period are used to examine the research questions posed in this study.

Keywords Financial management, Asset valuation, Investors, Portfolio investment

Paper type Research paper

I. Introduction

Using religious screens, faith-based portfolios restrict the investable universe. The practical importance of researching such portfolios is underscored by the growth in total assets under management by faith-based funds. For example, total assets have grown significantly from less than $500 million 11 years ago, to over $31 billion in 2010. Contrary to faith-based, sin portfolios restrict the investable universe by using impious screens. Due to good financial performance, the relevance of sin portfolios has also grown recently. Their respectable financial performance has been acknowledged by the popular press and investment advisors. For example, from 2002 to 2009, the Vice Fund had an annualized return of 43 percent, compared to 15 percent for the S&P 500 over the same interval. This increased demand by investors for faith-based and sin portfolios makes them viable candidates for further investigation.

Despite the rising trend of faith-based investments and the strong performance of sin stocks, the current state of the sin and faith-based literature leaves several questions unanswered. Specifically, it is not certain whether following social norms or neglecting them results in higher or lower risk-adjusted returns. Similarly, there appears little evidence on how betas of faith-based and sin portfolios behave over time.

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This article contributes to the literature in the following distinct ways. First, we estimate three asset-pricing models to examine Jensen's alpha for sin and faith-based portfolios. Second, we use a rolling regression procedure to examine the dynamic behavior relative to the market of the sin and faith-based portfolios. Third, we make use of the Jobson and Korkie test, which allows for statistical comparisons of Sharpe ratios. Lastly, we use daily instead of monthly data and a different sample period to examine the research questions posed in this study.

The results show that Jensen's alpha is positive and significant for the sin portfolio, while negative and significant for the faith-based portfolio. That is, we find norm-neglect for the sin portfolio and norm-conforming for the faith-based portfolio. The rolling regression procedure reveals that over the sample period, the sin and faith-based portfolios have been reacting distinctly to market variation. Further, we find that estimated market risk loadings are negatively correlated over time. We also find that the sin portfolio exhibits a statistically superior risk-reward relationship when compared with the faith-based portfolio.

The remainder of this paper is organized as follows. Section two summarizes the literature. Section three describes the methodology. Section four provides a discussion of the data and summary statistics. Section five reports the estimation results, and section six offers conclusions.

II. Literature review

Despite the rising popularity of faith-based investments, the empirical evidence for them is relatively small. Some studies find that they underperform conventional financial products. For example, Hussein and Omran (2005) find that faith-based returns are lower compared to their index counterparts during bear markets. Girard and Hassan (2005) find that during 2001-2005, faith-based stocks underperform their conventional counterparts. Other empirical studies find no underperformance due to faith-based screening (Wilson and Coleman, 1999; Naber, 2001; Boassson *et al.*, 2004, 2006; Hakim and Rashidian, 2004).

Similar to faith-based investments, there is little empirical evidence regarding sin investments. Goodall (1994) finds that gaming stocks seem to be more volatile than the market. In addition, it is suggested that gaming stocks are more vulnerable to stock market declines. Chen and Bin (2001) find that gaming stocks underperform when compared to the US stock market. Further, they find that gaming equipment suppliers and small casino operators' returns react to gambling legislation. Chong *et al.* (2006) find that the Vice Fund outperforms the S&P 500. Furthermore, Salaber (2007a) finds that positive abnormal returns for sin stocks are higher during recessions than expansions. Glushkov and Statman (2007) concur that sin stocks outperform the Domini 400 Index and the S&P 500. Kim and Venkatachalam (2008) argue that investors are willing to accept financial costs in order to comply with societal norms despite the superior returns sin stocks offer. Lobe and Roithmeier (2008) construct a worldwide index of more than 700 firms and find that sin stocks outperform regular and socially responsible stocks. Fabozzi *et al.* (2008) find that a sin portfolio outperforms common benchmarks. They argue that large returns result from infringing social norms. Hong and Kacperczyk (2009) studied the effects of social norms on sin stocks. Their empirical evidence suggests that social norms affect stock prices. They document positive alphas for sin stocks, at the same time controlling for various asset-pricing model specifications (e.g. CAPM, Fama and French factors, and momentum factor). All three asset-pricing models yield positive and significant alphas. They attribute the overperformance of sin stocks to the norm-constrained hypothesis, which suggests that sin stocks are largely neglected by norm-constrained investors.

III. Methodology

We use three conventional asset-pricing models to investigate the returns of sin and faith-based portfolios. Specifically, the Sharpe-Lintner-Mossin capital asset pricing model (CAPM), the Fama and French (1993) three-factor model, and the Carhart (1997) four-factor model are used to model the excess returns. In particular, we use the CAPM as our benchmark model for assessing the risk-adjusted returns, alphas, of the faith-based and sin portfolios. To make sure that the results are not model specific, we then use a three-factor model and expand the CAPM by adding two additional risk factors. The size factor, attributed to Banz (1981), which accounts for higher risk-adjusted returns of small stocks and the value factor of Rosenberg *et al.* (1985). As a third model, we use the Carhart (1997) four-factor model which builds on the Fama and French three-factor model by including a momentum factor. The momentum factor is included to account for trends in stock returns.

The specifications used in the study are expressed as follows:

$$R_t - Rf_t = \alpha + \beta EXRm_t + \varepsilon_t, \tag{1}$$

$$R_t - Rf_t = \alpha + \beta EXRm_t + \delta SMB_t + \gamma HML_t + \varepsilon_t, \tag{2}$$

$$\begin{aligned} R_t - Rf_t = {} & \alpha + \beta EXRm_t + \delta SMB_t + \gamma HML_t \\ & + \phi UMD_t + \varepsilon_t, \quad \textit{for all} \quad t = 1, \ldots, T, \end{aligned} \tag{3}$$

where R_t is the return on the portfolio, Rf_t is the return on the riskless asset, $EXRm_t$ is the excess return on the market portfolio, SMB_t is the size factor, HML_t is the book-to-market factor, and MOM_t is the momentum factor. We estimate alpha for each of the three models for the entire sample period. Then, using rolling regression, we examine the dynamic path of the market risk loading for each portfolio. According to Fama and French (1997), a rolling regression can be used to document temporal variation in risk loadings.

The risk-adjusted performance of sin and faith-based portfolios is investigated using the test of equal Sharpe ratios of Jobson and Korkie (1981). The Sharpe ratio is defined as follows:

$$SR = \frac{R_j - Rf}{\sigma_j}, \tag{4}$$

where SR is the Sharpe ratio, R_j is the return on the jth portfolio, Rf is the riskless rate, and σ_j is the standard deviation for jth portfolio. The Sharpe ratio measures the reward-to-variability of the jth portfolio. The Jobson and Korkie test is performed using the following equations:

$$z = \frac{\sigma_a(\mu_b - Rf) - \sigma_b(\mu_a - Rf)}{\sqrt{\theta}}, \tag{5}$$

$$\theta = \frac{1}{T}\left[2\sigma_a^2\sigma_b^2 - 2\sigma_a\sigma_b\sigma_{ab} + \frac{1}{2}\mu_a\sigma_b^2 + \frac{1}{2}\mu_b\sigma_a^2 - \frac{\mu_a\mu_b}{2\sigma_a\sigma_b}(\sigma_{ab}^2 + \sigma_a^2\sigma_b^2)\right], \tag{6}$$

where μ_j is the mean return of the jth portfolio, σ_j is the standard deviation of portfolio j, σ_{ij} is the covariance between portfolios i and j, and T is the number of observations. The hypotheses are:

H0. Sharpe ratio faith-based – Sharpe ratio sin $= 0$.

H1. Sharpe ratio faith-based – Sharpe ratio sin $\neq 0$.

A rejection of the null hypothesis indicates a distinct reward-to-risk relationship between faith-based and sin portfolios.

IV. Data and summary statistics

The data set spans from July 2001 to December 2007. The start of the sample is restricted by the faith-based data. Our shortest series is the Ave Maria Fund, which began in July 2001. The variables in the three models are the excess return on the portfolio of sin (EPORTSIN), the excess return on the faith-based portfolio (EFBI), excess market return (EXRm), size factor (SMB), book-to-market factor (HML), and momentum factor (MOM)[1],[2]. The first and second variables are acquired from CRSP and DataStream, and the last four, including risk-free rate (Rf), are from Ken French's website[3]. Each of these variables is in daily percent returns. Excess returns are calculated by subtracting the daily risk-free rate from the daily return.

Table I reports the descriptive statistics. At first glance, compared to the sin portfolio, the faith-based portfolio does not appear to have a reasonable risk-return tradeoff. However, sin stocks seem to reward investors with higher returns for a given level of risk (Hong and Kacperczyk, 2009) perhaps due to norm-neglect. Further, an efficient market explanation for the relatively small faith-based returns may be that restricting the investable universe to faith-based investments distorts the risk-reward relationship in undesirable ways for faith-based investors[4].

V. Estimation results

Sin and faith-based returns

Table II reports the estimation results from the three asset-pricing models for the sin portfolio. For each of the three model specifications, the sin portfolio has a positive and significant intercept. The intercept representing Jensen's alpha (α) therefore points to overperformance. The overperformance could be due to the norm-neglect hypothesis of Hong and Kacperczyk (2009). Finding similar results in favor of this overperformance, they

Variables	Mean	SD	Kurtosis	Skewness	Maximum	Minimum
EPORTSIN	0.085	0.848	6.241	−0.462	3.772	−6.471
EFBI	0.007	0.959	4.823	0.034	4.761	−4.195
R_f	0.013	0.007	1.467	−0.295	0.022	0.003
EXRm	0.021	0.984	5.687	0.069	5.310	−5.090
SMB	0.014	0.509	3.603	−0.197	1.610	−2.480
HML	0.018	0.385	5.571	−0.352	1.550	−2.210
UMD	0.030	0.714	5.890	−0.341	3.180	−4.520

Notes: The variables are the excess return on a portfolio of sin (EPORTSIN), the excess return on the faith-based portfolio (EFBI), excess market return (EXRm), size factor (SMB), book-to-market factor (HML), and momentum factor (MOM). The first variable comes from CRSP, the second from DataStream, and the last four, including the risk-free rate (Rf), are from Ken French's website. Each of the variables is in daily percent returns. Excess returns are calculated by subtracting the daily risk-free rate from the daily return. The sample period is from July 20, 2001 to December 31, 2007

Table I.
Descriptive statistics

	EPORTSIN					
	CAPM		Three-factor model		Four-factor model	
	n	*t*-statistic	*n*	*t*-statistic	*n*	*t*-statistic
α	0.082	5.607	0.071	5.523	0.070	5.420
β	0.652	25.212	0.678	30.548	0.689	32.114
δ			0.385	11.922	0.361	10.267
γ			0.290	6.303	0.242	4.550
ϕ					0.075	2.329
Adj. *R*-squared	0.594		0.657		0.660	

Notes: Standard errors estimated using the Newey-West estimator of the covariance matrix.

$$R_t - Rf_t = \alpha + \beta EXRm_t + \varepsilon_t$$
$$R_t - Rf_t = \alpha + \beta EXRm_t + \delta SMB_t + \gamma HML_t + \varepsilon_t$$
$$R_t - Rf_t = \alpha + \beta EXRm_t + \delta SMB_t + \gamma HML_t + \phi UMD_t + \varepsilon_t$$

Table II.
Daily time series regression coefficient estimates for the sin portfolio

where $R_t - Rf_t$ can be either *EPORTSIN* or *EFBI*. *EPORTSIN* is the return on the portfolio of sin net of the risk-free rate, Rf_t. *EFBI* is the return on faith-based portfolio net of the risk-free rate. *EXRm* is the return on the market net of the risk-free rate. *SMB* and *HML* are the size and book-to-market factors of Fama and French. And *UMD* is the Carhart momentum factor. ε_t is the error term. Sample period is from July 20, 2001 to December 31, 2007

argue that the neglect of sin portfolios by an important set of investors, such as institutions, probably generates high sin returns in order to compensate sin investors for limited risk sharing.

All three models indicate that the sin portfolio beta (β) is statistically significant and range between 0.652 and 0.689. Further, the estimated parameters from the three-factor model on the size (δ) and book-to-market (γ) factors appear to be statistically significant and positive, 0.385 and 0.290, respectively. For the four-factor model, the momentum factor (φ) is equal to 0.075 and statistically significant, while the size and book-to-market loadings retain their sign, magnitude, and significance. The statistically significant results from the three- and four-factor models therefore render these models as robust comparisons to the benchmark model.

Table III reports faith-based estimation results from the three asset-pricing models. In contrast to the findings from Table II, Jensen's alpha is negative and significant indicating underperformance for all three models. Faith-based returns underperform, after controlling for well-known predictors of stock returns. This underperformance could be due to the norm-conforming effect, where the opposite of norm-neglect occurs. It seems that the imposition of religious screens by faith-based investors causes a diversification loss probably leading to adverse returns. Sin investors seem to be rewarded for neglecting norms, while faith-based investors seem to be penalized for conforming to norms.

All three models indicate that the faith-based portfolio beta (β) is statistically significant and range between 0.939 and 0.952. A comparison of these parameter estimates to the ones from Table II implies that relative to the market, sin and faith-based returns appear to behave quite differently. The sin portfolio appears to be defensive, whereas the faith-based portfolio appears to mimic the market. The defensiveness of the sin portfolio is consistent with previous research (Olsson, 2005; Salaber, 2007a, b; Lobe and Roithmeier, 2008). The close co-movement of faith-based returns is also consistent

	EFBI					
	CAPM		Three-factor model		Four-factor model	
	n	*t*-statistic	*n*	*t*-statistic	*n*	*t*-statistic
α	−0.012	−2.439	−0.012	−2.428	−0.012	−2.483
β	0.952	130.683	0.939	146.059	0.942	153.156
δ			0.135	14.494	0.128	12.693
γ			−0.065	−3.846	−0.078	−4.149
ϕ					0.020	1.841
Adj. *R*-squared	0.953		0.959		0.959	

Notes: Standard errors estimated using the Newey-West estimator of the covariance matrix.

$$R_t - Rf_t = \alpha + \beta EXRm_t + \varepsilon_t$$
$$R_t - Rf_t = \alpha + \beta EXRm_t + \delta SMB_t + \gamma HML_t + \varepsilon_t$$
$$R_t - Rf_t = \alpha + \beta EXRm_t + \delta SMB_t + \gamma HML_t + \varphi UMD_t + \varepsilon_t$$

where $R_t - Rf_t$ can be either *EPORTSIN* or *EFBI*. *EPORTSIN* is the return on the portfolio of sin net of the risk-free rate, Rf_t. *EFBI* is the return on faith-based portfolio net of the risk-free rate. *EXRm* is the return on the market net of the risk-free rate. *SMB* and *HML* are the size and book-to-market factors of Fama and French. And *UMD* is the Carhart momentum factor. ε_t is the error term. Sample period is from July 20, 2001 to December 31, 2007

Table III. Daily time series regression coefficient estimates for the faith-based portfolio

with previous research (Hakim and Rashidian, 2004; Girard and Hassan, 2005; Boasson *et al.*, 2006). Similar to the findings from Table II, the estimated parameters from the three-factor model on the size (δ) and book-to-market (γ) factors appear to be statistically significant and equal to 0.135 and −0.065, respectively. For the four-factor model as well, the momentum factor (φ) is equal to 0.020 and statistically significant, while the size and book-to-market loadings retain their sign, magnitude, and significance. The statistically significant results from the three- and four-factor models also render these models as robust comparisons to the benchmark model.

Lastly we conduct a Wald test and find that the beta for the sin portfolio is statistically less than one, thus, confirming the defensiveness of the sin portfolio whereas a Wald test for the beta of the faith-based portfolio appears to be not statistically different than one confirming the mimicking of the market[5].

Rolling regression estimation

The defensiveness and market mimicking behavior of the sin and faith-based portfolio holds for the entire sample period. However, it is not certain whether it holds over previous subsamples. That is, there may be enough time-variation in the coefficients to alter the defensiveness and market mimicking behavior of these portfolios. Previous studies have documented the defensiveness and market mimicking behavior of sin and faith-based investments; however, these studies use monthly data and similar time spans (Salaber, 2007a; Fabozzi *et al.*, 2008; Hong and Kacperczyk, 2009). Instead, we use daily data to focus on a more recent time interval, allowing for time-variation in risk loadings using a rolling regression procedure. Further, Daves *et al.* (2000) find that using daily data – instead of weekly, biweekly, and monthly data – generates smaller standard errors for the estimated betas. This in turn increases the precision of the estimation results.

First, beginning at the start of the sample, a one-year, four-factor model is estimated from July 20, 2001 to July 20, 2002[6]. Then, we roll the one-year window forward one day,

and re-estimate the model from July 21, 2001 to July 21, 2002. This process is repeated until the one-year window has been rolled to the end of the sample, December 31, 2007. Finally, we extract the beta for each four-factor model. One of the benefits of using daily data is that we are able to calculate more than 1,000 betas for sin and faith-based portfolios.

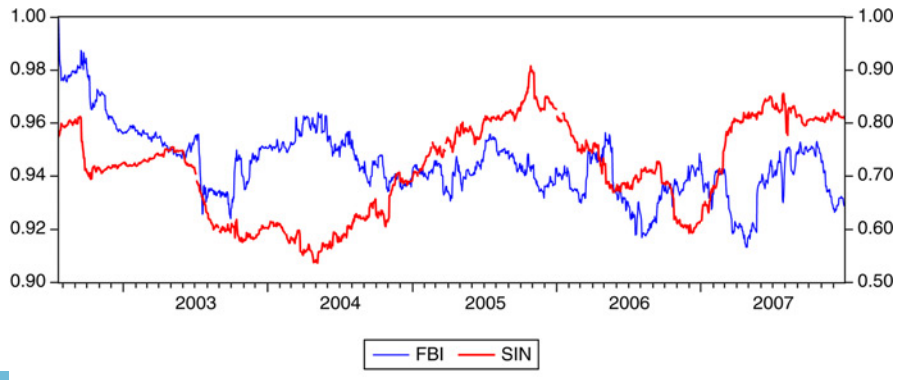
Table IV reports the descriptive statistics for the estimated betas. The mean beta for the faith-based portfolio is almost unity, indicating that, on average, faith-based returns move in tandem with the market. Also, the standard deviation is relatively small. These results provide large support for beta close to unity on faith-based returns. A mean beta less than one confirms the defensiveness of the sin portfolio. However, it appears that sin beta has a larger standard deviation than faith-based beta. These results are also consistent with the averages obtained from the Monte Carlo simulations[7].

Figure 1 plots the dynamic path of sin and faith-based betas. At no point in time does the sin beta rise over one. Most of the time, it stays below 0.90 confirming its defensiveness. Faith-based beta seems to be reverting around a mean close to one. It is worth noting that the betas seem to be moving in opposite directions during most of the sample period, except in 2005, where sin beta fluctuates and faith-based beta is relatively stable. In fact, the correlation between both betas is −0.21 and is statistically significant at the 1 percent level. A test for equality of means between betas indicates the means are significantly different from each other at the 1 percent level[8]. Thus, the evidence suggests that when sin returns become more defensive, faith-based beta

	Mean	SD	Maximum	Minimum
Faith-based beta	0.944	0.013	1.001	0.913
Sin beta	0.724	0.082	0.907	0.536

Notes: This table reports the descriptive statistics of the betas obtained from the rolling regression procedure. The procedure is as follows. First, beginning at the start of the sample, a one-year four-factor model is estimated from July 20, 2001 to July 20, 2002. Then, we roll the one-year window forward one day, and re-estimate the model from July 21, 2001 to July 21, 2002. This process is repeated until the one-year window has been rolled to the end of the sample, December 31, 2007. Finally, we extract the beta for each four-factor model

Table IV.
Descriptive statistics for time-varying betas



Note: Thick line represents sin beta

Figure 1.
Faith-based (sin) time-varying beta on the left (right) ordinate axis and time on the abscissa axis

increases. This provides support for the opposite behavior of both stock types, namely, norm-neglect (sin) and norm-conforming (faith-based).

The evidence provided by the rolling regression technique is consistent with the view that the sin portfolio is defensive, while the faith-based portfolio moves in tandem with the market. More importantly, this technique allows us to uncover the presence of a negative correlation between the time-varying betas.

Sharpe ratio comparison

To examine which portfolio has earned a higher reward for a given level of risk, we employ the Jobson and Korkie test of equal Sharpe ratios. Using Equations (5) and (6), we calculate the z score for the test. Table V reports the results of these calculations. The Jobson and Korkie test rejects the null hypothesis of equal reward-to-risk in returns for the faith-based and sin portfolios. Thus, it appears that the sin portfolio earns statistically higher risk-adjusted returns compared to the faith-based portfolio. This finding is consistent with the results reported earlier and consistent with norm-neglect and norm-conforming behavior.

VI. Conclusion

In this study, we use three conventional asset-pricing models – CAPM, three-factor, and four-factor – to investigate the possible differences between a conservative faith-based investment strategy and a sinful investment strategy. Then, a rolling regression technique is used to investigate the time-varying nature of market risk loadings for each portfolio. Finally, a comparison of the reward-to-risk relationship of the sin and faith-based portfolio is performed using the Jobson and Korkie test.

We find that Jensen's alpha is positive and significant for the sin portfolio, whereas Jensen's alpha is negative and significant for the faith-based portfolio. This result is consistent with the norm-neglect effect for the sin portfolio and the norm-conforming effect for the faith-based portfolio. Using a rolling regression procedure, we confirm the defensiveness of the sin portfolio and the market-mimicking behavior of the faith-based portfolio. We also find that the faith-based and sin betas are negatively correlated over time, indicating that both securities respond distinctly to the market. Further, the average betas appear to be statistically distinct from each other. Using the Jobson and Korkie test, we compare the Sharpe ratios of both portfolios and find that the Sharpe ratios are statistically different. In particular, the sin portfolio appears to have a higher Sharpe ratio.

The results provide evidence that the return generating process between the two types of portfolios is distinct. Investors seeking exposure in their portfolios to the market might find faith-based investments more appealing, while investors seeking protection from the market – especially during times of high market volatility – would prefer to invest in sin. Additionally, sin results somewhat challenge the efficient market hypothesis due to the norm-neglect hypothesis, that is, imposing sin screens does not carry a diversification cost.

Test statistic	Sharpe ratio sin	Sharpe ratio faith-based
5.110*	0.097	0.007

Notes: This table displays the Jobson and Korkie test statistic comparing risk-adjusted performance between the sin and faith-based portfolios. The null hypothesis is that both Sharpe ratios are equal. That is, no difference exists between risk-adjusted performances; *denotes significance at the 1 percent level; the sample spans from July 20, 2001 to December 31, 2007

Table V.
Jobson and Korkie test for comparing Sharpe ratios

Notes

1. The construction of the sin portfolio is almost identical to Hong and Kacperczyk (2009). That is, the portfolio includes only stocks that are in the tobacco, alcohol, and gaming industries.
2. The faith-based portfolio is equally weighted, calculated as the arithmetic average of the Dow Jones Islamic index and the Ave Maria Fund. It is important to note that other permutations of the composition of the faith-based portfolio were examined, but the overall results were qualitatively the same. The authors will gladly supply these other results if asked.
3. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
4. In fact, the prospectuses for many of these screened investments warn investors that returns might be lower due to investing only in faith-based securities.
5. Wald test results are available from the authors upon request.
6. We use the four-factor model because it is the most conservative specification. Different windows were used, but the results did not materially change.
7. Results are available upon request.
8. Correlation and mean tests are not shown here, but are available upon request.

References

Banz, R.W. (1981), "The relationship between return and market value of common stocks", *Journal of Financial Economics*, Vol. 9, pp. 3-15.

Boasson, E., Boasson, V. and Cheng, J. (2006), "Investment principles and strategies of faith-based funds", *Managerial Finance*, Vol. 32, pp. 837-45.

Boassson, V., Cheng, J. and Boasson, E. (2004), "Are investment managers investing ethically at a disadvantage?", *Journal of Applied Management and Entrepreneurship*, Vol. 33, pp. 956-65.

Carhart, M.M. (1997), "On persistence in mutual fund performance", *Journal of Finance*, Vol. 52, pp. 57-82.

Chen, D. and Bin, F. (2001), "Effects of legislation events on U.S. gaming stock returns and market turnings", *Tourism Management*, Vol. 22, pp. 539-49.

Chong, J., Her, M. and Phillips, G.M. (2006), "To sin or not to sin? Now that's the question", *Journal of Asset Management*, Vol. 6, pp. 406-17.

Daves, P., Ehrhardt, M. and Kunkel, R. (2000), "Estimating systematic risk: the choice of return interval and estimation period", *The Journal of Financial and Strategic Decisions*, Vol. 13, pp. 7-13.

Fabozzi, F., Ma, K.C. and Oliphant, B. (2008), "Sin stock returns", *The Journal of Portfolio Management*, Vol. 35, pp. 82-94.

Fama, E.F. and French, K.R. (1993), "Common risk factors in the returns on stocks and bonds", *Journal of Financial Economics*, Vol. 33, pp. 3-56.

Fama, E.F. and French, K.R. (1997), "Industry costs of equity", *Journal of Financial Economics*, Vol. 43, pp. 153-93.

Girard, E. and Hassan, M. (2005), "Faith-based ethical investing: the case of Dow Jones Islamic indexes", paper presented at the 2006 FMA Annual Meeting, Salt Lake City, UT, October 13.

Glushkov, D. and Statman, M. (2007), "Payoffs to virtue and sin: social responsibility and stock returns", unpublished manuscript.

Goodall, L.E. (1994), "Market behavior of gaming stocks: an analysis of the first twenty years", *Journal of Gambling Studies*, Vol. 4, pp. 20-36.

Hakim, S. and Rashidian, M. (2004), "How costly is investors' compliance to Sharia?", paper presented at the 11th Economic Research Forum Annual Conference in Sharjah, UAE, Beirut, Lebanon, December 14-16.

Hong, H. and Kacperczyk, M. (2009), "The price of sin: the effects of social norms on markets", *Journal of Financial Economics*, Vol. 93, pp. 15-36.

Hussein, K. and Omran, M. (2005), "Ethical investment revisited: evidence from Dow Jones Islamic indexes", *The Journal of Investing*, Vol. 36, pp. 15-25.

Jobson, J.D. and Korkie, B. (1981), "Performance hypothesis testing with the Sharpe and Treynor measures", *Journal of Finance*, Vol. 36, pp. 888-908.

Kim, I. and Venkatachalam, M. (2008), "Are sin stocks paying the price for accounting sins?", unpublished manuscript, Duke University, Durham, NC.

Lobe, S. and Roithmeier, S. (2008), "Vice vs virtue investing", unpublished manuscript.

Naber, M. (2001), "Catholic investing: the effects of screens on financial returns", *The Journal of Investing*, Vol. 32, pp. 86-7.

Olsson, M. (2005), "Do the nice guys go home empty handed?", Master's thesis, Lund University, Lund.

Rosenberg, B., Reid, K. and Lanstein, R. (1985), "Persuasive evidence of market inefficiency", *Journal of Portfolio Management*, Vol. 2, pp. 9-17.

Salaber, J. (2007a), "Sin stock returns over the business cycle", unpublished manuscript, University of Bath School of Management, Bath.

Salaber, J. (2007b), "The determinants of sin stock returns: evidence on the European market", unpublished manuscript, University of Bath School of Management, Bath.

Wilson, J. and Coleman, F. (1999), *Faith or Finance: Impact of Principled Purchasing on CBIS Fund Performance*, Christian Brothers Investment Service, available at: www.cbisonline.com/literature/pdf/cbisfaithinfinance.pdf

Further reading

Newey, W. and West, K. (1987), "A simple positive-definite heteroskedasticity and autocorrelation consistent covariance matrix", *Econometrica*, Vol. 55, pp. 703-8.

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