Compliance and the Cross Section of Firm Performance *

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Abstract

This study investigates the performance of complaint stocks at the firm level. A firm is compliant if it satisfies two screening stages defined by Islamic law. Our empirical analysis includes quarterly cross-sectional regressions of stock performance and risk on the compliance status. Using various market and accounting-based performance and risk measures, we provide robust evidence that compliant stocks exhibit higher performance and lower risk compared to their conventional peers independently of the business cycle and the period of study. Our results hold after accounting for different control variable known in finance literature to affect the cross section of stock returns.

Keywords: Islamic finance; Ethical finance; Compliance Screening; Accounting-based measure; Market-based measure; Stock Performance; Stock Risk

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1 Introduction

Islamic finance, promoting ethical practices through risk-sharing, exclusion of unethical activities, and establishing social well-being (Rice, 1999; Alam et al., 2017), is gaining increasing awareness among academics, investors, and practitioners. In particular, Islamic investing has witnessed phenomenal growth in the last decade. The Islamic assets under management exceeded US$238 billion in 2021[1]. The purpose of this study is to analyse in depth the financial performance and risk of Islamic-compliant firms in the US stock market between 1987 and 2022. Our study provides insights for portfolio managers and Islamic investors, facing restrictions set by the Shariah law (Islamic law) and requesting return-maximizing compliant investment opportunities. Indeed, Islamic finance prevents investors from participating in companies that engage in immoral activities or companies that provide interest-based financial services. Companies that use excessively leverage or do not meet certain financial criteria related to liquidity, and income derived from non-permissible activities are also excluded. Even though the scope of public equities an Islamic investor can hold is limited, it includes ethically engaged and financially stable companies (Alexakis et al., 2017).

In our empirical analysis, we first construct the compliant opportunity set by applying a qualitative and quantitative screening process. Then, we run quarterly cross-sectional regressions of performance and risk on the compliance variable. To proxy for performance, we use total return and abnormal return as market-based measures, industry-adjusted return on asset and operating income growth as accounting-based measures. To proxy for risk, we refer to idiosyncratic risk, total risk and market β as market-based measures, standard deviation of the operating income growth and operating leverage as accounting-based measures.

First, we show that compliant stocks exhibit significantly higher financial performance. Second, we document a significant reduction of risk associated with the compliance status. These findings portray an important benefit of compliance. We also illustrate that the out performance

[1] ICD – Refinitiv Islamic finance development report 2022

of compliant firms is not related to business cycle. This result supports our finding that compliant firms display lower systematic risk compared to non-compliant peers. To extend the robustness of our findings, we run two different robustness checks. The first examines the impact of compliance on firm's performance over three separate sub-periods. Results verify the outperformance of compliant stocks compared to non-compliant ones in all sub-samples using both market and accounting-based measures. Second, we examine whether firm's compliance is related to firm's individual characteristics such as size, value, momentum, liquidity, profitability, and investment. To do so, we sort stocks into five quintiles based on the control variable. Then within each quintile, we sort stocks into two groups based on their compliance status. We find that the quarterly return (abnormal return) spread between compliant and non-complaint portfolios is positive and significant across all subgroups, confirming our results.

Our study contributes to the Islamic finance literature in several ways. First, while most empirical articles concentrate at the index level or at the constituents of Islamic Indices, our article stands out by sorting the cross-section of individual firms into compliant and non-compliant firms. Indeed, we construct the faith-based opportunity set by applying the screening criteria. Second, to the best of our knowledge, this paper is the first attempt to provide a comprehensive analysis of the impact of Islamic compliance on risk and performance at the firms' level. We provide a wide range of market and accounting-based measures of performance and risk. Third, we use an innovative approach to confirm that compliant firms' outperformance is not driven by firm's individual characteristics.

The remainder of the article is organized as follows. Section 2 reviews the existing literature. Section 3 develops our hypotheses. Section 4 describes the data and defines the variable of interest as well as the performance and risk measures. Section 5 presents the empirical methodology, findings, and robustness checks. The last section concludes.

2 Literature review

The typical focus of Islamic finance studies is the performance comparison between Islamic and conventional equity indices. Hussein and Omran (2005), Al-Khazali et al. (2014) and Al-Yahyaee et al. (2020) confirm the outperformance of Islamic Dow Jones indices compared to their conventional counterparts. Few studies document the no difference in performance (Girard and Hassan, 2008; Setiawan and Oktariza, 2013) or the underperformance (Farooq and Alahkam, 2016; Ashraf et al., 2017) between compliant and non-Islamic investments.

A variety of studies investigate the effect of Shariah screening on performance at the firm level. Krishna and Fu (2014) compare fifty Shariah stocks and fifty conventional stocks listed on the Australian Stock Exchange and document that the performance of Islamic stocks tends to be similar to conventional stocks. Pepis and de Jong (2019) find that Shariah-compliance positively affects long-term financial performance. El Saleh and Jurdi (2021) identify Shariah-compliant investments on the Australian index for the period of 2000 to 2019 and show a negative impact of the Shariah screening process on performance.

Another strand of the literature focuses on analysing the impact of Islamic compliance on risk. Al-Zoubi and Maghyereh (2007) shows that Dow Jones Islamic Index outperforms the World Index in terms of risk. Sukmana and Kolid (2012) confirm that Islamic index is less risky than its conventional counterpart in Indonesia. Akhtar and Jahromi (2017) show that Islamic portfolio has lower risk compared to non-Islamic portfolio in the Malaysian stock market. Utami and Prasetyo (2020) document that Islamic stocks display lower idiosyncratic risk compared to their conventional peers in four Asian countries. Naveed et al. (2020) find that Islamic funds have lower idiosyncratic, systematic, and downside risk compared to their conventional peers. Asutay et al. (2021) state that Islamic indices, in four markets: worldwide, the US, Asia and Europe, present higher average returns and lower risks.

3 Theoretical framework and hypothesis development

Based on the empirical results listed in the previous section, we expect Islamic-compliant stocks to exhibit higher performance compared to their conventional peers. This claim can find a theoretical foundation in the pecking order, corporate governance, and agency theories.

The pecking order theory, developed by Myers (1984) and Myers and Majluf (1984), suggests that firms finance their projects by internal resources first, then using debt, and finally, by issuing equity. Firms that are profitable, are expected to use less debt as they can finance their investment opportunities with internal resources. Thus, debt and performance are negatively correlated (Fama and French, 1998; Wald, 1999). Accordingly, compliant companies, being less indebted compared to their conventional peers are expected to exhibit higher performance.

Several studies document that firms with superior corporate governance display lower levels of debt[2] (Hu and Kumar, 2004; Hoberg and Prabhala, 2009; Arping and Sautner, 2010; Michaely and Roberts, 2012; Jiraporn et al., 2012; La Porta et al., 2000; Zhou et al., 2021). Superior governance translates into lower agency costs (Shleifer and Vishny, 1997). Azmi et al. (2019) confirm that agency costs are lower for compliant firms compared to non-compliant peers and explains this difference by good governance and low debt. Consequently, better governance, negatively associated with agency cost, is positively correlated with better performance. (Bhagat and Bolton, 2008; Wang et al., 2010; Tuan et al., 2019). To conclude, corporate governance and agency theories support that low levered companies are expected to exhibit higher performance compared to their conventional peers. Therefore, compliant companies, not using debt beyond a specific threshold, are expected to outperform.

We derive our first hypothesis:

H1. Islamic-compliant stocks generate higher performance compared to non-compliant peers.

[2]Weakly governed companies need to signal to the market that they do not expropriate wealth from their shareholders by carrying more debt

Most previous empirical research documents a negative relationship between Islamic compliance and risk and explains it by the screening process that excludes excessively levered firms, interest-based transactions, and speculative and uncertain deals.

Capital Asset Pricing Model and Modern Portfolio Theory advocate that investors must hold well-diversified portfolios to reduce risks. Markowitz (1952) states that ethical filtering reduces the efficient frontier and is expected to lead to suboptimal and less performing portfolios. This argument is criticized in the finance literature.

On one hand, Lee et al. (2010) argue that an increase in screening intensity reduces the total and systematic risk. Hassan et al. (2021) explain that ethical restrictions on business activity reduce the Islamic equity universe but this reduction is compensated by the exclusion of highly indebted companies. According to liquid asset theory, the excessively levered companies are more volatile and present higher risk of financial distress. Eliminating these firms from the investment set is expected to reduce uncertainty and risk (Mao, 2003; Purnanandam, 2008; Akhtar and Jahromi, 2017; Sandwick and Collazzo, 2021). Also, Fu et al. (2020) claim that ethical screening allows the construction of Islamic-constrained portfolios with reasonable risk features. The authors document that the US stock market is sufficiently large such that common shares in other sectors can replicate the portfolio characteristics of non-compliant stocks. Saiti et al. (2014), Gueckel (2017), and Alexakis et al. (2017) confirm that compliant firms display lower risk, given their superior financially-screened quality.

On the other hand, according to Hassan and Mollah (2018), a small portfolio diversification can generate a substantial decrease in variability. Fu et al. (2020) state that an investor can achieve optimal diversification by constructing a portfolio from an Islamic-compliant universe. Indeed, the screening limit imposed on debt instruments leads to lower risk and greater diversification (Iqbal et al., 2010; Alam et al., 2013; Saiti et al., 2014; Abbes and Trichilli, 2015; Nagayev et al., 2016; Abu-Alkheil et al., 2017; Umar and Suleman, 2017; Ali et al., 2021).

We derive our second hypothesis:

H2. Islamic-compliant portfolios show lower risk level compared to their non-compliant peers.

4 Data description

We include all stocks listed in New York Stock Exchange (NYSE), American Stock Exchange (AMEX) and the Nasdaq Stock Market with share code 10 or 11 (common stocks). We exclude penny stocks (price below $\$5$) and micro-caps (stocks in the bottom 2 deciles of the monthly size distribution). We end up with a sample of 1812 firms covering the period from 1987 to 2022.

4.1 Screening Process and Variable of Interest

Stocks are considered compliant if they pass two screening stages: qualitative and quantitative screenings. Khatkhatay and Nisar (2007), Alam et al. (2017), Pepis and de Jong (2019), El Saleh and Jurdi (2021) and more recently Farhat and Hili (2023) review in detail the Shariah-law compliance criteria.

We start by applying the qualitative screening using two filters: Security Industry Code Filter and Business Description Keyword Filter. These filters exclude conventional financial services companies and non-financial companies operating in activities non permissible by the Shariah-law. These activities include, but are not limited to, gambling, entertainment, alcohol, pork-related products, tobacco, weapons, and defense.

Second, we conduct the quantitative screening process using three financial ratios related to debt, interest bearing assets and liquidity. A firm responds to quantitative screening criteria if:

$$\text{Debt} = \frac{\text{Total Debt}}{\text{Market Value}} < 33\% \tag{1}$$

$$\text{Cash + Interest bearing securities} = \frac{\text{Cash + Short Term Investment + Other Investment}}{\text{Market Value}} < 33\% \tag{2}$$

$$\text{Receivables} = \frac{\text{Net Receivables (+ Cash)}}{\text{Market Value}} < 45\% \tag{3}$$

$Compliant$, our main variable of interest, is a binary variable updated quarterly. It equals one if the firm satisfies the two-stage screening process, and zero otherwise. Figure 1 shows the numbers of compliant and non-compliant firms in our sample. On average, 810 firms are compliant and 1002 are non compliant. Table 1 shows the average number of firms per industry[3] during the period of study. Compliant firms are more present in Business Equipment, Healthcare industry, Medical Equipment and Drugs industry and are less present (not present) in Utilities (Finance) industry.

4.2 Performance measure

Market-based Performance measures.

Total returns and abnormal returns are our measures of market-based performance. The quarterly return for firm i at quarter t is defined as the sum of daily returns during the quarter. Abnormal return for firm i at quarter t is defined as the difference between the daily stock return and the CAPM β times the daily market return. The quarterly abnormal return for firm i is the sum of daily abnormal returns measured over a given quarter.

Accounting based Performance measures.

Our accounting-based performance measures are the industry-adjusted return on asset (ROA) and the operating income growth, OIG. Paint (1991) notes that the nature of operations and accounting practices makes the ROA larger in some industries compared to other. To control for the impact of

[3]The industry classification is based on the industry definition on Kenneth French website.

industry differences, we calculate the industry-adjusted ROA. Similar to Smith and Amoako-Adu (1999), we define the industry adjusted ROA as the difference between the company's quarterly ROA and the industry median ROA calculated using the three previous years. ROA is calculated as Operating income before depreciation over total assets. Following McGuire et al. (1988), quarterly OIG is defined as the percent change in operating income. Operating income is net sales less cost of goods sold and operating expenses before deducting depreciation, amortization, and depletion.

4.3 Risk measure

Market Risk measures.

Total volatility, idiosyncratic volatility, and systematic risk are our market-based measures of risk. To calculate the quarterly total volatility, we measure the monthly total volatility as the standard deviation of daily returns for a given month. We then annualize it by multiplying by $\sqrt{252}$. The quarterly total volatility is the average annualized monthly volatility for a given quarter.

Similar to Ang et al. (2006, 2009), we define the monthly idiosyncratic volatility as the standard deviation of the residuals of a linear regression of daily stock returns on the Fama French factors and the momentum factor over the past month. This value is annualized by multiplying by $\sqrt{252}$. The quarterly idiosyncratic volatility is the average annualized monthly idiosyncratic volatility for a given quarter.

Finally, the market beta is estimated following Hong and Sraer (2016). Each month, using the past 12 months of daily returns, we regress the excess return on the contemporaneous excess market return as well as five lags of the market return. The market β is then the sum of the six coefficients. The quarterly market βs is the average monthly β for a given quarter.

Accounting based Risk measures.

Similar to McGuire et al. (1988), we use the standard deviation of OIG as an accounting-based measure of risk. Every quarter, we use the previous three years of quarterly observations to calculate the quarterly standard deviation of the OIG for firm i. The operating leverage is also our

measure of accounting-based risk. Similar to Mandelker and Rhee (1984), Chen et al. (2011) and Cao (2015), we define operating leverage as the sensitivity of a firm's operating profits (EBIT) to its sales. We regress the natural logarithm of quarterly EBIT on the natural logarithm of quarterly sales. Operating leverage (OPL) is defined as the regression coefficient on the sales.

Detailed summary statistics of all the variables included in the study are presented in table 2. The numbers reported represent time-series averages of the quarterly cross-sectional mean, standard deviation, and the 10th to 90th percentiles.

5 Empirical Methodology and Findings

This section describes the tests of the hypotheses H1 and H2. First, we analyse the relationship between common performance measures and the $Compliant$ binary variable. To do so, we run the following quarterly cross-sectional regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i} \quad (4)$$

$\text{Performance}_{t,i}$ is either the market or the accounting-based measure of firm i's performance in quarter t.

Second, we examine how compliance is related to the firm's risk profile. To do so, we run the following quarterly cross-sectional regression:

$$\text{Risk}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i} \quad (5)$$

$\text{Risk}_{t,i}$ represents the market or the accounting-based measure of risk of firm i in quarter t.

The independent variable of interest in regressions 4 and 5, $Compliant$, is the compliance status binary variable of firm i in quarter t. The controls represent several firm characteristics

such as size, cash, leverage, dividend, cash flows from operating activities and growth. All control variables are winsorized at the 1% and 99% levels. Table A.1 presents a detailed definition of the variables. We run regression specifications with and without including the control variables. Both specifications include firm and year fixed effects. Standard errors are robust to heteroscedasticity.

5.1 Compliance and Firm's Performance

We first investigate the role of compliance on the firms' performance. Table 3 presents the regression 4 results using the market-based performance measure. We can clearly see that the impact of firms' compliance on the quarterly total returns and the quarterly abnormal returns is positive and significant at 0.1% level without (specification 1) and with firm controls (specification 2). Using total return as our dependent variable, the loading of the compliance status, β_1, equals 9.55% under specification (1) and 8.13% under specification (2). Results are similar using the CAPM-adjusted return, where the loading of the compliance status, β_1, equals 8.34% and 6.84% with and without adding the control variables, respectively.

Table 4 displays the regression 4 results using the accounting-based performance measure. The impact of firms' compliance on the quarterly industry-adjusted ROA as well as the quarterly OIG is positive and significant at 0.1% level under specifications (1) and (2). Compliant firms earn on average 3.36% and 1.87% higher industry-adjusted ROA per quarter compared to non-compliant firms in specification (1) and (2), respectively. Similarly, Compliant firms earn on average 24.2% and 15.4% higher OIG per quarter compared to non-compliant firms in specification (1) and (2), respectively.

Our findings provide strong evidence of the positive and highly significant effect of the compliance status on firms' financial performance during the period of study. These results confirm that the two-stage Shariah screening creates a subset of unique financially superior companies outperforming the unconstrained firms. This supports our first hypothesis H1.

5.2 Compliance and Firm's Risk

This section describes how the firm's risk varies with the compliance status in the cross section. Table 5 shows the regression 5 results using market-based risk measures. We find that despite the high returns' performance detected for compliant firms, the risk, measured by the quarterly total, idiosyncratic and systematic risk, is significantly lower for compliant firms. Using total volatility or market-β as dependent variable, we see the compliance loading equal to -1.85% (t-statistic -14.81) and -1.80% (t-statistic -4.6) with the control variables and equal to -1.79% (t-statistic -15.2) and -1.93% (t-statistic -5.13) without including the control variables. Using the firm-specific risk as dependent variable displays lower compliance loading in absolute value. Compliant firms display 0.86% (t-statistic -9.52) and 0.079% (t-statistic -8.19) lower idiosyncratic risk compared to non-compliant firms.

Table 6 shows the results of the cross-sectional regression 5 using the accounting-based risk measures. The standard deviation of the OIG is significantly lower for compliant firms compared to non-compliant peers. The compliance coefficient equals to -8.88% (t-statistic equals -6.31) and -7.18% (t-statistic equals -4.56) under specification (1) and (2), respectively. Using the OPL as a measure of risk, we find that the compliance loading is significantly negative only when we introduce firm controls. It equals -3.75% (t-statistic -2.26).

To conclude, these findings strongly suggest that the higher performance of compliant stocks is not explained by higher risks. As mentioned by Pepis and de Jong (2019), imposing Shariah screening promotes fairness in business, transparency, and accountability that effectively promote firm's financial health and reduce risk. This confirms our second hypothesis H2.

5.3 Compliance and Business Cycle

We indicate that compliant firms display higher performance and lower systematic risk. Therefore, their performance needs to be independent of the business cycle. To test this hypothesis, we run the regression 4 using three sub-samples based on the level of the Gross Domestic Product, GDP,

growth. Figure 2 plots the quarterly growth of the seasonally adjusted GDP[4], and shows the low, medium, and high GDP growth periods.

Market-based performance results are presented in table 7. We see clearly that the positive effect of compliance on return and abnormal returns is confirmed and is significant at the 0.1% level using all sub samples. Compliant firms earn on average 10.6%, 8.15% and 9.67% (9.72%, 7.24% and 7.51%) higher return in low, medium and high GDP growth period under specification (1) (specification (2)). Compliant firms earn on average 8.55%, 7.51% and 9.22% (7.55%, 6.45% and 7.15%) higher abnormal return in low, medium and high GDP growth period under specification (1) (specification (2)). Accounting-based performance results are presented in table 8. We observe that the compliance coefficient is again positive and highly significant for low, medium and high GDP growth quarters.

5.4 Robustness

In the following section, we run two different robustness checks. The first examines the performance and compliance relationship over three separate sub-periods: the first extends from 1987 to 1999, the second extends from 2000 to 2012 and the third extends from 2013 to 2022. As shown in tables 9 and 10, the outperformance of compliant stocks compared to non-compliant ones is verified in all sub-samples using both market and accounting-based measures.

The second robustness exercise aims to ensure that the market out-performance of compliant stocks is not driven by alternative explanations such as size, value, momentum, liquidity, profitability, or investment effects. To do so, we follow the approach of Brandon and Wang (2020) by sorting stocks into five quintiles based on different variables, known in the finance literature to affect stock returns. Then within each quintile, we sort stocks into two groups based on their compliance status. Therefore, we obtain 10 portfolios. We calculate the value weighted returns and abnormal returns of compliant and non-compliant firms in each portfolio. Tables 11 presents the results.

[4]GDP data obtained from the Federal Reserve Bank of St. Louis — Economic Resources & Data https://fred.stlouisfed.org/series/GDP

5.4.1 Size.

Banz (1981) is the first empirical paper showing that small firms tend on average to earn higher returns compared to large firms. Since then, a large body of finance literature, including Fama and French (1992), analysed the size effect (see Van Dijk (2011) for literature survey). To make sure that our results are not driven by the size effect, each quarter, we sort stocks into 5 quintiles based on their market capitalization at the end of previous quarter, calculated as shares outstanding times share price. Then within each size quintile, we sort stocks into two groups based on their compliance status. Panel A of table 11 shows that compliant stocks outperform non-compliant ones in all size groups. The return and abnormal return differentials between compliant and non compliant portfolios (C-NC) are positive and highly significant across all size subgroups. The quarterly return differential ranges from 6.31% (t-statistic 5.69) for small firms to 1.24% (t-statistic 3.45) for large firms. The quarterly abnormal return differential ranges from 5.98% (t-statistic 5.54) for small firms to 1.15% (t-statistic 3.29) for large firms. Thus, we are not simply capturing the size effect.

5.4.2 Value.

Fama and French (1992, 1993, 2006) and Davis (1994) among others provide evidence that higher book-to-market equities earn higher expected stock returns. Thus, we test if the outperformance of compliant stocks is explained by the value effect. To do so, we construct the book-to-market as defined in Fama and French (1992, 1993). Then, every quarter, we sort stocks into five quintiles based on their book-to-market ratios, and within each book-to-market quintile, stocks are sorted into two portfolios based on their compliance status. We observe in panel B of table 11 that compliant stocks significantly outperform non-compliant stocks within all market-to-book quintiles. The quarterly return (abnormal return) differential is most positive for value stocks reaching 7.29% (7.26%) per quarter. This clearly indicates that we are not capturing a book-to-market effect.

5.4.3 Intangibles-Augmented Value.

Eisfeldt et al. (2022) acknowledge the increasing importance of intangible capital and show that

a value portfolio that adds intangible capital to book assets provides stronger performance than the traditional value portfolio. We control for the intangibles-Augmented value effect using the intangible-augmented book-to-market, ${}^{B}/_{M}{}^{INT}$, obtained from the website of Andrea Eisfeldt and described in details in Eisfeldt et al. (2022). Every quarter, we sort stocks into 5 quintiles based on the ${}^{B}/_{M}{}^{INT}$ then within each ${}^{B}/_{M}{}^{INT}$ quintile, we sort stocks based on their compliance. Looking at Panel C of table 11, we find that compliant stocks outperform non-compliant stocks. The difference in average returns (abnormal returns) on the compliant and non compliant portfolios exceeds 1.7% (1.5%) per quarter and is highly statistically significant. Hence, the positive relationship between compliance and return (abnormal return) cannot be attributed to intangible value effect.

5.4.4 Liquidity Risk.

Pástor and Stambaugh (2003) argue that stocks that are more sensitive to aggregate liquidity have substantially higher expected returns. In this section, we test if the high returns observed among compliant firms are explained by high liquidity βs. We first estimate liquidity βs. Every month, using the past 12 months of daily returns, we estimate the monthly liquidity risk exposure in a four-factor model which augments the CAPM model with the Pástor and Stambaugh (2003) liquidity risk factor as well as the SMB and HML factors. The quarterly liquidity β is the average monthly estimated βs for a given quarter. Second, we sort stocks based on the quarterly liquidity β into 5 quintiles then we within each quintile, we sort stocks based on their compliance. Panel D of table 11 confirms the outperformance of compliant stocks. The return (abnormal return) spread between compliant and non-compliant stocks exceeds 1% (0.91%) per quarter and is significant at the 1% level.

5.4.5 Momentum.

Jegadeesh and Titman (1993) report that winners, stocks with strong past performance continue to outperform losers, stocks with poor past performance. To control for the momentum effect, each quarter, we sort stocks based on two-quarter lagged six months returns. Then within each momentum quintile, we group stocks into two subgroups based on their compliance status. Panel

E of table 11 shows that, again, the return and abnormal returns difference between compliant and non-compliant stocks are positive and significant at 1% level across all momentum quintiles.

5.4.6 Profitability.

Fama and French (2006), Novy-Marx (2013) and Aharoni et al. (2013) show that high profitability assets earn higher returns. To control for profitability, each quarter, we sort stocks into 5 groups based on their profitability, measured as the firm's gross profit to its asset, then within each profitability quintile, we group stocks into two subgroups based on their compliance status. We see in panel F of table 11 that the return differential between compliant and non-compliant stocks is positive and significant ranging from 1.28% to 6.16% per quarter. We find similar results using the abnormal returns, where the abnormal return differential is positive and significant ranging from 1% to 6.1%. Therefore, profitability does not explain the performance of compliant stocks.

5.4.7 Investment.

Fama and French (2006) and Aharoni et al. (2013) document a negative relation between expected investment and returns. We control for the effect of investment on stocks using the quarterly asset growth to proxy for investment. We repeat our sorting exercise by first sorting stocks based on the asset growth then we sort stocks in two groups based on their compliance status. Panel G of table 11 confirms our main finding. Compliant stocks significantly outperform non-compliant within all investment quantiles. The return and abnormal return spread exceeds 1.28% and 1.22% per quarter, respectively.

6 Conclusion

This paper offers a comprehensive performance and risk comparison between compliant and non-compliant stocks using both market and accounting-based measures. We apply two-stage Islamic screening process and construct a faith-based opportunity set. We show that Islamic stocks exhibit significantly higher performance compared to their conventional peers. Our findings highlight that

this out-performance cannot be associated with higher risks and is independent of the business cycle and the period of study. Also, we examine whether firm's compliance impact is explained by firm's individual characteristics. We demonstrate that compliant portfolios display higher returns and abnormal returns compared to non-compliant ones, independently of the control variables used.

This study is expected to guide Islamic investors and asset managers on the impact of faith-based screening criteria on the performance and risk of Islamic investment at the firm level. Also, it suggests new research avenues where we can generalize the analysis to include other ethical alternatives to conventional finance and measure their impact on stock market performance.

Table 1. Industrual distribution of Complaint and Non Complaint companies from 1987 to 2022

Industry sector	Compliant Firms	Non compliant Firms	Total	Weight(%)
Consumer Nondurables	48	53	102	5.61
Consumer Durables	23	25	48	2.64
Manufacturing	112	105	217	11.99
Oil, Gas, and Coal Extraction and Products	42	40	81	4.49
Chemicals and Allied Products	34	27	60	3.32
Business Equipment	218	101	319	17.59
Telephone and Television Transmission	16	40	56	3.07
Utilities	6	94	100	5.52
Wholesale, Retail, and Some Services	97	96	192	10.62
Healthcare, Medical Equipment, and Drugs	120	70	190	10.46
Finance	0	227	227	12.50
Other	95	126	221	12.19
Total	813	1002	1812	100.00

The table presents the Industrial distribution of Compliant and Non-compliant companies from 1987 to 2022. The average number of firms are presented across industries. A firm is considered Compliant if it satisfies the quantitative and qualitative screening criteria defined by the Islamic law. Industry classification is based on Fama French 12 industries and obtained from kenneth french website.

Table 2. Summary statistics: Variables included in the study during the period from 1987 to 2022.

	mean	sd	p10	p25	p50	p75	p90
Quantitative screening ratios							
Debt	0.51	6.90	0.00	0.03	0.18	0.49	0.96
Receivables	0.60	6.69	0.08	0.14	0.24	0.42	0.73
Cash + Interest bearing securities	0.23	6.40	0.02	0.04	0.10	0.21	0.38
Market-based measures							
Quarterly abnormal return$_i$	0.04	0.19	-0.09	-0.01	0.03	0.09	0.19
Quarterly return$_i$	0.06	0.20	-0.09	0.01	0.05	0.11	0.22
Quarterly total vol$_i$	0.54	0.40	0.27	0.35	0.47	0.63	0.86
Quarterly idio. vol$_i$	0.41	0.33	0.19	0.26	0.35	0.48	0.67
Quarterly marketβ_i	1.32	0.70	0.56	0.88	1.22	1.65	2.21
Accounting-based measures							
Ind_ROA	-0.06	0.24	-0.28	-0.08	-0.02	0.03	0.10
OIG	0.16	1.92	-1.01	-0.17	0.17	0.59	1.34
Standard deviation OIG	1.97	1.82	0.27	0.54	1.35	2.90	4.71
OPL	1.56	1.40	0.67	1.00	1.36	1.91	2.67
Control Variables							
Size	6.88	1.91	4.57	5.87	6.96	8.10	9.16
Cash	0.21	0.23	0.02	0.04	0.11	0.32	0.59
Leverage	0.25	0.21	0.01	0.07	0.22	0.38	0.54
Dividend	0.83	1.60	0.00	0.00	0.00	1.13	2.81
Cfo	0.03	0.16	-0.13	0.01	0.07	0.11	0.16
Growth	1.65	1.66	0.32	0.61	1.10	2.08	3.68

This table reports the summary statistics of all variables included in the study for the period from 1987 to 2022. The numbers reported represent the mean across firms as well as the standard deviation and the 10^{th} to 90^{th} percentile. A detailed definition of the variables is found in Table A.1.

Table 3. Cross-sectional regressions for quarterly return and quarterly abnormal return from the first quarter of 1987 to the fourth quarter of 2022.

	Return		Abnormal Return	
	(1)	(2)	(1)	(2)
Compliant	0.0955***	0.0813***	0.0834***	0.0684***
	(61.95)	(50.35)	(59.76)	(46.72)
size		-0.0240***		-0.0239***
		(-19.54)		(-20.73)
cash		0.0133*		0.0113
		(2.03)		(1.89)
leverage		0.0864***		0.0776***
		(17.42)		(17.07)
dividend		-0.00602***		-0.00617***
		(-16.94)		(-18.46)
cfo		0.0609***		0.0660***
		(6.34)		(7.28)
growth		0.0242***		0.0241***
		(35.64)		(38.59)
Constant	0.0123***	0.148***	-0.00406***	0.134***
	(15.15)	(14.86)	(-5.55)	(14.33)
N	260282	260282	260282	260282
R squared	0.0939	0.112	0.0805	0.102
Firm fixed effects	Yes	Yes	Yes	Yes
Robust standard errors	Yes	yes	Yes	yes

This table reports the results of the following regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where the dependent variable $\text{Performance}_{t,i}$ is the quarterly return and quarterly abnormal return of firm i at quarter t. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on the first quarter of 1987 to the fourth quarter of 2022, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 4. Cross-sectional regressions for quarterly industry-adjusted ROA and quarterly operating income growth from the first quarter of 1987 to the fourth quarter of 2022.

	Ind-ROA		OIG	
	(1)	(2)	(1)	(2)
Compliant	0.0336***	0.0187***	0.242***	0.154***
	(58.57)	(31.34)	(14.49)	(8.85)
size		0.0256***		0.0486***
		(27.05)		(4.14)
cash		-0.0503***		0.428***
		(-14.36)		(6.01)
leverage		0.0112***		0.392***
		(3.86)		(7.59)
dividend		-0.000953***		-0.0546***
		(-7.19)		(-14.40)
cfo		0.486***		2.175***
		(59.90)		(24.80)
growth		0.00948***		0.0854***
		(24.31)		(14.93)
Constant	-0.0223***	-0.263***	0.208***	-0.534***
	(-70.84)	(-34.70)	(23.46)	(-5.50)
N	258867	258867	255830	255830
R squared	0.656	0.713	0.101	0.109
Firm fixed effects	Yes	Yes	Yes	Yes
Robust standard errors	yes	yes	yes	yes

This table reports the results of the following regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where the dependent variable $\text{Performance}_{t,i}$ is the quarterly industry-adjusted ROA and quarterly operating income growth of firm i at quarter t. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on the first quarter of 1987 to the fourth quarter of 2022, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 5. Cross-sectional regressions for quarterly Total volatility from the first quarter of 1987 to the fourth quarter of 2022.

	Total Volatility		Idio. Volatility		Marketβ	
	(1)	(2)	(1)	(2)	(1)	(2)
Compliant	-0.0179***	-0.0185***	-0.00868***	-0.00792***	-0.0193***	-0.0180***
	(-15.12)	(-14.81)	(-9.52)	(-8.19)	(-5.13)	(-4.60)
size		-0.0296***		-0.0291***		-0.0291***
		(-25.07)		(-28.58)		(-9.79)
cash		0.0362***		0.0152***		0.228***
		(7.02)		(3.71)		(14.12)
leverage		0.0429***		0.0399***		0.114***
		(10.50)		(12.38)		(9.24)
dividend		-0.00244***		-0.00182***		-0.0263***
		(-6.90)		(-7.20)		(-30.54)
cfo		-0.129***		-0.0882***		-0.471***
		(-13.50)		(-10.66)		(-22.32)
growth		0.00613***		0.00305***		0.0135***
		(11.68)		(7.09)		(9.38)
Constant	0.413***	0.632***	0.299***	0.519***	1.174***	1.386***
	(679.58)	(67.66)	(655.02)	(65.05)	(591.45)	(56.56)
N	260281	260281	260281	260281	260274	260274
R squared	0.551	0.559	0.564	0.573	0.441	0.448
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Robust standard errors	yes	yes	yes	yes	yes	yes

This table reports the results of the following regression:

$$\text{Risk}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where the dependent variable $\text{Risk}_{t,i}$ is the quarterly total volatility of firm i, quarterly idiosyncratic volatility and market β. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on the first quarter of 1987 to the fourth quarter of 2022, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 6. Cross-sectional regressions for standard deviation of the quarterly operating income growth, Std. dev. OIG and the quarterly operating leverale, OPL. from the first quarter of 1987 to the fourth quarter of 2022.

	Std. dev. OIG		OPL	
	(1)	(2)	(1)	(2)
Compliant	-0.0888***	-0.0718***	-0.00883	-0.0375*
	(-6.31)	(-4.56)	(-0.64)	(-2.26)
size		-0.0682***		-0.212***
		(-6.68)		(-26.62)
cash		0.0965		0.308***
		(1.83)		(6.44)
leverage		-0.207***		-0.333***
		(-4.80)		(-7.55)
dividend		0.000425		0.0101**
		(0.13)		(2.99)
cfo		-0.919***		0.361***
		(-14.56)		(5.38)
growth		-0.00904*		-0.0347***
		(-2.10)		(-9.52)
Constant	1.312***	1.998***	1.521***	3.337***
	(189.14)	(24.07)	(209.59)	(47.97)
N	315915	259755	214112	179838
R squared	0.393	0.407	0.233	0.291
Firm fixed effects	Yes	Yes	Yes	Yes
Robust standard errors	yes	yes	yes	yes

This table reports the results of the following regression:

$$\text{Risk}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where the dependent variable $\text{Risk}_{t,i}$ is the quarterly standard deviation of operating income growth and the quarterly operating leverage of firm i. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on the first quarter of 1987 to the fourth quarter of 2022, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 7. Cross-sectional regressions for quarterly return and quarterly abnormal return: Alternative Sub samples based on GDP growth.

	Panel A: Low GDP growth quarters				**Panel B: Medium GDP growth quarters**				**Panel C: High GDP growth quarters**			
	Return		Abnormal Return		Return		Abnormal Return		Return		Abnormal Return	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Compliant	0.106***	0.0972***	0.0855***	0.0755***	0.0815***	0.0724***	0.0751***	0.0645***	0.0967***	0.0751***	0.0922***	0.0715***
	(36.55)	(32.14)	(34.07)	(28.75)	(34.27)	(27.05)	(33.44)	(25.46)	(37.51)	(26.31)	(37.30)	(26.24)
size		-0.0271***		-0.0272***		-0.0200***		-0.0197***		-0.0212***		-0.0213***
		(-9.56)		(-10.33)		(-9.99)		(-10.28)		(-10.82)		(-11.37)
cash		0.0239*		0.0237*		-0.0158		-0.0174		0.0312*		0.0282*
		(1.98)		(2.22)		(-1.40)		(-1.62)		(2.43)		(2.31)
leverage		0.120***		0.105***		0.0799***		0.0723***		0.0760***		0.0742***
		(12.24)		(12.05)		(9.63)		(9.10)		(8.24)		(8.47)
dividend		-0.00581***		-0.00591***		-0.00656***		-0.00646***		-0.00779***		-0.00811***
		(-8.72)		(-9.68)		(-11.06)		(-11.59)		(-12.16)		(-12.88)
cfo		0.0618**		0.0714***		0.0555***		0.0631***		0.0530**		0.0544**
		(3.20)		(3.97)		(3.43)		(4.08)		(3.03)		(3.23)
growth		0.0199***		0.0200***		0.0184***		0.0194***		0.0319***		0.0308***
		(16.36)		(18.40)		(15.18)		(16.73)		(25.28)		(25.86)
Constant	0.0160***	0.175***	0.00393**	0.168***	0.00749***	0.122***	-0.00697***	0.105***	0.0224***	0.122***	-0.000983	0.100***
	(11.36)	(7.60)	(3.28)	(7.85)	(6.25)	(7.41)	(-6.18)	(6.70)	(17.27)	(7.64)	(-0.79)	(6.58)
N	97632	91479	97632	91479	94541	79576	94541	79576	100368	87307	100368	87307
R squared	0.130	0.141	0.109	0.121	0.187	0.205	0.156	0.174	0.182	0.197	0.147	0.175
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust standard errors	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

This table reports the results of the following regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where the dependent variable $\text{Performance}_{t,i}$ is the quarterly return and the quarterly abnormal return of firm i at quarter t. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on three sub samples based on the level of GDP growth, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. GDP is obtained from the Federal Reserve Bank of St. Louis — Economic Resources & Data. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 8. Cross-sectional regressions for quarterly industry-adjusted ROA and quarterly Operating income growth: Alternative Sub samples based on GDP growth.

	Panel A: Low GDP growth quarters				**Panel B: Medium GDP growth quarters**				**Panel C: High GDP growth quarters**			
	ind-ROA		OIG		ind-ROA		OIG		ind-ROA		OIG	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Compliant	0.0269***	0.0146***	0.288***	0.214***	0.0367***	0.0209***	0.261***	0.146***	0.0356***	0.0195***	0.165***	0.0927**
	(21.88)	(14.09)	(10.33)	(7.30)	(39.24)	(21.86)	(9.10)	(4.56)	(36.15)	(18.93)	(5.52)	(2.84)
size		0.0279***		0.117***		0.0237***		0.0220		0.0256***		0.0267
		(19.13)		(5.54)		(18.15)		(1.02)		(20.61)		(1.10)
cash		-0.0435***		0.663***		-0.0459***		0.265*		-0.0642***		0.485***
		(-6.94)		(5.24)		(-7.38)		(1.97)		(-10.81)		(3.44)
leverage		0.00475		0.143		0.0341***		0.292**		0.00750		0.652***
		(1.00)		(1.65)		(6.74)		(2.92)		(1.36)		(6.55)
dividend		-0.000524**		-0.0507***		-0.00210***		-0.0545***		-0.00206***		-0.0632***
		(-2.77)		(-8.36)		(-7.43)		(-7.77)		(-8.73)		(-8.75)
cfo		0.440***		2.297***		0.480***		1.835***		0.471***		2.100***
		(30.31)		(14.81)		(29.64)		(11.51)		(32.65)		(12.12)
growth		0.00851***		0.0494***		0.0130***		0.0931***		0.0106***		0.0939***
		(11.37)		(4.98)		(17.94)		(8.72)		(17.45)		(8.56)
Constant	-0.0181***	-0.277***	0.106***	-1.157***	-0.0184***	-0.252***	0.191***	-0.256	-0.0188***	-0.247***	0.314***	-0.304
	(-28.33)	(-22.74)	(7.77)	(-6.46)	(-38.19)	(-25.11)	(13.17)	(-1.44)	(-37.68)	(-25.29)	(20.58)	(-1.55)
N	97217	91122	95901	90189	93870	79155	92039	78195	99498	86678	97342	85504
R squared	0.672	0.721	0.136	0.144	0.727	0.781	0.165	0.171	0.727	0.777	0.197	0.208
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust standard errors	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

This table reports the results of the following regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where The dependent variable $\text{Performance}_{t,i}$ is the quarterly industry-adjusted ROA and the quarterly operating income growth, OIG of firm i at time t. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on three sub samples based on the level of GDP growth, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels.GDP is obtained from the Federal Reserve Bank of St. Louis — Economic Resources & Data. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.

$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 9. Cross-sectional regressions for quarterly return and quarterly abnormal return: Alternative Sub samples.

	Panel A: From 1987 to 1999				Panel B: From 2000 to 2012				Panel C: From 2013 to 2022			
	Return		Abnormal Return		Return		Abnormal Return		Return		Abnormal Return	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Compliant	0.101***	0.0869***	0.0935***	0.0785***	0.114***	0.107***	0.0947***	0.0854***	0.0971***	0.0840***	0.0837***	0.0708***
	(36.58)	(30.22)	(36.45)	(29.54)	(40.88)	(37.31)	(37.66)	(33.07)	(28.89)	(24.61)	(27.81)	(23.09)
size		-0.0269***		-0.0298***		-0.0334***		-0.0314***		-0.0262***		-0.0262***
		(-10.02)		(-11.80)		(-10.76)		(-10.96)		(-8.07)		(-8.56)
cash		0.0241		0.0196		0.0229		0.0186		0.0403**		0.0402**
		(1.68)		(1.47)		(1.91)		(1.71)		(2.84)		(3.07)
leverage		0.117***		0.115***		0.117***		0.0998***		0.0749***		0.0684***
		(10.47)		(11.01)		(11.79)		(10.99)		(6.69)		(6.62)
dividend		-0.00936***		-0.00981***		-0.00632***		-0.00614***		-0.00678***		-0.00685***
		(-12.71)		(-14.07)		(-10.30)		(-10.59)		(-8.03)		(-8.72)
cfo		0.0935***		0.0961***		0.0676***		0.0791***		0.114***		0.120***
		(5.30)		(5.77)		(4.05)		(5.11)		(5.91)		(6.59)
growth		0.0312***		0.0310***		0.0229***		0.0245***		0.0279***		0.0265***
		(23.15)		(24.45)		(17.03)		(20.19)		(21.49)		(21.94)
Constant	0.0174***	0.149***	-0.00986***	0.145***	0.00100	0.205***	0.00295*	0.193***	0.00594***	0.155***	-0.0207***	0.132***
	(11.71)	(7.24)	(-7.21)	(7.53)	(0.70)	(8.09)	(2.30)	(8.28)	(3.61)	(5.57)	(-14.26)	(5.04)
N	82876	82876	82876	82876	103348	103348	103348	103348	73690	73690	73690	73690
R squared	0.133	0.152	0.126	0.150	0.108	0.121	0.0963	0.112	0.112	0.129	0.0876	0.109
Firm fixed effects		Yes		Yes		Yes		Yes		Yes		Yes
Robust standard errors		yes		yes		yes		yes		yes		yes

This table reports the results of the following regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where The dependent variable $\text{Performance}_{t,i}$ is the quarterly return and the quarterly abnormal return of firm i at quarter t. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on three sub samples from 1987 to 1999, from 2000 to 2012 and from 2013 to 2022, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 10. Cross-sectional regressions for quarterly industry-adjusted ROA and quarterly Operating income growth: Alternative Sub samples.

	Panel A: From 1987 to 1999				**Panel B: From 2000 to 2012**				**Panel C: From 2013 to 2022**			
	ind-ROA		OIG		ind-ROA		OIG		ind-ROA		OIG	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Compliant	0.0340***	0.0231***	0.248***	0.171***	0.0284***	0.0152***	0.278***	0.211***	0.0156***	0.00850***	0.225***	0.153***
	(38.12)	(25.10)	(8.32)	(5.50)	(31.02)	(17.26)	(9.55)	(7.07)	(12.46)	(6.14)	(5.96)	(3.97)
size		0.0261***		0.0535		0.0463***		0.118***		0.0326***		0.172***
		(19.49)		(1.63)		(13.63)		(4.69)		(12.62)		(5.84)
cash		-0.0329***		0.232		-0.0180**		0.711***		-0.0396***		0.621***
		(-4.97)		(1.51)		(-2.88)		(5.59)		(-4.53)		(3.60)
leverage		-0.0280***		0.586***		-0.00475		0.856***		-0.00401		0.147
		(-5.28)		(4.75)		(-0.88)		(8.55)		(-0.54)		(1.23)
dividend		-0.00328***		-0.0848***		0.000497*		-0.0551***		0.000875***		-0.0420***
		(-11.89)		(-9.47)		(2.24)		(-9.02)		(3.53)		(-4.46)
cfo		0.289***		2.467***		0.396***		2.086***		0.352***		2.448***
		(28.08)		(13.50)		(27.37)		(13.77)		(19.64)		(12.94)
growth		0.0103***		0.113***		0.00988***		0.138***		0.000877		0.0507***
		(16.20)		(9.55)		(13.19)		(12.11)		(1.12)		(4.44)
Constant	-0.0194***	-0.232***	0.222***	-0.561*	-0.0142***	-0.416***	0.216***	-1.316***	-0.0199***	-0.306***	0.165***	-1.588***
	(-41.40)	(-22.80)	(14.08)	(-2.23)	(-29.16)	(-15.38)	(14.21)	(-6.39)	(-29.96)	(-13.78)	(8.90)	(-6.27)
N	82310	82310	81148	81148	103014	103014	101667	101667	73175	73175	72647	72647
R squared	0.769	0.794	0.145	0.153	0.689	0.736	0.121	0.129	0.726	0.745	0.137	0.144
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Robust standard errors	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

This table reports the results of the following regression:

$$\text{Performance}_{t,i} = \alpha + \beta_1 \text{ Compliant}_{t,i} + \beta_2 \text{ Controls}_{t,i} + \beta_3 \text{ Firm FE}_i + \beta_4 \text{ Year FE}_t + \epsilon_{t,i},$$

where The dependent variable $\text{Performance}_{t,i}$ is the quarterly industry-adjusted ROA and the quarterly operating income growth, OIG of firm i at time t. Compliant , the variable of interest, is a binary variable equals one if the firm is compliant and zero otherwise. We run the regression on three sub samples from 1987 to 1999, from 2000 to 2012 and from 2013 to 2022, under two specifications: without firm controls (specification 1), with firm controls (specification 2). For both specifications, we control for the firm and time fixed effects. Control variables are winsorized at the 1% and 99% levels. A detailed definition of the dependent and independent variables is found in Table A.1. T-statistics are in parenthesis and are adjusted for heteroskedasticity.
$^{*}\ p < 0.05$, $^{**}\ p < 0.01$, $^{***}\ p < 0.001$.

Table 11. Robustness checks.

Panel A: Controlling for size

	Return				Abnormal Return			
size	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	16.023	9.713	6.310***	5.695	13.719	7.738	5.981***	5.542
2	10.798	6.125	4.673***	7.019	8.576	4.138	4.439***	6.865
3	9.025	5.363	3.661***	6.393	6.785	3.377	3.408***	6.058
4	7.939	4.700	3.240***	6.069	5.711	2.732	2.978***	5.744
5	5.302	4.061	1.241***	3.453	3.215	2.056	1.159***	3.296

Panel B: Controlling for value effect

	Return				Abnormal Return			
Book-to-Market	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	5.339	4.301	1.038**	2.944	3.454	2.564	0.889*	2.496
2	5.866	3.800	2.065***	5.795	3.925	1.892	2.033***	5.490
3	7.125	3.819	3.306***	5.093	5.197	1.945	3.252***	5.120
4	9.252	4.568	4.684***	5.258	7.125	2.738	4.387***	5.139
5	13.135	5.843	7.292***	6.284	11.163	3.897	7.266***	6.052

Panel C: Controlling for Intangibles-Augmented Value

	Return				Abnormal Return			
Book-to-Market^{I} NT	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	5.450	3.663	1.787***	4.427	3.474	1.822	1.652***	3.995
2	5.531	3.830	1.701***	4.015	3.669	2.115	1.554***	3.682
3	6.751	4.229	2.521***	5.039	4.840	2.365	2.475***	4.948
4	10.497	5.088	5.410***	8.117	8.424	3.062	5.362***	8.652
5	15.132	7.295	7.837***	7.794	13.191	5.196	7.995***	8.061

Panel D: Controlling for Liquidity β

	Return				Abnormal Return			
Liquidity β	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	7.495	5.268	2.228***	5.230	5.154	3.145	2.009***	5.130
2	5.832	4.287	1.545***	4.800	3.750	2.285	1.466***	4.578
3	5.223	4.220	1.003**	3.055	3.269	2.351	0.917**	2.883
4	5.510	4.146	1.364**	3.074	3.474	2.186	1.289**	3.038
5	7.248	4.719	2.530***	3.557	5.044	2.654	2.390***	3.304

Panel E: Controlling for Momentum

	Return				Abnormal Return			
Momentum	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	6.844	4.162	2.682***	5.013	4.451	1.941	2.510***	5.047
2	5.401	3.929	1.472***	3.462	3.206	1.851	1.355**	3.287
3	5.208	4.244	0.963**	2.717	2.991	2.202	0.789*	2.336
4	5.474	4.478	0.996*	2.469	3.336	2.360	0.976*	2.451
5	7.496	5.191	2.305***	4.302	5.057	3.014	2.043***	3.665

Panel F: Controlling for Profitability

	Return				Abnormal Return			
Gross profit	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	10.979	4.812	6.168***	5.419	8.656	2.539	6.117***	5.412
2	6.314	3.865	2.449***	5.246	4.231	2.055	2.176***	4.658
3	5.608	4.049	1.559***	4.216	3.546	2.122	1.423***	3.849
4	5.723	4.441	1.281**	3.213	3.598	2.592	1.006**	2.607
5	6.053	4.741	1.311**	2.941	3.972	2.912	1.060*	2.451

Panel G: Controlling for Investment

	Return				Abnormal Return			
Investment	C	NC	C-NC	t(C-NC)	C	NC	C-NC	t(C-NC)
1	6.425	4.065	2.360***	4.096	4.098	2.031	2.067***	3.615
2	5.835	4.122	1.713***	3.772	3.609	2.122	1.487***	3.359
3	5.334	4.054	1.280***	3.340	3.397	2.086	1.311***	3.705
4	5.543	4.240	1.303***	3.767	3.556	2.328	1.228***	3.689
5	6.816	5.027	1.789***	5.231	4.722	2.960	1.762***	5.186

The table reports average quarterly value-weighted portfolio returns formed by sorting stocks on size (Panel A), Book-to-market (Panel B), Book-to-Market^{I} NT (Panel C), liquidity β (Panel D), momentum (Panel E), gross profit (Panel F), investment (Panel G) then by compliance status. Compliant is a binary variable equals one if the firm is compliant and zero otherwise. Size is defined as the market capitalization (price × share outstanding). B/M is defined as the ratio of the book equity and the current month market value of equity. ${B/M}^{INT}$ is defined as the ratio of the $BE^{I}NT$ and the current month market value of equity. Every June-end, $BE^{I}NT$ is updated using the previous fiscal year's book equity value obtained from the website of Andrea Eisfeldt and described in Eisfeldt et al. (2022). Liquidity β is estimated using 12 months rolling regressions of daily stock returns on the market excess return, SMB, HML and the Pástor and Stambaugh (2003) liquidity risk factor. The momentum value is defined as the two quarters lagged two quarters returns: quarterly ret$_{t-3}$ + quarterly ret$_{t-4}$. Profitability, is the firm's gross profit to its asset. Investment is the quarterly asset growth. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

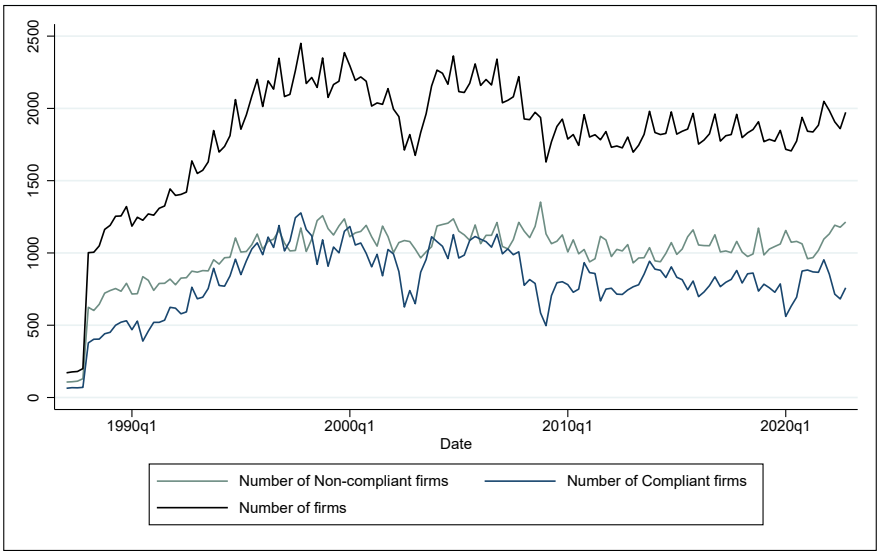

Figure 1. The figure plots the total number of firms as well as as the number of compliant and non compliant firms included in the study. The sample period is from 1987 to 2022.

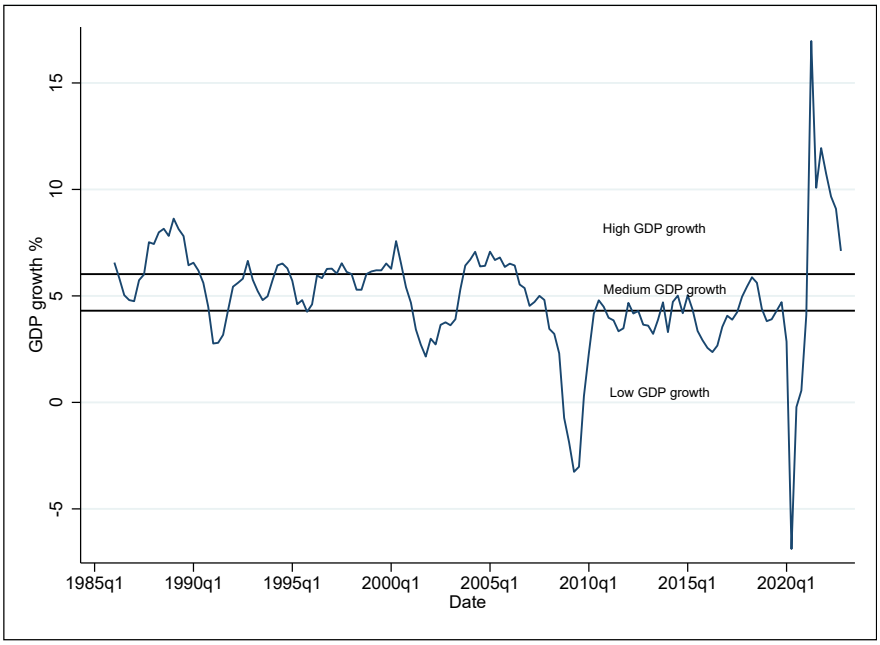

Figure 2. The figure plots the quarterly GDP growth rate. We sort quarters based on the level of GDP growth on three periods: low, medium and high GDP growth. The sample period is from 1987 to 2022.

A Appendix

Table A.1. Variables' definitions

Variable	Definition
Compliant	Binary variable, updated quarterly, equals one if the firm is compliant and zero otherwise. We construct the Compliant using two-stage screening process.
Quarterly return	The quarterly returns for firm i is the sum of daily returns during the quarter.
Quarterly Abnormal returns	The quarterly Abnormal return is the sum of daily abnormal returns measured over a given quarter. The daily Abnormal return is the difference between daily return of a stock and the CAPM beta times the daily market return.
Quarterly total volatility	The quarterly total volatility is the average annualized monthly volatility for a given quarter. The monthly total volatility is the standard deviation of daily returns for the month. It is annualized by multiplying by $\sqrt{252}$.
Quarterly idiosyncratic volatility	The quarterly idiosyncratic volatility is the average annualized monthly volatility for a given quarter. The monthly idiosyncratic volatility is the standard deviation of the residuals of a linear regression of daily stock returns on the Fama French factors and the Momentum factor over the past month. This value is annualized by multiplying by $\sqrt{252}$.
Quarterly market beta	Each month, using the past 12 months of daily returns, we regress the excess return on the contemporaneous excess market return as well as five lags of the market return. The monthly market β is then the sum of the six coefficients. The quarterly market βs is the average monthly β for a given quarter.
Quarterly Ind-ROA	The industry adjusted ROA is the difference between the company's quarterly ROA and the industry median ROA for the three previous years. ROA is calculated as Operating income before depreciation over total assets.
Quarterly OIG	The quarterly operating income growth, is the percent change in operating income. Operating income is net sales less cost of goods sold and operating expenses before deducting depreciation, amortization, and depletion.
Quarterly standard deviation of OIG	Every quarter, the quarterly standard deviation of the OIG for firm i is calculated using the previous three years of quarterly observations.
Quarterly OPL	We regress the natural logarithm of quarterly EBIT on the natural logarithm of quarterly sales. Operating leverage (OPL) is defined as the regression coefficient on the sales.
Growth	Market value (share outstanding* share price) over Book value.
Size	Natural log of the book value of total asset.
CFO	Cash flows from operating activities divided by total asset.
Dividend	Dividend per share times 100 over stock price.
Cash	Cash holdings over book assets.

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C Disclosure statement

The authors report there are no competing interests to declare.

D Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

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