Leverage Risk, Financial Crisis, and Stock Returns: A Comparison among Islamic, Conventional, and Socially Responsible Stocks

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According to the financial press, firms with low leverage have lower distress risk due to their reduced exposure to the credit market, especially during credit crises. Compared to their conventional and socially responsible (SRI) counterparts, sharia compliant (SC) stocks are low-leverage stocks. Our hypothesis is that SC firms would be less sensitive to leverage risk and thus would be ideal for wealth preservation during declining market environment. We find that the leverage risk factor performs consistently across various categories of firms and its impact is more pronounced during the recent financial crisis. However, we also find that compared to the conventional stocks, SC stocks are also quite sensitive to the leverage factor. In contrast, the SRI class of stocks has the least sensitivity to leverage risk factor, suggesting they can be attractive for wealth preservation during credit crises.

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Introduction

As the divine code of law, the Sharia is a code of conduct that guides business transactions for the Muslims and are based on the Quran and the edicts of Prophet Muhammad (pbuh). Hence, the guidelines set forth in the Sharia become imperative to every Muslim and govern all aspects of life, whether they may be of personal, social, political, economic or financial nature. Sharia compliant (SC) stocks[2] are low-leverage stocks with high asset backing, compared to their conventional and socially responsible (SRI) counterparts. It is widely held belief that firms with low leverage have lower distress risk due to their reduced exposure to the credit market. Naturally, these firms are capable of promoting flight to safety, especially in a declining market environment.

In this paper, we examine if SC stocks have lower sensitivity to economy wide leverage risk. To this extent, we create a new leverage risk factor (LEV) on the basis of firm-specific financial leverage (total debt over assets)[3]. The risk factor LEV (defined as the return on high leverage stocks minus the return on low leverage stocks) is a non-diversifiable risk premium and therefore should be included in any multifactor asset pricing model. The evidence that high leverage requires higher risk premium can be indicative of the notion that high leverage can be value destructive, especially when equity prices are falling in a persistent fashion. The fact that

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[2] Sharia compliant stocks are household names in mostly developed countries. Surprisingly, only few stocks with enough liquidity and strong balance sheet data from the emerging and Muslim countries are included in the Dow Jones Islamic Index.

[3] The leverage measure which we are using is the market value of debt to market value of assets and not book value of debt to market value of assets. Both debt to equity and debt to assets are measures of capital structure of a company reflecting the amount of fixed liabilities. The only difference being that debt to equity ratio is more specific to the overall capital used in the company while debt to assets ratio is a much broader measure.

Islamic stocks may have lower credit market exposure is important for wealth preservation during both good and bad times. Milly and Sultan (2009) report that Islamic stocks listed globally have outperformed conventional stocks and SRI stocks during the 2007-2009 economic crisis[4]. It would be interesting to examine how these stocks respond to the traditional risk factors (such as market risk premium, size, and value) as well as the leverage risk factor. If indeed Islamic stocks have lower sensitivity to the leverage risk factor, it would be indicative of their attractiveness for wealth preservation when investors are looking for safer assets.

In this paper, using a sample of 3704 globally traded stocks for the period January 2000-April 2009, we construct a risk factor based on firm-specific leverage find that the inclusion of the leverage risk factor leads to a weakening of the significance of the traditional FF variables. Furthermore, we show that, in comparison to the traditional FF factors, the economic and statistical significance of the leverage risk factor is high, especially during the financial crisis. We also demonstrate that the leverage risk factor contributes to the systematic risk of a firm and represents the underlying macroeconomic fundamentals. Finally, we show that compared to the conventional stocks, SC stocks display substantially lower risk premium to traditional risk factors. We also find that similar to the conventional stocks, Islamic stocks are also sensitive to the leverage factor, thus leading us to suggest that a leveraged based screening of Islamic stocks may not be ideal for wealth preservation especially during a credit crises. An investor must search for other redeemable characteristics in Islamic stocks that can help preserve equity value during falling equity prices.

The remainder of the paper is as follows. In Section II, we review the link between leverage and stock returns. In Section III, we discuss the recent financial crisis to motivate the empirical model. In Section IV we offer empirical results, and the final section concludes the paper.

Review of literature

A detailed analysis of the sensitivity of SC stocks to the leverage risk is tricky. In the first place, one must demonstrate that, in the context of a multifactor asset pricing model, the previous risk factors are incapable of capturing economy wide leverage risk. Once a reliable risk factor is constructed, a researcher can proceed to the next stage to investigate whether such risk factor is significant in an asset pricing model. Finally, the analysis can proceed to examine if there are differences in the way different categories of firms respond to this newly created risk factor.

Consider the following multifactor asset pricing model (Fama-French (1992))

$$(1) \qquad r_t - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

shows that excess return on a portfolio ($r_t - r_{ft}$) is explained by the sensitivity of its return to three factors: the excess return on a broad market portfolio ($r_{mt} - r_{ft}$); the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big); and the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low).

Our analysis thus leads us to *first* address an important question which has largely been ignored in the literature. Fama and French (1992) note that SMB (return on a portfolio of small firms minus the return on a portfolio of large firms) and HML (return on a portfolio of high book

[4]The authors used weekly data to examine the relative performance of investing in three different types of stocks – conventional, Islamic, and SRI stocks. Both in sample (Jan 2000-June 2007) and out of sample (July 2007-April 2009) mean-variance optimization indicated a portfolio with Islamic stocks generated significantly larger Sharp ratios. The authors claim that a low credit market exposure of Islamic stocks was largely responsible for the relative superior performance. The results are robust even when financial and real estate companies are removed from the sample.

to market firms minus return on a portfolio of low book to market firms) are statistically important in explaining the cross-section of equity returns. Subsequent work by academics and practitioners has sought to verify the effects of these factors (FF factors, from hereafter) on cross-section of equity returns (for example, see Fama and French (1993, 1995, and 1998), Liew and Vassalou (2000), Davis, Fama and French (2000), Sivaprasad and Muradoglu (2009), and Vassalou and Xing (2004)). A common finding in the literature is that value stocks earn a premium over growth stocks. Similarly there is evidence that small sized stocks earn a premium over big stocks.

These so-called empirical anomalies continue to generate controversies in the literature. For instance, are value and size premiums caused by the underlying risk factors of firms falling within these categories? Similarly, the notion of whether value and size premiums reflect incorrect extrapolation of past earnings growth by the market and subsequent correction of the mispricing errors, continues to receive attention in the literature (see Eom and Park (2008) for a recent survey).

How well do FF risk factors capture financial distress risk? Fama and French (1992) note that the combination of book to market and size describes the cross-section of average stock returns and absorb the apparent roles of other variables like leverage and E/P. The authors note that the SMB and HML factors are correlated with leverage and, therefore, adequately represent financial distress. The ability of the traditional FF factors to directly capture leverage risk is critical for asset management, especially when leverage risk becomes a source of systemic risk in the economy. The implication for an investor facing such catastrophic shocks is simple. If size and value based strategies do not perform consistently well across good and bad times, the rationale behind such investing strategy is at risk.

However, Fama and French (1992 and 1993) deal with the market leverage (assets over market value of equity) and the book leverage (assets over book value of equity), which may not directly capture the sensitivity of the firms to economy wide leverage risk[5]. In particular, the debt market exposure of a firm is a major determinant of the distress risk that may not be directly captured by the FF factors. Furthermore, to the extent that excessive leveraging and major credit events can lead to correlated defaults, we may find that the debt market exposure is monotonically increasing in financial leverage. In essence, the resulting credit crisis produces contagion-like effects with leverage risk as being the primary catalyst. According to Fama and French (1996), if default risk becomes correlated across firms, market participants, especially workers in distressed firms, tend to avoid all distressed firms in general. We believe that this presents an ideal opportunity for volatility spillover among firms in the economy, with the extent of spillover monotonically rising in leverage.

Surprisingly, very few studies have empirically examined the role of leverage *risk* factor in asset pricing. Chan and Chen (1991) examine the effects of financial leverage (book value of debt and preferred stock over market value of equity) on stock returns and find a positive relationship. Unfortunately, their analysis does not investigate if factor loadings on the financial leverage can subsume the effects of HML and SMB. As Fama and French (1992) write, “It would be interesting to check whether loadings on their distress factors absorb the size and book-to-market equity effects in average returns documented here.” Ferguson and Shockley (20003) write, “... a three-factor empirical model that includes factors based on relative leverage and relative distress should outperform the Fama and French (1993) three-factor model in the cross section”.

[5]A combination of these two leverage factors produces the book to market ratio. See Fama and French (1992).

An investigation into this topic is timely given the recent financial crisis when economy-wide leverage played a key role in exacerbating the risk exposure especially for the leveraged[6] financial and non-financial firms. As the subprime crisis deepened, coupled with escalating liquidity crisis, the credit market virtually dried up, limiting access to funds. The TED spread (difference between the interest rates on Eurodollar loans and short-term U.S. T-bill) rose in July 2007, then spiked even higher in September 2008, reaching as high as 4.65% on October 10, 2008. While the impact was felt mostly by the hedge funds, insurance agencies, banks, and firms directly involved in construction business and mortgage lending, the effects of the liquidity crisis also had affected the non-financial firms as well. Thus, the financial crisis in 2007-2008 had a devastating contagion-like effect on credit risk, with leverage risk acting as the centrepiece. An analysis of the Islamic stocks and their conventional counterparts is critical from the point of view of academic as well as the practitioner community. If Islamic stocks have lower sensitivity to the leverage risk factor, then these stocks would be ideal for wealth management, especially during financial crises.

There are several studies on the relationship between leverage and stock returns. See Chou, Ko, and Lin (2010) for a recent survey. In one strand of the literature, leverage is positively related to stock returns, especially for weak firms with poor investment opportunities. Accordingly, as debt increases the risk exposure of such firms, investors demand a premium. Sivaprasad and Muradoglu (2009) find that leverage has a significant positive relation with stock returns. Gomes and Schmid (2009) show that equity returns are increasing in market leverage. Ho, Strange and Piesse (2008) conduct a similar study for the Hong Kong stock exchange and conclude that market leverage (Assets/Market value of equity) exhibit a significant conditional relationship with the stock returns. Bhandari (1988) performs cross sectional regressions between monthly average returns and the leverage ratios for the period 1948 – 1979 and finds that the debt equity ratio has a positive effect on stock returns. Ferguson and Shockley (2003) include relative leverage (D/E) and relative distress risk, based on Altman’s Z score. They find that their model performs better than the three factor FF model in explaining stock returns. On similar lines, Chou et al (2010) propose an augmented five factor model which incorporates both FF factors as well as Ferguson and Shockley factors and demonstrate that this augmented five factor model explains most of the asset pricing anomalies.

In contrast, there are several studies that offer rationales for supporting a negative relationship between financial leverage and stock returns. The debt-overhang theory (Meyers, 1977) provides a convenient framework to suggest why leverage reduces equity return. Accordingly, as leverage increases, the distress risk increases, and shareholders pass up positive NPV projects. As a result, the stock price decreases, reflecting underinvestment in successful projects and a decline in firm value (Meyers (1977)). Other explanations include firms substituting debt for equity especially during economic crisis when the cost of equity financing is higher than the cost of debt financing (Dimitrov and Jain (2006)); managerial preference for equity over debt because high debt payments can reduce equity returns, especially when firms do not take advantage of growth opportunities (Lang, et al (1995)); the benefit of external disciplining mechanism of debt financing (Jensen and Meckling (1976) and Fama and Jensen (1983)); and a reduction of the manager’s ability to waste free cash (Jensen (1986)). Overall, these studies imply that debt reduces agency costs and managerial waste, improves disclosure, and thus reduces equity risk premium. As a result, leverage is decreasing in stock returns.

The previous discussion suggests that the leverage risk factor is important for asset pricing models. Our focus in this paper is to examine the extent to which the well-known anomalies (size and book to market effects) are resolved by directly adding leverage as a

[6] The crisis had a major impact in September and October 2008 when there was a huge withdrawal of $144.5 billion from the money market. Major institutions like Lehman Brothers, Bear Stearns, Merrill Lynch, Fannie Mae, Freddie Mac and AIG had to bear the brunt of high debt market exposure.

systematic risk factor. Leverage risk becomes fundamental risk especially when firms' exposure to the debt market becomes pervasive and correlated across the economy. Fama and French (1996) recognize that investors avoid financially distressed firms because distress risk is correlated across the economy. We suggest that when leverage risk becomes correlated across the economy, it has a contagion-like effect on firms in general, especially those with high exposure to the debt market. To this extent, while size and book to market factors are correlated with the leverage of the firm, they may not adequately capture the firm's direct exposure to the economy wide systemic risk due to excessive leverage. Finally, to the extent that Islamic stocks tend to have low leverage and are involved only in permissible economic activities under the guidelines of the Quran and Sunnah, may have reduced exposure to interest rate volatility. This simple and powerful proposition has not been fully addressed in the literature. If Islamic stocks continue to act like their conventional counterparts, it only goes to reaffirm the harmful effect of riba as firms take on more debt.

Our suggestion is consistent with the anecdotal evidence from the recent financial crisis when leverage risk became one of the primary drivers of the global economic crisis. There was plenty of evidence of such systemic risk in the recent financial crisis: debt markets such as the commercial paper market, the repo market, and short-term bank borrowing virtually dried up. Altogether, increased leverage of firms, especially of hedge funds, insurance agencies, banks, and mortgage companies, coupled with a liquidity crisis, took a heavy toll on the global economy.

In the next section, we discuss the link between leverage risk factor and selected macroeconomic variables such as the industrial production, unemployment, inflation, credit spread and term spread. Our intent is to draw inferences on the effects of the leverage risk factor on stock returns across various time periods.

Leverage risk and the financial crisis – contemporary evidence

In 2004, the US Securities and Exchange commission granted a waiver of the international standards of maximum accounting leverage ratio[7] (which was about 12) for five major securities firms – Goldman Sachs, Merrill Lynch, Morgan Stanley, Lehman Brothers and Bear Sterns.[8] Subsequently, many of the investment banks boosted their leverage ratios to as high as 30. Mortgage giants Freddie Mac and Fannie Mae had leverage levels close to 60 to 1 (2008 data), which can be very lucrative if the asset prices rise, but is disastrous when asset prices fall. A recent report[9] cites excessively high leverage ratios prevailing in the housing market and the underlying mortgage backed securities as the culprit behind the credit crisis. Towards the end of the year 2009, the global economy was afflicted with excessive indebtedness which adversely affected the worldwide economy. For example, average household sector debt increased 141 per cent of disposable income in the United States and 177 percent in the United Kingdom. Furthermore, the best known banks in the US and Europe had their leverage (assets/equity) rising to forty, sixty or even hundred times the size of their equity capital.[10]

There is a broad consensus that increased leverage affects stock returns during the financial crisis. According to the popular press[11], under normal circumstances where stock prices deviate from their underlying fundamentals, prices tend to bounce back to their intrinsic values, thereby restoring the efficiency of the equity markets. However, during a prolonged crisis, price

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[7] Accounting leverage is defined as assets/(assets-liabilities).

[8] Source: http://neutralobserver.blogspot.com/2008/11/understanding-financial-crisis-leverage.html

[9] This part of the discussion has been adapted from "Leverage 101: The Real Cause of Financial Crisis", Sept. 25, 2008, extracted from http://seekingalpha.com/article/97299-leverage-101-the-real-cause-of-the-financial-crisis

[10] Source: http://www.huffingtonpost.com/niall-ferguson/beyond-the-age-of-leverag_b_163872.html

[11] Source: http://sg.biz.yahoo.com/080625/67/4hbq2.html

discovery process takes longer, and stocks move away from their intrinsic values for a longer period of time. In addition, when investors are pessimistic about the financial markets, they may miss out on profitable arbitrage opportunities as prices move. In fact, due to the significant mispricing in the market, the US subprime crisis caused share prices of various US and European banks to fall and exerted immense pressure on these banks in the form of deteriorating profit margins.[12]

From a balance sheet perspective, companies reduce their leverage ratios either by selling off their assets (thereby restructuring their balance sheets) or by issuing new shares. Both of these strategies have different implications on the expected returns from the investor perspective. According to James Lee, Vice Chairman of JP Morgan,[13] in spite of the efforts by the financial sector to augment their capital levels to as high as $300 billion firms have not been able to bring down the leverage to pre-crisis levels.

While many financial institutions and asset managers have been deleveraging since 2008, the process might eventually diminish the ability of these institutions to produce attractive returns, especially when they are unable to grow their balance sheets. In such circumstances, as financing gets costlier, firms focus on augmenting their capital level rather than investing it. In this process – "The big get bigger and the rest get smaller"[14] – has a direct impact on the stock returns of these firms. In other words, higher leverage levels increase the risk exposure of the firms and present higher growth opportunities, which should lead to higher stock returns. In contrast, lower leverage levels shrink the balance sheet of the firm and also reduce their competitiveness, having a negative impact on the shareholder value and stock returns.

Leverage risk during the financial crisis has macroeconomic implications. Notwithstanding the de-leveraging efforts of banks and other financial institutions, as of November 6, 2009, banks in particular exhibited 40 to 1 leverage (assets over equity capital). Similarly, the deleveraging efforts undertaken by many governments have also led to adopting restrictive monetary policy, resulting in higher interest rates. However, analysts argue that increasing interest rates and withdrawing funds from the financial system may cause the economy to exacerbate the effects of the credit risk. It has also been forecasted[15] that deliberate attempts by the governments to deleverage will lead to lower wages in developed countries and a permanent unemployment of 15% to 25%. Such macroeconomic instability has the potential to push investors away from the stock and bond markets. Furthermore, an increase in the perceived risk in the financial markets would prompt investors requiring a higher risk premium, which directly affects the expected returns on these stocks. So, deleveraging could have negative effects and is expected to reduce productivity. Overall, leverage affects expected returns not as a firm specific variable but as a systematic risk factor.

Empirical Results

Our initial sample includes weekly data for approximately 4000 stocks from 55 countries from January 2000 to April 2009. Our sample includes both financials (banks, S&Ls, credit unions, mortgage financing companies, real estate firms, and insurance companies) and non-financial firms. Since financial firms, especially banks and insurance firms, operate with high leverage, we will also separate financials from the aggregate sample to examine if financials stocks have different sensitivity to the risk factors.

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[12] Source: http://sg.biz.yahoo.com/080625/67/4hbq2.html

[13] Source: http://www.financialweek.com/article/20080624/REG/705337846/-1/FWDAILYALERT01

[14] As stated in a research note by James Lee, vice chairman of J.P.Morgan Chase – extracted from http://www.financialweek.com/article/20080624/REG/705337846/-1/FWDAILYALERT01

[15] As stated by Bob Chapman, "Upsurge of Global Leveraged Speculation: The Financial Crisis is not over", Global Research, November 6, 2009 – extracted from http://www.globalresearch.ca/index.php?context=va&aid=15959

We eliminate stocks having negative book to market equity from the sample in the construction of the risk factors.[16] Also, the number of stocks each year used in the construction of factors varies depending on the availability of data for the corresponding year. This eliminates the problem of survivorship bias in the sample. The data for the weekly stock returns are extracted from Datastream, while the data related to economic fundamentals like size, book to market equity and leverage are extracted from FactSet. Stock returns are in US dollar terms and are based upon log relatives of weekly stock prices. The Dow Jones Global Index is used as the market benchmark, and the US risk-free rate is used as a proxy for global risk free rate[17]. We use previous year-end fundamentals to form portfolios for each successive year; the rationale behind this is that investors use information contained in the balance sheets and financial statements to predict future returns. Investors are assumed to follow a buy and hold policy with annual portfolio rebalancing.

a. Construction of risk factors

We sort all stocks in the sample by size, book to market and leverage and categorize them in 3 groups (top 30%, middle 40%, and bottom 30%). Using the independent sorting procedure we construct value weighted portfolios formed by the intersection of three portfolios based on size, three portfolios based on book to market equity and three portfolios based on leverage (Debt/Assets). In all, we have 3*3*3=27 portfolios. The returns on these annually rebalanced portfolios create the dependent variable. In addition to the XMKT (market risk premium), the FF factors are: SMB (size mimicking portfolio constructed each week by taking the simple average of the returns on small sized portfolios minus returns on big sized portfolios), HML (book to market mimicking portfolios constructed each week by taking the simple average of the returns on high book to market portfolios minus the returns on low book to market portfolios) and LEV (leverage mimicking portfolios constructed each week by taking simple average of the returns on high leveraged portfolios minus the returns on low leverage portfolios).

Table 1 reports the number of stocks used for the construction of factors and portfolios each year which varies depending on the availability of data and meeting specific requirements (for e.g. positive book to market equity). The correlation matrices for the sample across the three periods are reported in Tables 2A-2C. For the aggregate period, there is a positive correlation of .45 between HML and LEV, which is expected since both these factors closely represent the distress risk of the firm. In Table 2B, for the non-crisis period, the correlation coefficients are as follows: 0.407 (LEV, HML), -.1451 (LEV, XMKT), and .205 (LEV, SMB). In Table 2C, for the crisis period, there are some interesting changes. For example, the correlation between LEV and HML increases further, and the correlation between LEV and XMKT actually turns positive. Finally, the correlation between LEV and SMB actually turns negative. Table 3 reports summary statistics for the risk factors, XMKT, SMB, HML and LEV.

b. Macroeconomic variables and factor loadings

In this section we demonstrate that the FF and leverage risk factors have macroeconomic implications. Several studies have shown that macroeconomic variables predict expected returns on stocks and bonds. See for example, Abel (1999), Fama (1981), Elton, et. al. (2001), Vassolou (2003) and Petkova (2006) and references therein. These studies show a significant positive relationship between the excess market returns and indicators of economic growth. We

[16] This is consistent with the portfolio formation procedure as suggested in Fama and French (1993). However, for the purpose of firm specific analysis, we consider all stocks.

[17] To avoid complications, we restrict the 3-month T-bill return to zero for the months of December 2008 and January, 2009 when intraday return on T-bills was often negative.

extend this analysis and test for the relationship between selected macroeconomic variables and returns on SMB, HML, and LEV factors.

We choose the following variables to represent the world economic environment for these globally traded stocks: growth rate in industrial production (world), unemployment rate (world), inflation (U.S.), credit spread (U.S.) and term spread (U.S.) during our sample period. Credit spread is defined as the difference in the weekly yield on Moody's AAA corporate bonds and 1 year maturity government Treasury notes. Term spread is calculated as the difference between the weekly yield on 1 year treasury notes and 3 month treasury bills. The source of the data is the FRED database at the St. Louis Federal Reserve. Monthly data for industrial production for the world and unemployment rates have been obtained from the database of IHS Global Insights (http://www.ihsglobalinsight.com/EconomicFinancialData). Monthly inflation rates for the U.S. are obtained from the website *www.Inflationdata.com*.

Table 4 represents the results for multivariate regressions of each of the macroeconomic variables on lagged excess market returns and returns on SMB, HML and LEV. We use three lags to extract the maximum information content of these factors. The regressions are estimated at following periodicity: monthly for inflation, industrial production growth rate, unemployment rate and weekly for credit spread and term spread. The regression model is:

$$(2) \qquad Y_{kt} = \beta_0 + \beta_1 (r_m - r_{ft})_{t-i} + \beta_2 R_{t-i,SMB} + \beta_3 R_{t-i,HML} + \beta_4 R_{t-i,LEV} + \varepsilon_t$$

where, Y_{kt} represents each of the following macroeconomic variables: monthly percentage change in industrial production growth rate, inflation and unemployment rate, weekly credit spread and term spread, and *i* represents the number of lagged terms 1 to 3 to reduce serial correlation. All macroeconomic variables have been tested for unit root and those with unit root have been differenced once to induce stationarity.

Panel A represents the coefficients and t-statistics for each of the above macroeconomic variables regressed against one lag of the independent variables. The results indicate that the leverage risk factor affects the unemployment rate and inflation (at 5% level of significance) while remains insignificant for term spread, industrial production and credit spread. In Panel B, unemployment exhibits significant sensitivity to LEV lagged one period and inflation shows significant sensitivity to LEV lagged two periods. Panel C also shows significant factor loadings on LEV for all the macroeconomic variables at different lag lengths. With respect to the other factors, SMB shows significant factor loadings for industrial production and term spread (at the first and second lags) while the impact of excess market returns on these macroeconomic variables seems to be weak. Note that HML seems to have limited ability to predict these economic variables at the first and the second lags but tends to exhibit a significant impact on these variables at the third lag (significant for unemployment and inflation). Overall, the results emphasize that the "leverage risk factor" is a systematic risk factor, though its effects on macroeconomic variables are not uniform.

These results have powerful implications for the US economy bouncing back from a severe financial crisis. First, researchers argue that "deeper the decline in GDP, peak to trough, the more rapid the post recession rebound." A recent report[18] suggests that this is the case only if there is a significant increase in the private sector liabilities. According to the report, a 0.3% drop in employment rate requires the real GDP growth higher than 3%, which in turn requires a 5% rise in the private sector liabilities, and subsequently, has a significant impact on the level of industrial production. In fact, we have witnessed slow moving recoveries following the 1980, 1991 and 2001 recessions, with the slowness being attributed to low levels of private liabilities during these periods. This supports the positive relationship between the leverage risk factor and

[18] Source: http://www.lombardodier.com/annexes/23056/23074/Investment_Strategy_Bulletin_06.10.09.pdf, "*Is de-leveraging an obstacle to recovery?*"

industrial production and a consistently negative relationship between unemployment rate and the leverage risk factor which has been documented in the earlier section.

Next, the credit spread is a representative of firm's default risk. A high credit spread indicates stringent credit markets and higher risk levels. However, the last quarter century witnessed some of the major developments in finance, for e.g. "securitisation" and introduction of "structured products" which generate cash flows from underlying pool of assets like mortgages or credit card receivables (commonly known as collateralized debt obligations). Investors relied on the major credit rating agencies like Moody's and Standard & Poor's for the acceptance of these products. The collapse of the subprime lending sector and the resulting credit crisis in 2007 and 2008 exposed a colossal failure of the credit rating agencies; which also paved the way for a near-complete closure of markets for these products. In a nutshell, the credit spreads did not reflect the true economic risk underlying the corporate debt, hence it is difficult to establish a true empirical relationship between the leverage risk factor and the credit spread variables.

Notwithstanding the previous discussion, we find a positive relationship between LEV and the credit spread (see Table 4, Panel C). This is consistent with the evidence that the firms hit hard by the credit crisis were those that relied heavily on debt to finance growth like Home Depot, Toyota Motor and FedEx.[19] Stock prices of these firms, including investment banks like Citigroup and UBS AG, plummeted during the recent market meltdown. Bear Stearns and American Home Mortgage are notable examples of firms which were coerced to sell their holdings at far below their book values. In general, there was a continuous re-pricing of risk in the stock market and stock prices plummeted. In contrast, the US treasury yields were falling due to flight to safety, while the rates on mortgage debts failed to decline at the same pace. This resulted in higher credit spreads because mortgage debts were most risky and demanded a premium over Treasury bonds. Thus, the positive relationship between leverage risk factor and the credit spread as seen in Table 4 is plausible since both the variables are representative of the increased exposure of the firm to distress risk caused by over leveraging.

Finally, when inflation is uncertain, investors demand inflation risk premium. Inflation induces volatility in the returns on debt and hence there is a leverage risk premium. Whether the relationship between inflation and leverage risk premium is positive or negative depends on the interaction between inflation, taxes (corporate tax and personal tax), expected return on assets, and the amount of debt used in the project. According to Armitrage (2005), as inflation increases, the real tax adjusted weighted average cost of capital decreases because higher inflation alleviates the corporate taxes on the firms' real profits and increases the tax advantage on debt. However in the presence of personal taxes, higher inflation causes an increase in the tax rates on real returns to debt. This increases the leverage risk of the firms which are heavily dependent on debt and thus demand a premium over firms which rely less on external debt. For our sample, we find mixed evidence (positive and negative) of the relationship between inflation and the risk factors (See Table 4).

c. Explaining cross-section of returns

In this section, we present our regression results by including leverage factor as a systematic risk factor. First, we test for the significance of the FF risk factors. Next we add LEV to the regression model to compare results across three periods: January 2000 –April 2009 (aggregate), January 2000 – June 2007 (non-crisis), and July 2007 – April 2009 (crisis)[20]. To

[19] http://www.wikinvest.com/concept/2007_Credit_Crunch

[20] We split the periods to specifically test the impact of LEV factor during the non-crisis and the crisis period. Given the fact the overleveraging leads to increased risk exposure in the economy, we believe that this part of the systematic risk was not captured fully by the traditional FF factors. This leads us to conjecture that LEV factor has

check on the robustness of these results, we will further classify firms into two groups: financial and non-financial. Financial firms include all financial institution as well as real estate and mortgage firms. The popular adage is that leverage is a two-way sword. It magnifies returns in an up market and magnifies losses in a down market. Finally, we test our main hypothesis that Islamic stocks would be less sensitive to the leverage risk factor than conventional and socially responsible stocks. Our primary rationale is that low leverage of Islamic stocks would lessen the interest rate exposure of these firms.

We use the following firm-specific GARCH model:

(3) $$r_t - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

(5) $$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where r_t - r_{ft} in the mean equation is the weekly excess return on asset i, r_{ft} is the weekly risk free rate (US T-bill), r_{mt} - r_{ft} is the market risk premium (XMKT), and SMB, HML and LEV are Fama-French factors and the leverage risk factor, defined earlier. The variance equation (5) models the conditional variance as a GARCH(p,q) process where p and q denote the lag length. Ω is the intercept term, α is the ARCH term and δ is the GARCH term. α and δ terms are expected to be positive and significant determinants of the conditional variance of changes in the excess return. The primary reason for using the GARCH model is that preliminary diagnostics suggest that the weekly excess returns have time varying variance with volatility clustering and fat tails. The GARCH models are estimated using the Bollerslev-Wooldridge (1992) corrections to deal with excess kurtosis. As noted earlier, standard t-statistics based inferences in the presence of excess kurtosis in the residuals are asymptotically invalid because standard errors are biased downward, leading to false acceptances.

d.1 Factor loadings at the firm level

We test the above model at both the firm and portfolio level for all 3,707 financial and non-financial firms. Each week from January 2000 to April 2009 we run cross sectional regressions of weekly excess stock returns on XMKT, SMB, and HML factors. Next, we add LEV to test for its significance in addition to the market factor and the Fama-French factors. For robustness check, we test for the partial F-statistics of LEV to see whether this additional factor contributes significantly in explaining the cross section of expected returns (in addition to the market factor and the traditional FF factors).

Tables 5 exhibit the summary of the impact of XMKT, SMB, HML and LEV factors on the returns of firm and portfolios. Model 1 is the traditional FF case and Model 2 includes the LEV factor in addition to the FF factors. As shown, we have 3707 stocks in the sample. Note that in Table 5 and subsequent tables, we only include regression results that are significant at least at the 5% level. In Panel A, the results show that for the aggregate period (2000-2009), in 3,304 instances XMKT is positive. A positive sign for the XMKT is consistent with the single factor CAPM model. The distribution of the SMB is about half positive and half negative. The HML is positive in 1,539 and negative in 216 cases. When LEV is added to the model (Model 2), we find that, there is a .24% increase in the number of cases ((3312/3304)-1) where XMKT is significant. With the addition of LEV, there is a 2.54% increase in the number of cases where

more direct implications for the performance of the stocks during the recent credit crisis and hence we expect the LEV factor to exhibit stronger effects during this period.

SMB is significant. Surprisingly, the number of cases HML is positive and significant drops by 16.58%. Finally, in 2,208 instances, LEV is positive, though in 125 instances it is negative.

The results (Panel B) for the non-crisis period (2000-June 2007) are similar. The number of cases where the factors is significant changed as follows: .39% (XMKT), 1.83% (SMB), and -2.05% (HML). With regard to positive and negative impact of the factors on stock returns, there are some changes compared to the aggregate period (Model 2). For example, SMB, the number of negative cases is now 680, representing a 40% decline from the previous model. In contrast, HML, now has 539 instances for which the coefficients are negative, indicating a 17.43% increase from the previous value. Finally, we have 862 instances of positive and 149 cases of negative coefficients for LEV. It appears that, compared to Model 2 (aggregate period), there is a large number of instances the regression coefficients are insignificant. Altogether, the number of significant cases drops by 56%, suggesting that the LEV factor is able to capture systemic risk in the economy across good and bad times quite well.

However, the contribution of LEV in capturing leverage risk is evident when we estimate firm-specific regressions for the crisis period (Panel C). During July 2007-April 2009, compared to the non-crisis period, there is a 201.07% increase in the number of the cases where LEV is significant. This increase is indicative of several stylized facts during the escalating financial crisis afflicting the global economy. It appears that the credit crisis had a contagion-like effect, impacting firms across all spectrums of leverage. In essence, firms were hard hit especially when access to the debt market was severely limited because of reluctance among financial institutions to lend. The results suggest that for 3,038 firms, the sensitivity to LEV is positive and significant. Only in 66 cases the variable has negative coefficients. Compared to the non-crisis period, the addition of LEV during the credit crisis leads to a change in the number of significant cases for the remaining factors: XMKT (-84.91%), SMB (-14.97%), and HML (-27.54%). In particular, the number of negative coefficients for HML is higher than the positive ones, indicating that during the recent credit crisis, a value based investment strategy would have earned investors negative risk premium. Again, it supports the notion that the HML may not have been a good proxy for the distress risk during this period.

d.2 Factor loadings at the portfolio level

Table 5 also the highlights portfolio-specific regressions (Panels D-F) for the three periods. Based on the intersection of these three factors, we have 27 portfolios with annual rebalancing. The results reconfirm our earlier finding that the addition of LEV weakens the significance of the traditional FF factors. For the aggregate period (Panel D), we find that LEV is significant and positive for 19 out of 27 portfolios. The number drops to 17 when we estimate the model for the non-crisis period (Panel E). In contrast, we find that in all cases, LEV is positive and significant during the crisis period (Panel F). We also note that, in comparison to the aggregate period, there is a 100% reduction in the number of cases XMKT is significant during the crisis period. For the remaining variables, percentage change in significance is as follows: SMB (-41.67%) and for HML (-43.48%), indicating an across the board weakening of the FF factors during the financial distress. In contrast, there is a 35% increase in the number of instances where LEV is positive and significant.

Overall, the FF factors seem to lose their significance when LEV as a systemic risk is included in the model. In particular, during a financial crisis period, sensitivity to LEV at the firm and portfolio level suggests that the traditional FF factors may not be adequately capturing the effects of economy-wide distress arising from excess leverage. Therefore, sensitivity to this systemic risk translates into additional risk premium that is not adequately captured by the FF risk factors.

Portfolio-specific regression results across aggregate, non-crisis and crisis periods are provided next in Tables 6-8 to highlight the magnitude of the coefficients and to check for robustness of adding LEV. In Table 6, there are several stylized facts for the aggregate period. First, there is a noticeable increase in the adjusted R^2 when LEV is added as an explanatory variable. Second, as reported earlier, with the addition of LEV in Model 2, the traditional FF factors tend to lose their statistical significance. Finally, we find that in many instances, the coefficient of HML actually turns negative.

In Table 7, we report the results for the non-crisis period and the results indicate that while the variable LEV is an important explanatory power, its addition makes only marginal impact on Model 2. There is an increase in the adjusted R^2 but by a small margin. In contrast, during the crisis period (Table 8), the addition of the LEV makes a substantial contribution to the overall forecast ability of Model 2. The adjusted R^2 increases by a considerable margin. In addition, the size of the coefficients across the 27 portfolios is large, ranging from 1.56% (portfolio #7) to 4% (portfolio #18). The magnitude of the coefficients indicates the heightened sensitivity of firms to the economic distress during the period. As indicated earlier, the results indicate that our leverage risk factor performs quite well in representing systemic risk in the global economy. Also note that the number of negative significant coefficients for HML increases considerably (from 5 to 12)[21] which suggests that the value based investment strategy may not with falling equity prices. In contrast, LEV has a positive relationship with stock returns for all 27 portfolios, suggesting that investors demand a premium for investing in high leverage portfolios during the credit crisis.

d.3 The negative effects of leverage risk factor on stock returns

In a number of cases (see Tables 5-8), leverage risk has a negative effect on stock returns, which is consistent with several existing studies. For example, Penman et al (2007) decompose the book to price ratio of a firm into two components. The first component is the enterprise book to price (which represents the operating risk of the firm), measured as the ratio of book value of operating assets to their market value. The second component is the financial leverage component (which represents the financing risk of the firm), measured as the ratio of market value of debt to market value of equity. The authors find that enterprise book to price ratio has a significant positive relationship with the expected stock returns while the "leverage" component of book to price ratio has negative relationship with the expected stock returns. Johnson (2004) documents a negative relationship between leverage and cross section of expected returns after controlling for firm specific characteristics like volatility. See Arditti (1967), Dimitrov and Jain (2006) for similar results. In particular, Dimitrov and Jain (2006) note that during economic distress, raising equity is costlier than debt (e.g., bank financing or line of credit), so firms would prefer to increase leverage. So, falling equity returns during economic distress and rising leverage support the empirical finding that leverage and return on equity may be negatively correlated.

Managerial preference for debt over equity financing is also related to the value of the firm and its future prospects. Lang et. al (1995) find a negative relationship between financial leverage and future growth of a firm. The authors emphasize that the negative relationship between leverage and growth is more visible for firms with a low Tobin's q since these firms are characterised by negligible growth opportunities not recognised by the capital markets. The study further rationalises that managers of firms with considerably lucrative growth opportunities generally do not opt for a high leverage[22] because high interest payments on debt tend to erode

[21] See Table 5.
[22] According to the study, managers choose leverage on the basis of the private information about the future growth prospects and hence, the financial health of the firm.

the profitability of the firm which prevents the firm from utilizing the benefits of these growth opportunities. Hence, a negative relationship between leverage and growth seems rational, which implies a negative relationship between leverage and stock returns.[23]

The negative effect of leverage on return on equity is also consistent from a corporate governance perspective. Jensen and Meckling (1976) suggest that increased debt levels have direct implications on the cash flow of the company by enforcing regular interest payments on debt which controls managerial expropriation. Fama and Jensen (1983) explain that increased debt levels adds to the default risk of the firm and affects the manager's reputations adversely in case the firm defaults on its interest payments or debt. This imposes a constraint on manager expropriation and leads to better corporate disclosures. In addition, Jensen (1986) suggests that leverage increasing transactions such as LBOs, new debt issues (bonds), and stock repurchase reduce the manager's access to free cash, thus reducing their waste. He further suggests that debt reduces the agency cost. This implies that as leveraging increases, external monitoring increases, and managerial efficiency is expected to rise. Furthermore, this may be imply that as firms become efficient, shareholders demand less risk premium for leverage, and as a result, stock prices fall with higher leverage.

Consistent with the above discussion, there are also more instances of significant negative coefficients for LEV during the non-crisis period (which was a period with profitable investment opportunities in the market). For example as reported in Table 5, there are 149 cases of negative coefficients on LEV (Model 2, Panel B) during the non-crisis period, but the number reduces to 66 during the crisis period (Panel C). At the portfolio level (Panel F), compared to the non-crisis period (Panel E), the number of negative coefficients for LEV reduces from 3 to 0.

d.4 Leverage and investment strategy

These results have investment implications that suggest investing in highly leveraged firms. However, an investor needs to decide between excessively high leverage level and the negative effects of leverage on financial distress (Luoma and Spiller (2002)). See Bris and Koskinen (2002) for further evidences. A recent report[24] elaborates that the regular interest payments on debt for those companies which fund their investments through debt tend to erode the cash flow levels of the company by adding to the operating expenses of the firm. The flip side of the argument is that a firm with highly profitable growth opportunities and with a strong cash flow position would still earn a higher return on equity since they yield high profit margins. The report claims that a period of economic recovery is characterized by a strong economic momentum which bolsters earnings potentials of levered firms. The rationale behind this is that debt is cheaper for firms with promising growth prospects, and such they perform at the peak levels when debt is easily available[25]. The economic recovery in 2003 provides strong evidence to this fact when the federal funds rate was approximately 1.25%, which in turn stimulated

[23] Furthermore, a firm with low leverage (having low Tobin's q and insignificant growth opportunities) are harder hit during distress periods as compared to firms with higher leverage ratios (with major growth prospects and positive NPV projects). This also explains a negative relationship between credit spread and firm's leverage.

[24] Source: "How leverage can increase a company's return on equity", Putnam Spectral Funds, extracted from: http://www.putnam.com/spectrum/return-on-equity.htm

[25] However the risk substantially increases with the excessive use of debt since the firm is under a pressure to service its debt on a regular basis. In addition, during economic distress, the assumption that debt is available at a lower cost may not hold true. The recent credit crisis of 2007 presents plentiful evidence where debt became costly. In fact, a firm which undertakes risky projects may not enjoy the low cost of debt because the riskiness of its operations may require the debt holders to be paid a higher interest.

economic growth to jump from 1% to 7%. During this period, levered companies, high yield bonds and bank loans yielded attractive returns[26].

These results do not suggest that as efficiency increases, stock price decreases. Rather, as firms become more efficient, debt becomes cheaper and such companies can afford to have high debt levels in their capital structure (thereby decreasing the overall cost of capital) without increasing their credit risk. Due to lower risk levels, investors do not need additional compensation for excessive leverage as in the case of firms which are not efficient. Also, in efficient markets, due to strong corporate governance principles and better disclosures, the probability of insider information is reduced and information of the company is quickly reflected in the stock prices. Hence there is no scope for mispricing or arbitrage opportunities; so returns fall.

d.5 Leverage risk of financial and real estate firms

We perform additional robustness tests by separating the financial stocks in the sample from the non-financial stocks[27]. Such an examination is critical because it removes industry-specific effects of the credit crisis since the effects may not have been uniformly distributed among financial and non-financial firms. Financial firms included in the sample include banks, S&Ls, credit unions, mortgage financing companies, real estate firms, and insurance companies. Clearly, these firms bore the brunt of the credit crisis due to over speculation, deregulation, and over leveraging. We re-construct FF and LEV factors and estimate firm[28] and portfolio-specific regressions using two separate samples of firms: the first sample with 645 financial stocks and the second sample with 2,975 non-financial stocks.

A summary of the regression results are reported in Panels A-F, Table 9. In Panels A-C, there is evidence that the leverage risk factor performs well across the three periods, especially during the crisis period. The results support the hypothesis that the addition of LEV weakens the significance of the traditional FF factors. For the aggregate period (Panel A), LEV is significant and positive for 17 out of 27 portfolios. During the non-crisis period (Panel B), the significance of LEV drops, we now have 14 positive and 4 negative instances. During the crisis period (Panel C), in 23 out of 27 cases, LEV is positive and significant. Note that, in comparison to the non-crisis period, there is a -85.19% change in the number of cases XMKT is significant during the crisis period. For the remaining risk factors, the change in significance is as follows: SMB (-5.26%) and HML (-59%), suggesting a weakening of the FF factors during the financial distress. In contrast, there is an increase of 27.78% in the number of instances where LEV is positive and significant during the crisis period.

In Panels D-F, we report a summary of statistically significant results for the non-financial firms in the sample. We confirm our previous findings that the addition of LEV weakens the significance of the traditional FF factors considerably. For the aggregate period (Panel D), LEV is positive in 16 out of 27 portfolios. During the non-crisis period (Panel E), in 14 instances LEV has positive and significant coefficients, and in 4 instances the coefficients are negative and significant. Similar to our earlier findings, in 27 out of 27 cases, LEV is positive and significant during the crisis period (Panel F). In comparison to the non-crisis period, there is a -100% change in the number of cases where XMKT is significant during the crisis period. For

[26] Source: "How leverage can increase a company's return on equity", Putnam Spectral Funds, extracted from: http://www.putnam.com/spectrum/return-on-equity.htm

[27] It is believed that financial firms exhibit different characteristics as compared to non-financial firms and hence show different sensitivities to the risk factors. For instance, high leverage for a financial firm has different implication as compared to a non-financial firm with high debt levels. This further rationalizes the idea of conducting a robustness check by separating out financial firms from the sample.

[28] Firm-specific regressions are not reported to conserve space. They are available on request.

the SMB, the number of significant cases changes by -39.13% and for HML, the number of significant cases changes by -57%, confirming the fact that the power of the FF factors weakens during the financial distress. In contrast, there is a 50% increase in the number of instances where LEV is positive during the crisis period.

Details of these portfolio-specific regressions across aggregate, non-crisis and crisis periods are provided in Tables 10-15 to demonstrate the contribution of the LEV on a case by case basis. Tables 10-12 report the results for the financial stocks while Tables 13-15 report the results for the non-financial stocks. In these tables we also report the adjusted R^2 for Model 1 (without LEV) and Model 2 (with LEV) and the results confirm our earlier results. In Table 10, first, there is a noticeable increase in the adjusted R^2 when LEV is added as an explanatory variable, indicating increased forecasting power of Model 2 during the aggregate period. Second, as reported earlier, with the addition of LEV in Model 2, the statistical significance of the traditional FF factors tend to weaken. Finally, we find that in many instances the coefficient of HML actually turns negative. During the non-crisis period (Table 11), the addition of LEV to the model makes only marginal impact on the forecast power of the Model 2. The adjusted the R^2 changes by a small margin. In contrast, we find that during the crisis period (Table 12), the addition of the LEV makes a substantial contribution to the overall forecast ability of Model 2. The adjusted R^2 increases by a substantial margin. Furthermore, the size of the coefficient for LEV across portfolios is large, similar to the results reported earlier. The magnitude of the coefficient clearly indicates an increased sensitivity of firms to the economic distress. Similar results are obtained for non-financial stocks in Tables 13-15.

Overall, our analysis shows that financial and non-financial categories of stocks have similar exposure to the debt market, despite the fact that the concept of leverage and its use varies across these two categories of firms. It again reinforces the notion that the financial crisis had a contagion-like effect on all types of firms. It also establishes the fact that our leverage risk factor is able to capture economy-wide risk from over leveraging during the financial crisis period.

d.6 Test for robustness

Earlier, we reported that the correlation between LEV and HML as follows: .45 (aggregate period), .40 (non-crisis period), and .51 (crisis period). These correlations may be viewed as high, raising a criticism that LEV factor may be collinear with HML, and as such, rendering the effects of HML insignificant in majority of the cases. We argue that while HML and LEV are both balance sheet variables and are therefore should be correlated, they do not represent similar risk factor in the economy. That is to say that HML does not represent LEV and LEV does not represent HML. Both are capturing economy wide risk. However, while HML is supposed to be capturing distress risk (Fama and French 1993)), it does not adequately capture systemic risk of firms when their exposure to the debt market rises due to economy-wide problems with over leveraging. To this extent, LEV adds unique information to the model and does a good job in capturing systemic risk related to the over exposure of firms to the debt market.

While a correlation of .51 may not be indicative of multicollinearity, it is important to examine if these results are robust to such statistical artefact. In the present context, we do not find a glaring evidence of multicollinearity because it would have been reflected in high F-statistics with insignificant t-statistics for the estimated coefficients.

Despite the fact that multicollinearity is not an issue, we decided to estimate the partial F-statistics to check the robustness of these results to multicollinearity. The partial F-statistic determines the incremental explanatory power of adding additional variables to the basic model.

In the present context, a significant partial F statistic (critical value is 3.32 at the 1% significance level) provides justification for adding LEV to the model containing the traditional FF factors.

Table 16 reports the partial F-statistics (across all the three groups - all stock portfolios, financial stocks only portfolios, and non-financial stock only portfolios) for the aggregate, non-crisis, and crisis periods, respectively. For the combined stock portfolios, the partial F statistic is significant in 22 out of 27 portfolios during the aggregate period. During the non-crisis period, the number of cases of significant partial F statistics is reduced to 18. Similar results can be seen for financial and non-financial stock portfolios during the aggregate and the non-crisis period. However, the effect of LEV is predominantly high during the crisis period with significant partial F statistics in 27 cases for combined and non-financial stock portfolios, and in 26 cases for financial stocks only portfolios. This supports the evidence presented earlier suggesting that compared to HML, LEV incorporates additional and unique information concerning distress risk exposure of the firms. In particular, the effect of LEV is particularly dominant during the crisis period.

d.7 Factor loadings by types of firms

Previously, we noted that LEV is a good proxy for distress risk across financial and non-financial stocks. We find that stocks have similar sensitivities to the leverage risk factor. In this section, we further conduct an additional robustness check to examine whether there are differences in the way various categories of firms respond to the economy wide risk factors because they are classified by stock exchanges as meeting desired criteria for various style of investing. For instance, the Dow Jones classifies investing in certain stocks (popular household names) under broad categories such as socially responsible investing because these firms promote social, environmental, and corporate responsibility. To this extent, we consider conventional, Islamic and Socially Responsible Investing (SRI) stocks, where each group exhibits distinct characteristics[29]. There are distinct differences among these groups with respect to the fundamentals such as size, ROA, ROE, leverage, return on capital, PE ratio, and EPS. (See Milly and Sultan (2009) for further evidences.)

We use stocks included in the Dow Jones Islamic Index (DJIM) which is a proprietary index of stocks classified as Islamic stocks by the Dow Jones Sharia Board. Because of proprietary nature of such classifications, the names of the stocks are withheld though some of the common household names in the US may be classified as Islamic stocks because they meet the requirements set by the Dow Jones Sharia Board. On October 29, 2010, the market capitalization of the Dow Jones Islamic World Index was $20 billion with 2,369 stocks. The weights (%) for some of the major countries in the index are as follows: US (50.54), UK (6.71), Japan (5.42), Canada (5.27), Switzerland (3.45), Australia (3.26), France (2.97), India (2.5), Taiwan (2.2), Germany (1.73), South Korea (1.56), Brazil (1.5), Russia (1.47), China (1.39), Hong Kong (1.25), and Sweden (1.09). Among some of the traditionally Muslim majority countries, the weights are: Malaysia (.35), Kuwait (.22), Qatar (.08), UAE (.03), and Bahrain (.01).

Our selection of SC stocks is in line with the recent interest in the performance of faith based investing, with its overarching goal to promote the betterment of society, relative to conventional investment strategies, which lack such ethical ambition. SC stocks are popular among a new class of investors that, in addition to profit motives, is also driven by their desire to live ethically and invest morally. Compared to the conventional Western financial system, Islamic finance is a newcomer to the global financial world, encompassing somewhere between

[29] We thank Dow Jones for providing us with the proprietary list of stocks classified as conventional, Islamic and SRI stocks.

\$750 billion to \$1 trillion of investments in firms and projects that are classified as SC. Yet, over the past few years Islamic investments have become more competitive and consequently attractive not only to Muslim but also non-Muslim investors seeking alternative investments opportunities, which live up to high ethical as well as nominal performance standards. As a result, the number of Islamic mutual funds and exchange traded funds world-wide has increased considerably from merely 8 before 1992 to more than 300 in 2008, with an estimated market capitalization of \$300 billion and numerous traditional US financial institutions joining to partake in this development.

Similarly, the SRI class of stocks is a relative newcomer, which has gained popularity in recent years. In the early 2000s, we have seen a dramatic interest in socially responsible investing that poured billions of dollars into companies known for their efforts to offer ethical investments and projects that promoted environmental sustainability. In terms of the portfolio allocation and structure, Islamic and socially responsible investing (SRI) stocks exhibit strong similarities, whereas conventional stocks are not subject to any other qualitative or quantitative constraints. Although SRI funds were initially conceived in a religious context as well, socially responsible investing has expanded to take in consideration "the so-called 'triple bottom line', commonly known as the 'three P's rule: people, planet and profit'" (Forte & Miglietta, 2007, p. 3). Most recently, assets under SRI management were estimated to have increased "from \$639 billion in 1995 … to \$2.71 trillion in 2007", while "assets in all types of socially and environmentally screened funds [… in the US] rose to \$201.8 billion." (2007 Report on Socially Responsible Investing Trends in the United States, 2008, p. ii) The premise of the "three P's rule" is reflected in a definition of socially responsible investing, which can be found in the *2005 Report on SRI Trends in the United States* released by the Social Investment Forum:

> Socially responsible investing (SRI) is an investment process that considers the social and environmental consequences of investments, both positive and negative, within the context of rigorous financial analysis… It is a process of identifying and investing in companies that meet certain standards of Corporate Social Responsibility (CSR) (2004 Report on Socially Responsible Investing Trends in the United States. 10 Year Review, 2005, p. 2).

The congruence of Islamic and SRI stocks stems from the fact that both do not have profit maximization as their sole objective, but rather strive to achieve a paramount, ethical obligation and a social-utilitarian function. In the case of Islamic funds, the religious responsibilities and regulations outlined in the Sharia, take precedence over profit in order to further the establishment of a just and moral Islamic economic system and ultimately society.

In contrast, profit maximization is the dominant objective in traditional fund management. Conventional equity portfolio strategies include neither positive nor negative screens, whose purpose it is to align the portfolio with certain ethical, qualitative standards. As such, conventional funds are not subject to the qualitative screening procedures that are so imperative to Islamic and SRI funds. Additionally, Islamic funds differ from SRI and conventional ones, since their provisions incorporate quantitative screens that are directly based on ethical paradigms found in the Sharia. Furthermore, Islamic funds have to comply with certain income purification requirements, which are derived from the teachings of the Holy Quran and Sunnah.

The hypothesis tested is that high leverage increases exposure to the credit market and subsequently translates into shareholders demanding higher risk premium. Recall that Islamic stocks have low leverage, they are significantly more asset-backed than conventional firms, and are not involved in the business of speculation, production of weapons, alcohol, pork, and entertainment. More specifically, Islamic funds typically screen out companies with excessive reliance on debt, where the typical maximum level of total debt to market capitalization is set at 33 percent[30].

The first step towards applying our leverage risk factor to these index classifications is to recreate the FF and LEV specific to each category of stocks. This is followed by estimating GARCH regressions at the firm and portfolio level.

d.7.a Factor loadings of Conventional stocks

In Table 17, we report a summary of firm and portfolio specific regressions by groups. The first panel reports the results for the firms belonging to the conventional stock category. We find that at the firm level, the inclusion of LEV produced some interesting results. Compared to the aggregate period, the number of instances where the XMKT is significant drops by 79.57% at the firm and by 100% at the portfolio level. The change in significance for SMB is as follows: 8.89% at the firm and -17.39% at the portfolio level. The results for the HML are consistent across both the firm and the portfolio level. The number of instances where HML is significant at the firm level drops by 56.13% and by 44.44% at the portfolio level. Finally, the number of instances LEV is significant increases by 231% at the firm and by 58.82% at the portfolio level. Overall, these results are qualitatively similar to the ones reported earlier and confirm our earlier finding that the inclusion of LEV subsumes the effects of the traditional FF factors to a great extent.

d.7.b Factor loadings of Islamic stocks

Panel B reports the results for the Islamic group of stocks. Compared to the aggregate period, there is a remarkable change in the number of cases of where XMKT is significant (-87.6% at the firm and by -92.59% at the portfolio level). The change in significance for SMB is as follows: 9.89% at the firm and -44.44% at the portfolio level. The results for the HML are again consistent across both the firm and the portfolio level. The change in statistical significance for HML is as follows: -56.44% at the firm and by -60% at the portfolio level. Finally, the number of instances LEV is significant increases by 98.9% at the firm and by 73.33% at the portfolio level. Again, our results are quite consistent with the previous results reported without the index classifications. Islamic stocks behave similar to the conventional stocks when it comes to sensitivities to economic risk factors.

d.7.c Factor loadings of SRI stocks

In Panel C, we report the results for 238 stocks classified as SRI group of stocks. Compared to the previous groups, we have some unusual results. We find that, compared to the aggregate period, the number of instances where the XMKT is significant drops by 89% at the firm and by 100% at the portfolio level. For SMB, the changes in the number of significant cases are: -66% (firm-level) and -80.95% (portfolio-level). In contrast to our previous results, the number of instances where HML is significant at the firm level increases by 56.43% and by 35% at the portfolio level. Finally, the number of instances where LEV is significant drops by 11.11% the firm and by 56.25% at the portfolio level.

With respect to the effects of LEV risk factor, the results for the SRI group are quite different from the Conventional and Islamic stocks, suggesting that stocks in this category are

[30] Specifically, the debt ratio (short-term plus long-term debt as a percent of market capitalization) must not exceed 33%, interest income should not represent more than 5% of total revenue, the ratio of accounts receivables to total assets does not exceed 45%, and the ratio of cash and interest bearing securities to market capitalization does not exceed 33%. See Dow Jones website for more.

less sensitive to the economy-wide leverage risk factor. Certainly, leverage risk for this type of firms is not unusually different but perhaps the nature of the business these firms are involved may make it less susceptive to economy wide leverage risk. It may also be possible that during the financial crisis, while socially responsible investing would have earned positive risk premium with respect the HML, SRI investors would have earned a negative risk premium when leverage was employed as a stock picking strategy. Whether SRI investing produces a lower return because these stocks are generally less sensitive to the economy wide risk factors suggests that these stocks may offer significant diversification benefits. Overall, further research along these lines would offer more clues as to why SRI stocks have negative risk premium for leverage risk.

d.8 Partial F-test

Table 18 reports partial F-statistics (across all the three groups - all stock portfolios), for the aggregate, non-crisis, and crisis periods in order to test for the significance of the contribution made by LEV. For the combined stock portfolios, the partial F statistic is significant in 24 out of 27 portfolios during the aggregate period. During the non-crisis period, the number of significant partial F statistics is reduced to 17 cases. However, the effect of LEV is prominent during the crisis period with significant partial F statistics in all 27 portfolios. For the Islamic stocks, the results are quite strong. The number of cases F-statistics is significant is 17 (aggregate period), 15 (non-crisis period), and 27 (crisis period). Finally, we find that the SRI stocks only portfolios are not sensitive to the leverage risk during the credit crisis.

Overall, the regression results suggest that while the sensitivities of the portfolio returns to the FF factors are significant during the aggregate and the non-crisis periods, there are important changes in the sign and significance of these factors during the crisis period. Their significance also weakens with the introduction of leverage as a risk factor, almost to the tune of being subsumed by the leverage risk factor. The effects of the market factor are persistent before the crisis period but surprisingly became insignificant during the crisis period. Leverage factor is consistently significant across all the periods and its effect is more prominent during the crisis period due to the greater debt exposure of the firms and higher macroeconomic risk. The results further support the conclusions drawn in the earlier tables.

d.9 ***Leverage Risk Factor for US Stocks***

A potential shortcoming of the preceding results is due to the fact that our previous samples include stocks traded globally and may not accurately quantify the effects of the credit crisis on the US market. We therefore conduct another experiment using US stocks only. This additional exercise is carried out by excluding all non-US stocks, creating traditional Fama-French factors, and adding our newly created LEV factor to represent financial distress. In addition, we also estimate GARCH regressions to demonstrate that our risk factors represent macroeconomic shocks as well. While the results are not presented to save space, we can summarize the results as follows. We find that for predicting US industrial production, the following variables are statistically significant: SMB, HML, XMKT, HML (t-2), and LEV (t-2). For predicting US unemployment rate, variables such as SMB, HML, LEV and several interaction variables on LEV (for 2008 credit crisis period) are significant at various lag length. We find that several interaction variables using LEV are significant in predicting the credit spread and term spread. Finally, dummy variables on LEV are highly significant in affecting changes in the US inflation rate. Overall, it is safe to conclude that the risk factors contain adequate information on the US economy.

Next, GARCH regressions are estimated. For the aggregate period (Jan2000 – April 2009), out of 27 portfolios, SMB has 18 (6) positive (negative) coefficients. HML has 16 (8) positive (negative) coefficients. In contrast, for Model 2 (where we add LEV), the results are as follows: SMB has 18 positive and 4 negative coefficients, HML has 17 positive and 9 negative coefficients, and LEV has 6 positive and 17 negative coefficients. For the non-crisis period (January 2000 – June 2007), SMB has 18 (7) positive (negative) coefficients. HML has 13 (10) positive (negative) coefficients. In contrast, for Model 2, SMB has 18 positive and 7 negative coefficients, HML has 14 positive and 9 negative coefficients, and LEV has 6 positive and 18 negative coefficients. In all cases, there is a significant increase in R^2 when we add LEV in the model.

For the crisis period (July 2007- April 2009), SMB has 20 positive coefficients. HML has 17 (8) positive (negative) coefficients. For Model 2, SMB has 19 positive and 1 negative coefficients, HML has 17 positive and 8 negative coefficients, and LEV has 9 positive and 5 negative coefficients. As noted earlier, there is a marked improvement in the regression R^2 when LEV is added.

Finally, we estimated the partial F-statistics to measure the marginal significance of LEV in the model. Similar to the results for global stocks, we find that LEV contributes to improving the overall significance of the model. In all three periods (aggregate, non-crisis and turbulent), the partial F-statistics is significant in majority of the cases.

Conclusions

Fama and French (1993) note that the traditional FF factors SMB and HML are good proxies for the underlying distress risk of the firms. As of today, a comparison of how well SMB and HML explain stock returns across good times and bad is missing from the literature. In particular, an investigation into whether the economy wide leverage factor replicates the underlying economic fundamentals and contributes to systematic risk especially during bad times is still abstruse; and we attempt to unravel this puzzle in the present study. Our hypothesis is that, compared to conventional stocks with high leverage, we would expect SC stocks to have lower sensitivity to risk factors, as well as lower risk premium. This finding would significantly reaffirm the notion that excessive leverage and engaging in economic activities that are not consistent with the principles of Islamic transactions can destroy economic and social values, especially during falling market environment.

Using weekly data on stock returns for 3704 firms, we test for the significance of the factors constructed on the basis of size, book to market equity, and leverage. We find that the significance of the market factor is drastically reduced during the recent crisis while the explanatory power of the Fama-French factors, SMB and HML is reduced considerably. In contrast, leverage risk factor performs considerably well across all there periods, especially well during the financial crisis, in capturing systemic risk in the economy. Its addition to the model is directly correlated with the reduction of the economic and statistical significance of the traditional Fama-French factors.

The main result of this paper is that the effects of leverage risk are robust to heterogeneity of the firms in the sample. To show that, we perform cross-sectional regressions across three distinct categories of stocks i.e. Conventional, Islamic, and SRI stocks. First, as indicated in the earlier section, excess market returns play a leading role in explaining the cross section of expected returns prior to the crisis period, but the effects of the market factor consistently phased out across all the three categories of stocks during the crisis period. The effects of the leverage factor are consistently significant (except in the case of the socially responsible investing stocks) throughout; however leverage factor gains momentum during the crisis period and has a significant effect on the cross-section of expected returns on stocks and portfolios. The sensitivities of stock returns to the Fama-French factors are lower after the introduction of the leverage factor.

In a nutshell, the contribution of leverage risk to asset pricing has been quite strong. The results indicate that leverage based risk factor can explain a substantial portion of the cross-section of stock returns across financial and non-financial stocks, as well as, various categories of stocks including conventional, Islamic, and SRI stocks. These results have powerful implications for asset management using various types of stocks and also during periods of great uncertainties.

References:

Abel, A.B., 1988, Stock prices under time-varying dividend risk: An exact solution in an infinite-horizon general equilibrium model. *Journal of Monetary Economics* 22, 375–393.

Abel, A.B., 1999, Risk premia and term premia in general equilibrium. *Journal of Monetary Economics* 43, 3–33.

Arditti, F. D., 1967, Risk and the required return on equity. *Journal of Finance*, 22, 19-36.

Armitrage, Seth. 2005, The cost of capital: Intermediate theory. *Cambridge University Press.*

Bhandari, Laxmi Chand, 1988, Debt/Equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance* 43, 507-528.

Black, F., 1972, Capital market equilibrium with restricted borrowing. *Journal of Business* 45, 444–455.

Black, F., 1990, Mean reversion and consumption smoothing. *Review of Financial Studies* 3, 107–114.

Bris, Arturo & Koskinen, Yrjo, 2002, Corporate leverage and currency crises. *Journal of Financial Economics*, 632, 275-310.

Chan, K.C., Chen, N., 1991, Structural and return characteristics of small and large firms. Journal of Finance 46, 1467–1484.

Chou, Pin-Huang, K.C. Ko, and S. Lin, 2010, Do relative leverage and relative distress really explain size and book-to-market anomalies? *Journal of Financial Markets* 13, 77-100.

Cochrane, J., 2001, Asset Pricing. University Press, New Jersey.

Connor, G., Korajczyk, R., 1989, An intertemporal equilibrium beta pricing model. *Review of Financial Studies* 2, 373–392.

Davis, J.L., Fama, E and K. French 2000, Characteristics, covariances, and average returns: 1929 to 1997. *Journal of Finance*, 55, 389-406.

Daniel, K. and S. Titman, 1997, Evidence on the characteristics of cross-sectional variation in stock returns. *Journal of Finance* 52, 1-33.

Dempsey, M. 2009, The Fama and French three-factor model and leverage: compatibility with Modigliani and Miller propositions. *Investment Management and Financial Innovations*, 6, 48-53.

Dimitrov, V. And Jain, P 2006, The value relevance of changes in financial leverage. Working Paper, http://ssrn.com/abstract=708281.

Dow Jones & Company. (2009, February 27). *Dow Jones Indexes.* Retrieved August 9, 2009, from Dow Jones & Company: http://www.djindexes.com/mdsidx/index.cfm?event=showIslamicStats#fund

Dow Jones & Company. (2009, February 28). *Dow Jones Sustainability Index World Components. SAM Indexes.* Retrieved September 8, 2009, from Dow Jones & Company: http://www.sustainability-index.com/djsi_protected/djsi_world/components/SAM_DJSIWorld_Components.pdf

Dow Jones & Company. (2009, March 2). Guide to the Dow Jones Islamic Market Indexes. *Dow Jones & Company* .

Dow Jones Sustainability World Index. SAM Indexes. (2009, February 1). *Dow Jones Sustainability World Index. SAM Indexes.* Retrieved September 8, 2009, from Dow Jones & Company:

http://www.sustainability-index.com/djsi_pdf/publications/Factsheets/SAM_IndexesMonthly_DJSIWorld.pdf

Elton, Edwin J., Martin J. Gruber, Deepak Agrawal, and Christopher Mann, 2001, Explaining the rate spread on corporate bonds. *Journal of Finance* 247–277.

Eom, Kyong Shik and Park, Jong-Ho, 2008, Evidence on the three-factor and characteristics models: Korea, SSRN: http://ssrn.com/abstract=1329664

Fama, Eugene, and G. William. Schwert, 1977, Asset returns and inflation. *Journal of Financial Economics* 5, 115–146.

Fama, E.F., 1981, Stock returns, real activity, inflation and money. American Economic Review 71, 545-565.

Fama, E. and K. French, 1992, The cross-section of expected stock returns. *Journal of Finance* 47, 427-465.

Fama, E and K. French, 1993, Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, 3-56.

Fama, E. and K. French, 1995, Size and book-to-market factors in earnings and returns. *Journal of Finance* 50, 131-155.

Fama, E. and K. French, 1996, Multifactor explanations of asset pricing anomalies. *Journal of Finance* 51, 55-84.

Fama, E. F. and K. French, *1998*, Value versus growth: The international evidence. *Journal of Finance, 53,1975– 1999.*

Fama, Eugene F and M. Jensen, Separation of ownership and control. *Michael C, Jensen Foundations of Organizational Strategy*, Harvard University Press, 1998, and *Journal of Law and Economics*, Vol, 26, June 1983,

Ferguson, M. and R. Shockley, 2003. Equilibrium anomalies. *The Journal of Finance*, Vol. 58, No. 6 pp. 2549-2580

Gomes, Joao F. and Lukas Schmid, 2009, Levered returns. Forthcoming *Journal of Finance.*

Ron Yiu Wah Ho, Strange R. and P. Jenifer, 2008, Corporate financial leverage and asset pricing in the Hong Kong market. *International Business Review*, Vol. 17, No. 1, pp 1-7.

Jensen, Michael, 1986, The agency costs of free cash flow: Corporate finance and takeovers. *American Economic Review*, 76, 323-329.

Jensen, Michael and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3, 305-360.

Johnson, T., 2004, Forecast dispersion and the cross section of expected returns. *Journal of Finance*, Vol. 59, 1957-1978.

Kandel, S., R.F. Stambaugh, 1990, Expectations and volatility of consumption and asset returns. Review of Financial Studies 3, 207–232.

Lakonishok, J., Shleifer, A., R. Vishny, 1994, Contrarian investment, extrapolation, and risk. *Journal of Finance* 49, 1541–1578.

Lally, M. 2004, The Fama and French model, leverage, and the Modigliani-Miller propositions. *Journal of Financial Research* 27, 341-349.

Lang L., Ofek E. and R. Stulz,1996, Leverage, Investment and firm growth. *Journal of Financial Economics*, 40, 3-29.

Liew, Jimmy, and Maria Vassalou, 2000, Can book-to-market, size and momentum be risk factors that predict economic growth. *Journal of Financial Economics* 57, 221-245.

Luoma, G. A. and E. A. Spiller Jr. 2002, Financial accounting return on investment and financial leverage. *Journal of Accounting Education* 202, 131-138.

Milly, M. and J. Sultan, 2009, Portfolio diversification during financial crisis: An analysis of Islamic asset allocation strategy. Bentley University Working Paper.

Modigliani, F. and M. Miller, 1958, The cost of capital, corporation finance and the theory of investment. *American Economic Review* 48, 261–297.

Sivaprasad S. and Y. G. Muradoglu, 2009, An Empirical test on leverage and stock returns. University of Westminster Working Paper.

Penman, S., S. Richardson, and Irem Tuna 2007, The book-to-price effect in stock returns: Accounting for Leverage. *Journal of Accounting Research*, 45, 427-467.

Petkova, Ralitsa 2006, Do the Fama-French factors proxy for innovations in predictive variables? Journal of Finance 61, 581 – 612

Report on Socially Responsible Investing Trends in the United States. 10 Year Review. Washington D.C.: Social Investment Forum. 2004

Report on Socially Responsible Investing Trends in the United States. Washington D.C.: Social Investment Forum. 2008.

Vassalou, Maria, 2003, News related to future GDP growth as a risk factor in equity returns. *Journal of Financial Economics* 68, 47–73

Vassalou, Maria and Yuhang Xing, 2004, Default risk in equity returns. *Journal of Finance*, April, 831-868.

Table 1A: Number of stocks

Year	No. Of stocks
2000	3745
2001	4344
2002	4378
2003	4379
2004	4396
2005	4403
2006	4399
2007	4399
2008	4406
2009	4391

Table 2A: Correlation matrix of the explanatory factors for – all stocks (Jan 2000 – April 2009)

	XMKT	SMB	LEV	HML
XMKT	1.000	-0.087	0.031	-0.057
SMB	-0.087	1.000	-0.030	0.086
LEV	0.031	-0.030	1.000	0.451
HML	-0.057	0.086	0.451	1.000

Table 2B: Correlation matrix of the explanatory factors – all stocks (Jan 2000 – June 2007)

	XMKT	SMB	LEV	HML
XMKT	1.000	-0.151	-0.145	-0.213
SMB	-0.151	1.000	0.205	0.283
LEV	-0.145	0.205	1.000	0.407
HML	-0.213	0.283	0.407	1.000

Table 2C: Correlation matrix of the explanatory factors – all stocks (July 2007 – April 2009)

	XMKT	SMB	LEV	HML
XMKT	1.000	-0.007	0.222	0.143
SMB	-0.007	1.000	-0.448	-0.301
LEV	0.222	-0.448	1.000	0.523
HML	0.143	-0.301	0.523	1.000

Table 3: Descriptive statistics of the returns on Market factor, SMB, HML, and LEV factors

	XMKT	SMB	LEV	HML
Mean	-0.002	0.002	0.000	0.001
Median	0.001	0.002	0.000	0.001
Maximum	0.115	0.054	0.045	0.053
Minimum	-0.221	-0.063	-0.035	-0.049
Std. Dev.	0.027	0.017	0.008	0.013
Skewness	-1.398	-0.272	-0.077	0.127
Kurtosis	13.623	4.883	6.630	6.155

XMKT is defined as r_m-r_f where r_f is the return on the risk free asset and r_m is the return on the market portfolio. SMB is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all “small” portfolios minus “big” portfolios. HML is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all “high BE/ME” portfolios minus “low BE/ME” portfolios. LEV is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all “high leverage” portfolios minus “low leverage portfolios”.

Table 4: Multivariate regressions of macroeconomic variables conditional on factor returns during the aggregate period

The following regression is estimated to demonstrate the link between Fama-French factors and economic variables:

$$Y_{kt} = \beta_0 + \beta_1 (r_m - r_{ft})_{t-i} + \beta_2 R_{t-i,SMB} + \beta_3 R_{t-i,HML} + \beta_4 R_{t-i,LEV} + \varepsilon_t$$

where Y_{kt} represents each of these macroeconomic variables (monthly Industrial production growth rates, monthly unemployment rate, monthly data for percentage change in inflation rates and weekly data for credit spread and term spread) for the combined period (January 2000 to April 2009). *i* represents the number of lagged terms 1 to 3. r_f is the return on the risk free asset and r_m is the return on the market portfolio. r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios".

Panel A

	Industrial		Unemployment rate		Credit Spread		Term Spread		%change in inflation rate	
	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats
XMKT $_{t-}$	-3.241	-0.307	0.007	0.044	-0.0001	-2.081**	0.0000	-1.660*	1.847	-0.172
SMB $_{t-1}$	-41.724	-2.249**	0.338	1.110	0.0001	1.326	-0.0001	-2.965**	1.532	1.365
HML $_{t-1}$	-29.364	-1.090	0.729	1.721*	0.0001	0.681	-0.0001	-1.393	-6.337	0.959
LEV $_{t-1}$	62.315	1.540	-1.667	-2.302**	-0.0003	-1.404	0.0001	1.348	5.998	-2.207**
R-square	0.105		0.114**		0.030**		0.028**		0.152**	

Panel B

	Industrial		Unemployment rate		Credit Spread		Term Spread		%change in inflation rate	
	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats
XMKT $_{t-}$	-2.582	-0.205	0.016	0.098	-0.0001	-1.619	0.0000	-1.501	2.308	1.707
SMB $_{t-1}$	-47.422	-3.096**	0.438	1.786*	0.0001	1.928**	-0.0001	-2.992**	1.172	0.792
HML $_{t-1}$	-20.096	-0.794	0.578	1.588	0.0001	0.507	-0.0001	-1.802*	-5.263	-1.897*
LEV $_{t-1}$	24.896	0.903	-0.910	-1.840*	-0.0002	-0.960	0.0001	1.362	3.367	0.814
XMKT $_{t-2}$	13.845	2.104**	-0.350	-2.413**	-0.0001	-3.493**	0.0000	-0.388	0.361	0.454
SMB $_{t-2}$	-23.054	-1.497	0.087	0.305	0.0001	0.835	0.0000	-0.519	0.187	0.123
HML $_{t-2}$	-21.410	-0.897	0.447	1.018	0.0000	-0.183	-0.0002	-2.547**	0.306	0.165
LEV $_{t-2}$	61.648	1.553	-1.043	-1.412	-0.0001	-0.687	0.0001	0.951	5.379	2.274**
R-square	0.224		0.219		0.054		0.042		0.186	

Panel C

	Industrial		Unemployment rate		Credit Spread		Term Spread		%change in inflation rate	
	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats	Coeff.	t-stats
XMKT $_{t-}$	-5.246	-0.410	0.090	0.535	-0.0001	-1.651*	0.0000	-1.402	2.403	1.678*
SMB $_{t-1}$	-48.352	-3.397	0.480	2.004**	0.0001	1.835*	-0.0001	-2.961	0.803	0.537
HML $_{t-1}$	-7.562	-0.297	0.230	0.579	0.0001	0.540	-0.0001	-1.733	-4.378	-1.353
LEV $_{t-1}$	44.872	1.699	-1.224	-2.597**	-0.0002	-1.038	0.0001	1.267	3.673	0.859
XMKT $_{t-2}$	18.343	2.842	-0.458	-3.220**	-0.0001	-4.013**	0.0000	-0.505	0.739	0.991
SMB $_{t-2}$	-25.884	-2.343	0.196	0.941	0.0000	0.603	0.0000	-0.585	0.067	0.049
HML $_{t-2}$	-6.985	-0.384	0.270	0.946	0.0000	-0.320	-0.0001	-2.321	0.110	0.053
LEV $_{t-2}$	1.522	0.045	-0.043	-0.084	-0.0001	-0.787	0.0001	0.812	6.470	2.284**
XMKT $_{t-3}$	16.418	2.282	-0.476	-3.596**	0.0000	-0.529	0.0000	0.473	0.308	0.338
SMB $_{t-3}$	-25.738	-1.619	0.087	0.316	0.0000	0.354	0.0000	0.225	0.393	0.214
HML $_{t-3}$	2.303	0.149	-0.631	-2.107**	-0.0001	-0.923	0.0000	0.738	5.296	2.655**
LEV $_{t-3}$		2.740**	-1.109	-2.042**	0.0003	1.953*	0.0000	0.153	-2.493	-0.861
R-square	0.430		0.412		0.066		0.044		0.215	

(* indicates significant at 10% level, ** indicates significance at 5% level)

Table 5: Summary of results showing the number of stocks and portfolios which showed significant sensitivities to XMKT, SMB, HML, and LEV factors.

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at least at the 5% level of significance.

All stocks: 3707						All Portfolios: 27					
Panel A: Aggregate Period						Panel D: Aggregate Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	3304	1208	1539		Model 1	Positive	27	13	18	
	Negative	0	1114	216			Negative	0	9	3	
	Total	3304	2322	1755			Total	27	22	21	
Model 2	Positive	3312	1234	1005	2208	Model 2	Positive	27	12	17	19
	Negative	0	1147	459	125		Negative	0	9	6	1
	Total	3312	2381	1464	2333		Total	27	21	23	20
%change in significance (by model)		0.24%	2.54%	-16.58%		%change in significance (by model)		0.00%	-4.55%	9.52%	
Panel B: Non-crisis Period						Panel E: Non-crisis Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	3570	1461	1244	0	Model 1	Positive	27	15	18	
	Negative	0	612	417			Negative	0	9	3	
	Total	3570	2073	1661			Total	27	24	21	
Model 2	Positive	3584	1431	1088	882	Model 2	Positive	27	15	18	17
	Negative	0	680	539	149		Negative	0	9	5	3
	Total	3584	2111	1627	1031		Total	27	24	23	20
%change in significance (by model)		0.39%	1.83%	-2.05%		%change in significance (by model)		0.00%	0.00%	9.52%	
Panel C: Crisis period						Panel F: Crisis period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	439	401	1330	0	Model 1	Positive	4	0	16	
	Negative	115	1564	96			Negative	0	17	0	
	Total	554	1965	1426			Total	4	17	16	
Model 2	Positive	157	854	439	3038	Model 2	Positive	0	7	1	27
	Negative	384	941	740	66		Negative	0	7	12	0
	Total	541	1795	1179	3104		Total	0	14	13	27
%change in significance (by model)		-2.35%	-8.65%	-17.32%		%change in significance (by model)		0.00%	-17.65%	-18.75%	
%change in significance (by period)		- 84.91%	- 14.97%	-27.54%	201.07%	**%change in significance (by period)**		- 100.00%	-41.67%	-43.48%	35.00%

Table 6: Factor loadings of all firms for the aggregate period (January 2000 to April 2009)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated **coefficients** are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Aggregate Period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	0.002*	0.794*	0.388*	-0.235*	-0.015	0.002*	0.794*	0.389*	-0.231*	-0.023	-0.021
2	0.002*	0.663*	0.344*	-0.047	0.000	0.002*	0.642*	0.301*	-0.193*	0.722*	0.103
3	0.001	0.742*	0.598*	0.053	-0.004	0.001	0.727*	0.560*	-0.254*	1.303*	0.169
4	0.002	0.557*	0.390*	0.261*	0.014	0.001	0.547*	0.364*	0.248*	0.145	0.042
5	0.000	0.661*	0.546*	0.431*	-0.001	0.000	0.665*	0.521*	0.353*	0.396*	0.064
6	0.000	0.723*	0.565*	0.565*	0.024	0.000	0.701*	0.510*	0.444*	0.457*	0.103
7	0.000	0.622*	0.640*	0.744*	0.055	-0.001	0.639*	0.671*	0.753*	-0.118	0.021
8	0.000	0.765*	0.731*	0.812*	0.022	0.000	0.767*	0.720*	0.740*	0.306*	0.059
9	0.000	0.840*	0.842*	0.923*	0.080	0.000	0.862*	0.890*	0.725*	0.741*	0.141
10	0.000	0.896*	0.053	-0.264*	-0.041	0.000	0.900*	0.044	-0.289*	0.141	-0.028
11	0.001	0.690*	0.062	-0.072	0.009	0.001	0.700*	0.023	-0.169*	0.453*	0.079
12	0.000	0.718*	0.009	0.016	-0.021	0.000	0.733*	-0.050	-0.155	0.807*	0.101
13	0.000	0.630*	0.083	0.372*	-0.014	0.000	0.628*	0.050	0.306*	0.337*	0.034
14	0.001	0.631*	0.052	0.340*	0.042	0.001	0.648*	-0.003	0.214*	0.548*	0.129
15	0.001	0.632*	0.138*	0.462*	0.032	0.001	0.634*	0.089	0.306*	0.659*	0.151
16	0.000	0.630*	0.226*	0.892*	0.108	0.000	0.628*	0.222*	0.874*	0.053	0.112
17	0.001	0.749*	0.250*	0.684*	0.051	0.001	0.752*	0.203*	0.590*	0.515*	0.132
18	0.001	0.810*	0.188*	0.872*	0.086	0.001	0.814*	0.130*	0.716*	0.939*	0.215
19	0.000	0.772*	-0.470*	-0.288*	0.198	0.000	0.775*	-0.467*	-0.274*	-0.100	0.189
20	0.000	0.656*	-0.396*	0.035	0.094	0.000	0.651*	-0.406*	-0.022*	0.409*	0.148
21	0.000	0.613*	-0.379*	0.082	0.122	0.000	0.622*	-0.358*	-0.075	0.650*	0.202
22	0.001	0.698*	-0.387*	0.255*	0.064	0.001	0.671*	-0.414*	0.180*	0.312	0.104
23	0.001	0.721*	-0.283*	0.352*	0.073	0.001	0.718*	-0.338*	0.261*	0.599*	0.158
24	0.001	0.671*	-0.253*	0.505*	0.103	0.001	0.667*	-0.262*	0.357*	0.543*	0.184
25	0.002*	0.804*	-0.839*	0.856*	0.297	0.002*	0.806*	-0.848*	0.937*	-0.430*	0.277
26	0.000	0.773*	-0.321*	0.901*	0.179	0.000	0.769*	-0.290*	0.670*	1.035*	0.255
27	0.002*	0.846*	-0.486*	0.880*	0.255	0.002*	0.857*	-0.562	0.688*	1.271*	0.401

Table 7: Factor loadings of all firms for non-crisis period (January 2000 to June 2007)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Non-crisis Period										
	Model 1					Model 2					
Portfolio	Intercept	XMKT	SMB	HML	Adj. R-square	Intercept	XMKT	SMB	HML	LEV	Adj. R-square
1	0.002*	0.856	0.449*	-0.259*	0.473	0.002*	0.851*	0.454*	-0.224*	-0.195	0.473
2	0.002*	0.778	0.457*	-0.139	0.320	0.002*	0.783*	0.447*	-0.204*	0.343	0.328
3	0.001	0.822	0.678*	0.005	0.378	0.001	0.846*	0.646*	-0.253*	1.119*	0.419
4	0.001	0.673	0.397*	0.278*	0.394	0.001	0.674*	0.396*	0.277*	0.005	0.392
5	0.000	0.709	0.565*	0.435*	0.440	0.000	0.722*	0.540*	0.378*	0.313*	0.449
6	0.000	0.781	0.618*	0.562*	0.433	0.000	0.777*	0.572*	0.479*	0.311*	0.450
7	-0.001	0.785	0.686*	0.712*	0.532	-0.001	0.777*	0.699*	0.772*	-0.221*	0.531
8	0.000	0.807	0.764*	0.817*	0.501	0.000	0.810*	0.760*	0.766*	0.212*	0.502
9	0.000	0.878	0.882*	0.925*	0.471	0.000	0.899*	0.916*	0.775*	0.637	0.475
10	-0.001	0.973	0.142*	-0.367*	0.466	-0.001	0.974*	0.142*	-0.369*	0.008	0.464
11	0.000	0.743	0.069	-0.073	0.446	0.000	0.764*	0.045	-0.143	0.322*	0.456
12	0.000	0.791	0.081	-0.070	0.324	0.000	0.812*	0.027	-0.178	0.661*	0.361
13	0.000	0.699	0.127*	0.346*	0.383	0.000	0.703*	0.106*	0.310*	0.213*	0.386
14	0.001	0.687	0.077	0.346*	0.405	0.001	0.715*	0.049	0.256*	0.429*	0.422
15	0.001	0.662	0.176*	0.436*	0.400	0.001	0.682*	0.119*	0.338*	0.559*	0.437
16	0.000	0.701	0.294*	0.846*	0.482	0.000	0.700*	0.300*	0.870*	-0.084	0.481
17	0.001	0.781	0.298*	0.668*	0.469	0.001	0.797*	0.271*	0.599*	0.392*	0.484
18	0.001	0.852	0.233*	0.834*	0.446	0.001	0.886*	0.171*	0.729*	0.832*	0.473
19	0.000	0.865	-0.360*	-0.354*	0.542	0.000	0.929*	-0.349*	-0.415*	-0.430*	0.552
20	0.000	0.693	-0.367*	0.040	0.502	0.000	0.694*	-0.374*	-0.003	0.314*	0.511
21	0.000	0.664	-0.308*	0.037	0.437	0.000	0.682*	-0.304*	-0.085	0.539*	0.461
22	0.001	0.823	-0.335*	0.255*	0.420	0.001	0.814*	-0.345*	0.221*	0.170	0.422
23	0.001	0.769	-0.226*	0.324*	0.478	0.001	0.779*	-0.280*	0.266*	0.523*	0.504
24	0.001	0.715	-0.205*	0.498*	0.453	0.001	0.721*	-0.215*	0.392*	0.447*	0.480
25	0.002*	0.883	-0.747*	0.812*	0.401	0.002*	0.867*	-0.753	0.930*	-0.699*	0.441
26	0.000	0.951	-0.496*	0.940*	0.363	0.000	1.014*	-0.478	0.707*	0.666*	0.363
27	0.002*	0.891	-0.416*	0.846*	0.395	0.002*	0.921*	-0.450	0.677*	0.992*	0.456

Table 8: Factor loadings of all firms during crisis period (July 2007 to April 2009).

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} \ + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} \ + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

Crisis period											
	Model 1					Model 2					
Portfolio	Intercept	XMKT	SMB	HML	Adj. R-square	Intercept	XMKT	SMB	HML	LEV	Adj. R-square
1	-0.003	0.075	-0.320	0.161	-0.034	-0.001	-0.034	0.264	-0.942*	2.931*	0.410
2	-0.005	0.084	-0.164	0.221	-0.040	-0.002	0.020	0.461*	-0.974*	3.193*	0.444
3	-0.003	0.077	-0.326	0.498	-0.005	0.000	-0.028	0.393*	-0.831*	3.633*	0.549
4	-0.003	0.087	-0.079	0.608*	-0.010	-0.003	0.038	0.238	-0.180	1.784*	0.312
5	-0.003	0.145	-0.151	0.711*	0.012	-0.003	0.029	0.385*	-0.364	2.610*	0.450
6	-0.004	0.167*	0.060	0.757*	0.004	-0.004	0.064	0.598*	-0.196	2.643*	0.427
7	-0.004	0.078	0.129	0.782*	0.053	-0.003	-0.033	0.436*	0.177	1.563*	0.311
8	-0.002	0.196*	-0.081	0.855*	0.053	-0.001	0.019	0.544*	-0.087	2.736*	0.473
9	-0.002	0.112	0.077	1.347*	0.136	0.000	0.018	0.748*	-0.080	3.851*	0.587
10	-0.003	0.086	-0.520*	0.361	0.026	-0.001	0.063	0.022	-0.927*	3.042*	0.458
11	-0.004	0.037	-0.619*	0.522	0.053	-0.003	-0.007	-0.128	-0.910*	3.149*	0.506
12	-0.004	0.109	-0.791*	0.463	0.105	-0.003	0.063	-0.247	-0.859*	3.078*	0.538
13	-0.003	0.100	-0.370*	0.702*	0.059	-0.003	0.057	0.031	-0.274	2.140*	0.385
14	-0.003	0.127	-0.728*	0.724*	0.132	-0.002	0.039	-0.119	-0.442*	3.061*	0.552
15	-0.004	0.095	-0.586*	0.908*	0.130	-0.003	0.034	-0.016	-0.490*	3.328*	0.561
16	-0.003	0.098	-0.275	0.871*	0.134	-0.003	0.028	0.114	0.096	1.895*	0.373
17	-0.003	0.031	-0.556*	1.278*	0.175	-0.002	0.012	0.020	0.039	3.287*	0.609
18	-0.005	0.051	-0.863*	1.541*	0.264	-0.003	0.045	-0.134	-0.112	4.033*	0.657
19	-0.002	0.173*	-1.069*	-0.026	0.182	-0.002	0.028	-0.554*	-0.877*	2.388*	0.522
20	-0.001	0.119	-0.964*	-0.011	0.113	-0.002	0.000	-0.349	-1.069*	2.744*	0.479
21	-0.003	0.194*	-1.017*	0.092	0.117	-0.002	0.044	-0.475*	-0.853*	2.596*	0.531
22	-0.002	0.146	-0.903*	0.278	0.089	-0.001	-0.042	-0.480*	-0.416	2.083*	0.356
23	-0.002	0.160	-1.064*	0.445	0.178	-0.002	0.009	-0.485*	-0.600*	2.883*	0.534
24	-0.004	0.157	-0.897*	0.749*	0.199	-0.003	0.024	-0.386	-0.413	2.875*	0.561
25	-0.004	0.196	-1.176*	0.887*	0.374	-0.002	0.129	-0.735*	-0.004	2.702*	0.581
26	-0.004	0.043	-1.124*	1.435*	0.386	-0.003	0.048	-0.587*	0.333	2.972*	0.680
27	-0.005	-0.008	-1.782*	1.765*	0.454	-0.002	-0.048	-1.153*	0.486*	3.693*	0.771

Table 9: Summary of factor loadings for financial and non financial stock portfolios

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} \; + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \; \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} \; + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \; \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios".

Financial stock portfolios						**Non financial stock portfolios**					
Pane A: Aggregate Period						Panel D: Aggregate Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	27	7	15		Model 1	Positive	27	13	18	
	Negative	0	15	7			Negative	0	8	3	
	Total	27	22	22			Total	27	21	21	
Model 2	Positive	27	7	15	17	Model 2	Positive	27	13	18	16
	Negative	0	16	7	0		Negative	0	9	6	1
	Total	27	23	22	17		Total	27	22	24	17
%change in significance (by model)		0.00%	4.55%	0.00%		%change in significance (by model)		0.00%	4.76%	14.29%	
Panel B: Non-crisis Period						Panel E: Non-crisis Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	27	8	15	0	Model 1	Positive	27	14	18	
	Negative	0	12	7			Negative	0	9	3	
	Total	27	20	22			Total	27	23	21	
Model 2	Positive	27	8	15	14	Model 2	Positive	27	14	18	14
	Negative	0	11	7	4		Negative	0	9	3	4
	Total	27	19	22	18		Total	27	23	21	18
%change in significance (by model)		0.00%	-5.00%	0.00%		%change in significance (by model)		0.00%	0.00%	0.00%	
Panel C: Crisis period						Panel F: Crisis period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	15	0	3	0	Model 1	Positive	0	0	6	
	Negative	0	25	4			Negative	0	6	4	
	Total	15	25	7			Total	0	6	10	
Model 2	Positive	4	0	6	23	Model 2	Positive	0	10	0	27
	Negative	0	18	3	0		Negative	0	4	9	0
	Total	4	18	9	23		Total	0	14	9	27
%change in significance (by model)		-73.33%	-28.00%	28.57%		%change in significance (by model)		0.00%	133.33%	-10.00%	
%change in significance (by period)		-85.19%	-5.26%	-59.09%	27.78%	**%change in significance (by period)**		-100.00%	-39.13%	-57.14%	50.00%

Table 10: Factor loadings for financial and non-financial firms for the aggregate period (January 2000 to April 2009)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Aggregate Period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	0.002*	0.709*	-0.026	-0.189*	-0.060	0.002*	0.709*	-0.026	-0.189*	-0.001	-0.063
2	0.001	0.379*	0.514*	-0.395*	-0.098	0.001	0.263*	0.431*	-0.277*	0.857*	0.113
3	0.003*	0.783*	0.138*	-0.253*	0.060	0.002	0.716*	0.163*	-0.189*	1.112*	0.348
4	0.001	0.485*	0.151*	0.337*	0.023	0.001	0.478*	0.159*	0.333*	0.149	0.043
5	0.000	0.473*	0.069	0.203*	-0.015	0.000	0.441*	0.066	0.256*	0.419*	0.149
6	0.003*	0.463*	0.082*	0.188*	0.038	0.003*	0.423*	0.085*	0.192*	0.462*	0.204
7	0.000	0.383*	0.173*	0.822*	0.121	0.000	0.409*	0.175*	0.827*	-0.105	0.094
8	0.002	0.796*	0.211*	0.687*	-0.052	0.001	0.702*	0.193*	0.753*	0.544*	0.121
9	0.002*	0.756*	0.399*	0.783*	-0.002	0.001	0.673*	0.368*	0.797*	0.802*	0.267
10	0.002	0.546*	-0.315*	-0.245*	0.178	0.002	0.535*	-0.317*	-0.230*	0.112	0.209
11	0.001	0.552*	-0.190*	-0.125*	0.088	0.001	0.505*	-0.220*	-0.126*	0.332*	0.214
12	0.002*	0.520*	-0.154*	-0.302*	0.109	0.001	0.491*	-0.139*	-0.247*	0.809*	0.359
13	0.001	0.503*	-0.120*	0.312*	0.133	0.001	0.501*	-0.122*	0.312*	0.030	0.140
14	0.001	0.683*	-0.117*	0.164*	-0.022	0.001	0.633*	-0.127*	0.202*	0.384*	0.123
15	0.002*	0.369*	-0.085	0.085	0.071	0.002*	0.356*	-0.092*	0.092	0.489*	0.262
16	0.000	0.413*	-0.064	0.718*	0.187	0.000	0.423*	-0.068	0.713*	-0.071	0.175
17	0.003*	0.713*	-0.074	0.627*	0.072	0.002*	0.643*	-0.108	0.707*	0.602*	0.241
18	0.002*	0.414*	-0.112*	0.482*	0.142	0.002*	0.371*	-0.177*	0.584*	0.737*	0.408
19	0.001	0.668*	-0.591*	-0.067	0.316	0.001	0.653*	-0.598*	-0.070	0.119	0.340
20	0.001*	0.593*	-0.582*	-0.171*	0.341	0.001	0.564*	-0.605*	-0.158*	0.169	0.391
21	0.001	0.743*	-0.598*	0.007	0.298	0.001	0.706*	-0.609*	0.010	0.374*	0.392
22	0.001	0.670*	-0.911*	0.035	0.498	0.001	0.661*	-0.905*	0.037	0.108*	0.510
23	0.002*	0.693*	-0.458*	0.051	0.270	0.001	0.664*	-0.475*	0.118	0.324	0.368
24	0.002*	0.740*	-0.676*	0.207*	0.420	0.002	0.682*	-0.771*	0.190*	0.577*	0.566
25	0.001	0.609*	-0.617*	0.711*	0.373	0.001	0.608*	-0.617*	0.711*	0.028*	0.375
26	0.001	0.627*	-0.639*	0.611*	0.357	0.001	0.579*	-0.646*	0.689*	0.452*	0.439
27	0.001	0.679*	-1.120*	0.785*	0.478	0.000	0.505*	-1.087*	1.113*	1.562*	0.699

Table 11: Factor loadings for financial and non-financial firms for non-crisis period (January 2000 to June 2007)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Non-crisis Period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	0.002*	0.757*	0.110	-0.172*	0.168	0.002*	0.784*	0.110	-0.223*	-0.269*	0.170
2	0.001	0.547*	0.922*	-0.542*	0.143	0.001	0.521*	0.897*	-0.496*	0.375*	0.155
3	0.003*	0.873*	0.365*	-0.325*	0.265	0.002	0.867*	0.411*	-0.283*	0.673*	0.317
4	0.002	0.586*	0.311*	0.296*	0.262	0.002	0.589*	0.316*	0.294*	-0.035	0.260
5	0.000	0.508*	0.167*	0.171*	0.182	0.000	0.499*	0.160*	0.193*	0.186*	0.185
6	0.003*	0.497*	0.145*	0.208*	0.236	0.003*	0.466*	0.136*	0.208*	0.296*	0.257
7	0.000	0.643*	0.362*	0.800*	0.342	-0.001	0.683*	0.443*	0.826*	-0.408*	0.333
8	0.001	0.842*	0.354*	0.678*	0.265	0.001	0.834*	0.312*	0.693*	0.359*	0.274
9	0.002*	0.792*	0.547*	0.759*	0.307	0.002	0.753*	0.513*	0.786*	0.477*	0.347
10	0.002*	0.592*	-0.252*	-0.282*	0.301	0.002*	0.594*	-0.251*	-0.286*	-0.038	0.300
11	0.001	0.600*	-0.104*	-0.143*	0.224	0.001	0.589*	-0.121*	-0.143*	0.126	0.232
12	0.002*	0.590*	-0.056	-0.311*	0.168	0.002	0.562*	-0.055	-0.276*	0.411*	0.215
13	0.001	0.551*	-0.054	0.295*	0.299	0.001	0.557*	-0.038	0.293*	-0.153	0.301
14	0.002*	0.444*	-0.095*	0.137*	0.280	0.001	0.732*	-0.045	0.149*	0.277*	0.198
15	0.003*	0.362*	-0.033	0.030	0.158	0.002*	0.370*	-0.035	0.052	0.335*	0.192
16	0.001	0.524*	0.063	0.702*	0.316	0.001	0.553*	0.065	0.666*	-0.480*	0.351
17	0.003*	0.778*	0.043	0.588*	0.233	0.003*	0.768*	0.020	0.624*	0.377*	0.249
18	0.002*	0.417*	-0.017	0.419*	0.242	0.002*	0.405*	-0.020	0.452*	0.417*	0.283
19	0.001	0.727*	-0.493*	-0.040	0.452	0.001	0.731*	-0.483*	-0.044	-0.096	0.449
20	0.001*	0.663*	-0.454*	-0.224*	0.504	0.001*	0.663*	-0.454*	-0.224*	0.001	0.503
21	0.001	0.776*	-0.512*	0.003	0.522	0.001	0.765*	-0.535*	0.017	0.209*	0.537
22	0.001	0.745*	-0.795*	0.061	0.518	0.002	0.755*	-0.781*	0.056	-0.110	0.516
23	0.002*	0.747*	-0.367*	-0.008	0.376	0.002*	0.749*	-0.366*	0.009	0.088	0.378
24	0.002	0.789*	-0.523*	0.235*	0.442	0.002	0.773*	-0.544*	0.234*	0.212*	0.461
25	0.001	0.655*	-0.380*	0.651*	0.236	0.001	0.668*	-0.360*	0.602*	-0.436*	0.253
26	0.002	0.728*	-0.472*	0.497*	0.272	0.002	0.726*	-0.472*	0.525*	0.184	0.268
27	0.002	0.780*	-0.850*	0.655*	0.347	0.001	0.712*	-0.862*	0.956*	1.241*	0.497

Table 12: Factor loadings for financial and non-financial firms for the crisis period (July 2007 to April 2009)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Crisis period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	-0.004	-0.126	-0.577*	-0.168	0.130	-0.003	-0.154	-0.283	0.051	0.529	0.203
2	-0.003	-0.051	-0.644*	-0.708*	0.137	0.001	-0.104	-0.002	-0.187	1.207*	0.357
3	-0.005	0.596*	-1.159*	-1.536*	0.348	-0.002	0.266*	-0.263*	-0.952*	1.642*	0.653
4	-0.003	0.101	-0.197	0.265	0.069	-0.003	0.048	-0.065	0.336	0.257	0.102
5	-0.005	0.332*	-0.794*	-0.222	0.217	-0.003	0.074	-0.140	0.184	1.169*	0.483
6	-0.005	0.390*	-0.636*	-0.394	0.136	-0.003	0.201	0.227	0.131	1.551*	0.408
7	-0.005	0.092	-0.115	0.554*	0.059	-0.004	0.069	-0.027	0.619*	0.167	0.085
8	-0.006*	-0.034	-0.553*	0.103	0.144	-0.004	0.284*	-0.184	0.241	0.813*	0.251
9	-0.003	0.252	-0.724*	0.190	0.292	0.001	0.178	0.094	0.978*	1.691*	0.542
10	-0.005	0.344*	-0.998*	-0.588	0.361	-0.003	0.238*	-0.695*	-0.404	0.637*	0.449
11	-0.004	0.261*	-1.037*	-0.531	0.398	-0.003	0.140	-0.664*	-0.276	0.733*	0.506
12	-0.006	0.257*	-1.394*	-1.299*	0.499	-0.004	0.133	-0.611*	-0.809*	1.446*	0.696
13	-0.004	0.239*	-0.568*	-0.145	0.238	-0.004	0.193*	-0.434*	-0.083	0.228	0.277
14	-0.003	0.266*	-1.062*	-0.332	0.350	-0.002	0.152	-0.544*	0.050	0.843*	0.466
15	-0.009*	0.326*	-1.256*	-0.687	0.383	-0.005	0.103	-0.422*	-0.132	1.616*	0.603
16	-0.002	0.143	-0.338*	0.393*	0.231	-0.002	0.054	-0.161	0.442*	0.268*	0.265
17	-0.004	0.203*	-1.145*	-0.110	0.423	-0.002	0.140	-0.600*	0.421	1.005*	0.539
18	-0.007*	0.304*	-1.314*	0.109	0.488	-0.006	0.087	-0.596*	0.519*	1.275*	0.671
19	-0.001	0.308*	-1.277*	-0.542	0.469	0.000	0.227	-0.869*	-0.225	0.758*	0.543
20	-0.001	0.207	-1.383*	-0.437	0.552	0.000	0.107	-0.913*	-0.011	0.917*	0.644
21	-0.006	0.264	-1.458*	-1.107*	0.473	-0.003	0.118	-0.837*	-0.497*	1.275*	0.626
22	-0.003	0.292*	-1.459*	-0.528	0.614	-0.002	0.178*	-1.127*	-0.292	0.615*	0.661
23	-0.004	0.197*	-1.537*	-0.452	0.625	-0.002	0.107	-0.881*	0.056	1.182*	0.736
24	-0.005	0.154	-1.729*	0.039	0.704	-0.001	0.106	-1.108*	0.268	1.275*	0.809
25	-0.006	0.235	-1.570*	0.070	0.647	-0.005	0.130	-1.146*	0.462	0.725*	0.671
26	-0.001	0.034	-1.683*	0.908*	0.695	0.002	-0.052	-0.970*	1.247*	1.255*	0.770
27	-0.008*	0.393*	-2.280*	0.121	0.720	-0.005	0.161	-1.374*	0.854*	1.686*	0.826

Table 13: Factor loadings for the non-financial stock portfolios for aggregate period (January 2000 to April 2009)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Aggregate Period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	0.002*	0.776*	0.453*	-0.425*	0.076	0.002	0.774*	0.468*	-0.395*	-0.196	0.057
2	0.002*	0.646*	0.380*	-0.097	0.011	0.002	0.630*	0.391*	-0.246*	0.679*	0.095
3	0.000	0.698*	0.614*	0.048	0.041	0.000	0.686*	0.548*	-0.185*	1.123*	0.166
4	0.001	0.584*	0.345*	0.215*	0.023	0.001	0.587*	0.342*	0.206*	0.043	0.023
5	0.000	0.668*	0.533*	0.376*	0.048	0.000	0.677*	0.521*	0.336*	0.211*	0.071
6	0.000	0.775*	0.570*	0.586*	0.014	0.000	0.779*	0.554*	0.551*	0.181	0.031
7	0.000	0.621*	0.594*	0.690*	0.109	0.000	0.626*	0.613*	0.708*	-0.101	0.094
8	0.000	0.741*	0.729*	0.787*	0.075	0.000	0.748*	0.723*	0.752*	0.136	0.083
9	0.000	0.838*	0.812*	0.893*	0.103	0.000	0.871*	0.818*	0.767*	0.454*	0.130
10	-0.001	0.958*	0.098	-0.309*	-0.054	-0.001	0.943*	0.112	-0.276*	-0.161	-0.060
11	0.001	0.709*	0.094	-0.144	0.025	0.001	0.727*	0.084	-0.197*	0.238*	0.047
12	0.000	0.704*	0.021	-0.094	0.004	0.000	0.740*	-0.007	-0.224*	0.558*	0.064
13	0.000	0.682*	0.092	0.281*	-0.016	0.000	0.696*	0.081	0.246*	0.189	-0.007
14	0.001	0.629*	0.026	0.287*	0.036	0.001	0.673*	-0.019	0.185*	0.463*	0.088
15	0.000	0.665*	0.168*	0.474*	0.032	0.000	0.692*	0.125*	0.358*	0.531*	0.100
16	0.000	0.686*	0.341*	0.790*	0.056	0.000	0.687*	0.331*	0.757*	0.137	0.065
17	0.000	0.723*	0.270*	0.641*	0.051	0.000	0.753*	0.210*	0.528*	0.498*	0.110
18	0.001	0.848*	0.253*	0.796*	0.033	0.000	0.856*	0.182*	0.699*	0.809*	0.140
19	0.001	0.745*	-0.459*	-0.372*	0.194	0.001	0.743*	-0.454*	-0.347*	-0.166	0.187
20	0.000	0.638*	-0.372*	-0.008	0.054	0.000	0.651*	-0.392*	-0.053	0.369*	0.098
21	0.000	0.589*	-0.353*	0.000	0.102	0.000	0.604*	-0.364*	-0.131	0.628*	0.185
22	0.001	0.685*	-0.394*	0.224*	0.043	0.001	0.685*	-0.396*	0.210*	0.049	0.043
23	0.001	0.672*	-0.243*	0.257*	0.031	0.001	0.682*	-0.301*	0.178*	0.493*	0.094
24	0.001	0.647*	-0.165*	0.438*	-0.003	0.000	0.659*	-0.195*	0.312*	0.504*	0.067
25	0.001	0.666*	-1.074*	1.002*	0.236	0.001	0.672*	-1.089*	1.105*	-0.505*	0.236
26	0.001	0.772*	-0.187*	0.701*	0.054	0.000	0.767*	-0.233*	0.585*	0.814*	0.140
27	0.002	0.791*	-0.408*	0.796*	0.125	0.001	0.794*	-0.443*	0.589*	1.068*	0.241

Table 14: Factor loadings for non-financial stocks portfolio for non-crisis period (January 2000 to June 2007)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Non-crisis Period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	0.002	0.846*	0.462*	-0.390*	0.483	0.002	0.830*	0.482*	-0.321*	-0.364*	0.496
2	0.002*	0.732*	0.415*	-0.098	0.238	0.002*	0.741*	0.407*	-0.164	0.360*	0.251
3	0.000	0.782*	0.627*	0.115	0.347	0.000	0.821*	0.599*	-0.126	0.923*	0.371
4	0.001	0.673*	0.363*	0.268*	0.406	0.001	0.666*	0.366*	0.278*	-0.057	0.408
5	0.000	0.718*	0.518*	0.415*	0.451	0.000	0.726*	0.513*	0.394*	0.109	0.450
6	0.000	0.825*	0.573*	0.613*	0.453	0.000	0.835*	0.561*	0.590*	0.130	0.451
7	-0.001	0.758*	0.638*	0.673*	0.551	-0.001	0.750*	0.647*	0.719*	-0.147	0.554
8	0.000	0.789*	0.729*	0.815*	0.527	0.000	0.795*	0.726*	0.791*	0.092	0.525
9	0.000	0.903*	0.807*	0.953*	0.471	0.000	0.939*	0.800*	0.862*	0.385*	0.469
10	-0.001	1.023*	0.121	-0.323*	0.465	-0.001	0.982*	0.125	-0.243*	-0.292*	0.480
11	0.001	0.775*	0.057	-0.095	0.458	0.001	0.790*	0.051	-0.127	0.150	0.457
12	0.000	0.764*	0.044	-0.038	0.357	0.000	0.812*	0.026	-0.125	0.401*	0.365
13	0.000	0.756*	0.140*	0.277*	0.401	0.000	0.766*	0.136*	0.255*	0.111	0.396
14	0.001	0.689*	0.026	0.328*	0.411	0.001	0.731*	0.000	0.257*	0.366*	0.419
15	0.000	0.711*	0.160*	0.499*	0.444	0.000	0.751*	0.132*	0.408*	0.440*	0.458
16	0.000	0.759*	0.368*	0.798*	0.475	0.000	0.761*	0.366*	0.791*	0.031	0.473
17	0.000	0.759*	0.280*	0.657*	0.495	0.000	0.794*	0.240*	0.570*	0.394*	0.502
18	0.001	0.898*	0.249*	0.801*	0.447	0.001	0.932*	0.192*	0.726*	0.710*	0.461
19	0.000	0.849*	-0.432*	-0.375*	0.549	0.000	0.912*	-0.380*	-0.428*	-0.402*	0.565
20	0.000	0.664*	-0.367*	0.013	0.475	0.000	0.676*	-0.385*	-0.026	0.312*	0.486
21	0.000	0.639*	-0.323*	-0.002	0.414	-0.001	0.769*	-0.400*	-0.109	0.649*	0.418
22	0.001	0.801*	-0.370*	0.278*	0.403	0.001	0.799*	-0.369*	0.290*	-0.048	0.404
23	0.001	0.727*	-0.242*	0.308*	0.460	0.001	0.769*	-0.268*	0.242*	0.396*	0.470
24	0.000	0.699*	-0.173*	0.472*	0.416	0.000	0.731*	-0.208*	0.381*	0.422*	0.435
25	0.001	0.820*	-1.110*	1.026*	0.436	0.001	0.764*	-1.118*	1.202*	-0.918*	0.492
26	0.001	0.927*	-0.342*	0.879*	0.358	0.001	0.977*	-0.360*	0.763*	0.552*	0.358
27	0.001	0.865*	-0.388*	0.849*	0.410	0.001	0.890*	-0.412*	0.656*	0.885*	0.444

Table 15: Factor loadings for non-financial stock portfolios during crisis period (July 2007 to April 2009)

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Crisis Period										
	Model 1					Model 2					
Portfolio	Intercept	MKT	SMB	HML	Adj. R-square	Intercept	MKT	SMB	HML	LEV	Adj. R-square
1	-0.005	0.156	0.586	-1.208*	-0.092	-0.004*	0.051	0.718*	-1.277*	2.808*	0.391
2	-0.005	0.124	0.500	-0.967*	-0.087	-0.003*	0.044	0.832*	-1.075*	2.866*	0.442
3	-0.004	0.043	0.392	-0.652	-0.092	-0.002	0.017	0.756*	-0.717*	3.192*	0.535
4	-0.004	0.062	-0.008	0.459	-0.073	-0.004	0.047	0.377*	-0.081	1.710*	0.292
5	-0.005	0.086	0.047	0.359	-0.043	-0.005	0.049	0.537*	-0.216	2.292*	0.439
6	-0.006	0.143	0.427	0.191	-0.030	-0.005	0.053	0.733*	-0.074	2.438*	0.417
7	-0.004	0.079	0.233	0.579*	0.033	-0.003	-0.019	0.540*	0.307	1.427*	0.315
8	-0.004	0.110	0.393	0.305	0.001	-0.003	-0.008	0.716*	0.141	2.412*	0.471
9	-0.004	0.151	0.646	0.032	-0.040	-0.002	0.018	0.840*	0.150	3.242*	0.575
10	-0.005	-0.004	-0.268	0.055	-0.066	-0.002	0.078	0.212	-0.604*	2.539*	0.417
11	-0.006*	-0.004	-0.549*	0.112	-0.066	-0.004	0.019	0.055	-0.769*	2.855*	0.479
12	-0.005	0.047	-0.535	-0.161	-0.043	-0.003	0.070	-0.087	-0.736*	2.957*	0.504
13	-0.004	0.025	-0.410	0.674*	-0.073	-0.003	0.092	0.032	-0.116	1.839*	0.332
14	-0.005	0.041	-0.471	0.241	-0.042	-0.003	0.034	-0.056	-0.287	2.786*	0.487
15	-0.006*	0.064	-0.234	0.221	-0.045	-0.003	0.032	0.147	-0.227	2.963*	0.515
16	-0.004	0.033	-0.027	0.539	-0.010	-0.002	-0.008	0.445*	0.150	1.938*	0.359
17	-0.005	0.015	-0.527	0.772*	-0.022	-0.002	-0.014	-0.015	0.161	3.016*	0.533
18	-0.006	-0.004	-0.415	0.834*	0.004	-0.003	0.090	0.104	0.035	4.151*	0.612
19	-0.004	0.177	-0.643*	-0.673*	-0.020	-0.002	0.054	-0.451*	-0.773*	2.140*	0.444
20	-0.004	0.034	-0.667*	-0.626*	-0.020	-0.003	-0.012	-0.255	-0.933*	2.589*	0.445
21	-0.005*	0.114	-0.818*	-0.241	-0.009	-0.003	0.058	-0.427*	-0.616*	2.331*	0.487
22	-0.003	0.118	-0.640*	-0.076	-0.070	-0.003	-0.021	-0.302	-0.430	1.827*	0.239
23	-0.004	0.098	-0.543	-0.309	-0.040	-0.003	0.000	-0.276	-0.420	2.608*	0.448
24	-0.005	0.101	-0.468	0.036	-0.044	-0.003	0.017	-0.119	-0.201	2.566*	0.453
25	-0.003	-0.033	-0.337	0.756*	0.039	-0.003	-0.013	-0.085	0.351	1.865*	0.331
26	-0.006*	0.171	-1.072*	0.708*	0.010	-0.004	0.141	-0.379*	0.093	2.762*	0.488
27	-0.005	-0.018	-0.622	-0.079	-0.024	-0.003	0.002	-0.546*	0.192	3.637*	0.609

Table 16: Partial f-statistics testing for the significance of contribution made by the LEV factor

Restricted Model

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} \ + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Unrestricted Model

$$r_{it} - r_{ft} = \beta_0 + \beta_1 (r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} \ + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". Partial f-statistics and the p-values test for the significance in the contribution of R-square made by the new model (which includes the LEV factor). The factors SMB, HML and LEV have been rebalanced for financial stock portfolios and non financial stock portfolios. (*) indicates significance at 5% level of significance. GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	All stock portfolios			Financial stock portfolios			Non-financial stock portfolios		
Portfolio	*Aggregate Period* Partial f-statistic	*Non-crisis Period* Partial f-statistic	*Crisis Period* Partial f-statistic	*Aggregate Period* Partial f-statistic	*Non-crisis Period* Partial f-statistic	*Crisis Period* Partial f-statistic	*Aggregate Period* Partial f-statistic	*Non-crisis Period* Partial f-statistic	*Crisis Period* Partial f-statistic
1	-1.62	1.04	71.90*	-0.17	2.04	9.64*	-8.36	10.65*	75.57*
2	56.73*	5.39*	82.82*	115.83*	6.41*	33.22*	45.46*	7.58*	90.27*
3	101.36*	28.68*	116.58*	214.21*	30.94*	83.68*	72.96*	16.11*	127.92*
4	14.96*	-0.01	45.12*	11.11*	-0.07	4.60*	1.26	1.73	49.54*
5	34.46*	7.13*	75.91*	94.36*	2.16	49.55*	12.75*	0.13	81.80*
6	43.57*	13.12*	70.42*	101.84*	11.67*	44.31*	9.16*	-0.18	73.26*
7	-15.57	0.34	36.19*	-13.06	-3.84	3.66	-6.98	2.99	39.88*
8	19.58*	2.22	75.98*	95.79*	5.93*	14.53*	5.07*	-0.88	84.74*
9	35.62*	4.19*	103.75*	178.07*	24.36*	52.41*	15.69*	-0.56	137.36*
10	6.96*	-0.11	76.02*	19.93*	0.39	16.06*	-1.71	12.03*	78.90*
11	37.50*	8.58*	87.33*	78.43*	4.73*	21.61*	12.12*	0.92	99.36*
12	66.64*	23.42*	89.13*	189.67*	24.14*	62.10*	31.73*	5.81*	104.67*
13	25.01*	2.55	50.96*	4.82*	2.34	6.09*	5.04*	-1.87	58.03*
14	49.24*	12.04*	89.40*	80.92*	-38.57	21.53*	28.36*	6.12*	97.85*
15	68.41*	26.13*	93.21*	126.42*	17.04*	53.15*	37.70*	10.87*	109.78*
16	3.29	0.71	36.76*	-6.22	22.03*	5.42*	5.44*	-0.52	55.13*
17	46.24*	12.02*	105.33*	108.33*	9.49*	24.76*	33.00*	6.07*	112.73*
18	80.45*	21.10*	108.63*	217.60*	23.24*	53.18*	61.30*	11.21*	148.07*
19	-4.56*	9.18*	68.14*	18.88*	-0.99	16.25*	-3.45	15.24*	79.61*
20	31.43*	8.18*	67.16*	41.14*	0.03	25.47*	24.38*	9.57*	79.64*
21	49.63*	18.60*	83.87*	75.18*	13.06*	39.69*	50.31*	3.95*	91.88*
22	22.87*	2.70	39.97*	12.65*	-0.83	13.91*	1.05	1.35	39.27*
23	49.86*	21.54*	72.94*	75.48*	2.52	40.51*	34.80*	8.93*	84.35*
24	48.31*	21.56*	78.73*	162.88*	15.23*	52.25*	37.14*	13.95*	86.59*
25	-12.15*	28.19*	47.55*	2.89*	9.85*	7.90*	0.62	43.70*	42.22*
26	50.41*	1.07	87.66*	72.14*	-0.97	31.74*	49.04*	1.20	88.80*

27	118.71*	44.78*	131.34*	355.94*	116.64*	58.15*	74.25*	25.09*	153.14*

Table 17: Factor loadings by types of firms

Model 1

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

Model 2

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

$$\varepsilon_t \mid \psi_{t-1} \sim N(0, \sigma_t^2),$$

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance.

PANEL A											
Conventional stocks: 2308						Conventional portfolios: 27					
Aggregate Period						Aggregate Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	1757	8	1023		Model 1	Positive	27	4	18	
	Negative	0	1439	225			Negative	0	17	0	
	Total	1757	1447	1248			Total	27	21	18	
Model 2	Positive	1697	8	797	1208	Model 2	Positive	27	2	12	20
	Negative	0	1582	482	84		Negative	0	18	3	0
	Total	1697	1590	1279	1292		Total	27	20	15	20
%change in significance (by model)		-3.41%	9.88%	2.48%		%change in significance (by model)		0.00%	-4.76%	-16.67%	
Non-crisis Period						Non-crisis Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	2076	7	917	0	Model 1	Positive	27	7	17	
	Negative	0	1108	378			Negative	0	14	0	
	Total	2076	1115	1295			Total	27	21	17	
Model 2	Positive	2056	6	863	459	Model 2	Positive	27	7	15	15
	Negative	0	1152	499	80		Negative	0	16	3	2
	Total	2056	1158	1362	539		Total	27	23	18	17
%change in significance (by model)		-0.96%	3.86%	5.17%		%change in significance (by model)		0.00%	9.52%	5.88%	
Crisis period						Crisis period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	290	262	1026	0	Model 1	Positive	10	0	27	
	Negative	76	996	12			Negative	0	16	0	
	Total	366	1258	1038			Total	10	16	27	
Model 2	Positive	92	525	480	1744	Model 2	Positive	0	5	9	27
	Negative	328	736	115	41		Negative	0	14	1	0
	Total	420	1261	595	1785		Total	0	19	10	27
%change in significance (by model)		14.75%	0.24%	-42.68%		%change in significance (by model)		0.00%	18.75%	-62.96%	
%change in significance (by period)		-79.57%	8.89%	-56.31%	231.17%	**%change in significance (by period)**		-100.00%	-17.39%	-44.44%	58.82%

PANEL B											
Islamic stocks: 1161						Islamic portfolios: 1161					
Aggregate Period						Aggregate Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	1004	402	252		Model 1	Positive	27	12	12	
	Negative	0	214	196			Negative	0	5	8	
	Total	1004	616	448			Total	27	17	20	
Model 2	Positive	1019	401	248	388	Model 2	Positive	27	12	12	10
	Negative	0	244	239	202		Negative	0	7	9	4
	Total	1019	645	487	590		Total	27	19	21	14
%change in significance		1.49%	4.71%	8.71%		%change in significance		0.00%	11.76%	5.00%	
Non-crisis Period						Non-crisis Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	1087	236	259		Model 1	Positive	27	10	13	
	Negative	0	276	234			Negative	0	7	8	
	Total	1087	512	493			Total	27	17	21	
Model 2	Positive	1089	254	265	178	Model 2	Positive	27	11	12	4
	Negative	0	254	263	280		Negative	0	7	8	11
	Total	1089	508	528	458		Total	27	18	20	15
%change in significance (by model)		0.18%	- 0.78%	7.10%		%change in significance (by model)		0.00%	5.88%	-4.76%	
Crisis period						Crisis period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	83	508	191		Model 1	Positive	0	0	7	
	Negative	33	48	64			Negative	0	11	3	
	Total	116	556	255			Total	0	11	10	
Model 2	Positive	92	489	133	873	Model 2	Positive	2	10	6	26
	Negative	43	69	97	38		Negative	0	0	2	0
	Total	135	558	230	911		Total	2	10	8	26
%change in significance (by model)		16.38%	0.36%	-9.80%		%change in significance (by model)		0.00%	-9.09%	-20.00%	
%change in significance (by period)		-87.60%	9.84%	-56.44%	98.91%	**%change in significance (by period)**		- 92.59%	- 44.44%	-60.00%	73.33%

PANEL C											
SRI stocks: 238						SRI Portfolios: 27					
Aggregate Period						Aggregate Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	224	80	183		Model 1	Positive	27	9	20	
	Negative	0	69	0			Negative	0	10	1	
	Total	224	149	183			Total	27	19	21	
Model 2	Positive	224	79	191	12	Model 2	Positive	27	11	21	8
	Negative	0	69	0	51		Negative	0	10	2	9
	Total	224	148	191	63		Total	27	21	23	17
%change in significance (by model)		0.00%	-0.67%	4.37%		%change in significance (by model)		0.00%	10.53%	9.52%	
Non-crisis Period						Non-crisis Period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	235	78	124	0	Model 1	Positive	27	9	17	
	Negative	0	82	11			Negative	0	10	3	
	Total	235	160	135			Total	27	19	20	
Model 2	Positive	237	76	133	18	Model 2	Positive	27	11	17	8
	Negative	0	83	7	27		Negative	0	10	3	8
	Total	237	159	140	45		Total	27	21	20	16
%change in significance (by model)		0.85%	-0.63%	3.70%		%change in significance (by model)		0.00%	10.53%	0.00%	
Crisis period						Crisis period					
		XMKT	SMB	HML	LEV			XMKT	SMB	HML	LEV
Model 1	Positive	8	36	222		Model 1	Positive	0	3	27	
	Negative	10	12	0			Negative	0	1	0	
	Total	18	48	222			Total	0	4	27	
Model 2	Positive	12	39	219	28	Model 2	Positive	0	2	27	7
	Negative	14	15	0	12		Negative	0	2	0	0
	Total	26	54	219	40		Total	0	4	27	7
%change in significance (by model)		44.44%	12.50%	-1.35%		%change in significance (by model)		0.00%	0.00%	0.00%	
%change in significance (by period)		- 89.03%	- 66.04%	56.43%	- 11.11%	**%change in significance (by period)**		- 100.00%	-80.95%	35.00%	-56.25%

Table 18: Partial f-statistics testing for the significance of contribution made by the LEV factor
Old Model

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

New Model

$$r_{it} - r_{ft} = \beta_0 + \beta_1(r_{mt} - r_{ft}) + \beta_2 R_{t,SMB} + \beta_3 R_{t,HML} + \beta_4 R_{t,LEV} + \varepsilon_t$$

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

$$\sigma_t^2 = \Omega + \sum_{i=1}^{q} \alpha_i \varepsilon^2{}_{t-i} + \sum_{j=1}^{p} \delta_i \sigma_{t-j}$$

where, r_i is the return on portfolio i; r_f is the return on the risk free asset and r_m is the return on the market portfolio. R_{SMB} is the return on the size mimicking portfolio constructed by taking the simple average of the returns each week of all "small" portfolios minus "big" portfolios. R_{HML} is the return on book to market mimicking portfolio constructed by taking the simple average of the returns each week of all "high BE/ME" portfolios minus "low BE/ME" portfolios. R_{LEV} is the return on leverage mimicking portfolios constructed by taking the simple average of the returns each week of all "high leverage" portfolios minus "low leverage portfolios". All indicated coefficients with (*) are significant at 5% level of significance. Partial f-statistics and the p-values test for the significance in the contribution of R-square made by the new model (which includes the LEV factor). GARCH models are estimated using the Bollerslev-Wooldridge corrections to the standard errors. Model 1 excludes LEV. Model 2 includes LEV. Coefficients of the GARCH variance equations are not reported to conserve space. They are available upon request.

	Conventional Portfolios			Islamic Portfolios			SRI Portfolios		
	Aggregate Period	Non-crisis Period	Crisis Period	Aggregate Period	Non-crisis Period	Crisis Period	Aggregate Period	Non-crisis Period	Crisis Period
Portfolio	Partial f-statistic	Partial f-statistic	Partial f-statistic	Partial f-statistic	Partial f-statistic	Partial f-statistic	Partial f-statistic	Partial f-statistic	Partial f-statistic
1	21.91*	-1.27	69.32*	-9.88	40.84*	20.16*	43.73*	24.27*	2.56
2	34.89*	5.64*	83.46*	16.99*	-0.38	45.00*	0.86	0.74	-2.26
3	59.14*	17.21*	119.34*	92.84*	53.73*	51.58*	1.26	37.32*	1.22
4	4.67*	-0.71	25.16*	-3.19	6.05*	24.07*	29.93*	18.52*	0.12
5	8.03*	-0.21	51.10*	7.80*	0.02	20.48*	-1.26	0.02	-1.37
6	28.87*	4.78*	95.20*	16.85*	-0.50	43.11*	-3.29	20.11*	-2.12
7	6.48*	0.03	21.11*	-5.00	13.93*	17.95*	39.16*	22.08*	4.96*
8	12.42*	1.32	80.78*	-10.27	2.37	36.12*	3.40	0.46	-1.58
9	73.34*	45.25*	110.37*	11.15*	0.00	102.05*	-16.20	16.59*	6.18*
10	39.51*	0.63	71.80*	-8.71	21.96*	38.52*	17.58*	8.50*	0.08
11	37.85*	7.25*	74.64*	-3.90	5.45*	34.93*	2.31	0.13	-0.48
12	107.88*	39.23*	96.55*	12.21*	0.02	47.64*	-3.58	13.58*	0.42
13	21.39*	1.59	35.39*	-9.71	6.82*	22.37*	16.78*	1.64	2.30
14	44.05*	9.55*	82.74*	7.34*	-0.35	35.52*	4.54*	0.87	-2.03
15	57.86*	14.22*	98.65*	36.39*	10.23*	57.74*	-8.10	7.48*	-0.94
16	5.55*	2.44	29.10*	-1.82	14.17*	15.63*	16.09*	-0.36	1.87
17	36.48*	4.02*	109.43*	4.21*	0.32	38.63*	4.81*	1.16	-0.16
18	49.86*	19.90*	103.38*	30.52*	2.30	74.60*	-6.02	15.96*	4.00*
19	0.84	-2.49	65.33*	-15.51	40.79*	45.68*	45.41*	39.12*	-0.74
20	27.10*	6.44	72.09*	35.40*	6.89*	44.07*	3.41	-2.41	-1.16
21	108.17*	29.41*	69.69*	26.46*	2.18	48.00*	-7.28	16.48*	-0.76
22	-8.32	-5.24	48.33*	-10.31	2.29	10.15*	22.20*	6.17*	-0.59
23	92.18*	24.24*	79.91*	22.92*	5.23*	39.53*	0.15	0.56	-0.66
24	98.98*	29.60*	45.80*	36.11*	4.99*	72.64*	-1.92	0.55	1.66
25	-5.79	13.44*	20.00*	54.37*	108.31*	3.51	53.43*	71.05*	2.78
26	25.65*	2.07	77.86*	19.86*	0.54	43.08*	-2.53	1.10	-0.97
27	258.76*	81.47*	134.57*	88.06*	47.13*	92.43*	3.03	53.30*	-0.37