Oil Price Shocks and Stock Market Anomalies

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Abstract

This paper provides a novel perspective to the nexus of oil prices and stock markets by examining the impact of oil price shocks on stock market anomalies. After decomposing oil price shocks into three types (Kilian, 2009), we find that aggregate demand shocks have the strongest influence on stock market anomalies. In contrast, oil supply shocks and oil specific demand shocks have little impact. Similar results are also found in the industry analysis. Interestingly, the link between aggregate demand shocks and anomalies are the strongest among firms with either small size or high idiosyncratic risks. The documented effects are robust after controlling for investor sentiment as well as several well-known macroeconomic or market factors. Our findings are consistent with but also extend the results of Stambaugh, Yu, and Yuan (2012) in that we show that uncertainty also plays a role in explaining stock market anomalies.

JEL Classification: G11, G12, Q40

Keywords: Stock market anomalies; Oil supply shocks; Aggregate demand shocks; Oil specific shocks; Investor Sentiment

1. Introduction

In this article, we study the implications of oil price shocks on investor behavior, limits to arbitrage, and stock market anomalies. The extant literature in finance documents many capital market anomalies such as accrual, momentum, and gross profitability (e.g., Harvery, Liu, and Zhu, 2016; Engelberg, McLean, and Pontiff, 2018), which appear to contradict the market efficiency hypothesis (Fama, 1970). In addition, the literature on energy finance has shown that oil price changes and shocks have significant impact on stock returns in the aggregate, sectorial, and firm levels (e.g., Kilian and Park, 2009; Chiang, Hughen, and Sagi, 2015; Degiannakis, Filis, and Arora, 2018; Ready, 2018). Motivated by these studies, our goal is to investigate whether oil price shocks have significant impact on stock market anomalies.

To contextualize the following discussions and to provide intuition, we assume that there exist two groups of investors in the economy: rational traders and noise traders. Importantly, rational traders are assumed to be risk-averse and have reasonably short investment horizons. Given such a heterogeneous agent setting, it is easy to show that equilibrium asset prices could deviate from their fully rational values due to noise trader's irrational 'bullishness" or sentiment (e.g., De Long et al., 1990). Empirically, Stambaugh, Yu, and Yuan (2012) confirm that anomalies are more prominent when investor sentiment levels are elevated and short sales impediments are binding.

In addition to the sentiment channel, in this paper we further explore the relation between an uncertainty channel and stock market anomalies. We argue that when limits to arbitrage are binding, increases in uncertainty could also contribute to the prevalence of anomalies even if noise traders' sentiment levels remain unchanged. A key insight from our paper is that the uncertainty channel relies on both the real effect caused by (for example) elevated cash flow risks as well as the perceived changes in noise traders' sentiment from the rational investors' perspective.

The specific form of uncertainty that we entertain in this paper is oil price shocks, which have very complex dynamics and could be difficult to quantify or interpret by investors. For example, Kilian (2009) argues that it is highly unrealistic to treat oil price shocks as exogenous and macroeconomic models based on the assumption of exogenous oil prices are potentially misleading. Instead, he proposes to use a structural VAR model to decompose oil price shocks into three distinct components. Kilian and Park (2009) further point out that prior studies on the relation between oil price and the aggregate stock market tend to find biased or unstable results due to the misspecification of oil price as an exogenous variable. Interestingly, they report that oil price shocks driven by an unanticipated global economic expansion can have persistent positive effects on the aggregate stock market in the short run due to its simulative effect on the US economy, whereas oil-specific supply shocks seem to have very little impact.

In light of Kilian (2009) and Kilian and Park (2009)'s findings, we deduce that oil price shocks tend to amplify the uncertainty faced by investors. For example, even for fully rational investors, the complexity in modeling oil price shocks could amplify the difficulty in identifying mispriced stocks, especially for stocks with higher information uncertainty (Zhang, 2006).

More specifically, we conjecture that there could be two direct implications arising from the complex dynamics of oil price shocks. First, if a given oil price shock has negative impacts on the real economy but is interpreted by noise traders as good news (at least initially), then the presence of shocks could help elevate investor sentiment, which will influence the pricing of anomalies.[1] Second, perhaps more subtly, rational traders will have to taking into their calculations both the impact of oil prices' effect on noise traders' sentiment as well as the real effect on the economy and the fundamental value of stocks. In other words, when oil price shocks arrive, regardless their nature, the rational investors immediately realizes two things: (a) uncertainty has increased because the oil prices shocks could, for example, amplify the cash flow volatility for companies, and (b) noise traders' sentiment could also shift to a higher gear after the shocks. Therefore, given the rising uncertainty, risk-averse rational traders are likely to retreat and cut down their bets against "over-valued" stocks, which consequently will result in more pronounced market anomalies. For the latter, we call it the "indirect sentiment effect" to distinguish it from the direct sentiment channel. We emphasize that this indirect sentiment effect occurs in the minds of rational investors and could work even if there are no measured changes in noise traders' sentiment levels.

To evaluate our main hypothesis that oil price shocks should have a sizeable impact on market anomalies through the uncertainty channel, we provide strong empirical evidence that oil price shocks have significant impact on anomalies in both the aggregate and industry level. To alleviate concerns about data-mining bias, following Stambaugh, Yu, and Yuan (2015), we focus on 11 well-known asset pricing anomalies as well as an aggregate anomaly that is jointly determined by the 11 prominent anomalies. Following

[1] This is consistent with Qadan and Nama (2018) and Güntner and Linsbauer (2018), who document that oil price changes and oil price shocks are significantly linked to investor and consumer sentiment. In this case, for example, high negative aggregate demand shocks signal lower real oil prices that may be good news for noise traders because they think that lower oil prices are associated with lower production costs, leading to relative high sentiment.

Kilian (2009), we use the structural VAR model to decompose oil price shocks into three specific shocks: oil supply shocks, aggregate demand shocks, and oil-specific demand shocks.[2] Specifically, we find that aggregate demand shocks have significant impact on 8 out of 12 anomalies. In contrast, oil supply shocks and oil-specific demand shocks have little impact on anomalies.

Consistent with the uncertainty channel explanation, we find that the impact of aggregate demand shocks on anomalies is more pronounced among stocks with high uncertainty. For example, the aggregate anomaly is significantly stronger following high negative aggregate demand shocks than following high positive aggregate demand shocks among stocks with high idiosyncratic volatility. In contrast, aggregate demand shocks have no impact on the aggregate anomaly among stocks with low idiosyncratic volatility. We further confirm that even after controlling for investor sentiment, there still exists a direct link between oil price shocks (especially for negative aggregate demand shocks) and anomalies.

Importantly, we find that the impact of aggregate demand shocks on anomalies could not be subsumed by some well-known prominent macro factors such as option-implied volatility, market volatility, economic policy uncertainty, and industrial production growth. Aggregate demand shocks appear to have distinct and incremental information beyond investor sentiment and other macro and market factors.

Our paper differs from the majority of other studies on the relation between oil prices and stock markets in that many in the extant literature focus on the aggregate- or

[2] See the detailed discussion on these three oil price shocks in the subsection 3.3.

industry-level stock returns.[3] In contrast, we rely on firm-level portfolios as test assets, which is the gold standard for evaluating market anomalies in the cross-section of stock returns. In the current context, the cross-sectional portfolio approach allows us the quantify the influence from oil price shocks on asset pricing anomalies after controlling for standard factors that are known to have explanatory power for stocks returns in the cross-section. In addition to the cross-sectional portfolio analysis, we also use time-series predictive regressions to study on the relation between oil price shocks and stock market anomalies from a different angle.

To summarize, this paper contributes to the literature in several ways. First, unlike prior studies, we provide interesting new evidence on the nexus between oil and stock markets by documenting significant impact of oil price shocks on stock market anomalies. Second, we provide new evidence on the role and information content of aggregate demand shocks by documenting that aggregate demand shocks have greater impact on stock markets than the other two oil shocks. Third, we document that the aggregate anomaly is robust across industries and that the impact of oil price shocks on the cross-section of stock returns varies across industries. Last, but not least, we show that the impact of oil price shocks on anomalies is robust even after controlling for investor sentiment as well as some well-known macro and market factors. We conclude that the overall evidence is supportive of an uncertainty channel explanation where oil price shocks force rational investors to reduce their arbitrage activities due to increases in perceived risks.

[3] Some exceptions include Boyer and Filion (2007), Scholtens and Wang (2008), Sadorsky (2001, 2008), Tsai (2015), Broadstock et al. (2016), and Ewing et al. (2018). However, their motivations and methodologies are quite different from our paper.

Our paper is organized as follows. The next section provides a brief review of the related literature. We discuss our data and methodology in section 3. The main empirical results are shown in section 4. The last section offers some concluding remarks.

2. A Brief Review of Related Literature

A large number of studies document that oil has significant impact on stock markets in the aggregate, industry, and firm levels around the world (e.g., Jones and Kaul, 1996; Kilian and Park, 2009; Chiang, Hughen, and Sagi, 2015; Driesprong et al., 2018; Ready, 2018). Driesprong et al. (2018) conduct a good review of the relation between oil price shocks and stock market returns. In particular, most studies focus on examining the impact of oil shocks on the aggregate stock market and some specific industries. Driesprong et al. (2018) propose that more future research should focus on the impact of oil shocks in the firm-level.

We note that only a few recent studies examine the impact of oil on stock market anomalies. For example, Chen, Cheng, and Dimirer (2017) show that oil return and volatility are significantly linked to industry momentum in Chinese stock markets. Cheema and Scrimgeour (2019) show that oil price changes have significant impact on many stock market anomalies in China. However, no prior studies have systematically examined the impact of oil price shocks on stock market anomalies.

Some recent studies also document significant relations between oil prices and investor sentiment. Güntner and Linsbauer (2018) find that aggregate demand shocks have significantly positive effects on consumer sentiment in the first several months and negative and persistent effects thereafter and that oil demand shocks also have persistent negative effects. Qadan and Nama (2018) show that various sentiment proxies are interrelated with oil price changes dynamically. In addition, existing studies show that investor sentiment could significantly explain a set of prominent anomalies mainly due to short-sale constrains on short legs of anomalies (e.g., Stambaugh et al., 2012).

3. Data and Methodology

Our sample includes common stocks (CRSP share code 10 and 11) listed on the NYSE, AMEX, and NASDAQ. Following Fama and French (1997), we use the classification of 17 industries based on 4-digit Standard Industrial Classification (SIC) codes. Stock return and price data are obtained from the Center for Research in Security Prices (CRSP). Financial statement data are obtained from the Compustat. The sample period is from January 1976 to October 2015, which is determined by the availability of the investor sentiment data provided by Baker and Wurgler (2006). To minimize concerns about market microstructure and liquidity-related issues, firms with stock prices less than $5 at the end of portfolio formation period are excluded. Fama-French factors are from Kenneth French's website. Following Shumway (1997) and Shumway and Warther (1999), we set delisting returns of -30% to NYSE/AMEX delisted stocks and -50% to NASDAQ delisted stocks if their delisting returns are missing or zero and delisting is due to performance reasons.

To alleviate concerns about data-mining bias, we follow Stambaugh et al. (2015), and construct the aggregate anomaly based on 11 prominent asset pricing anomalies. Each stock is assigned a score of 1 to 100 based on the measure of each anomaly at the end of each month. Then each stock has a composite mispricing score between 1 and 100 based on the average of 11 anomalies' scores. Finally, each stock is assigned into ten decile portfolios based on its mispricing score. The long (short) portfolio of the aggregate anomaly includes stocks with the lowest (highest) mispricing scores. The long-short portfolio is to buy stocks with the lowest mispricing scores and short stocks with the highest mispricing score. The 11 accounting and finance anomalies include total accrual, asset growth, composite equity issues, financial distress, gross profitability, investment to assets, net operating assets, net stock issues, O-SCORE, momentum, and returns on asset. Stambaugh and Yuan (2016) give a detailed description of these anomalies in their appendix.

The monthly global crude oil production in millions of barrels pumped per day (averaged by month) is obtained from Energy Information Administration (EIA) of US Department of Energy. Kilian's index as the proxy of global real economic activity is collected from Kilian's website (http://www-personal.umich.edu/~lkilian/). Following Kilian (2009), the nominal oil price is quantified by the crude oil imported acquisition cost of refiners, provided by the US Department of Energy. Then the nominal oil price is deflated by the US CPI to generate the real oil price series. CPI data is available at Federal Reserve Bank of Saint Louis (refer https://fred.stlouisfed.org/ for details).

3.1 Portfolio Analysis Approach

In this paper, following Stambaugh et al. (2012), we mainly adopt portfolio analysis and predictive regression analysis approaches to examine how oil price shocks affect these cross-sectional effects in the aggregate stock market and across industries.

The portfolio analysis approach is a standard method in empirical asset pricing to examine the cross-sectional differences (Boehmer et al., 2008). It has three main advantages. First, it replicates realistic trading activities, so it could be easily interpreted. Second, compared to a regression analysis, portfolio analysis could mitigate the impact of outliers. Last, it considers the nonlinear relation between firm characteristics and stock returns.

Specifically, for example, for each anomaly, we first assign all sample stocks into decile portfolios based on the measure of one specific characteristic such as past medium-term cumulative returns (momentum) at the end of each formation month *t*. Then we construct zero-investment long-short portfolio strategy by buying stocks in the top decile portfolio with highest future returns and short selling stocks in the bottom decile portfolio with lowest future returns. We rebalance the portfolios each month. The holding period is 1-month in the main analysis. We hold the stock portfolio in month *t+1*.

When we examine the impact of oil price shocks on anomalies, we compare the performance of anomalies conditional on high and low oil-price-shocks periods. Following the structural VAR model in Kilian (2009), we decompose oil price shocks into oil supply shocks, aggregate demand shocks, and oil specific demand shocks. In the portfolio analysis, following Stambaugh et al. (2012), for each oil shocks, month t is classified as a high positive (negative) shock month if the shock index in month t is above (below) the top (bottom) 40% of the distribution of the shocks in the sample.[4] Then we hold the portfolios for one-month (month *t+1*).

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[4] We get consistent results if we use the cutoff of 50% in the classification of high or low oil shock periods. In addition, high oil shocks refer to high positive oil shocks, and low oil shocks refer to high negative oil shocks because the value of oil shocks in the top (bottom) 40% of the distribution is positive (negative) in most cases.

3.2 Predictive Regression Analysis Approach

Stambaugh et al. (2012) argue that a binary classification of high and low sentiment is too simple. Following Stambaugh et al. (2012), we also conduct predictive regressions as an alternative analysis.

We use the following predictive regressions to examine whether the level of 1-month lagged oil price shocks predicts future returns of anomalies:

$$R_{i,t} = \alpha + \beta OS_{t-1} + Control_t + \mu_t$$

where $R_{i,t}$ is the returns in excess of 1-month T-bill for the long, short, or long-short portfolios of each anomalies, OS_{t-1} is the one-month lagged oil price shocks, $Control_t$ include Fama-French three factors (market factor (MKT), size factor (SMB), and value factor (HML)).

3.3 Structural VAR Model

Following Kilian (2009), we use a structural VAR model to decompose oil shocks into three components: oil supply shocks, aggregate demand shocks, and oil specific demand shocks. The standard structural VAR representation can be given by:

$$\mathbf{A}_0\mathbf{Z}_t = \boldsymbol{\alpha} + \sum_{i=1}^{p} \mathbf{A}_i\mathbf{Z}_{t-i} + \boldsymbol{\varepsilon}_t,$$

where $\mathbf{Z}_t = (\Delta prod_t,\ KI_t, rpo_t)'$. $\Delta prod_t$ is the log difference of global crude oil production, KI_t is the logarithm of Kilian (2009) index indicating the real economic activity, rpo_t denotes the logarithm of the real oil price, and $\boldsymbol{\varepsilon}_t$ defers to the vector of the structural innovations, which are assumed to be serially and mutually uncorrelated. Following Kilian (2009), p takes value of 24 to allow for the potentially long-delayed effects of oil price shocks on the economy (Kang, de Gracia, and Ratti, 2017) and we decompose the reduced-form errors $\boldsymbol{e}_t$ by postulating $\mathbf{A}_0^{-1}$ has a recursive structure and $\boldsymbol{e}_t = \mathbf{A}_0^{-1}\boldsymbol{\varepsilon}_t$, specifically

$$\boldsymbol{e}_t \equiv \begin{pmatrix} e_t^{\Delta prod} \\ e_t^{KI} \\ e_t^{rpo} \end{pmatrix} = \begin{bmatrix} a_{11} & 0 & 0 \\ a_{21} & a_{22} & 0 \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{pmatrix} \varepsilon_t^{oil\ supply\ shock} \\ \varepsilon_t^{aggregate\ demand\ shock} \\ \varepsilon_t^{oil\ specific-demand\ shock} \end{pmatrix}$$

We extract the three oil price shocks from the SVAR model and use these shocks in our study. In the portfolio analysis. We classify month t as a high positive (negative) shock month if the shock index in month t is above (below) the top (bottom) 40% of the distribution of the shocks in the sample. We examine the impact of oil price shocks on stock market anomalies in the next month.

Oil supply shocks are defined as unpredictable innovations to global oil production. In other words, oil supply shocks refer to shocks to the current physical availability of crude oil. Crude oil supply is assumed not to respond to innovations to the demand for oil within the same month. Increases in the real price of oil driven by oil specific supply shocks will have no immediately negative impact on global real economic activity, but with a delay of at least a month (Kilian, 2009).

Aggregate demand shocks are defined as innovations to global real economic activity that cannot be explained based on crude oil supply shocks. In other words, aggregate demand shocks refer to shocks to the current demand for crude oil driven by fluctuations in the global business cycle (Kilian, 2009). A decrease in aggregate demand shocks signals lower real oil prices and global real economic activities.

Oil-specific demand shocks are defined as innovations to the real price of oil that cannot be explained based on oil supply shocks or aggregate demand shocks. Oil-specific demand shocks reflect fluctuations in precautionary demand for oil driven by uncertainty about future oil supply shortfalls. Precautionary demand arises from the uncertainty about shortfalls of expected supply relative to expected demand (Kilian, 2009).

Kilian (2009) argues that an increase in oil specific demand shocks causes an immediate, substantial, and persistent increase in the real price of crude oil; an increase in aggregate demand for all industrial commodities also causes an substantial increase in the real oil price but with a somewhat delay; and crude oil production disruptions cause a small and transitory increase in the real oil price in the first year. Oil price shocks have been driven mainly by a combination of global aggregate demand shocks and precautionary demand shocks, rather than oil supply shocks.

4. Empirical Results

4.1 Anomalies in the Aggregate Stock Market and within Industries

In this paper, we systematically examine the impact of oil price shocks on stock market anomalies in the aggregate and industry level. Therefore, we first confirm that some well-known prominent anomalies are robust in the aggregate stock market and across industries in our sample period. In this subsection, we use the portfolio analysis to examine the performance of the aggregate anomaly in 11 industries and individual anomalies in the aggregate stock market.[5] At the end of each month, we assign all sample stocks into ten decile portfolios based on their composite mispricing scores. The aggregate anomaly strategy buys stocks with the lowest mispricing scores in the long portfolio and shorts sell stocks with the highest mispricing scores in the short portfolio.

[5] For the sake of brevity, we focus on the aggregate anomaly that is constructed based on 11 individual anomalies in the industry analysis.

Panel A in Table 1 reports the average monthly returns in excess of 1-month T-bill as well as the Fama-French (1993) three-factor-adjusted returns for 11 individual anomalies in the aggregate stock market. Consistent with extant studies on anomalies, these prominent asset pricing anomalies generate economically and statistically significant profits in the aggregate stock markets even controlling for risk factors. An interesting finding is that the aggregate anomaly has the best performance than 11 individual anomalies, suggesting that it is reasonable to use the aggregate anomaly in the industry analysis in the next subsections.

Panel B of Table 1 reports the performance for the aggregate anomaly within 11 industries. Overall, the aggregate anomaly generates economically and statistically significant profits in all these industries, suggesting that the aggregate anomaly is robust in the industry level and that stocks in the same industry are considerably heterogeneous in the cross section of stocks returns.

However, the performance of the aggregate anomaly varies across different industries. The aggregate anomaly has an average monthly excess return of 1.52% (t-value is 9.14) in the sample of all sample stocks. In contrast, the excess returns are only 0.96% and 0.49% in financials and utility industries, respectively. Such a significant difference suggests that the anomaly could be attenuated in some industries in which firms are more likely to be similarly affected by the common shocks because the degree of similarity of these firms is relatively high. On the other hand, the excess returns are 1.79% and 1.69% in consumer durables and *other* industries, respectively. Overall, the empirical evidence from Table 1 supports the view that anomalies are unlikely solely driven by idiosyncratic shocks that are firm-specific. In addition, it raises the likelihood that anomalies could be driven by cross-industry or macroeconomic shocks.

4.2 Oil Price Shocks and Anomalies in the Aggregate Stock Market

In this subsection, we use the portfolio analysis and predictive regression analysis to examine the impact of three oil price shocks on stock market anomalies in the aggregate stock market, respectively.

4.2.1 Oil Supply Shocks

Kilian (2009) and Kilian and Park (2009) point out that oil supply shocks are less important than aggregate demand shocks or oil specific demand shocks in explaining macroeconomic activities and the stock market returns. Consistent with their arguments, we find that oil supply shocks have insignificant effects on most anomalies in both portfolio and predictive regression analyses.

Panel A and B in Table 2 reports the returns in excess of 1-month T-bill rate and Fama-French (1993) three-factor-adjusted returns for anomalies following high positive and negative oil supply shocks from the portfolio analysis, respectively. We find that almost all anomalies have similar excess and risk-adjusted returns following high positive and negative oil supply shocks. For example, the excess returns of the aggregate anomaly are 1.55% and 1.70% per month following high positive and negative shocks, respectively. These results suggest that oil supply shocks have no significant effect on the cross section of stock returns based on these firm characteristics.

Following Stambaugh et al. (2012), we conduct predictive regressions as an alternative analysis. Panel A in Table 3 reports the coefficients of 1-month lagged oil shocks for the long leg, short leg, and long-short leg of anomalies from the predictive regression analysis. We do not find statistically significant results for majority of the anomalies except the net-operating-assets anomaly. The coefficients of the long-short portfolio of 11 out of 12 anomalies are statistically insignificant. Overall, these results are consistent with those in portfolio analysis.

4.2.2 Aggregate Demand Shocks

Kilian (2009) and Kilian and Park (2009), among others, show that aggregate demand shocks play a significant role in explaining macroeconomic activities and the stock market returns. Our results provide novel evidence that aggregate demand shocks have greater impact on the stock market than other two oil price shocks.

Panel C and D in Table 2 reports the excess returns and Fama-French (1993) three-factor-adjusted returns for anomalies following the aggregate demand shocks from the portfolio analysis. There are two main findings. First, the aggregate demand shocks have significant effects on 8 out of 12 anomalies. Specifically, these anomalies are stronger following *high negative* aggregate demand shocks. For example, the aggregate anomaly has an average monthly excess return of 0.94% and 1.90% following high positive and negative aggregate demand shocks, respectively. The return difference of 0.95% is highly significant. This result suggests that the aggregate anomaly is *negatively* affected by prior aggregate demand shocks. We find similar results for other 7 individual anomalies such as asset growth, composite equity issues, net stock issues, financial distress, investment to assets, net operating assets, and price momentum. Consistent results hold after controlling for Fama and French three risk factors.

Second, consistent with existing studies on anomalies, the short leg contributes more than the long leg on the profitability of most anomalies following high negative aggregate demand shocks. For example, the short leg of the aggregate anomaly has an average monthly three-factor-adjusted return of -1.30% (t-value is -6.37), and the long leg has an average monthly return of 0.80% (t-value is 6.14) following high negative aggregate demand shocks. Moreover, the return spread of the short leg between following high positive shocks and following high negative shocks is 0.49% (t-value is 2.09), and the return spread of the long leg is -0.38% (t-value is -2.35). Similar findings hold for other anomalies.

Panel B in Table 3 reports the coefficients of 1-month lagged oil shocks for the long leg, short leg, and long-short leg of anomalies from the predictive regression analysis. Consistent with portfolio analysis, the coefficients of the long-short portfolios of 7 out of 12 anomalies are significantly negative, suggesting that these 7 anomalies become weaker (stronger) following positive (negative) aggregate demand shocks.

4.2.3 Oil Specific Demand Shocks

Panel E and F in Table 2 reports the results of oil specific demand shocks from the portfolio analysis. The results from the portfolio analysis show that oil specific demand shocks have no consistently significant effect on anomalies. Panel C in Table 3 reports the results from the predictive regression analysis. Taken together, the results show that oil specific demand shocks have some significant effects *only* on accrual and asset growth anomalies after controlling for Fama-French three factors.

4.2.4 Discussion of Explanations and Implications

First, we find that the aggregate demand shocks have greater impact on asset pricing anomalies, while other two oil price shocks have little impact. To some extent, these results are consistent with existing studies that aggregate demand shocks and oil specific demand shocks have greater impact on stock markets, while oil supply shocks have weaker impact. In our setting, according to their definitions, a potential explanation may be that aggregate demand shocks contain valuable information about economic activities, which are more directly linked to stock markets than the information contained in other two oil shocks.

Specifically, negative aggregate demand shocks contain two signals. One is that some investors regard it as a good signal because negative aggregate demand shocks are associated with lower real oil prices that decrease the production costs of firms. If this signal pushes up investors' sentiment (in particular, noise traders, in our assumption) due to lower production costs for firms, then stock market anomalies could be stronger following negative aggregate demand shocks. The other side is that negative aggregate demand shocks signal decreasing global economic activities, which is a bad signal for investors. In our argument, therefore, negative aggregate demand shocks are bad shocks or uncertainty for investors. Stock mispricing is magnified when bad shocks or uncertainty proxied by negative aggregate demand shocks, leading to stronger anomalies subsequently. Our study shows that stock mispricing in the cross-section is magnified when negative macro shocks or uncertainty arrive.

Second, consistent with the significant role of short-sale constraints in anomalies (e.g., Stambaugh et al., 2012, 2015), we find that the aggregate demand shocks have greater impact on the short leg than the long leg of most anomalies. A potential and plausible explanation is that firms in the short legs are sensitive to macro uncertainty and are more vulnerable to negative macro uncertainty than positive uncertainty, leading to worse performance following negative aggregate demand shocks.

Third, the aggregate demand shocks also have little impact on some anomalies such as accrual and gross profitability. One explanation is that unconditionally, accrual and gross profitability anomalies are not very strong compared to other anomalies (see Table 1). A closer look at results show that the aggregate demand shocks have similar impact on the long and short legs of accrual and gross profitability. It is expected that oil price shocks have different impact on different anomalies due to that different anomalies reflect different asset pricing inefficiency.

4.3 Uncertainty, Oil Price Shocks, and Anomalies

Using a structural VAR approach, Kilian and Park (2009) show that the dynamics of oil price shocks and the subsequent impact on stock market is quite complicated. They find (pp. 1285 – 1286) that “the response of U.S. real stock returns to oil price shocks differs substantially, depending on the underlying causes of the oil price increase.” Specifically, they report that shocks to the production of crude oil are less important for understanding changes in stock prices than shocks to the global aggregate. Moreover, they caution (p. 1286) that “researchers have to move beyond empirical and theoretical models that vary the price of oil while holding everything else fixed.” For example, they find that conventional VAR models based on unanticipated changes in the price of oil or DSGE models such as Wei (2003) that postulate an exogenous ARMA(1,1) process for oil prices could deliver misleading empirical results.

Given the complexity in modelling the relation between stock returns and oil price shocks, we conjecture that (as least some) investors with bounded rationality (Simon,

1955) are likely to misprice stocks when facing high levels of oil price shocks (either positive or negative). This conjecture is consistent with prior literature that document investors' deficiency in their computational and information processing capabilities (e.g., Merton, 1987; Peng, 2005; Peng and Xiong, 2006; Barber and Odean, 2008). Moreover, the mispricing is likely to be more severe for stocks where information uncertainty is high (Zhang, 2006). In our setting, we expect that the magnified mispricing during heightened macro uncertainty due to oil price shocks is concentrated among stocks with high information uncertainty in firm level. Therefore, in this subsection, we study the relation between anomalies, uncertainty, and oil shocks in some details. Following prior studies, we rely on two popular proxies of uncertainty: size and idiosyncratic volatility.

In the portfolio analysis, we first assign stocks into tercile portfolios based on each formation uncertainty measure such as firm size and idiosyncratic volatility. Then we independently assign stocks into ten decile portfolios based on each anomaly measure. Finally, we intersect these portfolios to get 30 portfolios. We examine the performance of long-short leg of anomalies following high positive shocks versus high negative shocks.

Table 4 reports the results from the portfolio analysis. Overall, these results show that anomalies are more pronounced among stocks with high information uncertainty and that the impact of the aggregate demand shocks on anomalies is also stronger among stocks with high information uncertainty. For example, Panel A in Table 1 shows that 8 out of 12 anomalies are significantly stronger following high negative aggregate demand shocks among stocks with high IVOL. In contrast, only 2 out of 12 anomalies are significantly stronger following high negative shocks among stocks with low IVOL. Similar findings hold for an alternative uncertainty proxy such as firm size. Specifically, the aggregate anomaly has an average monthly FF3 alphas of 2.92% (1.76%) following high negative (positive) aggregate demand shocks among stocks with high IVOL. The return difference of 1.15% (2.92% minus 1.76%) is highly significant. In contrast, the return difference is only 0.11% among stocks with low IVOL.

Table 5 reports the results for the predictive regressions. The results in the predictive regression analysis are consistent with those in the portfolio analysis. 8 out of 12 anomalies are significantly stronger following high negative shocks than following high positive shocks among stocks with high uncertainty, while only 3 out of 12 anomalies are significantly stronger among stocks with low uncertainty. For example, the coefficient of 1-month lagged aggregate demand shocks for the aggregate anomaly is -1.01 (-0.05), which is significant (insignificant) among stocks with high (low) IVOL. The difference on the coefficient between high and low IVOL subsamples is significant. Similar results hold for the alternative uncertainty proxy such as firm size.

Moreover, we provide some evidence on the direct link between aggregate demand shocks and proxies for macroeconomic uncertainty. In the appendix 2, we show that aggregate demand shocks are highly correlated to two important economic uncertainty indices.[6] The first proxy for economic uncertainty is the macroeconomic uncertainty indices developed by Jurado et al. (2015), and the second proxy is the forecasts of price index levels (CPI) inflation rate based on the Survey of Professional Forecasters (SPF) provided by the Federal Reserve Bank of Philadelphia. Specifically, aggregate demand shocks are highly correlated with both measures of economic uncertainty with correlations at 39% and 40% for the economic uncertainty indices and uncertainty in CPI

[6] We provide detailed discussions as well as time series plots of the two uncertainty measures against aggregate demand shocks in the appendix.

inflation, respectively. Overall, these results based on firm-level and market-level uncertainty support the uncertainty channel through which aggregate demand shocks affect stock market anomalies.

4.4 Oil Price Shocks and Investor Sentiment

In this subsection, we study the relation between oil price shocks and other important variables such as investor sentiment (Bake and Wurgler, 2006), the option-implied volatility (VIX) index (Whaley, 2000), stock market return volatility, variance risk premia (Bollerslev, Tauchen, and Zhou, 2009), economic policy uncertainty (Baker, Bloom and Davis, 2016), industrial production growth, and aggregate stock market attention (Chen et al., 2020). We are interested in whether the impact of aggregate demand shocks on anomalies could be subsumed by other macro variables.

In the predictive regression analysis, we include the aggregate demand shocks and one other variable of interest simultaneously in the same regression. Table 6 reports coefficients of these variables. In the regression 1, the coefficients of both aggregate demand shocks and investor sentiment are significant for 6 out of 12 anomalies. This result suggest that aggregate demand shocks and investor sentiment have *distinct* and *incremental* impact on many anomalies. For example, both aggregate demand shocks and sentiment have significant impact on the aggregate anomaly. In addition, aggregate demand shocks have significant impact on some anomalies such as net stock issues and momentum, while investor sentiment has no significant effect on these two anomalies. Investor sentiment has significant effects on anomalies such as distress, OSCORE, and return on assets, while aggregate demand shocks have no significant effect on these three anomalies.[7]

Regressions 2 to 5 compare the aggregate demand shocks with several macro/market uncertainty measures such as the option-implied volatility (VIX), market volatility (MKTVOL), variance risk premia (VRP), and economic policy uncertainty (EPU). VIX, MKTVOL, VRP, and EPU have significant effects on 5, 4, 1, and 2 out of 12 anomalies, respectively. In contrast, aggregate demand shocks consistently have significant effects on 7 out of 12 anomalies. In addition, aggregate demand shocks and these macro uncertainty variables have significant effects on different anomalies. These results suggest that aggregate demand shocks have distinct and incremental information beyond some prominent macro/market uncertainty variables.

Because aggregate demand shocks contain much information about macroeconomic activities, we examine whether some important macroeconomic variables could explain the impact of oil shocks on anomalies. Regression 6 shows that the industrial production growth has no effect on the power of aggregate demand shocks in explaining anomalies.

Overall, our results show that the significant impact of aggregate demand shocks on anomalies could not be subsumed by either investor sentiment or several other well-known macro variables. We note that aggregate demand shocks and investor sentiment appear to stand out and have the strongest impact on anomalies. In untabulated results, we find that aggregate demand shocks are negatively correlated with investor sentiment. In other words, aggregated demand shocks appear to carry some distinct and incremental

[7] Shen, Yu, and Zhao (2017) show that Investor sentiment has significant impact on the pricing of systematic risk measured by some important economic forces. However, we do not find that oil price shocks have consistently significant impact on the pricing of systematic risk. Although sentiment and aggregate demand shocks are highly correlated and both could explain many anomalies, these two variables contain different information.

information on anomalies beyond that conveyed by investor sentiment. This finding seems to support our uncertainty channel explanation of the relation between oil price shocks and anomalies.

4.5 Oil Price Shocks and the Aggregate Anomaly at the Industry Level

In this subsection, we use portfolio and predictive regression analyses to examine how the impact of oil price shocks on anomalies varies across different industries. For the sake of brevity, we focus on examining how oil price shocks affect *the aggregate anomaly* across different industries.

4.4.1 Oil Supply Shocks

Panel A in Table 7 reports the excess returns for the long, the short, and the long-short portfolios of the aggregate anomaly following high positive and negative oil supply shocks.[8] We find that the aggregate anomaly generates economically and statistically significant profits following both high positive and negative oil supply shocks in almost all industries. However, the return spread for the long-short portfolio between high positive and negative oil supply shocks is significant only in retail and utility industries. In particular, compared with the performance in utility industry in Table 1, oil supply shocks seem to have significant impact on the aggregate anomaly in utility industry. For retail industry, a high positive oil supply shock has a positive impact on the profitability of the aggregate anomaly.

Panel A in Table 8 reports the results from the predictive regressions. The coefficient of the long-short portfolio is significantly positive for retail and consumables industries

[8] An unreported table shows that the results are consistent after controlling for Fama-French three factors.

without controlling for Fama-French factors. The coefficient is significantly positive only for the retail industry after controlling for Fama-French factors in the regressions.

4.4.2 Aggregate Demand Shocks

The results above show that aggregate demand shocks have larger and more significant effects on a broad set of anomalies in the aggregate stock market than other two oil shocks. We find similar results for the impact of aggregate demand shocks on the aggregate anomaly across various industries.

Panel B in Table 7 reports the results from portfolio analysis. Overall, the aggregate anomaly generates economically and statistically significant profits in most industries following both high positive and negative aggregate demand shocks. Moreover, the return spread between high positive and negative demand shocks is *economically* large in 8 out of 11 industries, though the return spread is statistically significant only in the oil and *other* industries. Panel B in Table 8 reports the results from the predictive regressions. The coefficient of the long-short portfolio is significantly negative for food, machinery, oil, and *other* industries.

4.4.3 Oil Specific Demand Shocks

Panel C in Table 7 reports the results from portfolio analysis. There are two main findings. First, oil specific demand shocks have asymmetric effects on the aggregate anomaly in different industries, while the aggregate anomaly is statistically significant following both shocks. The aggregate anomaly is stronger in construction, oil, and utility industries following high positive shocks, but it is stronger in consumables, consumer durables, food, retail, transportation, and *other* industries following high negative shocks.

Second, the return spread between high positive and negative shocks is statistically significant in consumables, consumer durables, and *other* industries. Overall, negative shocks have larger effects on the aggregate anomaly.

Panel C in Table 8 reports the results from the predictive regressions. Consistent with the results in portfolio analysis, oil specific demand shocks have a negative effect on the aggregate anomaly in most industries. Specifically, the coefficients of the long-short portfolio are statistically significant for consumables, consumer durables, retail, transportation, and *other* industries.

4.4.4 Discussion of Explanations and Implications

Consistent with findings in prior studies that oil price shocks have different impact on stocks in different industries, three oil price shocks have different impact on the aggregate anomaly in different industries. The results are expected because different industries have different exposure to different oil price shocks. In particular, for example, firms in the utility industry have strong heterogenous response to large negative oil supply shocks. In contrast, large positive oil supply shocks have similar impact on firms in the utility industry. The large negative demand shocks have substantial impact on oil and gas firms, while the impact is much weaker for other industries. Moreover, compared to other industries, oil specific demand shocks have more significant impact on two consumer-related industries. In addition, we find that both positive and negative oil shocks have impact on industries, while the positive or negative impact depends on the industry characteristics.

5. Conclusion

In this paper, we provide a comprehensive analysis of the impact of oil price shocks on stock market anomalies. We find that aggregate demand shocks have significant effects on many stock market anomalies, while oil supply shocks and oil-specific demand shocks have significant impact on very few anomalies. The significant impact of aggregate demand shocks on anomalies is mainly concentrated among stocks with high uncertainty.

Moreover, the significant impact of aggregate demand shocks on anomalies is not subsumed by either investor sentiment or other prominent macro and market factors such as VIX, market volatility, economic policy uncertainty, industrial production growth, and aggregate stock market attention.

In addition, we document that the aggregate anomaly is robust within most industries, suggesting that stocks in the same industry are considerably heterogeneous in the cross section of stocks returns. Furthermore, we show that three oil price shocks have significant effects on the aggregate anomaly in some specific industries such as consumables, consumer durables, retail, and oil industries, suggesting that oil price shocks have industry-level effect on anomalies.

Overall, our findings are supportive of the view that both aggregate demand shocks and investor sentiment play important roles in determining the prevalence of anomalies. From this perspective, the results from this paper complements the intriguing evidence from Stambaugh, Yu, and Yuan (2019) because we show that the uncertainty channel, in addition to the influence from investor sentiment, also contributes to the ubiquity of stock market anomalies.

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Appendix 1: Description of Stock Market Anomalies

Anomaly	Measure	Findings	Sources
Aggregate Anomaly	Aggregate anomaly is jointly determined by the following 11 individual anomalies.	Firms with higher mispricing scores have lower future returns than firms with lower mispricing scores	Stambaugh, Yu, and Yuan (2015)
Total Accruals	Total accruals are measured as changes in noncash working capital minus depreciation expense scaled by average total assets for the previous two fiscal years.	Firms with high total accruals have lower future returns than firms with low total accruals	Sloan (1996)
Asset Growth	Asset growth (AG) is measured as the growth rate of total assets in the previous fiscal year.	Firms with higher total asset growth have lower future returns than firms with lower total asset growth	Cooper, Gulen, and Schill (2008)
Composite Equity Issues	Composite equity issues (CEI) are measured as the difference between the 12-month growth in equity market capitalization and the 12-month cumulative stock return.	stock issuers have lower future returns than non-issuers	Daniel and Titman (2006)
Distress	Campbell et al. (2008) use a dynamic logit model to estimate failure probability based on some market variables.	Firms with high failure probability have lower future returns than firms with low failure probability	Campbell, Hilscher, and Szilagyi (2008)
Gross Profitability	Gross profitability (GP) is measured by the difference between total revenue and the cost of goods sold, scaled by the current total assets.	More profitable firms have higher future returns than less profitable firms	Novy-Marx (2013)
Investment to Assets	Investment to assets (IA) is measured as the annual change in gross property, plant, and equipment and change in inventory, scaled by the total assets in the previous year.	Firms with higher past investment have lower future returns than firms with lower past investment	Titman, Wei, and Xie (2004)
Net Operating Assets	Net operating assets (NOA) is measured as the difference between all operating assets and all operating liabilities scaled by total assets.	Firms with high net operating assets underperform firms with low net operating assets due to investors' limited attention	Hirshleifer, Hou, Teoh, and Zhang (2004)
Net Stock Issues	Net stock issues (NSI) is measured as the annual growth rate of the split-adjusted shares outstanding.	Stock issuers have lower future returns than non-issuers	Loughran and Ritter (1995)
O-SCORE	Based on some accounting variables, Ohlson (1980) use a static model to estimate the probability of bankruptcy (O-SCORE).	Firms with high O-SCORE have lower future returns with firms with low O-SCORE	Ohlson (1980)
Return on Assets	Return on assets (ROA) is measured as the ratio of quarterly earnings to the total assets in the last quarter.	Firms with higher past return on assets have higher future returns than firms with lower past return on assets	Chen, Novy-Marx, and Zhang (2010)
Price Momentum	Past 6- or 11-month cumulative returns	Past winners over past 1-year outperform past losers in subsequent 1-year	Jegadeesh and Titman (1993)

Appendix 2: Aggregate Demand Shocks and Macroeconomic Uncertainty

In this appendix, we discuss the link between aggregate demand shocks (ADS) and proxies for macroeconomic uncertainty. Theoretical and empirical studies document that time-varying macroeconomic uncertainty is linked to real economic activity and asset prices (e.g., Bloom, 2009; Jurado, Ludvigson, and Ng, 2015; Bali, Brown, and Tang, 2017; Bali, Subrahmanyam, and Wen, 2021). In particular, Bali et al. (2017) show that economic uncertainty indices developed by Jurado et al. (2015) are significantly priced in the cross-section of individual stocks.

We find that aggregate demand shocks are highly correlated to two important economic uncertainty indices. The first proxy for economic uncertainty is the economic uncertainty indices developed by Jurado et al. (2015), and the second proxy is the forecasts of price index levels (CPI) inflation rate based on the Survey of Professional Forecasters (SPF) provided by the Federal Reserve Bank of Philadelphia.[9]

The one-, three-, and 12-month-ahead economic uncertainty indices in Jurado et al. (2015) are defined as the conditional volatility of the unforecastable component of a large number of economic indicators. These economic indicators represent broad categories of macroeconomic activities: real output and income, employment and hours, real retail, manufacturing and trade sales, consumer spending, housing starts, inventories and inventory sales ratios, orders and unfilled orders, compensation and labor costs, capacity utilization measures, price indexes, bond and stock market indexes, and foreign exchange measures (Jurado et al., 2015).

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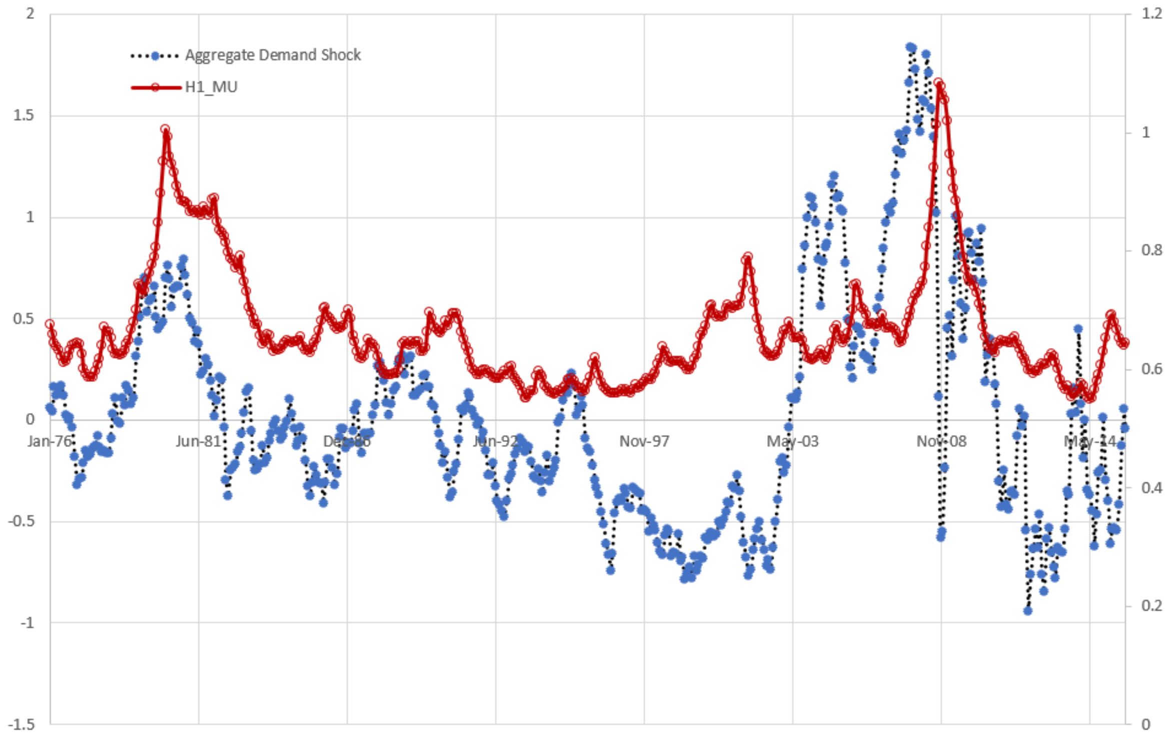
[9] The data is from the website of Federal Reserve Bank of Philadelphia. https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/dispersion-forecasts.

Quarterly forecasts for the CPI inflation rate are annualized quarter-over-quarter percent changes of the quarterly average price index level. These forecasts are seasonally adjusted, annual rate, percentage points. The quarterly price index level is the quarterly average of the underlying monthly price index levels. Uncertainty in CPI inflation is measured by the cross-sectional forecast dispersions defined as the difference between the 75th and 25th percentile forecasts. For details, we refer the readers to the Survey of Professional Forecasters website from the Federal Reserve Bank of Philadelphia.

Figure A1 shows the time-series plot of aggregate demand shocks and economic uncertainty indices developed by Jurado et al. (2015) and the CPI inflation uncertainty from SPF. We find that the correlation between aggregate demand shocks and one-, three-, and 12-month-ahead economic uncertainty indices is 0.39. To conserve space, we only show the one-month economic uncertainty time series plot in Figure A1 as the three series yield almost identical results. The correlation between aggregate demand shocks and one-period ahead forecast dispersions of CPI inflation rate is 0.40. We find both correlations are highly significant, which supports our hypothesis that there appears to be a direct link between aggregate demand shocks and macroeconomic uncertainty.

Figure A1: Time Series Plots of Aggregate Demand Shocks and Proxies for Macroeconomic Uncertainty

The top panel shows the time series plots of aggregate demand shocks vs. the 1-month ahead economic uncertainty index (H1_MU) from Jurado et al. (2015). The bottom panel shows the time series plots of aggregate demand shocks vs. CPI inflation uncertainty from Philly Fed's Survey of Professional Forecasters.



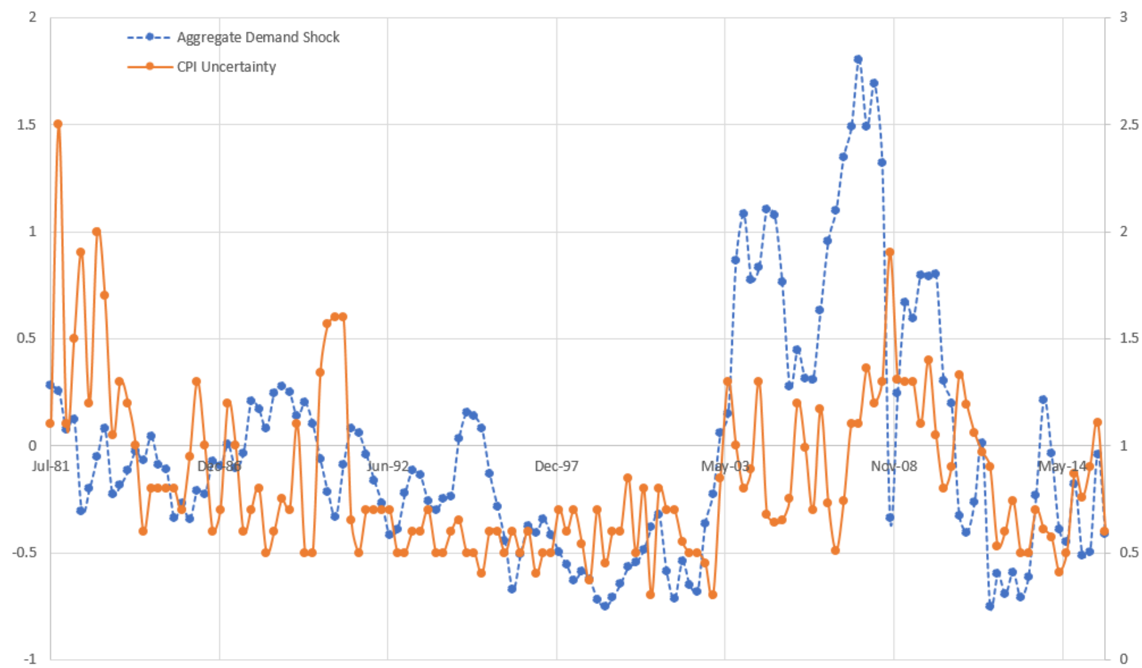


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Table 1. Returns to Anomalies

Panel A presents the average monthly returns in excess of 1-month T-bill rate and Fama and French (1993) three-factor-adjusted returns for 11 individual anomalies in the aggregate stock market. Panel B presents the average monthly excess returns and FF3 alphas for the aggregate anomaly across various industries. The aggregate anomaly is constructed based on 11 individual anomalies. Following Fama and French (1997), we use the classification of 17 industries based on 4-digit Standard Industrial Classification (SIC) codes. The sample stocks are common stocks listed in NYSE, AMEX, and NASDAQ. Stocks with prices less than $5 at the end of formation period are excluded. The holding period is 1-month. The return is equally weighted. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses. The numbers that are significant at 1%, 5%, and 10% levels are highlighted.

Panel A: Anomalies in the Aggregate Stock Market

	Excess Return			FF3 Alpha		
	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-0.18	1.33	**1.52**	-1.11	0.63	**1.74**
	(-0.58)	(6.17)	(9.14)	(-10.57)	(9.69)	(12.98)
Accrual	0.32	0.81	**0.49**	-0.56	-0.11	**0.45**
	(0.95)	(2.67)	(3.55)	(-6.22)	(-1.24)	(3.96)
Asset Growth	0.02	0.94	**0.91**	-0.81	0.01	**0.83**
	(0.06)	(3.06)	(5.51)	(-8.33)	(0.15)	(6.19)
Composite Equity Issues	0.29	1.14	**0.86**	-0.55	0.42	**0.97**
	(0.93)	(5.58)	(4.67)	(-7.58)	(5.15)	(9.23)
Distress	0.03	1.19	**1.16**	-0.98	0.51	**1.49**
	(0.09)	(5.51)	(6.06)	(-9.05)	(7.53)	(10.16)
Gross Profitability	0.46	1.08	**0.62**	-0.32	0.29	**0.61**
	(1.65)	(4.08)	(4.37)	(-3.01)	(3.69)	(4.15)
Investment to Assets	0.07	0.98	**0.91**	-0.83	0.07	**0.90**
	(0.22)	(3.57)	(6.11)	(-6.66)	(1.24)	(6.53)
Net Operating Assets	0.04	0.93	**0.89**	-0.83	0.17	**1.00**
	(0.13)	(3.63)	(5.37)	(-7.53)	(1.87)	(6.31)
Net Stock Issues	0.22	1.15	**0.93**	-0.63	0.34	**0.98**
	(0.73)	(4.79)	(6.61)	(-7.91)	(3.98)	(8.92)
O-SCORE	0.39	0.77	**0.39**	-0.53	0.08	**0.61**
	(1.06)	(3.13)	(2.26)	(-4.26)	(1.17)	(4.36)
Momentum	0.11	1.35	**1.23**	-0.95	0.53	**1.49**
	(0.31)	(3.94)	(4.40)	(-6.21)	(4.05)	(5.83)
Return on Assets	-0.12	1.19	**1.30**	-1.02	0.42	**1.44**
	(-0.30)	(4.32)	(6.00)	(-6.73)	(5.28)	(7.41)

Panel B: The Aggregate Anomaly across Industries

	Excess Return			FF3 Alpha		
	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	-0.18	1.33	**1.52**	-1.11	0.63	**1.74**
	(-0.58)	(6.17)	(9.14)	(-10.57)	(9.69)	(12.98)
Construction	0.23	1.28	**1.05**	-0.93	0.52	**1.45**
	(0.58)	(5.32)	(3.63)	(-4.23)	(3.34)	(6.16)
Consumables	0.14	1.54	**1.40**	-0.75	1.03	**1.78**
	(0.29)	(6.49)	(3.51)	(-2.45)	(6.27)	(5.62)
Consumer Durables	-0.58	1.21	**1.79**	-1.58	0.39	**1.97**
	(-1.39)	(4.35)	(6.02)	(-6.02)	(2.22)	(6.98)
Financials	0.33	1.29	**0.96**	-0.58	0.57	**1.15**
	(1.07)	(5.94)	(5.50)	(-3.26)	(5.16)	(6.78)
Food	-0.04	1.23	**1.27**	-0.90	0.73	**1.63**
	(-0.12)	(6.22)	(4.55)	(-3.63)	(4.56)	(5.98)
Machinery	-0.21	1.30	**1.51**	-1.28	0.52	**1.80**
	(-0.51)	(4.55)	(7.01)	(-8.19)	(4.36)	(9.83)
Oil	-0.36	1.22	**1.58**	-1.40	0.55	**1.95**
	(-0.65)	(4.18)	(4.28)	(-3.01)	(2.31)	(5.68)
Retail	-0.30	1.36	**1.66**	-1.31	0.60	**1.91**
	(-0.77)	(4.94)	(6.01)	(-4.66)	(3.43)	(7.46)
Transportation	-0.31	1.31	**1.62**	-1.44	0.61	**2.05**
	(-0.80)	(5.44)	(5.37)	(-5.87)	(3.88)	(6.99)
Utility	0.32	0.81	**0.49**	-0.28	0.41	**0.69**
	(1.38)	(4.61)	(2.58)	(-1.38)	(3.04)	(3.17)
Other	-0.37	1.32	**1.69**	-1.31	0.64	**1.95**
	(-0.93)	(5.76)	(6.54)	(-7.32)	(7.74)	(9.22)

Table 2. Anomalies and Oil Price Shocks: Portfolio Analysis

This table presents the average monthly returns in excess of 1-month T-bill rate and Fama and French (1993) three-factor-adjusted returns for various anomalies following high positive and negative oil price shocks. Following the structural VAR model in Kilian (2009), we decompose oil price shocks into oil supply shocks, aggregate demand shocks, and oil specific demand shocks. For each oil shocks, month t is classified as a high positive (negative) shock month if the shock index in month t is above (below) the top (bottom) 40% of the distribution of the shocks in the sample. The sample stocks are common stocks listed in NYSE, AMEX, and NASDAQ. Stocks with prices less than $5 at the end of formation period are excluded. The holding period is 1-month. The return is equally weighted. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses.

Panel A: Oil Supply Shocks (Excess Returns)

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-0.50	1.06	**1.55**	-0.36	1.34	**1.70**	-0.14	-0.28	-0.15
	(-1.06)	(3.22)	(6.73)	(-0.69)	(3.78)	(6.33)	(-0.19)	(-0.56)	(-0.42)
Accrual	-0.18	0.35	**0.53**	0.29	0.83	**0.54**	-0.47	-0.48	-0.01
	(-0.34)	(0.82)	(2.46)	(0.52)	(1.71)	(2.52)	(-0.59)	(-0.72)	(-0.03)
Asset Growth	-0.52	0.59	**1.11**	-0.03	0.90	**0.94**	-0.49	-0.31	0.18
	(-0.96)	(1.35)	(4.20)	(-0.06)	(1.95)	(3.33)	(-0.59)	(-0.49)	(0.48)
Composite Equity Issues	-0.11	0.92	**1.03**	0.22	1.23	**1.01**	-0.32	-0.31	0.02
	(-0.22)	(3.21)	(3.88)	(0.43)	(3.74)	(3.46)	(-0.45)	(-0.69)	(0.05)
Distress	-0.41	0.87	**1.28**	-0.09	1.23	**1.32**	-0.32	-0.36	-0.04
	(-0.84)	(2.61)	(4.27)	(-0.18)	(3.47)	(4.72)	(-0.43)	(-0.7)	(-0.1)
Gross Profitability	0.33	0.76	**0.42**	0.19	0.97	**0.78**	0.15	-0.21	-0.36
	(0.81)	(1.97)	(2.17)	(0.44)	(2.29)	(3.73)	(0.26)	(-0.35)	(-1.39)
Investment to Assets	-0.37	0.53	**0.90**	0.00	1.08	**1.07**	-0.38	-0.54	-0.17
	(-0.73)	(1.33)	(4.00)	(0.01)	(2.47)	(4.38)	(-0.49)	(-0.89)	(-0.54)
Net Operating Assets	-0.37	0.71	**1.08**	-0.01	0.74	**0.75**	-0.37	-0.03	0.34
	(-0.79)	(1.87)	(4.65)	(-0.01)	(1.90)	(3.04)	(-0.5)	(-0.05)	(1.09)
Net Stock Issues	-0.11	0.82	**0.92**	0.12	1.19	**1.07**	-0.22	-0.37	-0.15
	(-0.23)	(2.39)	(4.47)	(0.23)	(3.20)	(4.37)	(-0.31)	(-0.72)	(-0.47)
O-SCORE	-0.04	0.49	**0.53**	0.28	0.66	**0.37**	-0.32	-0.16	0.16
	(-0.07)	(1.28)	(2.17)	(0.51)	(1.58)	(1.64)	(-0.43)	(-0.27)	(0.53)
Momentum	-0.51	0.74	**1.24**	-0.44	1.62	**2.06**	-0.06	-0.88	-0.82
	(-1.02)	(1.45)	(3.47)	(-0.81)	(2.91)	(5.05)	(-0.08)	(-1.14)	(-1.47)
Return on Assets	-0.51	0.81	**1.33**	-0.42	1.19	**1.61**	-0.09	-0.37	-0.28
	(-0.92)	(1.93)	(4.63)	(-0.75)	(2.60)	(5.56)	(-0.12)	(-0.57)	(-0.81)

Panel B: Oil Supply Shocks (FF3 Alphas)

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-1.02	0.60	**1.63**	-1.27	0.66	**1.93**	0.24	-0.06	-0.30
	(-6.17)	(6.25)	(8.63)	(-7.54)	(6.54)	(8.72)	(1.07)	(-0.43)	(-1.10)
Accrual	-0.52	-0.15	**0.36**	-0.60	-0.08	**0.52**	0.08	-0.08	-0.16
	(-4.13)	(-1.35)	(2.25)	(-3.88)	(-0.59)	(2.99)	(0.44)	(-0.48)	(-0.74)
Asset Growth	-0.79	0.11	**0.90**	-0.89	-0.03	**0.86**	0.10	0.14	0.04
	(-5.00)	(0.83)	(3.82)	(-5.17)	(-0.23)	(4.10)	(0.44)	(0.86)	(0.14)
Composite Equity Issues	-0.47	0.35	**0.81**	-0.62	0.56	**1.17**	0.15	-0.21	**-0.36**
	(-4.07)	(3.4)	(6.05)	(-5.84)	(4.66)	(7.16)	(1.02)	(-1.58)	(-1.82)
Distress	-1.02	0.45	**1.48**	-1.08	0.57	**1.65**	0.06	-0.12	-0.18
	(-5.42)	(4.23)	(6.10)	(-5.77)	(5.45)	(6.68)	(0.21)	(-0.77)	(-0.49)
Gross Profitability	-0.04	0.34	0.37	-0.60	0.19	**0.79**	0.57	0.15	-0.42
	(-0.20)	(2.89)	(1.58)	(-4.33)	(1.45)	(3.83)	(2.79)	(0.91)	(-1.51)
Investment to Assets	-0.82	-0.01	**0.81**	-0.89	0.18	**1.06**	0.06	-0.18	-0.25
	(-4.74)	(-0.09)	(4.14)	(-5.15)	(1.85)	(5.39)	(0.31)	(-1.37)	(-1.03)
Net Operating Assets	-0.83	0.29	**1.12**	-0.86	-0.01	**0.85**	0.03	0.30	0.27
	(-5.06)	(2.15)	(4.61)	(-5.84)	(-0.04)	(4.12)	(0.16)	(1.87)	(0.98)
Net Stock Issues	-0.52	0.23	**0.74**	-0.73	0.43	**1.16**	0.22	-0.20	**-0.42**
	(-3.75)	(1.89)	(4.77)	(-6.17)	(3.46)	(6.68)	(1.24)	(-1.31)	(-1.88)
O-SCORE	-0.34	0.16	**0.50**	-0.68	-0.03	**0.65**	0.35	0.19	-0.15
	(-1.79)	(1.63)	(2.27)	(-3.86)	(-0.25)	(3.26)	(1.48)	(1.27)	(-0.54)
Momentum	-1.16	0.48	**1.64**	-1.40	0.76	**2.16**	0.24	-0.28	-0.52
	(-5.21)	(2.76)	(4.64)	(-5.47)	(3.85)	(5.32)	(0.67)	(-1.11)	(-0.96)
Return on Assets	-0.76	0.45	**1.21**	-1.37	0.44	**1.81**	0.61	0.01	**-0.60**
	(-3.98)	(3.85)	(4.89)	(-6.16)	(3.49)	(6.27)	(2.18)	(0.05)	(-1.70)

Panel C: Aggregate Demand Shocks (Excess Returns)

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	0.31	1.25	**0.94**	-0.46	1.43	**1.90**	0.77	-0.18	**-0.95**
	(0.61)	(3.72)	(4.05)	(-0.90)	(4.34)	(6.46)	(1.05)	(-0.39)	(-2.51)
Accrual	0.76	1.07	**0.31**	0.08	0.51	0.43	0.68	0.56	-0.12
	(1.51)	(2.27)	(1.92)	(0.14)	(1.06)	(1.49)	(0.87)	(0.83)	(-0.36)
Asset Growth	0.58	1.05	**0.47**	-0.43	0.84	**1.27**	1.01	0.21	**-0.80**
	(1.16)	(2.23)	(2.70)	(-0.69)	(1.75)	(3.49)	(1.25)	(0.31)	(-1.97)
Composite Equity Issues	0.70	1.00	0.30	0.04	1.30	**1.26**	0.66	-0.30	**-0.95**
	(1.52)	(2.98)	(1.58)	(0.08)	(4.38)	(3.21)	(0.94)	(-0.66)	(-2.18)
Distress	0.39	1.18	**0.79**	-0.29	1.26	**1.55**	0.68	-0.07	**-0.76**
	(0.75)	(3.66)	(2.82)	(-0.54)	(3.64)	(4.39)	(0.89)	(-0.15)	(-1.64)
Gross Profitability	0.52	1.16	**0.64**	0.51	1.08	**0.58**	0.01	0.07	0.06
	(1.36)	(2.82)	(3.69)	(1.04)	(2.57)	(2.07)	(0.02)	(0.13)	(0.19)
Investment to Assets	0.71	1.13	**0.41**	-0.47	0.85	**1.32**	1.18	0.28	**-0.91**
	(1.28)	(2.54)	(1.82)	(-0.91)	(2.05)	(5.39)	(1.54)	(0.45)	(-2.68)
Net Operating Assets	0.61	0.89	0.28	-0.40	1.16	**1.56**	1.01	-0.27	**-1.28**
	(1.25)	(2.36)	(1.15)	(-0.81)	(2.89)	(6.57)	(1.43)	(-0.48)	(-3.67)
Net Stock Issues	0.63	1.13	**0.50**	-0.06	1.21	**1.27**	0.69	-0.08	**-0.77**
	(1.39)	(2.83)	(3.46)	(-0.12)	(3.49)	(4.38)	(1.01)	(-0.15)	(-2.35)
O-SCORE	0.68	0.92	0.24	0.09	0.83	**0.75**	0.60	0.09	-0.50
	(1.31)	(2.58)	(1.14)	(0.14)	(1.89)	(2.25)	(0.73)	(0.16)	(-1.28)
Momentum	0.38	1.37	**0.99**	-0.37	1.54	**1.92**	0.75	-0.18	-0.93
	(0.63)	(2.81)	(2.28)	(-0.70)	(2.49)	(4.08)	(0.92)	(-0.23)	(-1.49)
Return on Assets	0.36	1.31	**0.94**	-0.45	1.25	**1.69**	0.81	0.06	-0.75
	(0.70)	(3.12)	(4.30)	(-0.60)	(2.81)	(3.55)	(0.89)	(0.09)	(-1.43)

Panel D: Aggregate Demand Shocks (FF3 Alphas)

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-0.80	0.42	**1.22**	-1.30	0.80	**2.09**	0.49	-0.38	**-0.87**
	(-6.58)	(4.92)	(7.30)	(-6.37)	(6.14)	(8.54)	(2.09)	(-2.35)	(-2.92)
Accrual	-0.33	-0.01	**0.32**	-0.72	-0.28	**0.43**	0.39	0.27	-0.12
	(-2.87)	(-0.08)	(2.23)	(-4.28)	(-1.77)	(1.97)	(1.89)	(1.40)	(-0.44)
Asset Growth	-0.47	-0.05	**0.43**	-1.19	0.05	**1.24**	0.72	-0.10	**-0.82**
	(-4.81)	(-0.44)	(3.27)	(-6.06)	(0.33)	(4.50)	(3.21)	(-0.52)	(-2.65)
Composite Equity Issues	-0.33	0.18	**0.51**	-0.72	0.65	**1.37**	0.39	-0.47	**-0.86**
	(-3.58)	(1.92)	(4.40)	(-5.57)	(4.23)	(7.70)	(2.50)	(-2.67)	(-4.17)
Distress	-0.80	0.38	**1.18**	-1.18	0.64	**1.82**	0.38	-0.26	**-0.65**
	(-5.36)	(4.63)	(6.31)	(-5.8)	(4.39)	(5.81)	(1.51)	(-1.52)	(-1.71)
Gross Profitability	-0.42	0.21	**0.63**	-0.17	0.38	**0.55**	-0.25	-0.17	0.08
	(-2.79)	(1.99)	(3.40)	(-0.86)	(2.59)	(1.86)	(-1.00)	(-0.93)	(0.23)
Investment to Assets	-0.38	0.06	**0.44**	-1.29	0.07	**1.35**	0.91	-0.01	**-0.92**
	(-2.11)	(0.71)	(2.31)	(-7.21)	(0.69)	(6.72)	(3.63)	(-0.06)	(-3.42)
Net Operating Assets	-0.44	-0.01	**0.43**	-1.19	0.49	**1.68**	0.75	-0.50	**-1.25**
	(-3.20)	(-0.05)	(2.00)	(-6.27)	(3.94)	(7.18)	(3.23)	(-2.77)	(-3.91)
Net Stock Issues	-0.41	0.21	**0.61**	-0.83	0.49	**1.32**	0.43	-0.28	**-0.71**
	(-4.27)	(2.01)	(4.67)	(-5.62)	(3.00)	(7.53)	(2.40)	(-1.50)	(-3.36)
O-SCORE	-0.45	0.06	**0.51**	-0.69	0.18	**0.87**	0.24	-0.11	-0.36
	(-2.82)	(0.90)	(2.96)	(-2.59)	(1.31)	(2.89)	(0.78)	(-0.74)	(-1.02)
Momentum	-0.81	0.33	**1.14**	-1.30	0.80	**2.10**	0.50	-0.47	**-0.96**
	(-3.86)	(1.75)	(3.14)	(-4.64)	(3.47)	(4.73)	(1.46)	(-1.64)	(-1.76)
Return on Assets	-0.76	0.37	**1.14**	-1.22	0.54	**1.76**	0.46	-0.17	-0.63
	(-4.22)	(3.87)	(5.40)	(-3.74)	(3.33)	(4.05)	(1.23)	(-0.91)	(-1.29)

Panel E: Oil Specific Demand Shocks (Excess Returns)

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	0.19	1.52	**1.33**	-0.20	1.47	**1.68**	0.39	0.05	-0.34
	(0.40)	(4.48)	(6.00)	(-0.43)	(4.72)	(6.51)	(0.60)	(0.11)	(-1.02)
Accrual	0.61	0.90	0.29	0.34	1.01	**0.66**	0.27	-0.10	-0.37
	(1.16)	(1.96)	(1.39)	(0.73)	(2.40)	(3.51)	(0.39)	(-0.17)	(-1.30)
Asset Growth	0.24	1.02	**0.78**	0.13	1.19	**1.05**	0.11	-0.17	-0.28
	(0.42)	(2.17)	(2.83)	(0.28)	(2.74)	(5.82)	(0.15)	(-0.27)	(-0.84)
Composite Equity Issues	0.48	1.34	**0.87**	0.44	1.22	**0.78**	0.03	0.12	0.09
	(0.95)	(4.41)	(2.97)	(1.04)	(3.81)	(3.62)	(0.05)	(0.29)	(0.24)
Distress	0.35	1.42	**1.07**	0.24	1.21	**0.97**	0.10	0.21	0.10
	(0.71)	(4.20)	(3.77)	(0.47)	(3.85)	(3.20)	(0.15)	(0.46)	(0.25)
Gross Profitability	0.69	1.29	**0.60**	0.50	1.25	**0.75**	0.19	0.04	-0.15
	(1.75)	(3.22)	(2.95)	(1.19)	(3.11)	(3.50)	(0.34)	(0.08)	(-0.51)
Investment to Assets	0.16	1.12	**0.96**	0.23	1.21	**0.98**	-0.07	-0.08	-0.02
	(0.29)	(2.62)	(3.65)	(0.47)	(2.98)	(5.50)	(-0.09)	(-0.15)	(-0.06)
Net Operating Assets	0.25	1.09	**0.84**	0.09	1.04	**0.96**	0.16	0.05	-0.11
	(0.49)	(2.93)	(3.08)	(0.19)	(2.62)	(4.22)	(0.24)	(0.09)	(-0.32)
Net Stock Issues	0.43	1.31	**0.88**	0.33	1.30	**0.97**	0.10	0.01	-0.09
	(0.89)	(3.58)	(4.56)	(0.75)	(3.55)	(4.94)	(0.16)	(0.03)	(-0.32)
O-SCORE	0.59	0.94	0.34	0.44	0.97	**0.53**	0.16	-0.03	-0.19
	(1.11)	(2.56)	(1.25)	(0.86)	(2.60)	(2.29)	(0.22)	(-0.06)	(-0.52)
Momentum	0.12	1.43	**1.31**	0.07	1.62	**1.55**	0.05	-0.19	-0.24
	(0.24)	(2.54)	(3.43)	(0.12)	(3.32)	(3.26)	(0.07)	(-0.26)	(-0.39)
Return on Assets	-0.05	1.28	**1.32**	0.14	1.46	**1.32**	-0.19	-0.18	0.01
	(-0.08)	(2.96)	(4.12)	(0.26)	(3.58)	(4.67)	(-0.25)	(-0.32)	(0.01)

Panel F: Oil Specific Demand Shocks (FF3 Alphas)

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-0.90	0.70	**1.60**	-1.38	0.57	**1.95**	0.47	0.13	-0.35
	(-6.45)	(6.73)	(8.85)	(-8.45)	(6.04)	(9.62)	(2.16)	(0.85)	(-1.26)
Accrual	-0.41	-0.21	0.19	-0.76	-0.08	**0.68**	0.35	-0.14	**-0.49**
	(-2.93)	(-1.67)	(1.22)	(-5.67)	(-0.69)	(4.41)	(1.74)	(-0.87)	(-2.17)
Asset Growth	-0.72	-0.13	**0.59**	-0.93	0.13	**1.05**	0.20	-0.26	**-0.46**
	(-4.62)	(-1.09)	(3.07)	(-6.05)	(1.23)	(6.41)	(0.88)	(-1.69)	(-1.72)
Composite Equity Issues	-0.49	0.49	**0.98**	-0.61	0.30	**0.91**	0.12	0.19	0.07
	(-4.31)	(4.56)	(6.31)	(-5.54)	(3.17)	(6.80)	(0.75)	(1.39)	(0.38)
Distress	-0.87	0.62	**1.49**	-0.99	0.35	**1.34**	0.12	0.28	0.16
	(-4.19)	(5.65)	(5.68)	(-6.72)	(3.09)	(6.06)	(0.46)	(1.70)	(0.45)
Gross Profitability	-0.26	0.35	**0.61**	-0.42	0.27	**0.69**	0.16	0.08	-0.08
	(-1.66)	(2.67)	(2.86)	(-2.60)	(2.38)	(3.06)	(0.72)	(0.44)	(-0.26)
Investment to Assets	-0.89	0.00	**0.89**	-0.93	0.14	**1.06**	0.04	-0.14	-0.17
	(-4.11)	(0.04)	(4.02)	(-5.36)	(1.72)	(6.06)	(0.14)	(-1.13)	(-0.64)
Net Operating Assets	-0.76	0.19	**0.95**	-1.03	0.12	**1.15**	0.26	0.06	-0.20
	(-4.56)	(1.45)	(3.82)	(-6.23)	(0.84)	(5.06)	(1.11)	(0.32)	(-0.59)
Net Stock Issues	-0.57	0.36	**0.93**	-0.74	0.28	**1.02**	0.17	0.08	-0.09
	(-5.46)	(2.96)	(6.80)	(-5.77)	(2.79)	(6.76)	(1.06)	(0.51)	(-0.47)
O-SCORE	-0.55	0.15	**0.70**	-0.59	0.04	**0.63**	0.04	0.11	0.08
	(-3.27)	(1.33)	(3.10)	(-3.21)	(0.38)	(2.90)	(0.15)	(0.70)	(0.24)
Momentum	-1.10	0.40	**1.50**	-1.20	0.65	**1.85**	0.10	-0.26	-0.35
	(-4.66)	(2.12)	(3.98)	(-4.37)	(2.87)	(4.07)	(0.26)	(-0.88)	(-0.59)
Return on Assets	-1.15	0.41	**1.56**	-0.88	0.47	**1.34**	-0.27	-0.05	0.22
	(-5.47)	(3.31)	(5.42)	(-3.85)	(3.63)	(4.76)	(-0.87)	(-0.28)	(0.51)

Table 3. Anomalies and Oil Price Shocks: Predictive Regression Analysis

This table presents average coefficients for the predictive regressions:

$$R_{i\,t} = a + \beta_1 OS_{t-1} + \beta_x Control_t + \varepsilon_t$$

The dependent variable, $R_{i\,t}$, is the excess returns of the long, the short, and the long-short portfolio of each anomaly, respectively. OS_{t-1} refers to one-month lagged oil price shocks. The control variables include Fama-French (1993) three factors when we control them. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses.

Panel A: Oil Supply Shocks

	Excess Return			FF3 Factors		
	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-15.27	-10.36	4.91	-0.31	-1.19	-0.88
	(-0.76)	(-0.70)	(0.56)	(-0.05)	(-0.30)	(-0.12)
Accrual	-23.46	-22.72	0.75	-2.69	-7.34	-3.97
	(-1.04)	(-1.28)	(0.08)	(-0.53)	(-1.58)	(-0.55)
Asset Growth	-23.13	-17.64	5.48	-1.05	-0.63	2.03
	(-1.03)	(-1.00)	(0.55)	(-0.19)	(-0.13)	(0.26)
Composite Equity Issues	-16.64	-11.75	4.89	1.49	-7.20	-8.29
	(-0.82)	(-0.87)	(0.48)	(0.34)	(-1.77)	(-1.56)
Distress	-16.02	-13.10	2.92	-1.22	-3.46	2.65
	(-0.81)	(-0.89)	(0.26)	(-0.16)	(-0.84)	(0.42)
Gross Profitability	-0.53	-7.59	-7.06	15.22	6.38	-9.17
	(-0.04)	(-0.43)	(-0.99)	(2.58)	(1.27)	(-1.15)
Investment to Assets	-20.96	-20.83	0.13	-3.92	-6.92	-1.30
	(-0.97)	(-1.17)	(0.01)	(-0.64)	(-1.84)	(-0.18)
Net Operating Assets	-19.71	-1.47	**18.24**	-4.27	11.24	**17.02**
	(-0.97)	(-0.10)	(1.71)	(-0.71)	(2.21)	(1.71)
Net Stock Issues	-12.52	-14.73	-2.22	4.30	-7.50	**-10.90**
	(-0.67)	(-0.93)	(-0.32)	(0.87)	(-1.62)	(-2.04)
O-SCORE	-22.92	-10.70	12.23	1.66	3.19	0.46
	(-1.12)	(-0.64)	(1.41)	(0.25)	(0.75)	(0.06)
Momentum	-12.18	-28.73	-16.55	0.44	-6.18	4.35
	(-0.58)	(-1.26)	(-0.96)	(0.04)	(-0.81)	(0.59)
Return on Assets	-9.37	-14.64	-5.27	16.65	0.17	-14.78
	(-0.49)	(-0.78)	(-0.58)	(1.88)	(0.04)	(-1.49)

Panel B: Aggregate Demand Shocks

	Excess Return			FF3 Factors		
	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	0.25	-0.47	**-0.72**	0.33	-0.40	**-0.73**
	(0.37)	(-1.13)	(-2.20)	(1.52)	(-3.47)	(-2.93)
Accrual	0.26	0.06	-0.20	0.33	0.09	-0.24
	(0.38)	(0.10)	(-0.73)	(1.92)	(0.49)	(-1.04)
Asset Growth	0.42	-0.35	**-0.78**	0.49	-0.35	**-0.85**
	(0.60)	(-0.57)	(-2.52)	(2.50)	(-2.07)	(-3.20)
Composite Equity Issues	0.11	-0.49	**-0.60**	0.18	-0.42	**-0.60**
	(0.18)	(-1.18)	(-1.78)	(1.47)	(-2.73)	(-3.73)
Distress	0.17	-0.30	-0.46	0.22	-0.24	-0.46
	(0.23)	(-0.70)	(-1.08)	(0.80)	(-1.60)	(-1.31)
Gross Profitability	-0.48	-0.23	0.24	-0.46	-0.18	0.28
	(-0.92)	(-0.43)	(0.94)	(-2.21)	(-1.18)	(0.98)
Investment to Assets	0.60	-0.17	**-0.78**	0.69	-0.15	**-0.84**
	(0.86)	(-0.30)	(-2.47)	(2.79)	(-1.41)	(-3.35)
Net Operating Assets	0.62	-0.59	**-1.21**	0.70	-0.56	**-1.26**
	(0.97)	(-1.29)	(-4.12)	(3.54)	(-4.42)	(-5.07)
Net Stock Issues	0.13	-0.34	**-0.47**	0.19	-0.27	**-0.46**
	(0.21)	(-0.69)	(-1.81)	(1.37)	(-1.62)	(-2.81)
O-SCORE	-0.18	-0.13	0.05	-0.20	-0.03	0.17
	(-0.23)	(-0.26)	(0.14)	(-0.75)	(-0.29)	(0.56)
Momentum	0.31	-0.58	-0.90	0.40	-0.57	**-0.98**
	(0.42)	(-0.88)	(-1.59)	(1.40)	(-2.27)	(-2.04)
Return on Assets	0.14	-0.29	-0.42	0.13	-0.20	-0.32
	(0.17)	(-0.55)	(-0.96)	(0.41)	(-1.49)	(-0.82)

Panel C: Oil Specific Demand Shocks

	Excess Return			FF3 Factors		
	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	0.62	0.18	-0.44	0.49	0.11	-0.38
	(0.93)	(0.40)	(-1.30)	(2.48)	(0.72)	(-1.43)
Accrual	0.60	0.12	-0.48	0.46	-0.13	**-0.59**
	(0.82)	(0.19)	(-1.57)	(2.28)	(-0.71)	(-2.66)
Asset Growth	0.32	0.07	-0.24	0.19	-0.24	**-0.43**
	(0.42)	(0.11)	(-0.78)	(0.88)	(-1.36)	(-1.71)
Composite Equity Issues	0.21	0.29	0.08	0.09	0.23	0.14
	(0.32)	(0.69)	(0.21)	(0.54)	(1.66)	(0.64)
Distress	0.27	0.35	0.08	0.06	0.28	0.21
	(0.38)	(0.76)	(0.19)	(0.24)	(1.57)	(0.56)
Gross Profitability	0.34	0.24	-0.11	0.12	0.09	-0.03
	(0.57)	(0.42)	(-0.34)	(0.46)	(0.48)	(-0.09)
Investment to Assets	0.16	0.17	0.01	0.05	-0.09	-0.15
	(0.22)	(0.30)	(0.02)	(0.19)	(-0.73)	(-0.55)
Net Operating Assets	0.50	0.15	-0.35	0.41	-0.01	-0.41
	(0.75)	(0.26)	(-0.93)	(1.62)	(-0.04)	(-1.09)
Net Stock Issues	0.23	0.28	0.05	0.10	0.19	0.09
	(0.35)	(0.57)	(0.18)	(0.60)	(1.26)	(0.44)
O-SCORE	0.38	0.03	-0.35	0.00	0.01	0.01
	(0.5)	(0.05)	(-0.92)	(0.00)	(0.08)	(0.03)
Momentum	0.13	-0.08	-0.21	-0.01	-0.35	-0.34
	(0.18)	(-0.10)	(-0.37)	(-0.02)	(-1.09)	(-0.58)
Return on Assets	-0.07	-0.13	-0.06	-0.41	-0.18	0.23
	(-0.08)	(-0.22)	(-0.14)	(-1.13)	(-0.95)	(0.50)

Table 4: Anomalies, Oil Price Shocks, and Uncertainty Proxies: Portfolio Analysis

This table presents the average monthly Fama and French (1993) three-factor-adjusted returns for anomalies following high positive and negative *aggregate demand shocks* in high and low subsamples of information-uncertainty proxies such as the idiosyncratic volatility (IVOL) and firm size. First, we equally assign stocks into three portfolios based on the information-uncertainty measure; then we independently assign stocks into decile portfolios based on each anomaly measure. Then we intersect these portfolios to get 30 (3x10) portfolios. Month t is classified as a high positive (negative) shock month if the aggregate demand shock index in month t is above (below) the top (bottom) 40% of the distribution of the shocks in the sample. The sample stocks are common stocks listed in NYSE, AMEX, and NASDAQ. Stocks with prices less than $5 at the end of formation period are excluded. The holding period is 1-month. The return is equally weighted. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses.

Panel A: Idiosyncratic Volatility

	Low IVOL			High IVOL			High - Low IVOL		
	Positive	Negative	Pos. - Neg.	Positive	Negative	Pos. - Neg.	Positive	Negative	Pos. - Neg.
Aggregate	0.72	0.83	-0.11	1.76	2.92	**-1.15**	1.04	2.09	**-1.05**
	(4.97)	(5.13)	(-0.52)	(7.63)	(8.48)	(-2.79)	(4.43)	(6.80)	(-2.70)
Accrual	0.08	0.41	-0.33	0.52	0.40	0.11	0.44	-0.01	0.45
	(0.51)	(1.64)	(-1.16)	(2.58)	(1.42)	(0.34)	(2.13)	(-0.02)	(1.36)
Asset Growth	0.15	0.20	-0.04	0.65	1.34	**-0.69**	0.50	1.15	**-0.65**
	(0.88)	(0.90)	(-0.16)	(3.73)	(4.13)	(-1.86)	(2.30)	(3.54)	(-1.65)
Composite Equity Issues	0.33	0.42	-0.09	0.66	1.77	**-1.11**	0.34	1.35	**-1.02**
	(2.55)	(3.04)	(-0.50)	(3.55)	(7.25)	(-3.75)	(1.63)	(4.96)	(-3.02)
Distress	0.83	1.19	-0.36	1.45	2.48	**-1.04**	0.62	1.29	-0.68
	(3.82)	(4.63)	(-1.09)	(5.89)	(6.11)	(-2.13)	(2.40)	(3.32)	(-1.47)
Gross Profitability	0.29	-0.11	0.39	1.14	1.05	0.09	0.85	1.15	-0.30
	(1.30)	(-0.56)	(1.37)	(4.35)	(2.37)	(0.18)	(3.13)	(2.52)	(-0.57)
Investment to Assets	0.17	0.86	**-0.69**	0.72	1.72	**-1.01**	0.54	0.86	-0.32
	(0.96)	(5.77)	(-3.04)	(3.48)	(6.06)	(-2.91)	(2.84)	(2.87)	(-0.88)
Net Operating Assets	0.28	1.07	**-0.80**	0.58	2.07	**-1.49**	0.30	0.99	-0.70
	(1.42)	(5.05)	(-2.77)	(2.08)	(5.84)	(-3.27)	(1.34)	(2.65)	(-1.55)
Net Stock Issues	0.38	0.52	-0.14	0.83	1.68	**-0.85**	0.45	1.16	**-0.71**
	(2.54)	(4.80)	(-0.78)	(4.40)	(6.37)	(-2.66)	(2.05)	(4.30)	(-2.05)
O-SCORE	0.24	0.09	0.15	0.55	1.00	-0.45	0.31	0.91	-0.60
	(1.07)	(0.32)	(0.42)	(2.57)	(2.79)	(-1.08)	(1.20)	(2.34)	(-1.28)
Momentum	0.88	1.01	-0.13	1.28	2.54	**-1.26**	0.40	1.53	**-1.14**
	(2.52)	(2.17)	(-0.23)	(3.39)	(5.66)	(-2.19)	(1.53)	(3.33)	(-2.14)
Return on Assets	0.67	0.79	-0.12	1.26	1.85	-0.60	0.59	1.06	-0.47
	(3.79)	(2.57)	(-0.34)	(5.04)	(4.02)	(-1.13)	(2.40)	(2.60)	(-1.00)

Panel B: Firm Size

	Small Stocks			Large Stocks			Large Stocks - Small Stocks		
	Positive	Negative	Pos. - Neg.	Positive	Negative	Pos. - Neg.	Positive	Negative	Pos. - Neg.
Aggregate	1.63	2.48	**-0.85**	0.92	1.44	-0.52	-0.72	-1.04	0.32
	(9.6)	(11.42)	(-3.02)	(3.93)	(4.65)	(-1.37)	(-3.10)	(-4.19)	(0.95)
Accrual	0.31	0.47	-0.17	0.10	0.13	-0.04	-0.21	-0.34	0.13
	(1.74)	(1.60)	(-0.49)	(0.43)	(0.51)	(-0.11)	(-0.81)	(-1.01)	(0.30)
Asset Growth	0.56	1.49	**-0.93**	0.05	0.94	**-0.89**	-0.51	-0.55	0.04
	(3.44)	(4.51)	(-2.51)	(0.26)	(3.26)	(-2.61)	(-2.25)	(-1.51)	(0.09)
Composite Equity Issues	1.44	1.89	-0.45	1.39	1.70	-0.31	-0.05	-0.19	0.14
	(7.77)	(7.07)	(-1.32)	(3.90)	(3.48)	(-0.52)	(-0.15)	(-0.42)	(0.27)
Distress	1.44	1.89	-0.45	1.39	1.70	-0.31	-0.05	-0.19	0.14
	(7.77)	(7.07)	(-1.32)	(3.90)	(3.48)	(-0.52)	(-0.15)	(-0.42)	(0.27)
Gross Profitability	0.87	0.32	**0.56**	0.43	0.56	-0.12	-0.44	0.24	-0.68
	(3.60)	(1.51)	(1.73)	(2.09)	(1.27)	(-0.25)	(-1.51)	(0.60)	(-1.44)
Investment to Assets	0.59	1.46	**-0.87**	0.18	0.95	**-0.77**	-0.41	-0.51	0.11
	(2.73)	(5.94)	(-2.67)	(0.80)	(4.07)	(-2.43)	(-1.95)	(-1.74)	(0.30)
Net Operating Assets	0.75	1.70	**-0.95**	0.14	1.31	**-1.16**	-0.61	-0.39	-0.22
	(3.08)	(7.90)	(-2.94)	(0.66)	(4.41)	(-3.21)	(-2.35)	(-1.34)	(-0.55)
Net Stock Issues	0.66	1.67	**-1.01**	0.46	0.85	-0.40	-0.20	-0.82	**0.62**
	(3.45)	(7.99)	(-3.88)	(2.94)	(4.16)	(-1.57)	(-0.83)	(-3.38)	(1.97)
O-SCORE	0.86	0.97	-0.11	0.11	0.45	-0.34	-0.75	-0.52	-0.23
	(4.16)	(2.97)	(-0.28)	(0.34)	(0.93)	(-0.58)	(-2.02)	(-1.18)	(-0.41)
Momentum	1.32	2.20	**-0.88**	1.02	1.76	-0.73	-0.30	-0.45	0.15
	(3.87)	(5.53)	(-1.71)	(2.27)	(3.26)	(-1.11)	(-1.02)	(-1.19)	(0.32)
Return on Assets	1.87	2.11	-0.23	0.59	0.76	-0.17	-1.28	-1.34	0.06
	(8.15)	(4.74)	(-0.46)	(2.15)	(1.45)	(-0.29)	(-5.87)	(-3.57)	(0.14)

Table 5. Anomalies, Oil Price Shocks, and Information Uncertainty Proxies: Predictive Regression Analysis

This table presents average coefficients for the predictive regressions in high and low information-uncertainty subsamples:

$$R_{i\ t} = a + \beta_1 OS_{t-1} + \beta_x Control_t + \varepsilon_t$$

The dependent variable, $R_{i\ t}$, is the excess returns of the long, the short, and the long-short portfolio of each anomaly, respectively. OS_{t-1} refers to one-month lagged aggregate demand shocks. The control variables include Fama-French (1993) three factors. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses.

Panel A: Idiosyncratic Volatility

	Low IVOL			High IVOL			High - Low IVOL		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	-0.09	-0.14	-0.05	0.35	-0.66	**-1.01**	0.44	-0.52	**-0.96**
	(-0.42)	(-0.95)	(-0.32)	(1.47)	(-3.54)	(-2.97)	(1.63)	(-2.20)	(-3.27)
Accrual	0.44	0.03	**-0.41**	0.25	0.18	-0.07	-0.19	0.15	0.34
	(1.98)	(0.16)	(-1.78)	(1.11)	(0.74)	(-0.22)	(-0.66)	(0.58)	(1.29)
Asset Growth	0.19	-0.18	-0.37	0.30	-0.41	**-0.72**	0.12	-0.23	-0.35
	(0.84)	(-0.98)	(-1.63)	(1.30)	(-1.51)	(-2.15)	(0.39)	(-0.63)	(-1.02)
Composite Equity Issues	-0.16	-0.35	-0.19	0.20	-0.46	**-0.66**	0.36	-0.11	**-0.47**
	(-0.81)	(-2.03)	(-1.46)	(1.35)	(-2.64)	(-2.89)	(1.36)	(-0.60)	(-1.83)
Distress	0.26	0.01	-0.24	0.30	-0.56	**-0.86**	0.04	-0.58	-0.62
	(0.85)	(0.09)	(-0.79)	(1.00)	(-2.51)	(-2.11)	(0.13)	(-2.31)	(-1.54)
Gross Profitability	-0.40	-0.03	0.37	-0.55	-0.27	0.29	-0.15	-0.23	-0.09
	(-1.89)	(-0.18)	(1.61)	(-1.42)	(-1.29)	(0.65)	(-0.31)	(-1.07)	(-0.20)
Investment to Assets	0.66	-0.04	**-0.71**	0.59	-0.18	**-0.77**	-0.08	-0.13	-0.06
	(2.29)	(-0.26)	(-2.69)	(2.28)	(-0.90)	(-2.64)	(-0.24)	(-0.46)	(-0.20)
Net Operating Assets	0.45	-0.49	**-0.94**	0.85	-0.65	**-1.50**	0.40	-0.16	-0.56
	(2.21)	(-2.51)	(-4.66)	(3.50)	(-2.49)	(-4.00)	(1.57)	(-0.43)	(-1.56)
Net Stock Issues	-0.14	-0.24	-0.11	0.23	-0.28	**-0.52**	0.37	-0.04	-0.41
	(-0.76)	(-1.27)	(-0.74)	(1.29)	(-1.36)	(-1.87)	(1.37)	(-0.16)	(-1.31)
O-SCORE	-0.32	0.04	0.36	-0.18	-0.29	-0.11	0.14	-0.33	-0.47
	(-1.02)	(0.36)	(1.08)	(-0.57)	(-1.66)	(-0.32)	(0.33)	(-1.86)	(-1.19)
Momentum	0.10	0.18	0.08	0.48	-0.62	**-1.11**	0.39	-0.80	**-1.19**
	(0.3)	(0.68)	(0.19)	(1.64)	(-2.01)	(-2.10)	(1.41)	(-1.92)	(-2.46)
Return on Assets	-0.17	-0.07	0.10	0.07	-0.34	-0.41	0.24	-0.27	-0.51
	(-	(-	(0.35)	(0.20)	(-	(-0.95)	(0.64)	(-	(-1.27)

0.68)	0.45)	1.81)	1.29)

Panel B: Firm Size

	Small Stocks			Large Stocks			Large Stocks - Small Stocks		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
Aggregate	0.08	-0.58	**-0.66**	0.25	-0.25	-0.50	0.17	0.33	0.17
	(0.35)	(-3.07)	(-2.84)	(0.86)	(-2.22)	(-1.51)	(0.67)	(1.68)	(0.57)
Accrual	0.40	0.06	-0.34	0.14	0.29	0.15	-0.27	0.22	0.49
	(1.59)	(0.31)	(-1.16)	(0.6)	(1.22)	(0.55)	(-0.87)	(0.93)	(1.46)
Asset Growth	0.60	-0.35	**-0.94**	0.48	-0.31	**-0.79**	-0.12	0.04	0.16
	(2.23)	(-1.56)	(-2.98)	(2.34)	(-2.11)	(-3.36)	(-0.44)	(0.16)	(0.48)
Composite Equity Issues	0.12	-0.71	**-0.83**	0.27	-0.16	**-0.43**	0.15	0.55	**0.40**
	(0.55)	(-3.27)	(-4.25)	(1.79)	(-1.04)	(-2.16)	(0.63)	(2.67)	(1.69)
Distress	0.02	-0.31	-0.34	-0.31	-0.13	0.18	-0.34	0.18	0.52
	(0.10)	(-1.44)	(-1.20)	(-0.58)	(-0.8)	(0.30)	(-0.80)	(0.87)	(1.03)
Gross Profitability	-0.62	-0.05	**0.58**	-0.37	-0.24	0.14	0.25	-0.19	-0.44
	(-3.09)	(-0.22)	(2.19)	(-1.43)	(-1.28)	(0.35)	(0.81)	(-0.90)	(-1.14)
Investment to Assets	0.45	-0.17	**-0.63**	0.81	0.06	**-0.75**	0.35	0.23	-0.12
	(1.69)	(-0.96)	(-2.29)	(2.57)	(0.44)	(-2.38)	(1.20)	(1.09)	(-0.39)
Net Operating Assets	0.69	-0.41	**-1.10**	0.68	-0.36	**-1.04**	0.00	0.05	0.06
	(2.86)	(-1.86)	(-4.74)	(3.02)	(-1.89)	(-3.42)	(-0.02)	(0.17)	(0.18)
Net Stock Issues	0.12	-0.47	**-0.60**	0.18	-0.16	**-0.35**	0.06	0.31	0.25
	(0.53)	(-1.91)	(-2.95)	(1.00)	(-1.09)	(-1.76)	(0.26)	(1.36)	(0.99)
O-SCORE	-0.13	0.12	0.26	-0.17	-0.10	0.07	-0.04	-0.22	-0.18
	(-0.46)	(0.69)	(0.77)	(-0.42)	(-0.73)	(0.17)	(-0.10)	(-1.02)	(-0.44)
Momentum	0.33	-0.59	**-0.92**	0.36	-0.37	-0.73	0.03	0.22	0.19
	(1.18)	(-1.82)	(-2.21)	(0.86)	(-1.17)	(-1.14)	(0.10)	(0.65)	(0.43)
Return on Assets	0.02	-0.03	-0.04	-0.18	-0.18	0.00	-0.19	-0.15	0.04
	(0.05)	(-0.11)	(-0.10)	(-0.46)	(-1.35)	(-0.01)	(-0.60)	(-0.69)	(0.11)

Table 6. Oil Price Shocks versus Other Macro Factors

This table presents average coefficients for the predictive regressions:

$$R_{i\,t} = a + \beta_1 OS_{t-1} + \beta_2 MV_{t-1} + \beta_x FF3_t + \varepsilon_t$$

The dependent variable, $R_{i\,t}$, is the excess returns of the long-short portfolio of anomalies, respectively. OS_{t-1} refers to one-month lagged aggregate demand shocks (ADS). MV_{t-1} refers to one-month lagged macro variables such as investor sentiment, VIX, market volatility, VRP, economic policy uncertainty (EPU), industrial production growth (IPG), or the aggregate market attention (ATT). The control variables include Fama and French three factors. The sample period is from January 1976 to October 2015 except for ATT. The sample period for ATT is from January 1980 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses. Panel A reports the results for anomalies in the aggregate stock market. Panel B reports the results for the aggregate anomaly across industries.

	Regression 1		Regression 2		Regression 3		Regression 4		Regression 5		Regression 6		Regression 7	
	ADS	Sentiment	ADS	VIX	ADS	MKTVOL	ADS	VRP	ADS	EPU	ADS	IPG	Shock 2	ATT
Aggregate	**-0.58**	**0.59**	**-0.76**	-0.02	**-0.73**	-0.21	**-0.72**	0.27	**-0.80**	-0.60	**-0.72**	0.07	**-0.67**	**1.12**
	(-2.61)	(3.81)	(-2.74)	(-0.64)	(-2.89)	(-0.64)	(-2.72)	(0.32)	(-2.84)	(-1.35)	(-2.93)	(0.34)	(-2.78)	(2.11)
Accrual	-0.20	0.15	-0.22	0.01	-0.24	1.06	-0.19	0.78	-0.26	-0.30	-0.23	0.10	-0.25	0.28
	(-0.86)	(1.43)	(-0.87)	(0.44)	(-1.04)	(0.05)	(-0.78)	(1.33)	(-0.99)	(-0.67)	(-1.00)	(0.79)	(-1.05)	(0.62)
Asset Growth	**-0.77**	**0.33**	**-0.84**	0.01	**-0.84**	0.16	**-0.82**	0.64	**-0.91**	-0.50	**-0.84**	0.10	**-0.81**	**1.22**
	(-3.05)	(2.37)	(-3.03)	(0.68)	(-3.22)	(0.76)	(-3.00)	(0.91)	(-3.05)	(-0.98)	(-3.18)	(0.68)	(-3.21)	(2.26)
Composite Equity Issues	**-0.54**	**0.23**	**-0.56**	**0.04**	**-0.59**	**0.31**	**-0.59**	0.31	**-0.55**	0.35	**-0.62**	-0.20	**-0.55**	0.57
	(-3.54)	(2.43)	(-3.36)	(2.75)	(-3.77)	(1.78)	(-3.46)	(0.52)	(-3.25)	(1.50)	(-3.82)	(-1.31)	(-3.40)	(1.44)
Distress	-0.30	**0.62**	-0.52	-0.02	-0.46	-0.94	-0.51	-0.30	-0.60	**-0.90**	-0.44	0.21	-0.44	1.08
	(-0.97)	(3.44)	(-1.34)	(-0.42)	(-1.31)	(-0.23)	(-1.29)	(-0.30)	(-1.54)	(-1.95)	(-1.26)	(0.84)	(-1.28)	(1.43)
Gross Profitability	0.34	0.25	0.30	**0.06**	0.29	**0.46**	0.29	**1.35**	0.30	0.53	0.26	-0.19	0.30	-0.08
	(1.28)	(1.27)	(1.06)	(2.61)	(1.03)	(1.69)	(1.04)	(2.00)	(1.03)	(1.13)	(0.92)	(-0.87)	(1.02)	(-0.12)
Investment to Assets	**-0.74**	**0.41**	**-0.82**	-0.01	**-0.84**	0.10	**-0.81**	-0.07	**-0.87**	-0.20	**-0.86**	-0.16	**-0.81**	**1.18**
	(-2.92)	(3.66)	(-2.86)	(-0.22)	(-3.29)	(0.32)	(-3.11)	(-0.08)	(-2.84)	(-0.30)	(-3.53)	(-0.83)	(-3.22)	(2.23)
Net Operating Assets	**-1.17**	**0.37**	**-1.23**	-0.01	**-1.26**	0.95	**-1.22**	-0.20	**-1.31**	-0.70	**-1.27**	-0.10	**-1.20**	**1.09**
	(-4.90)	(2.28)	(-4.68)	(-0.38)	(-5.02)	(0.03)	(-5.18)	(-0.18)	(-4.79)	(-1.37)	(-5.21)	(-0.50)	(-5.04)	(1.89)

Net Stock Issues	**-0.42**	0.14	**-0.47**	**0.03**	**-0.45**	0.23	**-0.49**	0.45	**-0.49**	0.36	**-0.45**	0.09	**-0.43**	**0.72**
	(-2.60)	(1.17)	(-2.81)	(2.26)	(-2.80)	(1.46)	(-2.91)	(0.85)	(-2.86)	(1.28)	(-2.81)	(0.51)	(-2.43)	(1.79)
O-SCORE	0.31	**0.58**	0.22	**0.05**	0.19	**0.67**	0.17	0.31	0.26	0.73	0.12	**-0.46**	0.25	**1.34**
	(1.13)	(3.68)	(0.75)	(2.00)	(0.65)	(2.55)	(0.58)	(0.42)	(0.80)	(1.42)	(0.44)	(-2.38)	(0.84)	(2.26)
Momentum	**-0.83**	0.61	**-1.34**	**-0.21**	**-1.04**	**-2.15**	**-1.04**	0.05	**-1.41**	**-3.20**	**-0.89**	0.93	**-0.94**	1.42
	(-1.86)	(1.66)	(-2.32)	(-3.04)	(-2.07)	(-2.55)	(-2.01)	(0.04)	(-2.56)	(-3.10)	(-1.90)	(1.61)	(-2.02)	(1.25)
Return on Assets	-0.14	**0.76**	-0.52	0.00	-0.32	0.17	-0.51	0.27	-0.49	0.15	-0.34	-0.13	-0.33	1.09
	(-0.38)	(3.57)	(-1.44)	(0.08)	(-0.81)	(0.40)	(-1.41)	(0.27)	(-1.26)	(0.30)	(-0.86)	(-0.51)	(-0.87)	(1.18)

Table 7. Intra-Industry Anomaly and Oil Price Shocks: Portfolio Analysis

This table presents the average monthly returns in excess of the one-month T-bill for the aggregate anomaly following high positive and negative oil price shocks. Following the structural VAR model in Kilian (2009), we decompose oil price shocks into oil supply shocks, aggregate demand shocks, and oil specific demand shocks. For each oil shocks, month t is classified as a high positive (negative) shock month if the shock index in month t is above (below) the top (bottom) 40% of the distribution of the shocks in the sample. The sample stocks are common stocks listed in NYSE, AMEX, and NASDAQ. Stocks with prices less than $5 at the end of formation period are excluded. The holding period is 1-month. The return is equally weighted. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses.

Panel A: Oil Supply Shocks

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	-0.50	1.06	**1.55**	-0.36	1.34	**1.70**	-0.14	-0.28	-0.15
	(-1.06)	(3.22)	(6.73)	(-0.69)	(3.78)	(6.33)	(-0.19)	(-0.56)	(-0.42)
Construction	-0.34	1.12	**1.46**	-0.04	1.26	**1.30**	-0.30	-0.14	0.16
	(-0.63)	(3.17)	(3.75)	(-0.07)	(3.20)	(3.05)	(-0.38)	(-0.25)	(0.28)
Consumables	-0.08	1.53	**1.61**	0.23	1.58	**1.34**	-0.32	-0.05	0.27
	(-0.12)	(4.19)	(2.86)	(0.29)	(3.94)	(2.02)	(-0.29)	(-0.09)	(0.32)
Consumer Durables	-1.46	0.64	**2.09**	-0.17	1.36	**1.53**	-1.28	-0.72	0.57
	(-2.54)	(1.58)	(5.25)	(-0.24)	(2.96)	(2.73)	(-1.35)	(-1.14)	(0.78)
Financials	0.02	1.24	**1.22**	0.33	1.40	**1.07**	-0.31	-0.16	0.14
	(0.05)	(3.79)	(5.44)	(0.69)	(4.04)	(3.86)	(-0.51)	(-0.33)	(0.45)
Food	0.02	1.01	**1.00**	-0.21	1.34	**1.55**	0.22	-0.33	-0.55
	(0.04)	(3.21)	(2.44)	(-0.39)	(3.82)	(3.48)	(0.32)	(-0.68)	(-0.96)
Machinery	-0.82	0.93	**1.75**	-0.48	1.36	**1.84**	-0.34	-0.43	-0.09
	(-1.33)	(2.29)	(5.29)	(-0.78)	(2.88)	(5.64)	(-0.37)	(-0.68)	(-0.19)
Oil	-0.74	1.10	**1.84**	-0.29	1.37	**1.66**	-0.45	-0.27	0.18
	(-0.86)	(2.29)	(3.13)	(-0.36)	(2.75)	(3.46)	(-0.39)	(-0.37)	(0.25)
Retail	-1.35	1.11	**2.45**	0.10	1.14	**1.04**	-1.45	-0.04	**1.41**
	(-2.39)	(2.70)	(6.79)	(0.17)	(2.87)	(2.37)	(-1.70)	(-0.07)	(2.56)
Transportation	-0.74	0.94	**1.68**	-0.54	1.54	**2.08**	-0.20	-0.60	-0.40
	(-1.36)	(2.74)	(3.96)	(-0.88)	(3.72)	(4.22)	(-0.24)	(-1.06)	(-0.59)
Utility	0.86	0.91	0.05	-0.30	0.52	**0.83**	1.16	0.39	**-0.78**
	(2.82)	(3.22)	(0.22)	(-0.64)	(1.69)	(2.32)	(1.92)	(0.87)	(-1.74)
Other	-0.58	1.06	**1.64**	-0.68	1.32	**2.00**	0.10	-0.27	-0.37
	(-0.97)	(2.96)	(4.35)	(-1.06)	(3.36)	(4.99)	(0.11)	(-0.47)	(-0.72)

Panel B: Aggregate Demand Shocks

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	0.31	1.25	**0.94**	-0.46	1.43	**1.90**	0.77	-0.18	**-0.95**
	(0.61)	(3.72)	(4.05)	(-0.90)	(4.34)	(6.46)	(1.05)	(-0.39)	(-2.51)
Construction	0.09	1.24	**1.15**	0.26	1.26	**1.00**	-0.17	-0.02	0.15
	(0.14)	(3.85)	(2.61)	(0.40)	(2.83)	(2.15)	(-0.18)	(-0.04)	(0.24)
Consumables	0.43	1.29	**0.87**	0.19	1.74	**1.56**	0.24	-0.45	-0.69
	(0.72)	(3.39)	(1.80)	(0.23)	(4.53)	(2.15)	(0.24)	(-0.84)	(-0.80)
Consumer Durables	-0.11	1.09	**1.21**	-0.90	1.31	**2.21**	0.78	-0.22	-1.00
	(-0.16)	(2.31)	(2.64)	(-1.40)	(3.36)	(4.13)	(0.81)	(-0.34)	(-1.40)
Financials	0.42	1.15	**0.73**	0.67	1.44	**0.76**	-0.26	-0.29	-0.03
	(0.89)	(3.69)	(2.74)	(1.40)	(4.08)	(3.06)	(-0.38)	(-0.62)	(-0.09)
Food	0.35	1.13	0.77	-0.22	1.20	**1.42**	0.57	-0.08	-0.65
	(0.58)	(3.63)	(1.53)	(-0.43)	(3.89)	(3.06)	(0.69)	(-0.18)	(-0.89)
Machinery	0.36	1.36	**0.99**	-0.49	1.32	**1.80**	0.85	0.04	-0.81
	(0.6)	(3.14)	(3.48)	(-0.68)	(2.76)	(4.27)	(0.90)	(0.06)	(-1.56)
Oil	1.08	1.73	0.65	-1.62	0.75	**2.37**	2.71	0.98	**-1.73**
	(1.19)	(3.56)	(1.11)	(-2.04)	(1.77)	(4.17)	(2.28)	(1.56)	(-2.14)
Retail	-0.12	1.05	**1.17**	-0.21	1.78	**1.99**	0.09	-0.72	-0.81
	(-0.21)	(2.65)	(3.54)	(-0.31)	(4.08)	(3.58)	(0.10)	(-1.23)	(-1.27)
Transportation	0.34	1.41	**1.07**	-0.55	1.48	**2.03**	0.89	-0.08	-0.97
	(0.60)	(3.86)	(2.23)	(-0.86)	(3.78)	(4.26)	(1.03)	(-0.14)	(-1.44)
Utility	0.61	1.07	**0.46**	0.24	0.70	0.46	0.36	0.37	0.01
	(1.87)	(4.07)	(1.89)	(0.56)	(2.52)	(1.32)	(0.66)	(0.99)	(0.02)
Other	0.40	1.20	**0.81**	-1.14	1.37	**2.52**	1.54	-0.17	**-1.71**
	(0.73)	(3.47)	(2.77)	(-1.57)	(3.74)	(4.80)	(1.67)	(-0.34)	(-2.81)

Panel C: Oil Specific Demand Shocks

	High Positive Shock			High Negative Shock			High Positive - High Negative Shock		
	Short	Long	Long - Short	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	0.19	1.52	**1.33**	-0.20	1.47	**1.68**	0.39	0.05	-0.34
	(0.40)	(4.48)	(6.00)	(-0.43)	(4.72)	(6.51)	(0.60)	(0.11)	(-1.02)
Construction	0.77	1.86	**1.09**	0.39	1.12	0.73	0.38	0.74	0.36
	(1.30)	(4.86)	(2.78)	(0.61)	(3.19)	(1.53)	(0.45)	(1.45)	(0.57)
Consumables	1.14	1.57	0.43	-0.71	1.76	**2.47**	1.85	-0.19	**-2.04**
	(1.69)	(4.40)	(0.83)	(-0.98)	(5.29)	(3.87)	(1.86)	(-0.40)	(-2.44)
Consumer Durables	0.31	1.26	**0.95**	-0.84	1.71	**2.55**	1.14	-0.45	**-1.59**
	(0.49)	(3.01)	(2.17)	(-1.23)	(4.02)	(4.96)	(1.26)	(-0.79)	(-2.34)
Financials	0.67	1.65	**0.98**	0.35	1.22	**0.88**	0.32	0.42	0.11
	(1.48)	(4.81)	(4.09)	(0.67)	(3.61)	(2.91)	(0.47)	(0.91)	(0.28)
Food	0.30	1.44	**1.14**	-0.41	1.26	**1.67**	0.71	0.18	-0.53
	(0.71)	(4.78)	(3.14)	(-0.75)	(4.61)	(3.43)	(1.08)	(0.44)	(-0.89)
Machinery	-0.13	1.34	**1.47**	0.06	1.55	**1.49**	-0.19	-0.21	-0.02
	(-0.22)	(3.35)	(4.43)	(0.10)	(3.64)	(4.90)	(-0.23)	(-0.37)	(-0.04)
Oil	-0.62	1.49	**2.11**	-0.07	1.26	**1.33**	-0.55	0.23	0.77
	(-0.61)	(2.71)	(3.42)	(-0.10)	(3.42)	(2.36)	(-0.46)	(0.36)	(0.95)
Retail	0.10	1.58	**1.48**	-0.36	1.74	**2.10**	0.45	-0.17	-0.62
	(0.17)	(3.61)	(3.17)	(-0.57)	(4.11)	(5.26)	(0.53)	(-0.28)	(-1.02)
Transportation	0.35	1.65	**1.30**	-0.75	1.29	**2.04**	1.10	0.36	-0.74
	(0.59)	(4.84)	(3.00)	(-1.31)	(3.49)	(4.82)	(1.35)	(0.73)	(-1.23)
Utility	0.37	1.03	**0.66**	0.45	0.61	0.16	-0.09	0.42	0.51
	(1.05)	(3.92)	(2.47)	(1.50)	(2.31)	(0.57)	(-0.19)	(1.20)	(1.35)
Other	0.29	1.37	**1.09**	-0.50	1.51	**2.01**	0.78	-0.14	**-0.92**
	(0.47)	(3.82)	(3.00)	(-0.91)	(4.54)	(5.74)	(0.96)	(-0.29)	(-1.82)

Table 8. Intra-Industry Anomaly and Oil Price Shocks: Predictive Regression Analysis

This table presents average coefficients for the predictive regressions:

$$R_{i\,t} = a + \beta_1 OS_{t-1} + \beta_x Control_t + \varepsilon_t$$

The dependent variable, $R_{i\,t}$, is the excess returns of the long, the short, and the long-short portfolio of the aggregate anomaly, respectively. OS_{t-1} refers to one-month lagged oil price shocks. The control variables include the market factors, Fama-French (1993) three factors, and Fama-French (2015) five factors, respectively. The sample period is from January 1976 to October 2015. Newey-West (1987) adjusted t-statistics are in parentheses.

Panel A: Oil Supply Shocks

	Excess Return			FF3 Factors		
	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	-0.153	-0.104	0.049	-0.003	-0.012	-0.009
	(-0.76)	(-0.70)	(0.56)	(-0.05)	(-0.30)	(-0.12)
Construction	-0.139	-0.047	0.091	-0.029	0.002	0.032
	(-0.64)	(-0.29)	(0.64)	(-0.23)	(0.02)	(0.22)
Consumables	-0.370	0.165	**0.535**	-0.075	0.210	0.285
	(-1.14)	(0.99)	(2.09)	(-0.38)	(1.74)	(1.31)
Consumer Durables	-0.288	-0.330	-0.042	-0.141	-0.251	-0.110
	(-1.13)	(-1.74)	(-0.23)	(-0.95)	(-2.20)	(-0.65)
Financials	-0.037	-0.076	-0.039	-0.003	-0.046	-0.043
	(-0.2)	(-0.49)	(-0.38)	(-0.03)	(-0.66)	(-0.42)
Food	0.082	-0.081	-0.163	0.152	-0.078	-0.230
	(0.39)	(-0.60)	(-0.99)	(1.19)	(-0.83)	(-1.63)
Machinery	-0.159	-0.173	-0.015	0.090	-0.023	-0.112
	(-0.61)	(-1.00)	(-0.11)	(0.91)	(-0.42)	(-1.06)
Oil	-0.377	-0.225	0.152	-0.307	-0.211	0.096
	(-1.16)	(-1.11)	(0.76)	(-1.14)	(-1.37)	(0.50)
Retail	-0.440	0.062	**0.502**	-0.307	0.138	**0.445**

	(-1.74)	(0.35)	(2.97)	(-2.00)	(1.24)	(2.84)
Transportation	-0.093	-0.145	-0.052	0.006	-0.083	-0.089
	(-0.38)	(-0.88)	(-0.26)	(0.04)	(-0.72)	(-0.50)
Utility	0.153	0.077	-0.076	0.133	0.044	-0.089
	(1.12)	(0.64)	(-0.72)	(1.21)	(0.52)	(-0.84)
Other	-0.141	-0.130	0.011	0.072	-0.006	-0.078
	(-0.60)	(-0.79)	(0.09)	(0.75)	(-0.12)	(-0.74)

Panel B: Aggregate Demand Shocks

	Excess Return			FF3 Factors		
	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	0.002	-0.005	**-0.007**	0.003	-0.004	**-0.007**
	(0.37)	(-1.13)	(-2.20)	(1.52)	(-3.47)	(-2.93)
Construction	-0.002	0.000	0.002	-0.002	0.001	0.002
	(-0.3)	(-0.01)	(0.46)	(-0.39)	(0.21)	(0.56)
Consumables	-0.003	-0.007	-0.004	-0.003	-0.006	-0.002
	(-0.37)	(-1.63)	(-0.62)	(-0.64)	(-1.76)	(-0.45)
Consumer Durables	0.002	-0.004	-0.007	0.003	-0.004	-0.007
	(0.27)	(-0.77)	(-1.10)	(0.51)	(-1.21)	(-1.13)
Financials	-0.007	-0.004	0.003	-0.006	-0.003	0.003
	(-1.02)	(-1.08)	(0.67)	(-1.45)	(-1.55)	(0.75)
Food	0.008	-0.003	**-0.011**	0.008	-0.002	**-0.010**
	(1.06)	(-0.63)	(-1.86)	(1.62)	(-0.50)	(-1.89)
Machinery	0.003	-0.005	**-0.007**	0.003	-0.004	**-0.007**
	(0.36)	(-0.79)	(-1.82)	(1.23)	(-1.73)	(-2.21)
Oil	0.019	0.004	**-0.015**	0.020	0.005	**-0.015**
	(1.89)	(0.56)	(-2.60)	(2.60)	(0.95)	(-2.75)
Retail	-0.003	-0.007	-0.004	-0.003	-0.006	-0.004
	(-0.37)	(-1.51)	(-0.76)	(-0.49)	(-2.19)	(-0.78)
Transportation	0.007	-0.003	-0.010	0.008	-0.002	-0.010
	(0.82)	(-0.62)	(-1.36)	(1.74)	(-0.56)	(-1.57)
Utility	0.002	0.002	0.000	0.003	0.003	0.000
	(0.29)	(0.41)	(-0.01)	(0.76)	(1.02)	(-0.01)
Other	0.008	-0.005	**-0.014**	0.009	-0.005	**-0.014**
	(1.05)	(-1.17)	(-2.83)	(2.79)	(-3.10)	(-3.65)

Panel C: Oil Specific Demand Shocks

	Excess Return			FF3 Factors		
	Short	Long	Long - Short	Short	Long	Long - Short
All Stocks	0.006	0.002	-0.004	0.005	0.001	-0.004
	(0.93)	(0.40)	(-1.30)	(2.48)	(0.72)	(-1.43)
Construction	0.008	0.010	0.002	0.006	0.010	0.004
	(0.89)	(1.85)	(0.31)	(1.04)	(2.61)	(0.55)
Consumables	0.019	0.002	**-0.017**	0.015	0.003	-0.012
	(1.73)	(0.44)	(-1.87)	(1.85)	(0.84)	(-1.50)
Consumer Durables	0.015	-0.004	**-0.019**	0.013	-0.005	**-0.018**
	(1.55)	(-0.64)	(-2.41)	(1.72)	(-1.08)	(-2.39)
Financials	0.005	0.005	0.001	0.004	0.005	0.001
	(0.68)	(1.15)	(0.23)	(1.20)	(2.01)	(0.40)
Food	0.011	0.004	-0.007	0.009	0.005	-0.005
	(1.63)	(0.88)	(-1.13)	(1.81)	(1.22)	(-0.78)
Machinery	0.001	-0.001	-0.003	-0.001	-0.003	-0.002
	(0.13)	(-0.23)	(-0.49)	(-0.39)	(-1.19)	(-0.38)
Oil	-0.005	0.000	0.005	-0.006	0.001	0.007
	(-0.35)	(0.00)	(0.49)	(-0.48)	(0.12)	(0.71)
Retail	0.011	-0.002	**-0.013**	0.008	-0.003	**-0.012**
	(1.24)	(-0.42)	(-2.12)	(1.23)	(-0.73)	(-1.93)
Transportation	0.017	0.006	**-0.011**	0.015	0.005	**-0.010**
	(2.04)	(1.09)	(-1.82)	(3.31)	(1.67)	(-1.82)
Utility	0.002	0.005	0.004	0.002	0.007	0.004
	(0.35)	(1.47)	(0.99)	(0.64)	(2.14)	(1.17)
Other	0.010	0.000	**-0.010**	0.009	-0.001	**-0.010**
	(1.22)	(-0.07)	(-2.09)	(2.54)	(-0.74)	(-2.36)