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## **COVID–19 and Oil Price Risk Exposure**

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### **Abstract**

This study investigates oil price risk exposure of financial and non-financial industries around the world during the COVID–19 pandemic. The empirical results show that oil supply industries benefit from positive shocks to oil price risk in general, whereas oil user industries and financial industries react negatively to positive oil price shocks. The COVID–19 outbreak appears to moderate the oil price risk exposure of both financial and non-financial industries. This brings important implications in risk management of energy risk during the pandemic.

**Keywords:** COVID–19; oil price risk; financial industries; non-financial industries; Fama-French 5-factor; risk management

**JEL classification:** G12; G15; G18; G20; G29

## **COVID–19 and Oil Price Risk Exposure**

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## 1. Introduction

This study presents a comprehensive analysis of oil price exposure across financial and non-financial sectors during the COVID–19 pandemic around the world. The COVID–19 pandemic is a “once-in-a century pathogen we’ve been worried about” (CNBC, 2020).<sup>1</sup> The world has been experiencing an economic catastrophe since the onset of the pandemic. Global financial markets had the worst turmoil since 1930 and more pervasive than the global financial crisis (GFC) in terms of the number of countries affected (IMF, 2020). IMF projects global growth at –4.4% in 2020. To combat the pandemic, governments across the globe announced fiscal measures estimated at USD 11 trillion, resulting in a fiscal deficit of 14% of GDP in 2020, up 10% points from 2019 (IMF, 2020).

Since the onset of the COVID–19 crisis, academic literature and industry reports on the effect of the pandemic have been growing on a fast pace (e.g., Akhtaruzzaman, Boubaker, & Sensoy, 2020; International Energy Agency, 2020). Most of the studies focus on the effects of the COVID–19 on the aggregate financial markets and financial assets such as gold, cryptocurrencies (e.g., Akhtaruzzaman, Boubaker, Lucey, & Sensoy, 2020; Baker et al., 2020; Bissoondoyal-Bheenick, Do, Xu and Zhong, 2020; Chiah and Zhong, 2020; Corbet, et. al, 2020a; Corbet, et. al, 2020b; Yarovaya et al., 2020; Zhang, Hu, & Ji, 2020). However, there has been little attention paid to oil price risk exposure of financial and non-financial industries and their roles as oil suppliers, users and infrastructure providers during the COVID–19 pandemic. Also, the energy sector is severely affected by the COVID–19 pandemic (International Energy Agency, 2020). Countries in full (partial) lockdown experienced a decline of 25% (18%) in energy demand per week through mid-April (International Energy Agency, 2020).

In the context of such an economic crisis and unprecedented drop in energy demand, our study aims at exploring a research question: How do financial and non-financial industries across different regions expose to the change in oil price during the COVID–19?<sup>2</sup> A number of studies examine the oil price risk exposure of industries during the non-

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<sup>1</sup> As of June 28th, 2020, there are 9,782,197 COVID–19 confirmed cases and 494,421 deaths from 216 countries and territories (WHO, 2020).

<sup>2</sup> Oil price risk refers to the sensitivity of stock returns to the changes in oil prices.

COVID–19 period.<sup>3</sup> Our study contributes to the literature by investigating the impact of the COVID–19 pandemic on the relationship between changes in oil price and financial and non-financial stock returns across regions around the world.<sup>4</sup> Our paper also speaks to the important literature (Batten, Kinatader, Szilagyi and Wagner, 2017, 2018, 2019) on the implication of the relation between oil price and stock prices in risk management, asset pricing and portfolio theory. The comovement between oil price changes and stock returns, is a significant factor that helps decide on how to hedge energy risk. Studying the impact of pandemic on the nexus between oil price and stock returns provides fruitful insights into the consideration of health-related crisis in the design of hedging strategies of energy risk.

The empirical results provide interesting findings. First, across all times, among non-financial industries, oil suppliers such as oil crude production, integrated oil & gas benefit most from an increase in oil price. Industries that are users of oil, such as home improvement retailers, multi utilities, recreational services, and waste & disposal services benefit most from a decline in oil price. Second, COVID–19 appears to moderate the oil price exposure of both financial and non-financial industries. Among non-financial industries, weaker positive (negative) exposure to oil price risk is documented in oil supply (demand) industries during COVID–19.<sup>5</sup> In a similar vein, financial industries (e.g., banks) experience a weakened negative exposure to oil price during COVID–19. Third, the oil price risk exposure of financial and non-financial industries remains robust across regions and even when using an alternative asset pricing framework.

The rest of the paper is organised as follows. Section 2 presents data and methodology. Section 3 presents the results and Section 4 concludes.

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<sup>3</sup> For instance, Elyasiani, Mansur and Odusami (2011) investigate the oil price risk exposure of US industries during the non-COVID–19 period. Yun and Yoon (2019) look at oil price risk exposure of the airline industry in China and South Korea. Narayan and Sharma (2015) examine how oil price affects firms differently depending on their industries.

<sup>4</sup> Changes in crude oil prices have had a significant effect on the economic and financial activities (e.g., Cologni & Manera, 2008; Gisser & Goodwin, 1986; Gogolin et al., 2018; Hamilton, 1983; Jones & Kaul, 1996; Lau et al., 2018) and on stock returns through several channels including higher production cost (Jones, Leiby, & Paik, 2004), decrease in the discretionary income (Gogineni, 2010), higher equity risk premium (Hamilton & Herrera, 2004; Demirer, Jategaonkar, & Khalifa, 2015), higher inflation rates and uncertainties leading to lower economic growth (Friedman, 1977).

<sup>5</sup> Elyasiani, Mansur and Odusami (2011) classify industries into oil-substitute, oil-related, and oil user.

## 2. Data and Methodology

### 2.1 Data

This paper explores oil price exposure of different industries with a special focus on the COVID–19 outbreak period. The full sample period is from January 1st, 2018 to April 30th, 2020. The pre-COVID–19 period starts January 1st, 2018 to not overlap with prior financial crises and ends January 22nd, 2020.<sup>6</sup> The COVID–19 period is from January 23rd, 2020 to April 30th, 2020. We choose January 23rd, 2020 as the starting point of the period, as the Chinese government imposed a lockdown on Wuhan on that day.

We obtain daily returns of Datastream industry classification of level six (subsector level) for three regions: Americas (North and South American countries), Asia, and Europe. In total, our dataset contains 216 industries for Americas, 206 industries for Asia, and 216 industries for Europe. We further divide the industries into financial and non-financial sectors. There are 39 financial industries and 177 non-financial industries for Americas. Asia (Europe) comprises 29 (35) financial and 177 (181) non-financial industries. We conduct analysis for all industries and present the top and bottom 25 industries in terms of oil price exposure in each region. To further analyse the sensitivity of different industries to oil price risk exposure, we also consider their roles as oil demand, supply and infrastructure provider industries.

We classify oil & gas producers as oil suppliers based on the Industrial Classification Benchmark (ICB)-Datastream Level 4.<sup>7</sup> Similarly, we classify oil equipment & services as an oil infrastructure industry. Following Elyasiani, Mansur and Odusami (2011), industries such as airlines, container & packaging, defence, and pharmaceuticals are considered as oil demand industries. We calculate daily returns from the USD denominated return series for each industry subsector. We obtain the daily Fama and French (2015) five risk factors from Kenneth French's website.<sup>8</sup> Oil price is obtained from the daily returns on the West Texas Intermediate (WTI) in USD per barrel.

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<sup>6</sup> Global financial crisis in 2007–2009, European debt crisis in 2010–2012 (Akhtaruzzaman, Abdel-Qader, Hammami, & Shams, 2019), Russian financial crisis in 2014–2015 (Viktorov & Abramov, 2020), Chinese stock market crash in 2014–2015 (Jian, Wu, & Zhu, 2018).

<sup>7</sup> <https://www.ftserussell.com/files/support-document/icb-structure-definitions>.

<sup>8</sup> [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

## 2.2 Methodology

The Fama and French (2015) five-factor model has been widely used as an asset pricing model in the literature (Barillas & Shanken, 2018; Fama & French, 2017; Hou, Xue, & Zhang, 2020; Stambaugh & Yuan, 2017). Given the oil price is an input in the production cost and valuation model (Hamilton & Herrera, 2004; Jones, Leiby, & Paik, 2004), prior literature uses the oil risk factor within a multifactor asset pricing framework (Azimli, 2020; Narayan and Sharma, 2015; Shaeri, Adaoglu, & Katircioglu, 2016). In our baseline model, we augment the Fama and French (2015) five-factor model with oil price return in our baseline model:

$$R_{i,t} = \alpha_i + \beta_i MKT_t + \tau_i SMB_t + \gamma_i HML_t + \theta_i RMW_t + \mu_t CMA_t + \sigma_i Oil_t + \omega_i Oil_{t-1} + \delta_i D_t + \epsilon_{i,t} \quad (1)$$

where  $MKT_t$ ,  $SMB_t$ ,  $HML_t$ ,  $RMW_t$ , and  $CMA_t$  are the market risk premium, size factor, value factor, profitability factor and investment factor for a region on day  $t$ , respectively;  $Oil_t$  and  $Oil_{t-1}$  are the oil price return on day  $t$  and  $t-1$ , respectively;  $R_{i,t}$  is the excess return for each industry subsector;  $D_t$  is a dummy variable that is equal to one if day  $t$  is within the COVID-19 period and zero otherwise.  $\epsilon_{i,t}$  is the error term on day  $t$ . Oil price risk exposure is reflected by the slope coefficient ( $\sigma_i$ ) on  $Oil_t$ . The loading on the COVID-19 dummy ( $D_t$ ) illustrates the relative performance of subsector  $i$  in the pandemic. We also include the lagged oil return to account for return autocorrelation.

To investigate oil price risk exposure in the COVID-19 outbreak, we include an interaction term between oil price return and the COVID-19 dummy in Equation 2:

$$R_{i,t} = \alpha_i + \beta_i MKT_t + \tau_i SMB_t + \gamma_i HML_t + \theta_i RMW_t + \mu_t CMA_t + \sigma_i Oil_t + \omega_i Oil_{t-1} + \delta_i D_t + \varphi_i Oil_t * D_t + \epsilon_{i,t} \quad (2)$$

## 3. Empirical results

Table 1 presents summary statistics of the industries in each region.<sup>9</sup> We only present the top and bottom 25 industries in terms of oil exposure in each region. Panel A (Table 1) presents the non-financial industries with the most positive oil price risk exposure captured by  $\sigma_i$  in Equation 1 during the sample period (2018–2020) for Americas. Not surprisingly, the crude oil production subsector and other supplier industries has the highest positive exposure to oil price risk. Interestingly, the average returns of most industries in this panel are negative. In

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<sup>9</sup> Table A5 (Appendix) presents additional summary statistics to those in Table 1.

particular, oil and gas industries such as crude oil production, oil equipment and services, oil, gas, and coal generate negative mean return with higher economic magnitude. This is reflective of the fact that energy sectors perform the worst during the COVID-19 (Kwan & Mertens, 2020). For instance, Alternative Fuels industry has the highest mean return as well as the highest variation proxied by standard deviation.<sup>10</sup> Panel B (Table 1) portrays results for the non-financial industries with the most negative oil price risk exposure, which also resemble the definition of oil users and infrastructure providers. The airlines industry has the highest negative exposure to oil price risk indicating that it benefits from lower oil prices. All the industries except the household equipment production have a positive mean return.

Panel C (Table 1) presents 25 financial industries with the highest exposure to the oil price risk. Most financial industries have positive mean returns during the sample period. We conduct the Augmented Dicky-Fuller test to detect the presence of a unit root. The tests are all statistically significant, indicating the rejection of the null hypothesis of a unit root. The Jarque-Bera test statistic is significant in all industries, indicating that the returns do not follow a normal distribution. The Box-Pierce-Ljung portmanteau test indicates the presence of autocorrelation in returns. We observe significant Q (10) statistic in a large number of industries, indicating autocorrelation in daily returns, which is consistent with Jegadeesh (1990). The pattern in the summary statistics is similar to Shaeri, Adaoglu and Katircioglu (2016).

Table 2 reports the regression output of Equation (2) in the Americas. For the sake of brevity, we only report the key variables of interest of the top and bottom 25 industries ranked by their exposure to oil price risk in Equation (1). Panel A (B) reports the top 25 non-financial industries with the highest positive (negative) exposure to oil price return, whereas Panel C reports the results for the financial industries. Oil supply industries such as oil crude production, integrated oil & gas, oil, gas & coal are among the top 5 industries with the highest positive exposure to oil price risk, which is consistent with prior literature (e.g., Elyasiani, Mansur, & Odusami, 2011; Nandha & Faff, 2008). Oil infrastructure providers such as oil equipment & services and pipelines are among the top 10 industries with the highest positive exposure to oil price risk. Equally, oil-substitute industries such as alternative energy, alternative fuels, energy, and renewable energy equipment have positive exposure to

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<sup>10</sup> The higher moments (standard deviation, kurtosis and skewness) are similar across the 25 industries.



oil price risk, and the magnitude of the sensitivity is much lower than those of oil supply and infrastructure provider industries. The oil demand industries such as airlines, defense, home improvement retailers, multi utilities, recreational services, and waste & disposal services are negatively exposed to oil price return. This is an intuitive result. Oil demand industries are heavy users of oil, and hence they benefit from lower oil prices.<sup>11</sup> The varying exposures of suppliers and users of oil indicate that different risk management measures should be put in place to hedge energy risk (Batten et al., 2019).

Consistent with the literature, most financial industries are negatively exposed to oil price risk (Elyasiani, Mansur, & Odusami, 2011). Financial industries are not heavy users of oil or not directly involved with oil production. However, their association with oil occurs mainly through their lending and investment portfolios to firms which have exposure to oil price risk. The breakdown of bank loan portfolios shows that the majority of loans go to individuals and industries other than oil and gas industry (Forbes, 2018). The relative higher exposure to oil-user industries leads to the negative exposure of financial industries to oil price risk. Retail REITs has the highest exposure, while investment bank broker has the lowest exposure. The magnitude of the sensitivity of financial industries to the oil price risk is considerably lower than that of non-financial industries. The diverse lending and investment portfolios of financial industries may have effects on lowering the magnitude of the sensitivity to the oil price risk. Elyasiani, Mansur and Odusami (2011) and Shaeri, Adaoglu and Katircioglu (2016) find similar results for US financial and non-financial industries, whereby non-financial industries are more sensitive to oil price risk than their financial counterparts are. The exposure of financial and non-financial industries to oil price risk appears to be similar across the three regions.

Compared to non-financial sectors, financial industries have higher loadings on the market risk premium that are above 1. The loadings on the market risk premium of the non-financial sectors tend to be around 0.8. Non-financial industries appear to have lower loadings on the size (SMB) and investment (CMA) factors for those with high exposure to oil price, while the opposite is true for industries with low exposure to oil price return. Industries with high exposure to oil price risk tend to load negatively on RMW and positively on other factors.

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<sup>11</sup> We report all slope coefficients in Table A6 (Appendix).

This pattern is reversed in part for the industries with negative exposure to oil price risk, suggesting that oil price exposure is an important force in driving firm profitability.

An interesting finding emerges in the variable of interest, i.e., the interaction between COVID-19 dummy and oil price return. The interaction terms for part of the 25 industries with oil positive exposures in Panel A (Table 2) are negative and statistically significant, indicating that industries such as copper, nonferrous metal, basic resources, industrial metals, renewable energy equipment, and construction machinery exhibit less pronounced positive exposure to the oil price risk during the COVID-19 outbreak compared to other non-financial industries. The interaction terms for 25 industries with highest oil negative exposures differ in Panel B of Table 2. The top 12 industries appear to be negatively associated with oil price risk exposure in COVID-19. The results suggest that the negative oil exposures for industries such as airlines, multi utilities, recreational services, soft drinks, home improvement retailers, waste & disposal services, pharmaceuticals, pharma & biotech, and conventional electricity were moderated during the COVID-19. This is potentially a result of lower oil prices and less reliance on oil in COVID-19. Likewise, Panel C (Table 2) shows that the negative oil exposure of financial industries such as banks, financial data providers, diversified financial services, financial credit services, and investment bank broker decreases during the COVID-19. This is potentially related to their systemic importance in the economic system. Interestingly, industries in Asia and Europe do not respond to oil price risk differently in COVID-19.<sup>12,13</sup>

#### **4. Conclusion**

COVID-19 has exerted a dramatic impact on the health and economic systems around the world. This paper investigates the impact of COVID-19 on exposure to oil price risk of both financial and non-financial sectors around the world. In general, oil supply (user) industries suffer (benefit) most when there is a decrease in oil prices. The COVID-19 pandemic moderates the relationship between changes in oil prices and stock returns around the world. Oil supply and infrastructure provider industries exhibit weaker positive exposure to oil price risk during the COVID-19 outbreak compared to the non-COVID-19 period. Oil demand industries and financial industries display weakened negative exposure to oil price

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<sup>12</sup> For the sake of brevity, the detailed results for Asia and Europe are provided in Internet Appendix.

<sup>13</sup> Equations 1 and 2 are also estimated using the Capital Asset Pricing Model and the Fama and French (1993) three-factor model. The results remain qualitatively similar.

risk during the COVID–19. Our results are robust to alternative asset pricing frameworks. They are of particular importance for investors, portfolio managers, and policymakers in mitigating oil price risk. We believe that there is more scope of research on COVID–19 and oil price factor for the industries of developed versus emerging/frontier countries and/or oil-importing versus oil-exporting countries. The time-varying comovement between oil price changes and industry stock returns during the pandemic provides fruitful insights to the literature on management of energy risk (Batten et al., 2018). It appears that hedging strategies designed for normal times should be re-considered in health-related crises and the associated economic turbulence. Future research would benefit from developing hedging strategies of energy risk that considers pandemic situations.

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**Table 1: Descriptive statistics: Americas**

This table reports the summary statistics of returns by sector in the Americas region. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. The sample period is from 1 January 2018 to 30 April 2020.

| Panel A: Non Financial Industries (Positive Exposure) |         |                    |          | Panel B: Non Financial Industries (Negative Exposure) |         |                    |          | Panel C: Financial industries (Top 25) |         |                    |          |
|---|---------|--------------------|----------|---|---------|--------------------|----------|--|---------|--------------------|----------|
| Subsector   | Mean    | Standard-deviation | Skewness | Subsector   | Mean    | Standard Deviation | Skewness | Subsector                              | Mean    | Standard Deviation | Skewness |
| Oil Crude Production                                  | -0.0005 | 0.0212             | -3.9315  | Airlines  | 0.0001  | 0.0201             | -1.4138  | Mortgage Finance                       | -0.0001 | 0.0178             | -2.6706  |
| Oil Equipment & Services                              | -0.0007 | 0.021              | -2.2949  | Household Equipment Products                          | -0.0002 | 0.0228             | -2.3311  | Investment Companies                   | 0.0002  | 0.0139             | -2.2092  |
| Oil, Gas, Coal  | -0.0003 | 0.0166             | -2.3314  | Drug Retailers  | 0.0002  | 0.0129             | -0.5938  | Closed End Investments                 | 0.0002  | 0.0139             | -2.2093  |
| Energy  | -0.0003 | 0.0163             | -2.4415  | Misc Consumer Staple                                  | 0.0007  | 0.0161             | -0.6856  | Real Estate Holding & Development      | -0.0004 | 0.0156             | -4.2495  |
| Integrated Oil & Gas                                  | -0.0002 | 0.0155             | -1.9247  | Toys  | 0.0004  | 0.0166             | -0.5898  | Real Estate Investment Services        | -0.0001 | 0.0134             | -2.0404  |
| Pipelines   | 0.0001  | 0.0165             | -2.3768  | Defense   | 0.0007  | 0.0121             | -0.7699  | Financial Data Providers               | 0.0008  | 0.0118             | -0.8845  |
| General Mining  | -0.0006 | 0.0232             | -0.2502  | Multi utilities                                       | 0.0003  | 0.0116             | -0.7412  | Hotel, Lodge REIT                      | -0.0002 | 0.0178             | -1.4911  |
| Chemicals Synthetic Fibers                            | -0.0006 | 0.0217             | -0.5401  | Apparel Retailer                                      | 0.0002  | 0.0152             | -1.7931  | Diversified Financial Services         | 0.0001  | 0.013              | -1.0266  |
| Copper  | -0.0004 | 0.0211             | -0.0539  | Health Care Services                                  | 0.0005  | 0.0116             | -0.6675  | Financial Credit Services              | 0.0006  | 0.0126             | -1.0795  |
| Marine Transport                                      | -0.0002 | 0.0198             | -1.1811  | Recreational Services                                 | 0.0002  | 0.0172             | -1.7174  | Mortgage REITs: Commercial             | 0.0003  | 0.0193             | -0.0707  |
| Plastics  | -0.0007 | 0.0216             | -0.3120  | Drug/Grocery Stores                                   | 0.0003  | 0.0091             | -0.3145  | Mortgage REITs: Residential            | 0       | 0.0167             | -2.3501  |
| Nonferrous Metal                                      | -0.0004 | 0.0187             | -0.1094  | Container & Packaging                                 | 0.0003  | 0.0116             | -0.7981  | Real Estate Services                   | 0.0002  | 0.0153             | -0.8405  |
| Industrial Metal, Mining                              | -0.0003 | 0.0176             | -0.3726  | Delivery Service                                      | 0.0002  | 0.013              | -0.4022  | Divers REITs                           | -0.0002 | 0.0142             | -3.4817  |
| Alternative Energy                                    | 0.0002  | 0.0253             | 1.3737   | Soft Drinks   | 0.0003  | 0.0098             | -1.2410  | Mortgage REITs                         | 0       | 0.0153             | -2.4288  |
| Alternative Fuels                                     | 0.0012  | 0.0461             | 1.6098   | Tobacco   | 0.0001  | 0.0124             | -1.1848  | Insurance Brokers                      | 0.0007  | 0.0127             | 2.3233   |
| Precious Metal, Mining                                | -0.0001 | 0.0197             | -0.1230  | Home Improvement Retailers                            | 0.0007  | 0.0145             | -2.3500  | Health Care REIT                       | 0       | 0.017              | -3.0946  |
| Basic Resources                                       | -0.0002 | 0.0149             | -0.4749  | Waste & Disposal Services                             | 0.0005  | 0.0103             | -1.0171  | Retail REITs                           | -0.0002 | 0.0155             | -4.1248  |
| Gold Mining   | -0.0001 | 0.0234             | -0.1451  | Distillers Vintners                                   | 0.0005  | 0.0119             | -2.0522  | Financial Services                     | 0.0004  | 0.013              | -1.0387  |
| Commercial Vehicle Lease                              | 0.0003  | 0.0207             | -0.8013  | Aero/Defence  | 0.0004  | 0.0131             | -1.1644  | Infrastructure REITs                   | 0.0006  | 0.0135             | -0.3040  |
| Platinum Precious Metal                               | 0.0000  | 0.0253             | -0.2479  | Pharmaceuticals                                       | 0.0004  | 0.0105             | -0.1937  | Full Line Insurance                    | 0       | 0.0141             | -1.9592  |
| Renewable Energy Equipment                            | 0.0002  | 0.0256             | 1.4486   | Pharmaceuticals & Biotech                             | 0.0005  | 0.0113             | -0.1573  | Investment Bank, Broker                | 0.0004  | 0.0132             | -0.9555  |
| Building & Plumbing                                   | 0.0000  | 0.0259             | -0.6331  | Nondurable Household Products                         | 0.0005  | 0.0102             | 0.7155   | Banks                                  | 0.0001  | 0.0133             | -1.1297  |
| Oil Refinery Marketing                                | 0.0001  | 0.0179             | -1.1464  | Biotechnology   | 0.0006  | 0.0152             | -0.1591  | Consumer Lending                       | 0.0004  | 0.0156             | -1.1074  |
| Electronic Office Equipment                           | 0.0001  | 0.0212             | -1.1810  | Conventional Electricity                              | 0.0003  | 0.0108             | -0.6414  | Asset Managers                         | 0.0003  | 0.0141             | -0.8874  |
| Machinery Constructions                               | 0.0002  | 0.0167             | -0.6380  | Water   | 0.0002  | 0.0128             | -0.5126  | Life Insurance                         | 0.0001  | 0.0149             | -1.3421  |

**Table 2: Oil Exposures for Americas (1 Jan 2018–30 April 2020)**

This table reports the regression output of Equation 2 in the Americas region. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Sector returns are regressed on the five asset pricing factors of Fama and French (2015), as well as oil price returns and COVID-19 dummy. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non Financial Industries (Positive Exposure)    Panel B: Non Financial Industries (Negative Exposure)    Panel C: Financial industries (Top 25)**

| Subsector                      | Oil           | COVID19 | Oil*<br>COVID19 | Subsector                        | Oil            | COVID19 | Oil*<br>COVID | Subsector        | Oil            | COVID19 | Oil*<br>COVID |
|--------------------------------|---------------|---------|-----------------|----------------------------------|----------------|---------|---------------|------------------|----------------|---------|---------------|
| Oil Crude Production           | <b>0.3062</b> | 0.0012  | -0.0186         | Airlines                         | <b>-0.1279</b> | -0.0037 | <b>0.1077</b> | Mortgage Finance | -0.0086        | 0.0027  | 0.1549        |
| Oil Equipment & Services       | <b>0.2639</b> | 0.0001  | -0.0091         | Household Equipment<br>Products  | -0.0324        | 0.0005  | -0.0247       | Investment Cos.  | -0.0067        | 0.0020  | 0.1257        |
| Oil, Gas, Coal                 | <b>0.2259</b> | 0.0011  | -0.037          | Drug Retailers                   | -0.0340        | -0.0009 | -0.0084       | Closed End Inv.  | -0.0067        | 0.0020  | 0.1257        |
| Energy                         | <b>0.2142</b> | 0.0011  | -0.0263         | Misc Consumer Staple             | -0.0276        | 0.0007  | -0.0165       | Real Est.Hold,Dv | 0.0139         | -0.0018 | 0.0736        |
| Integrated Oil & Gas           | <b>0.1745</b> | 0.0003  | -0.0071         | Toys                             | -0.0031        | -0.0041 | -0.0408       | Real Est.Inv.Svs | 0.0184         | 0.0004  | 0.0441        |
| Pipelines                      | <b>0.1586</b> | 0.0015  | 0.0209          | Defense                          | <b>-0.0360</b> | -0.0009 | 0.0259        | Fin. Data Prov.  | 0.0021         | 0.0013  | <b>0.0691</b> |
| General Mining                 | <b>0.1859</b> | 0.0011  | -0.0516         | Multi utilities                  | <b>-0.0445</b> | -0.0009 | <b>0.0487</b> | Hotel,Lodge REIT | -0.0124        | -0.0010 | 0.0926        |
| Chemicals Synthetic<br>Fibers  | <b>0.1152</b> | -0.0021 | 0.0125          | Apparel Retailer                 | -0.0141        | 0.0013  | -0.0023       | Div. Fin. Svs    | 0.0059         | -0.0007 | <b>0.0537</b> |
| Copper                         | <b>0.2018</b> | 0.0037  | <b>-0.1570</b>  | Health Care Services             | -0.0072        | 0.0003  | -0.0138       | Fin. Credit Svs  | -0.0049        | 0.0013  | <b>0.0717</b> |
| Marine Transport               | <b>0.1363</b> | 0.0012  | -0.0346         | Recreational Services            | <b>-0.0738</b> | 0.0011  | <b>0.1139</b> | Mge REITs: Comm. | -0.0367        | 0.0001  | 0.1306        |
| Plastics                       | <b>0.1018</b> | -0.0008 | 0.0082          | Drug/Grocery Stores              | <b>-0.0206</b> | -0.0011 | 0.0165        | Mge REITs: Resid | <b>-0.0360</b> | -0.0002 | 0.1228        |
| Nonferrous Metal               | <b>0.214</b>  | 0.0029  | <b>-0.2060</b>  | Container & Packaging            | <b>-0.0236</b> | 0.0009  | 0.0234        | Real Est.Service | 0.0160         | 0.0021  | 0.0249        |
| Industrial Metal, Mining       | <b>0.1613</b> | 0.0022  | <b>-0.1226</b>  | Delivery Service                 | -0.0019        | 0.0002  | -0.0161       | Divers REITs     | -0.0152        | -0.0009 | 0.0793        |
| Alternative Energy             | <b>0.1198</b> | 0.0033  | -0.0513         | Soft Drinks                      | <b>-0.0268</b> | -0.0013 | <b>0.0314</b> | Mortgage REITs   | <b>-0.0318</b> | 0.0000  | 0.0998        |
| Alternative Fuels              | <b>0.1036</b> | 0.0044  | -0.0221         | Tobacco                          | <b>-0.0261</b> | -0.0013 | 0.0314        | Insur Brokers    | <b>-0.0200</b> | 0.0003  | 0.0738        |
| Precious Metal, Mining         | <b>0.1237</b> | 0.0039  | -0.0600         | Home Improvement<br>Retailers    | <b>-0.0462</b> | 0.0025  | <b>0.0693</b> | Health Care REIT | <b>-0.0551</b> | -0.0008 | 0.1393        |
| Basic Resources                | <b>0.1274</b> | 0.0026  | <b>-0.0743</b>  | Waste & Disposal Services        | <b>-0.0379</b> | -0.0003 | <b>0.0561</b> | Retail REITs     | <b>-0.0603</b> | -0.0013 | 0.1470        |
| Gold Mining                    | <b>0.0946</b> | 0.0035  | -0.0164         | Distillers Vintners              | <b>-0.0224</b> | -0.0004 | 0.0284        | Fin. Services    | -0.0114        | 0.0013  | 0.0535        |
| Commercial Vehicle Lease       | <b>0.0726</b> | 0.0031  | 0.0227          | Aero/Defence                     | <b>-0.0238</b> | -0.0013 | 0.0312        | Infrastr. REITs  | <b>-0.0183</b> | -0.0002 | 0.0654        |
| Platinum Precious Metal        | <b>0.1280</b> | 0.0037  | -0.0814         | Pharmaceuticals                  | <b>-0.0275</b> | -0.0006 | <b>0.0391</b> | Full Line Insur  | -0.0122        | -0.0005 | 0.0507        |
| Renewable Energy<br>Equipment  | <b>0.1200</b> | 0.0037  | <b>-0.0678</b>  | Pharmaceuticals & Biotech        | <b>-0.0246</b> | -0.0003 | <b>0.0342</b> | Inv. Bank,Broker | <b>-0.0141</b> | 0.0011  | <b>0.0525</b> |
| Building & Plumbing            | <b>0.0523</b> | 0.0034  | 0.0568          | Nondurable Household<br>Products | -0.0117        | -0.0002 | 0.0104        | Banks            | -0.0097        | 0.0013  | <b>0.0427</b> |
| Oil Refinery Marketing         | <b>0.0490</b> | 0.001   | 0.0620          | Biotechnology                    | -0.0196        | 0.0006  | 0.0257        | Consumer Lending | -0.0204        | 0.0000  | 0.0547        |
| Electronic Office<br>Equipment | <b>0.0373</b> | -0.0023 | 0.0830          | Conventional Electricity         | <b>-0.0381</b> | -0.0011 | <b>0.0608</b> | Asset Mngr, Cust | -0.0039        | 0.0032  | 0.0226        |
| Machinery Constructions        | <b>0.1166</b> | 0.001   | <b>-0.0684</b>  | Water                            | <b>-0.0232</b> | -0.0011 | 0.0348        | Life Insurance   | -0.0063        | 0.0021  | 0.0258        |

## Internet Appendix

**Table A1 Descriptive statistics: Europe**

This table reports the summary statistics of returns to sectors in Europe. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Panel D reports the summary statistics of the independent variables, including the five asset pricing factors of Fama and French (2015), as well as oil price returns. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non-financial Top 25 positive**

| Subsector                 | Mean    | Maximum | Minimum | Standard-deviation | Skewness | Kurtosis | JB test             | ADF             | Q (10)          |
|---------------------------|---------|---------|---------|--------------------|----------|----------|---------------------|-----------------|-----------------|
| Oil Equipment & Services  | -0.0009 | 0.0993  | -0.2134 | 0.0186             | -1.0421  | 14.1132  | <b>10190.4438</b>   | <b>-39.3158</b> | <b>80.5225</b>  |
| Oil Crude Productions     | -0.0002 | 0.1243  | -0.2517 | 0.0169             | -2.0561  | 37.2637  | <b>94925.3496</b>   | <b>-39.4453</b> | <b>110.5294</b> |
| Offshore Drill & Services | -0.0007 | 0.1866  | -0.2991 | 0.0136             | -5.4385  | 172.0195 | <b>2286504.5604</b> | <b>-37.5026</b> | <b>579.8586</b> |
| Integrated Oil & Gas      | -0.0001 | 0.1407  | -0.1573 | 0.0146             | -1.0617  | 24.0428  | <b>35654.1193</b>   | <b>-39.1737</b> | <b>105.8503</b> |
| Oil, Gas, Coal            | -0.0001 | 0.1338  | -0.1555 | 0.0144             | -1.0886  | 23.2205  | <b>32968.1366</b>   | <b>-39.2617</b> | <b>99.8770</b>  |
| Energy                    | -0.0001 | 0.1329  | -0.1547 | 0.0142             | -1.0961  | 23.1041  | <b>32599.0167</b>   | <b>-39.3444</b> | <b>98.6779</b>  |
| Diamonds & Gems           | 0.0000  | 0.1388  | -0.1525 | 0.0205             | -0.1843  | 8.7833   | <b>2676.8039</b>    | <b>-43.4884</b> | <b>27.3536</b>  |
| Metal Fabric.             | -0.0004 | 0.0668  | -0.1497 | 0.0155             | -0.8323  | 11.4946  | <b>5972.5152</b>    | <b>-42.8583</b> | <b>37.3101</b>  |
| General Mining            | -0.0002 | 0.1540  | -0.1836 | 0.0217             | -0.2933  | 9.6742   | <b>3578.0250</b>    | <b>-43.9173</b> | <b>60.5265</b>  |
| Nonferrous Metal          | 0.0003  | 0.1681  | -0.1601 | 0.0178             | -0.3815  | 13.4297  | <b>8716.9486</b>    | <b>-41.8828</b> | <b>53.4161</b>  |
| Prec. Metal, Mine         | 0.0000  | 0.1365  | -0.1064 | 0.0187             | -0.0133  | 7.4781   | <b>1598.5102</b>    | <b>-43.6258</b> | <b>55.2994</b>  |
| Copper                    | -0.0004 | 0.1615  | -0.1779 | 0.0235             | -0.0963  | 7.5405   | <b>1646.1991</b>    | <b>-43.0153</b> | <b>40.6058</b>  |
| Basic Resources           | 0.0000  | 0.1276  | -0.1472 | 0.0160             | -0.3657  | 10.5277  | <b>4559.3970</b>    | <b>-42.6396</b> | <b>52.9055</b>  |
| Iron & Steel              | -0.0001 | 0.0980  | -0.1426 | 0.0159             | -0.5598  | 8.8075   | <b>2788.2609</b>    | <b>-41.2844</b> | <b>44.7869</b>  |
| Platinum Precious Metal   | -0.0004 | 0.1376  | -0.1559 | 0.0245             | -0.1162  | 6.9086   | <b>1221.9933</b>    | <b>-42.8428</b> | <b>32.8024</b>  |
| Industrial Metal, Mining  | 0.0000  | 0.1348  | -0.1602 | 0.0153             | -0.5941  | 14.1229  | <b>9974.0134</b>    | <b>-41.5952</b> | <b>53.7484</b>  |
| Aluminum                  | -0.0002 | 0.0960  | -0.1419 | 0.0174             | -0.4878  | 8.4785   | <b>2468.1984</b>    | <b>-43.5106</b> | <b>29.0559</b>  |
| Pipelines                 | 0.0001  | 0.0808  | -0.1781 | 0.0149             | -1.0609  | 16.0486  | <b>13930.4716</b>   | <b>-45.6523</b> | <b>34.0917</b>  |
| Commercial Vehicle Lease  | 0.0006  | 0.1790  | -0.2718 | 0.0203             | -1.0939  | 27.4131  | <b>47887.7407</b>   | <b>-43.2478</b> | <b>87.5961</b>  |
| Gold Mining               | 0.0002  | 0.1549  | -0.1025 | 0.0178             | 0.0230   | 9.0197   | <b>2888.5432</b>    | <b>-44.0374</b> | <b>48.0104</b>  |
| Photography               | -0.0001 | 0.1954  | -0.3082 | 0.0258             | -2.2331  | 33.9823  | <b>78101.9882</b>   | <b>-43.2791</b> | <b>53.3150</b>  |
| Basic Materials           | 0.0000  | 0.0948  | -0.1342 | 0.0123             | -0.9118  | 14.2771  | <b>10401.7846</b>   | <b>-43.2176</b> | <b>54.3662</b>  |
| Chemical Synthetic Fibers | 0.0001  | 0.0954  | -0.1612 | 0.0189             | -0.6325  | 8.8723   | <b>2876.2139</b>    | <b>-42.6862</b> | <b>23.6203</b>  |
| Oil Refinery, Marketing   | 0.0004  | 0.0745  | -0.1013 | 0.0138             | -0.4413  | 9.3256   | <b>3251.4412</b>    | <b>-41.2592</b> | <b>41.2648</b>  |
| Transportation Process    | 0.0006  | 0.0721  | -0.1128 | 0.0145             | -0.9020  | 9.6727   | <b>3808.4194</b>    | <b>-42.7846</b> | <b>36.1727</b>  |



**Table A1 Descriptive statistics: Europe (continued)****Panel B: Non-financial bottom 25 negative**

| Subsector                   | Mean    | Maximum | Minimum | Standard-deviation | Skewness | Kurtosis | JB test             | ADF             | Q (10)          |
|-----------------------------|---------|---------|---------|--------------------|----------|----------|---------------------|-----------------|-----------------|
| Electronic Equipment        | 0.0005  | 0.4472  | -0.3681 | 0.0393             | 1.2994   | 45.1308  | <b>142021.2841</b>  | <b>-46.3838</b> | <b>119.1922</b> |
| Airlines                    | 0.0000  | 0.1035  | -0.1894 | 0.0180             | -1.7969  | 21.7358  | <b>29009.6464</b>   | <b>-40.6885</b> | <b>54.1565</b>  |
| Recreational Services       | 0.0000  | 0.1049  | -0.1894 | 0.0137             | -2.2316  | 36.1390  | <b>89122.6819</b>   | <b>-36.6450</b> | <b>145.3321</b> |
| Electronic Office Equipment | -0.0004 | 0.1603  | -0.1867 | 0.0227             | -1.1807  | 15.6068  | <b>13112.5454</b>   | <b>-42.1977</b> | <b>32.6843</b>  |
| Tires                       | 0.0000  | 0.0795  | -0.1815 | 0.0157             | -1.0252  | 14.8250  | <b>11480.8201</b>   | <b>-43.1416</b> | <b>24.9103</b>  |
| Travel & Leisure            | 0.0000  | 0.1069  | -0.1605 | 0.0126             | -2.0567  | 35.7044  | <b>86602.9113</b>   | <b>-37.3235</b> | <b>173.9254</b> |
| Railroads                   | 0.0003  | 0.0935  | -0.1784 | 0.0156             | -2.1062  | 30.2733  | <b>60703.9571</b>   | <b>-40.4608</b> | <b>54.6802</b>  |
| Rest. & Bars                | 0.0001  | 0.1053  | -0.1789 | 0.0127             | -1.9038  | 39.6137  | <b>108009.8733</b>  | <b>-36.3948</b> | <b>248.8010</b> |
| Home Improvement Retailers  | -0.0002 | 0.0930  | -0.1524 | 0.0148             | -1.3151  | 17.6439  | <b>17644.3228</b>   | <b>-37.9485</b> | <b>62.6840</b>  |
| Apparel Retailer            | 0.0000  | 0.1142  | -0.1389 | 0.0135             | -0.5626  | 13.8069  | <b>9410.0747</b>    | <b>-43.7675</b> | <b>47.0466</b>  |
| Renew Energy Equipment      | 0.0007  | 0.1130  | -0.1391 | 0.0199             | -0.4246  | 7.9074   | <b>1977.0335</b>    | <b>-42.4701</b> | <b>15.8998</b>  |
| Alternative Energy          | 0.0007  | 0.1131  | -0.1351 | 0.0193             | -0.4402  | 8.0707   | <b>2111.2330</b>    | <b>-42.5610</b> | <b>16.3834</b>  |
| Training, Employment        | 0.0001  | 0.1046  | -0.1519 | 0.0147             | -1.4182  | 20.4416  | <b>24889.3607</b>   | <b>-40.1636</b> | <b>49.2378</b>  |
| Hotels & Motels             | 0.0001  | 0.1028  | -0.1407 | 0.0129             | -0.8127  | 22.4221  | <b>30277.9133</b>   | <b>-40.5457</b> | <b>82.8959</b>  |
| Retailers                   | 0.0000  | 0.1078  | -0.1400 | 0.0115             | -1.0456  | 23.2944  | <b>33177.3488</b>   | <b>-41.4087</b> | <b>81.9924</b>  |
| Autos & Parts               | 0.0000  | 0.1122  | -0.1560 | 0.0148             | -1.0565  | 15.7046  | <b>13221.3941</b>   | <b>-40.5511</b> | <b>56.3276</b>  |
| Auto Parts                  | 0.0002  | 0.0855  | -0.1636 | 0.0154             | -0.9141  | 13.2186  | <b>8589.5308</b>    | <b>-39.4466</b> | <b>72.3901</b>  |
| Automobiles                 | 0.0000  | 0.1226  | -0.1513 | 0.0153             | -1.0117  | 15.5823  | <b>12945.2153</b>   | <b>-40.4676</b> | <b>59.5637</b>  |
| Funerals                    | -0.0009 | 0.1379  | -0.6917 | 0.0273             | -10.0983 | 232.7559 | <b>4240137.7677</b> | <b>-41.6742</b> | <b>25.1560</b>  |
| Defense                     | 0.0003  | 0.0845  | -0.1118 | 0.0125             | -0.7453  | 12.8669  | <b>7937.1198</b>    | <b>-41.4234</b> | <b>36.3077</b>  |
| Electronic Equipment Other  | 0.0003  | 0.1636  | -0.1694 | 0.0167             | -1.0138  | 20.0795  | <b>23579.3629</b>   | <b>-41.6463</b> | <b>43.1600</b>  |
| Medical Services            | 0.0006  | 0.1219  | -0.1062 | 0.0193             | 0.0610   | 7.0846   | <b>1331.0494</b>    | <b>-44.3847</b> | <b>32.5817</b>  |
| Railroad Equipment          | -0.0005 | 0.0797  | -0.1078 | 0.0160             | -0.4908  | 7.8836   | <b>1977.8298</b>    | <b>-45.4012</b> | <b>32.5875</b>  |
| Consumer Discretionary      | 0.0001  | 0.0934  | -0.1334 | 0.0108             | -1.4089  | 24.0846  | <b>36068.1927</b>   | <b>-41.0063</b> | <b>76.4488</b>  |
| Rent/Lease :Cons            | 0.0003  | 0.1080  | -0.2207 | 0.0168             | -1.4071  | 24.7623  | <b>38380.8564</b>   | <b>-38.7870</b> | <b>109.3237</b> |

**Table A1 Descriptive statistics: Europe (continued)****Panel C: Financial industries (Top 25 oil exposures)**

| <b>Subsector</b>  | <b>Mean</b> | <b>Maximum</b> | <b>Minimum</b> | <b>Standard deviation</b> | <b>Skewness</b> | <b>Kurtosis</b> | <b>JB test</b>     | <b>ADF</b>      | <b>Q (10)</b>   |
|---|-------------|----------------|----------------|---------------------------|-----------------|-----------------|--------------------|-----------------|-----------------|
| Storage REITs   | 0.0007      | 0.1028         | -0.2103        | 0.0164                    | -1.6540         | 24.6304         | <b>38165.8728</b>  | <b>-39.7962</b> | <b>49.8258</b>  |
| Investment Trust  | 0.0002      | 0.1196         | -0.1066        | 0.0104                    | -1.0826         | 39.1379         | <b>104468.7671</b> | <b>-41.0864</b> | <b>116.4222</b> |
| Closed End Investment Real Estate Holding & Development | 0.0002      | 0.1078         | -0.0958        | 0.0096                    | -1.1322         | 36.9945         | <b>92521.9324</b>  | <b>-40.0017</b> | <b>121.6559</b> |
| Real Estate Investment Services                         | 0.0003      | 0.0610         | -0.1077        | 0.0086                    | -1.7811         | 23.8739         | <b>35742.1479</b>  | <b>-38.0233</b> | <b>110.4917</b> |
| Hotel, Lodge REITs                                      | 0.0003      | 0.0613         | -0.1086        | 0.0087                    | -1.8092         | 24.3080         | <b>37233.6998</b>  | <b>-37.9447</b> | <b>111.4497</b> |
| Real Estate Diversified Financial Services              | 0.0004      | 0.0826         | -0.1300        | 0.0139                    | -0.7510         | 12.7241         | <b>7716.8974</b>   | <b>-46.2726</b> | <b>57.2509</b>  |
| Real Estate Services                                    | 0.0001      | 0.0689         | -0.1239        | 0.0096                    | -2.0994         | 29.3084         | <b>56574.0632</b>  | <b>-38.4785</b> | <b>106.1501</b> |
| Banks   | 0.0001      | 0.1005         | -0.1559        | 0.0109                    | -1.8773         | 33.4967         | <b>75256.0943</b>  | <b>-42.0434</b> | <b>76.8775</b>  |
| Fin. Services   | -0.0002     | 0.0843         | -0.1622        | 0.0141                    | -1.8081         | 23.0966         | <b>33234.2919</b>  | <b>-41.2953</b> | <b>54.8095</b>  |
| Retail REITs  | 0.0002      | 0.1061         | -0.1320        | 0.0103                    | -1.6838         | 32.1146         | <b>68469.5224</b>  | <b>-39.9242</b> | <b>102.5602</b> |
| Investment Services                                     | -0.0004     | 0.1029         | -0.1730        | 0.0132                    | -1.9004         | 32.1655         | <b>68953.6477</b>  | <b>-39.2464</b> | <b>153.8824</b> |
| Residential REITs                                       | 0.0004      | 0.1013         | -0.1139        | 0.0112                    | -1.1759         | 21.2521         | <b>26994.8975</b>  | <b>-39.9687</b> | <b>81.9288</b>  |
| Investment Bank, Broker                                 | -0.0004     | 0.0863         | -0.2139        | 0.0150                    | -2.1872         | 31.2819         | <b>65281.3261</b>  | <b>-41.5060</b> | <b>46.1014</b>  |
| Investment Companies                                    | 0.0002      | 0.1056         | -0.1426        | 0.0110                    | -1.6695         | 29.2322         | <b>55738.2578</b>  | <b>-40.6316</b> | <b>77.0952</b>  |
| Office REITs  | 0.0001      | 0.0448         | -0.0592        | 0.0069                    | -0.9986         | 11.4811         | <b>6051.3191</b>   | <b>-41.2930</b> | <b>48.0785</b>  |
| REITs   | 0.0002      | 0.0926         | -0.1437        | 0.0115                    | -2.1779         | 37.6193         | <b>97042.6395</b>  | <b>-38.5005</b> | <b>132.7603</b> |
| Property /Casualty Insurance                            | 0.0000      | 0.0789         | -0.1433        | 0.0113                    | -2.1739         | 33.4679         | <b>75499.2692</b>  | <b>-39.3951</b> | <b>105.8882</b> |
| Divers REITs  | 0.0002      | 0.0864         | -0.1384        | 0.0108                    | -1.6604         | 25.7298         | <b>42059.7281</b>  | <b>-41.7197</b> | <b>55.3937</b>  |
| Industrial REITs  | 0.0000      | 0.0863         | -0.1320        | 0.0114                    | -1.3567         | 26.2619         | <b>43718.4293</b>  | <b>-40.3284</b> | <b>63.1440</b>  |
| Mortgage Finance  | 0.0006      | 0.1190         | -0.1572        | 0.0129                    | -1.1760         | 26.5010         | <b>44463.7489</b>  | <b>-42.4923</b> | <b>82.8264</b>  |
| Real Estate Service                                     | 0.0002      | 0.1179         | -0.1495        | 0.0183                    | -0.3271         | 9.4130          | <b>3312.2002</b>   | <b>-43.0861</b> | <b>23.4392</b>  |
| Financial Data Providers                                | 0.0001      | 0.0714         | -0.1359        | 0.0123                    | -1.4881         | 21.6419         | <b>28406.3957</b>  | <b>-38.6126</b> | <b>70.4438</b>  |
| Asset Managers, Customers                               | 0.0003      | 0.0994         | -0.2122        | 0.0173                    | -0.8727         | 18.2488         | <b>18777.1821</b>  | <b>-42.2541</b> | <b>33.5514</b>  |
| Life Insurance  | 0.0003      | 0.1131         | -0.1608        | 0.0138                    | -1.6547         | 25.0310         | <b>39560.5008</b>  | <b>-39.7715</b> | <b>64.8299</b>  |
|   | 0.0001      | 0.1455         | -0.1991        | 0.0159                    | -1.8500         | 32.7049         | <b>71424.5558</b>  | <b>-40.3449</b> | <b>92.3538</b>  |

**Table A2: Oil Exposures for Europe (1 Jan 2018–30 April 2020)**

This table reports the regression output of Equation 2 in the European region. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Sector returns are regressed on the five asset pricing factors of Fama and French (2015), as well as oil price returns and COVID-19 dummy. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non-financial industries (Top 25 oil positive exposures)**

| Subsector                 | Constant       | Mkt-Rf        | SMB            | HML            | RMW           | CMA            | Oil            | Oil (-1)      | COVID         | Oil*<br>COVID  | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|---------------------------|----------------|---------------|----------------|----------------|---------------|----------------|----------------|---------------|---------------|----------------|-----------------|---------------------|--------------------|
| Oil Equipment & Services  | -0.0009        | <b>1.0833</b> | <b>0.5724</b>  | <b>1.2417</b>  | <b>0.9917</b> | <b>0.4983</b>  | <b>0.2100</b>  | <b>0.0651</b> | 0.0005        | <b>-0.1066</b> | <b>33.4497</b>  | <b>232.9243</b>     | 0.5950             |
| Oil Crude Productions     | -0.0002        | <b>0.9166</b> | <b>0.2301</b>  | <b>1.1416</b>  | <b>1.3341</b> | <b>0.4536</b>  | <b>0.1322</b>  | <b>0.0642</b> | 0.0007        | 0.0226         | 21.6252         | <b>287.4426</b>     | 0.5504             |
| Offshore Drill & Services | <b>-0.0004</b> | <b>0.4145</b> | <b>0.4954</b>  | <b>1.0574</b>  | <b>1.4874</b> | 0.3367         | <b>-0.0325</b> | 0.0394        | -0.0065       | <b>0.3056</b>  | <b>209.0994</b> | <b>1881.6519</b>    | 0.4359             |
| Integrated Oil & Gas      | -0.0001        | <b>0.8524</b> | <b>-0.2602</b> | <b>1.1361</b>  | <b>1.2574</b> | <b>0.6714</b>  | <b>0.1269</b>  | <b>0.0401</b> | 0.0005        | -0.0307        | <b>27.2085</b>  | <b>1023.3987</b>    | 0.7296             |
| Oil, Gas, Coal            | -0.0001        | <b>0.8532</b> | <b>-0.2161</b> | <b>1.1033</b>  | <b>1.2177</b> | <b>0.6484</b>  | <b>0.1284</b>  | <b>0.0411</b> | 0.0005        | -0.0375        | 22.3661         | <b>701.9435</b>     | 0.7304             |
| Energy                    | -0.0002        | <b>0.8714</b> | <b>-0.1680</b> | <b>1.0764</b>  | <b>1.1791</b> | <b>0.6138</b>  | <b>0.1272</b>  | <b>0.0402</b> | 0.0006        | -0.0412        | 20.8356         | <b>699.6435</b>     | 0.7400             |
| Diamonds & Gems           | 0.0001         | <b>0.6346</b> | 0.1507         | <b>0.7879</b>  | <b>0.7521</b> | 0.2818         | <b>0.1075</b>  | 0.0474        | -0.0011       | -0.0217        | <b>28.8178</b>  | <b>298.5711</b>     | 0.1815             |
| Metal Fabric.             | <b>-0.0004</b> | <b>1.0377</b> | 0.1256         | <b>0.7215</b>  | <b>0.3580</b> | <b>0.4062</b>  | <b>0.1224</b>  | <b>0.0387</b> | 0.0007        | <b>-0.0814</b> | <b>31.6907</b>  | <b>95.9347</b>      | 0.6432             |
| General Mining            | -0.0003        | <b>1.1730</b> | -0.2337        | <b>1.2022</b>  | <b>0.4888</b> | <b>0.4001</b>  | <b>0.1515</b>  | 0.0269        | 0.0027        | <b>-0.1512</b> | <b>29.1233</b>  | <b>422.6575</b>     | 0.5124             |
| Nonferrous Metal          | 0.0001         | <b>0.9365</b> | 0.1678         | <b>0.7958</b>  | <b>0.5372</b> | 0.2338         | <b>0.0663</b>  | 0.0059        | 0.0033        | 0.0170         | <b>27.6779</b>  | <b>125.1508</b>     | 0.3812             |
| Prec. Metal, Mine         | -0.0002        | <b>1.0062</b> | -0.0190        | <b>0.8262</b>  | <b>0.3186</b> | 0.3653         | <b>0.1477</b>  | 0.0243        | <b>0.0063</b> | <b>-0.1479</b> | 23.0695         | <b>347.4596</b>     | 0.4610             |
| Copper                    | -0.0007        | <b>1.3637</b> | 0.1868         | <b>0.9644</b>  | <b>0.5447</b> | <b>0.6177</b>  | <b>0.1202</b>  | -0.0022       | 0.0039        | <b>-0.0967</b> | <b>29.6081</b>  | <b>119.3208</b>     | 0.4464             |
| Basic Resources           | -0.0002        | <b>1.0455</b> | 0.0156         | <b>0.9061</b>  | <b>0.5440</b> | <b>0.3146</b>  | <b>0.1032</b>  | <b>0.0186</b> | <b>0.0025</b> | <b>-0.0813</b> | 18.5404         | <b>143.8025</b>     | 0.6231             |
| Iron & Steel              | -0.0002        | <b>1.0391</b> | 0.1362         | <b>0.9924</b>  | <b>0.4138</b> | <b>0.4001</b>  | <b>0.0936</b>  | <b>0.0263</b> | 0.0020        | <b>-0.0629</b> | <b>25.2219</b>  | <b>45.7551</b>      | 0.6375             |
| Platinum Precious Metal   | -0.0007        | <b>0.7960</b> | <b>0.6685</b>  | <b>0.6768</b>  | <b>1.1180</b> | 0.4358         | <b>0.1217</b>  | 0.0259        | 0.0023        | <b>-0.1301</b> | <b>29.8599</b>  | <b>93.7442</b>      | 0.1227             |
| Industrial Metal, Mining  | -0.0002        | <b>1.0402</b> | 0.1277         | <b>0.9321</b>  | <b>0.5317</b> | <b>0.4042</b>  | <b>0.0779</b>  | 0.0154        | 0.0021        | <b>-0.0458</b> | <b>25.8688</b>  | <b>53.3601</b>      | 0.6466             |
| Aluminium                 | -0.0003        | <b>1.0103</b> | <b>0.3681</b>  | <b>0.6711</b>  | <b>0.5278</b> | 0.2534         | <b>0.0522</b>  | 0.0049        | 0.0011        | -0.0017        | <b>39.5161</b>  | <b>92.6144</b>      | 0.3829             |
| Pipelines                 | 0.0001         | <b>0.5366</b> | -0.0733        | -0.0439        | -0.0281       | <b>0.6073</b>  | <b>0.0712</b>  | -0.0046       | -0.0004       | -0.0459        | <b>50.6462</b>  | <b>436.6911</b>     | 0.1750             |
| Commercial Vehicle Lease  | 0.0002         | <b>1.4655</b> | <b>0.4492</b>  | 0.1842         | 0.4114        | 0.0412         | -0.0206        | -0.0097       | 0.0021        | <b>0.1339</b>  | <b>58.6950</b>  | <b>356.6257</b>     | 0.4800             |
| Gold Mining               | -0.0003        | <b>0.6669</b> | <b>0.4001</b>  | <b>0.4762</b>  | <b>1.2285</b> | 0.5528         | <b>0.0583</b>  | 0.0092        | <b>0.0062</b> | -0.0423        | <b>20.8468</b>  | <b>88.4264</b>      | 0.1511             |
| Photography               | -0.0002        | <b>1.1406</b> | <b>1.6991</b>  | -0.0066        | 0.2340        | 0.1443         | -0.0289        | 0.0481        | -0.0043       | 0.1308         | <b>56.0841</b>  | <b>84.2234</b>      | 0.1615             |
| Basic Materials           | -0.0002        | <b>0.9658</b> | <b>-0.1017</b> | <b>0.5183</b>  | <b>0.5080</b> | 0.0846         | <b>0.0460</b>  | 0.0035        | 0.0012        | <b>-0.0263</b> | <b>39.1818</b>  | <b>66.3665</b>      | 0.7581             |
| Chemical Synthetic Fibers | -0.0001        | <b>1.0049</b> | <b>0.6807</b>  | -0.0101        | 0.1144        | 0.1449         | 0.0046         | -0.0110       | -0.0009       | 0.0498         | 19.0925         | 27.4684             | 0.2235             |
| Oil Refinery, Marketing   | 0.0002         | <b>0.9249</b> | <b>0.5638</b>  | <b>0.3657</b>  | <b>0.4326</b> | 0.1710         | 0.0010         | -0.0104       | 0.0011        | <b>0.0546</b>  | <b>25.2379</b>  | <b>158.8075</b>     | 0.4109             |
| Transportation Process    | 0.0003         | <b>1.1195</b> | <b>0.3567</b>  | <b>-0.6294</b> | -0.1319       | <b>-0.5239</b> | <b>0.0267</b>  | 0.0270        | 0.0009        | -0.0002        | <b>33.1084</b>  | <b>499.6690</b>     | 0.4888             |

**Table A2: Oil Exposures for Europe (1 Jan 2018–30 April 2020) (continued)**

**Panel B: Non-financial industries (Top 25 oil negative exposures)**

| Subsector                       | Constant       | Mkt- <i>rf</i> | SMB            | HML            | RMW            | CMA            | Oil            | Oil (–1)       | COVID          | Oil*<br>COVID  | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|---------------------|--------------------|
| Electronic Equipment            | 0.0006         | <b>0.4257</b>  | <b>1.1603</b>  | 0.1523         | <b>–1.3462</b> | <b>–0.8676</b> | –0.0607        | <b>–0.1196</b> | –0.0047        | –0.1235        | <b>106.2957</b> | <b>391.1474</b>     | 0.0310             |
| Airlines                        | –0.0002        | <b>1.4152</b>  | <b>0.7965</b>  | <b>0.4955</b>  | 0.1560         | <b>–0.6155</b> | <b>–0.1336</b> | <b>–0.0323</b> | <b>–0.0038</b> | <b>0.1197</b>  | <b>22.0357</b>  | <b>193.2098</b>     | 0.5097             |
| Recreational Services           | –0.0001        | <b>1.1371</b>  | <b>0.7724</b>  | 0.1499         | 0.2155         | –0.2882        | <b>–0.0721</b> | 0.0019         | <b>–0.0044</b> | 0.0443         | <b>37.1919</b>  | <b>1062.633</b>     | 0.5182             |
| Electronic Office<br>Equipment  | –0.0005        | <b>1.0508</b>  | <b>0.9627</b>  | <b>0.5480</b>  | 0.1323         | 0.1053         | <b>0.0468</b>  | 0.0425         | –0.0025        | <b>–0.1785</b> | 20.3411         | <b>40.1086</b>      | 0.2016             |
| Tires                           | –0.0003        | <b>1.0141</b>  | –0.1218        | <b>1.4443</b>  | <b>1.5274</b>  | <b>–0.9005</b> | <b>–0.0435</b> | –0.0039        | 0.0001         | 0.0035         | <b>30.4532</b>  | <b>72.2839</b>      | 0.5597             |
| Travel & Leisure                | –0.0002        | <b>1.2119</b>  | <b>0.7153</b>  | <b>0.2795</b>  | <b>0.4173</b>  | <b>–0.2992</b> | <b>–0.0681</b> | –0.0014        | –0.0024        | <b>0.0633</b>  | <b>66.1161</b>  | <b>1462.144</b>     | 0.7275             |
| Railroads                       | 0.0000         | <b>1.1537</b>  | <b>0.6388</b>  | <b>0.3884</b>  | 0.3146         | –0.1015        | <b>–0.0466</b> | <b>0.0261</b>  | –0.0003        | 0.0227         | <b>50.8080</b>  | <b>111.3579</b>     | 0.4560             |
| Rest. & Bars                    | –0.0001        | <b>1.0880</b>  | <b>0.5648</b>  | 0.2657         | <b>0.8158</b>  | –0.0892        | <b>–0.0533</b> | <b>0.0164</b>  | –0.0032        | <b>0.0368</b>  | <b>110.7006</b> | <b>1115.834</b>     | 0.5963             |
| Home Improvement<br>Retailers   | –0.0005        | <b>1.0917</b>  | <b>0.7401</b>  | <b>0.3632</b>  | 0.3687         | <b>–0.3599</b> | <b>–0.0388</b> | <b>0.0194</b>  | –0.0005        | 0.0091         | <b>17.5208</b>  | 25.0035             | 0.4341             |
| Apparel Retailer                | –0.0002        | <b>1.0946</b>  | <b>–0.1416</b> | 0.0487         | <b>0.5178</b>  | <b>–0.4169</b> | <b>–0.0216</b> | 0.0056         | –0.0017        | –0.0254        | 23.6218         | 21.3457             | 0.6502             |
| Renew Energy<br>Equipment       | 0.0004         | <b>1.3293</b>  | <b>0.5370</b>  | 0.2745         | 0.3587         | –0.0836        | <b>–0.0422</b> | –0.0095        | 0.0011         | 0.0175         | 20.2146         | <b>88.5788</b>      | 0.3676             |
| Alternative Energy              | 0.0004         | <b>1.3302</b>  | <b>0.5696</b>  | 0.2438         | 0.3494         | –0.0819        | <b>–0.0405</b> | –0.0095        | 0.0011         | 0.0166         | 20.5697         | <b>84.9840</b>      | 0.3834             |
| Training, Employment            | –0.0001        | <b>1.2532</b>  | <b>0.3899</b>  | –0.0386        | –0.2146        | –0.0076        | <b>–0.0224</b> | –0.0020        | –0.0019        | –0.0170        | <b>49.4186</b>  | <b>174.5464</b>     | 0.6067             |
| Hotels & Motels                 | –0.0001        | <b>1.1046</b>  | <b>0.3990</b>  | <b>0.3145</b>  | <b>0.3382</b>  | <b>–0.2647</b> | <b>–0.0376</b> | 0.0123         | –0.0020        | 0.0151         | <b>69.1541</b>  | <b>979.5797</b>     | 0.6381             |
| Retailers                       | –0.0002        | <b>1.0610</b>  | <b>0.0998</b>  | <b>0.1663</b>  | <b>0.4946</b>  | <b>–0.1545</b> | <b>–0.0174</b> | 0.0050         | –0.0015        | –0.0218        | <b>60.0875</b>  | <b>284.1587</b>     | 0.7806             |
| Autos & Parts                   | –0.0002        | <b>1.0554</b>  | <b>–0.1369</b> | <b>1.5053</b>  | <b>1.1654</b>  | <b>–0.9452</b> | <b>–0.0408</b> | <b>–0.0153</b> | 0.0003         | <b>0.0343</b>  | <b>18.3303</b>  | <b>186.7550</b>     | 0.7188             |
| Auto Parts                      | 0.0000         | <b>1.2145</b>  | <b>0.3606</b>  | <b>1.0698</b>  | <b>1.0165</b>  | <b>–0.7134</b> | <b>–0.0344</b> | 0.0159         | –0.0005        | 0.0230         | 22.7810         | <b>444.6387</b>     | 0.6462             |
| Automobiles                     | –0.0002        | <b>1.0386</b>  | <b>–0.2164</b> | <b>1.5916</b>  | <b>1.1127</b>  | <b>–0.9904</b> | <b>–0.0408</b> | <b>–0.0208</b> | 0.0005         | <b>0.0400</b>  | 20.8798         | <b>257.1974</b>     | 0.6980             |
| Funerals                        | –0.0009        | <b>1.1609</b>  | <b>1.1096</b>  | –0.3233        | 0.2757         | 0.1500         | –0.0024        | –0.0296        | –0.0081        | –0.0366        | <b>26.1484</b>  | <b>0.5180</b>       | 0.1218             |
| Defense<br>Electronic Equipment | 0.0001         | <b>1.0031</b>  | <b>0.1837</b>  | –0.0828        | 0.1282         | 0.0866         | <b>–0.0354</b> | 0.0053         | –0.0011        | 0.0302         | 15.1197         | 20.8922             | 0.5411             |
| Other                           | 0.0001         | <b>0.8834</b>  | <b>0.8125</b>  | 0.3412         | <b>0.7083</b>  | –0.3602        | –0.0175        | <b>0.0421</b>  | –0.0017        | –0.0033        | <b>71.8661</b>  | <b>75.5039</b>      | 0.2248             |
| Medical Services                | 0.0003         | <b>1.0751</b>  | 0.1457         | <b>–0.6771</b> | –0.0923        | –0.3533        | 0.0116         | <b>0.0380</b>  | 0.0000         | –0.0615        | <b>26.9114</b>  | <b>142.5673</b>     | 0.2593             |
| Railroad Equipment              | <b>–0.0007</b> | <b>0.7457</b>  | <b>0.5306</b>  | –0.1244        | –0.1336        | 0.3127         | –0.0163        | 0.0129         | 0.0013         | –0.0052        | <b>43.3908</b>  | <b>149.0634</b>     | 0.1526             |
| Consumer<br>Discretionary       | –0.0001        | <b>1.0101</b>  | <b>–0.0414</b> | <b>0.2046</b>  | <b>0.5650</b>  | –0.2618        | <b>–0.0286</b> | 0.0005         | –0.0010        | <b>0.0199</b>  | <b>158.4583</b> | <b>253.4107</b>     | 0.8659             |
| Rent/Lease :Cons                | 0.0001         | 1.2846         | 0.9238         | 0.6952         | 0.7654         | –0.2206        | <b>–0.0611</b> | <b>–0.0115</b> | –0.0017        | 0.0856         | <b>34.8297</b>  | <b>423.8623</b>     | 0.4939             |

**Table A2: Oil Exposures for Europe (1 Jan 2018–30 April 2020) (continued)**

**Panel C: Financial industries (Top 25 oil exposures)**

| Subsector   | Constant      | Mkt-Rf        | SMB            | HML           | RMW            | CMA            | Oil            | Oil (-1)      | COVID   | Oil*<br>COVID  | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|---|---------------|---------------|----------------|---------------|----------------|----------------|----------------|---------------|---------|----------------|-----------------|---------------------|--------------------|
| Storage REITs   | 0.0004        | <b>1.2005</b> | <b>1.0097</b>  | -0.1982       | -0.2455        | <b>-0.5069</b> | <b>-0.0284</b> | 0.0101        | 0.0002  | <b>0.0878</b>  | <b>20.3207</b>  | <b>118.4342</b>     | 0.3941             |
| Investment Trust  | 0.0000        | <b>0.9776</b> | <b>0.6163</b>  | 0.1177        | 0.1133         | -0.1960        | -0.0114        | 0.0117        | 0.0003  | 0.0424         | <b>158.8000</b> | <b>1730.4926</b>    | 0.7089             |
| Closed End Investment<br>Real Estate Holding &<br>Development | 0.0000        | <b>0.9185</b> | <b>0.6318</b>  | 0.0753        | 0.0727         | -0.1531        | -0.0092        | 0.0134        | 0.0003  | 0.0344         | <b>151.9247</b> | <b>1824.3258</b>    | 0.7169             |
| Real Estate Investment<br>Services                            | 0.0001        | <b>0.7516</b> | <b>0.4773</b>  | 0.0581        | <b>0.2397</b>  | <b>-0.3167</b> | <b>-0.0156</b> | 0.0047        | -0.0005 | <b>0.0404</b>  | <b>18.1044</b>  | <b>321.5149</b>     | 0.6006             |
| Hotel, Lodge REITs  | 0.0004        | <b>0.6096</b> | <b>0.8059</b>  | -0.1453       | -0.3570        | -0.0423        | -0.0060        | -0.0014       | -0.0032 | 0.0107         | <b>92.8239</b>  | <b>521.5393</b>     | 0.1345             |
| Real Estate<br>Diversified Financial<br>Services              | 0.0000        | <b>0.8558</b> | <b>0.4429</b>  | 0.1217        | 0.1758         | <b>-0.3728</b> | <b>-0.0235</b> | 0.0082        | -0.0010 | <b>0.0429</b>  | <b>34.4555</b>  | <b>319.3228</b>     | 0.6503             |
| Banks   | 0.0000        | <b>1.0349</b> | <b>0.2898</b>  | 0.1240        | 0.0021         | -0.1021        | <b>-0.0229</b> | -0.0111       | -0.0004 | <b>0.0408</b>  | <b>120.9938</b> | <b>226.4376</b>     | 0.7986             |
| Fin. Services   | -0.0001       | <b>1.0934</b> | <b>-0.0995</b> | <b>0.5420</b> | <b>-1.2569</b> | <b>-0.2639</b> | <b>-0.0198</b> | 0.0018        | -0.0014 | <b>0.0334</b>  | <b>53.3383</b>  | <b>182.9099</b>     | 0.8688             |
| Retail REITs  | 0.0000        | <b>1.0435</b> | <b>0.4197</b>  | 0.0404        | -0.1263        | <b>-0.2026</b> | <b>-0.0192</b> | 0.0017        | 0.0002  | <b>0.0317</b>  | <b>173.3275</b> | <b>211.3069</b>     | 0.8567             |
| Investment Services   | -0.0004       | <b>0.9731</b> | <b>0.2875</b>  | <b>0.5144</b> | <b>0.4096</b>  | <b>-0.5553</b> | <b>-0.0401</b> | 0.0043        | -0.0044 | <b>0.0689</b>  | <b>92.6547</b>  | <b>1847.6491</b>    | 0.5332             |
| Residential REITs   | 0.0002        | <b>1.0146</b> | <b>0.2983</b>  | -0.1576       | <b>-0.3500</b> | <b>-0.3800</b> | <b>-0.0213</b> | 0.0125        | 0.0010  | 0.0307         | <b>31.9924</b>  | <b>457.3254</b>     | 0.6794             |
| Investment Bank,<br>Broker                                    | -0.0005       | <b>0.7430</b> | <b>0.5269</b>  | 0.3976        | 0.2435         | -0.0515        | <b>-0.0370</b> | 0.0109        | 0.0000  | <b>0.0621</b>  | 20.6904         | 1.0961              | 0.2139             |
| Investment Companies  | 0.0000        | <b>1.0941</b> | <b>0.3257</b>  | 0.0190        | <b>-0.2246</b> | <b>-0.2271</b> | <b>-0.0231</b> | -0.0044       | 0.0002  | <b>0.0316</b>  | <b>144.5504</b> | <b>164.5072</b>     | 0.8484             |
| Office REITs  | 0.0000        | <b>0.4705</b> | <b>0.6092</b>  | -0.2581       | <b>-0.3150</b> | 0.1101         | 0.0094         | <b>0.0315</b> | 0.0000  | <b>-0.0345</b> | <b>99.1653</b>  | <b>53.5402</b>      | 0.3343             |
| REITs<br>Property /Casualty<br>Insurance                      | 0.0000        | <b>0.9711</b> | <b>0.5523</b>  | 0.1617        | 0.1105         | <b>-0.4114</b> | <b>-0.0303</b> | 0.0154        | -0.0011 | <b>0.0450</b>  | <b>63.9171</b>  | <b>461.0400</b>     | 0.5806             |
| Divers REITs  | -0.0001       | <b>0.9532</b> | <b>0.4326</b>  | <b>0.2353</b> | 0.1735         | <b>-0.4283</b> | <b>-0.0318</b> | 0.0111        | -0.0016 | <b>0.0462</b>  | <b>51.6656</b>  | <b>423.1295</b>     | 0.6114             |
| Industrial REITs  | 0.0001        | <b>0.9555</b> | <b>0.3171</b>  | 0.0582        | <b>-0.2465</b> | 0.0180         | <b>-0.0299</b> | -0.0105       | -0.0007 | <b>0.0415</b>  | <b>46.5142</b>  | <b>73.3759</b>      | 0.6873             |
| Mortgage Finance  | -0.0001       | <b>0.9094</b> | <b>0.6367</b>  | <b>0.2926</b> | 0.1314         | <b>-0.3880</b> | <b>-0.0196</b> | 0.0003        | -0.0016 | 0.0185         | <b>26.2486</b>  | <b>354.4662</b>     | 0.5146             |
| Real Estate Service<br>Financial Data<br>Providers            | <b>0.0004</b> | <b>1.0109</b> | <b>0.5108</b>  | -0.1139       | -0.0734        | <b>-0.4460</b> | -0.0165        | 0.0226        | 0.0006  | 0.0106         | <b>106.0210</b> | <b>294.8001</b>     | 0.4790             |
| Asset Managers,<br>Customers                                  | 0.0002        | <b>1.1983</b> | <b>0.5135</b>  | <b>0.7274</b> | <b>-0.4898</b> | <b>-0.5443</b> | -0.0196        | 0.0190        | -0.0007 | 0.0146         | <b>64.6647</b>  | <b>57.2937</b>      | 0.4541             |
| Life Insurance  | -0.0002       | <b>1.0143</b> | <b>0.8792</b>  | 0.0071        | -0.1211        | <b>-0.5062</b> | <b>-0.0277</b> | 0.0134        | 0.0003  | <b>0.0305</b>  | 17.8867         | <b>43.4466</b>      | 0.5019             |
|   | 0.0000        | <b>1.1354</b> | 0.0589         | 0.0407        | <b>0.4764</b>  | 0.1231         | -0.0055        | <b>0.0409</b> | 0.0004  | -0.0143        | 18.1679         | <b>94.7145</b>      | 0.4045             |
|   | 0.0001        | <b>1.2879</b> | <b>0.3436</b>  | -0.0811       | <b>-0.5454</b> | <b>-0.3031</b> | <b>-0.0212</b> | -0.0023       | 0.0005  | 0.0160         | <b>24.1550</b>  | <b>131.0921</b>     | 0.7506             |
|   | 0.0000        | <b>1.3432</b> | <b>0.1057</b>  | <b>0.5491</b> | <b>-0.5646</b> | -0.3469        | -0.0349        | -0.0123       | -0.0004 | 0.0431         | 20.5783         | <b>479.9148</b>     | 0.7897             |

**Table A3: Descriptive statistics: Asia**

This table reports the summary statistics of returns to sectors in Asia. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Panel D reports the summary statistics of the independent variables, including the five asset pricing factors of Fama and French (2015), as well as oil price returns. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non-financial industries (Top 25 oil positive exposures)**

| Subsector                | Mean    | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis | JB test           | ADF             | Q (10)          |
|--------------------------|---------|---------|---------|--------------------|----------|----------|-------------------|-----------------|-----------------|
| Forestry                 | 0.0002  | 0.2076  | -0.1628 | 0.0303             | -0.1475  | 14.5000  | <b>10548.3865</b> | <b>-57.8656</b> | <b>228.9221</b> |
| Oil Crude Production     | -0.0001 | 0.1024  | -0.1792 | 0.0125             | -1.7415  | 32.2303  | <b>69070.6714</b> | <b>-40.8836</b> | <b>90.6277</b>  |
| Oil Equipment & Services | -0.0005 | 0.0720  | -0.1350 | 0.0131             | -0.5336  | 13.5202  | <b>8912.4483</b>  | <b>-41.5883</b> | <b>64.5628</b>  |
| Oil, Gas, Coal           | 0.0000  | 0.0847  | -0.1229 | 0.0115             | -0.9290  | 17.6872  | <b>17469.2947</b> | <b>-41.9571</b> | <b>77.7163</b>  |
| Energy                   | 0.0000  | 0.0822  | -0.1201 | 0.0112             | -0.9560  | 17.6607  | <b>17423.6362</b> | <b>-41.9868</b> | <b>77.6686</b>  |
| Integrated Oil & Gas     | -0.0001 | 0.0883  | -0.1621 | 0.0119             | -0.9807  | 25.7971  | <b>41731.7437</b> | <b>-43.2929</b> | <b>65.9317</b>  |
| Oil Refinery Marketing   | 0.0002  | 0.0887  | -0.1082 | 0.0123             | -0.5881  | 14.4399  | <b>10541.7833</b> | <b>-43.3812</b> | <b>76.9840</b>  |
| Hotels & Motels          | -0.0002 | 0.0561  | -0.0807 | 0.0110             | -0.6057  | 9.0839   | <b>3067.3225</b>  | <b>-41.3809</b> | <b>45.2345</b>  |
| Computer Services        | 0.0004  | 0.0614  | -0.0840 | 0.0110             | -0.5944  | 9.4575   | <b>3436.3922</b>  | <b>-42.1075</b> | <b>38.3122</b>  |
| Health Care Providers    | 0.0005  | 0.1135  | -0.0768 | 0.0108             | 0.3606   | 12.7907  | <b>7682.1617</b>  | <b>-43.1593</b> | <b>26.5210</b>  |
| Farming, Fishing         | -0.0002 | 0.0477  | -0.0774 | 0.0093             | -0.4661  | 9.2975   | <b>3230.3907</b>  | <b>-40.8313</b> | <b>34.7888</b>  |
| Health Care Facilities   | 0.0001  | 0.0549  | -0.0995 | 0.0095             | -0.9127  | 14.1249  | <b>10130.6562</b> | <b>-44.0100</b> | <b>37.4138</b>  |
| Fertilizers              | 0.0005  | 0.0669  | -0.1117 | 0.0115             | -0.9522  | 15.0015  | <b>11769.8392</b> | <b>-39.9267</b> | <b>50.0617</b>  |
| Vending/Catering         | 0.0001  | 0.1229  | -0.1424 | 0.0140             | -0.2026  | 16.6411  | <b>14845.1467</b> | <b>-44.5324</b> | <b>40.2868</b>  |
| Tobacco                  | -0.0002 | 0.0476  | -0.0695 | 0.0099             | -0.4218  | 6.9313   | <b>1288.6516</b>  | <b>-42.3891</b> | <b>33.6443</b>  |
| Multi utilities          | -0.0006 | 0.0595  | -0.0813 | 0.0126             | -0.3173  | 6.7071   | <b>1127.4901</b>  | <b>-42.6911</b> | <b>35.9326</b>  |
| Alternative Energy       | -0.0002 | 0.2289  | -0.1845 | 0.0198             | -1.2058  | 39.2158  | <b>105007.892</b> | <b>-41.3462</b> | <b>152.3174</b> |
| Alternative Electricity  | 0.0000  | 0.0830  | -0.0719 | 0.0102             | -0.1449  | 10.9074  | <b>4990.5650</b>  | <b>-41.0430</b> | <b>37.9705</b>  |
| Aerospace                | -0.0002 | 0.0647  | -0.1020 | 0.0129             | -0.4918  | 8.6178   | <b>2592.6898</b>  | <b>-42.5029</b> | <b>46.0197</b>  |
| Aero/Defence             | -0.0001 | 0.0566  | -0.1164 | 0.0124             | -0.7328  | 10.4667  | <b>4615.0752</b>  | <b>-42.8503</b> | <b>38.0751</b>  |
| General Mining           | -0.0007 | 0.1267  | -0.1638 | 0.0211             | -0.5487  | 8.7350   | <b>2717.5715</b>  | <b>-43.1781</b> | <b>39.2859</b>  |
| Plastics                 | 0.0002  | 0.0585  | -0.0796 | 0.0113             | -0.4969  | 8.5007   | <b>2490.5202</b>  | <b>-42.5150</b> | 20.6066         |
| Telecom Equipment        | -0.0003 | 0.0686  | -0.0719 | 0.0119             | -0.2293  | 7.3794   | <b>1545.4982</b>  | <b>-44.1762</b> | 22.7553         |
| Transport Services       | 0.0001  | 0.0705  | -0.1001 | 0.0093             | -1.2644  | 22.0797  | <b>29526.1802</b> | <b>-42.7737</b> | <b>89.9251</b>  |
| Coal                     | -0.0003 | 0.0692  | -0.0855 | 0.0126             | -0.2742  | 6.6552   | <b>1088.9050</b>  | <b>-41.1855</b> | <b>35.8965</b>  |

**Table A3: Descriptive statistics: Asia****Panel B: Non-financial industries (Top 25 oil negative exposures)**

| Subsector   | Mean    | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis | JB test           | ADF             | Q (10)         |
|---|---------|---------|---------|--------------------|----------|----------|-------------------|-----------------|----------------|
| Training, Employment                                | 0.0008  | 0.1228  | -0.1243 | 0.0181             | -0.1738  | 8.2092   | <b>2172.5943</b>  | <b>-43.4888</b> | <b>30.6215</b> |
| Machinery: Tools                                    | 0.0001  | 0.0990  | -0.0832 | 0.0180             | -0.0474  | 4.4106   | <b>159.3261</b>   | <b>-45.2913</b> | <b>25.3214</b> |
| Recreation Vehicles                                 | 0.0002  | 0.1208  | -0.1917 | 0.0222             | -0.6367  | 11.1100  | <b>5371.8410</b>  | <b>-47.6020</b> | <b>38.6377</b> |
| Cosmetics   | 0.0005  | 0.0755  | -0.0739 | 0.0156             | -0.1478  | 5.3206   | <b>436.2059</b>   | <b>-42.9724</b> | <b>27.6176</b> |
| Prod Tech Equipment                                 | 0.0007  | 0.1249  | -0.0833 | 0.0170             | 0.1101   | 6.3815   | <b>915.2994</b>   | <b>-44.4176</b> | 19.0390        |
| Diversified Materials                               | 0.0001  | 0.1087  | -0.1009 | 0.0183             | 0.1306   | 7.3761   | <b>1531.8433</b>  | <b>-44.1077</b> | 18.8716        |
| Machinery: Construction                             | 0.0001  | 0.0814  | -0.0711 | 0.0152             | -0.0992  | 5.4113   | <b>466.5832</b>   | <b>-43.0402</b> | 20.9590        |
| Machinery: Industrial<br>Electronic Equipment       | 0.0002  | 0.0724  | -0.0607 | 0.0134             | -0.1333  | 5.7591   | <b>612.4345</b>   | <b>-46.7748</b> | <b>33.3064</b> |
| Gauges  | 0.0004  | 0.0731  | -0.0648 | 0.0122             | -0.0545  | 5.8074   | <b>629.1738</b>   | <b>-45.9849</b> | <b>41.2853</b> |
| Recreational Services                               | 0.0006  | 0.0761  | -0.0684 | 0.0133             | -0.0276  | 6.3791   | <b>910.3824</b>   | <b>-46.4616</b> | <b>32.3206</b> |
| Copper  | -0.0004 | 0.1571  | -0.0835 | 0.0195             | 0.5600   | 8.0828   | <b>2159.2527</b>  | <b>-40.6057</b> | <b>31.3610</b> |
| Machinery: Specialty                                | 0.0000  | 0.0749  | -0.0803 | 0.0157             | -0.0979  | 5.1269   | <b>363.6226</b>   | <b>-47.2157</b> | <b>38.2072</b> |
| Ind. Engineering                                    | 0.0001  | 0.0703  | -0.0598 | 0.0122             | -0.1335  | 6.2355   | <b>840.0872</b>   | <b>-44.2741</b> | <b>25.7109</b> |
| Home Const.   | 0.0003  | 0.0770  | -0.0812 | 0.0137             | -0.1477  | 6.8832   | <b>1208.9125</b>  | <b>-45.3426</b> | <b>30.9465</b> |
| Form, Bulk Print                                    | 0.0002  | 0.0988  | -0.0710 | 0.0137             | 0.0338   | 7.4636   | <b>1588.4738</b>  | <b>-47.4256</b> | <b>34.9207</b> |
| Glass   | 0.0001  | 0.0908  | -0.0828 | 0.0142             | -0.0223  | 6.6927   | <b>1087.0905</b>  | <b>-44.3042</b> | <b>32.0244</b> |
| Electronic Office<br>Equipment                      | 0.0000  | 0.0654  | -0.0843 | 0.0122             | -0.4341  | 6.6892   | <b>1144.9002</b>  | <b>-50.3704</b> | <b>58.5743</b> |
| Industrial Support<br>Services                      | 0.0002  | 0.0952  | -0.0613 | 0.0116             | -0.0258  | 8.7223   | <b>2610.2851</b>  | <b>-45.2060</b> | <b>47.7644</b> |
| Household Furnishing                                | -0.0001 | 0.1011  | -0.0831 | 0.0173             | 0.1198   | 6.1492   | <b>795.0614</b>   | <b>-44.9956</b> | <b>29.2700</b> |
| Electronic Equipment<br>Commercial Vehicle<br>Lease | 0.0003  | 0.0672  | -0.0655 | 0.0115             | -0.2232  | 5.9655   | <b>716.8654</b>   | <b>-44.8697</b> | <b>28.5509</b> |
| Trucking  | 0.0004  | 0.1097  | -0.1012 | 0.0150             | -0.3263  | 9.3085   | <b>3206.1395</b>  | <b>-41.6019</b> | <b>56.0536</b> |
| Apparel Retailer                                    | 0.0002  | 0.0906  | -0.0707 | 0.0138             | 0.0677   | 6.0681   | <b>751.7999</b>   | <b>-49.5010</b> | <b>42.7826</b> |
| Apparel Retailer                                    | 0.0002  | 0.1083  | -0.1029 | 0.0151             | -0.0669  | 9.1476   | <b>3013.8124</b>  | <b>-47.8320</b> | <b>39.1192</b> |
| Photography   | 0.0002  | 0.0649  | -0.0895 | 0.0136             | -0.4203  | 6.0330   | <b>789.5450</b>   | <b>-46.8590</b> | <b>24.6992</b> |
| Alternative Fuels                                   | 0.0005  | 0.2550  | -0.2122 | 0.0281             | 0.8430   | 15.1549  | <b>12002.9095</b> | <b>-40.8533</b> | <b>35.7318</b> |

**Table A3: Descriptive statistics: Asia (continued)****Panel C: Financial industries (Top 25 oil exposures)**

| Subsector                         | Mean    | Maximum | Minimum | Standard Deviation | Skewness | Kurtosis | JB test            | ADF             | Q (10)          |
|-----------------------------------|---------|---------|---------|--------------------|----------|----------|--------------------|-----------------|-----------------|
| Reinsurance                       | -0.0008 | 0.1836  | -0.1216 | 0.0171             | 0.4701   | 19.9381  | <b>22938.7277</b>  | <b>-39.2657</b> | <b>129.7331</b> |
| Full Line Insurance               | -0.0002 | 0.1084  | -0.0980 | 0.0194             | -0.1594  | 5.7100   | <b>593.4939</b>    | <b>-41.9412</b> | <b>28.0430</b>  |
| Health Care REITs                 | 0.0002  | 0.1210  | -0.0975 | 0.0114             | 0.1237   | 20.0700  | <b>23230.6910</b>  | <b>-45.6940</b> | <b>105.8580</b> |
| Consumer Lending                  | -0.0002 | 0.0874  | -0.1204 | 0.0152             | -0.4522  | 9.4558   | <b>3387.1636</b>   | <b>-43.8150</b> | <b>19.8898</b>  |
| Mortgage Finance                  | 0.0002  | 0.0810  | -0.1009 | 0.0173             | -0.2820  | 6.6825   | <b>1106.2849</b>   | <b>-42.2516</b> | <b>34.1818</b>  |
| Financial Credit Services         | 0.0000  | 0.0671  | -0.1000 | 0.0134             | -0.5762  | 7.9176   | <b>2033.3751</b>   | <b>-41.7949</b> | <b>29.1693</b>  |
| Diversified Financial Services    | 0.0002  | 0.0521  | -0.2035 | 0.0128             | -2.9772  | 42.3596  | <b>126308.7569</b> | <b>-42.7027</b> | <b>73.7245</b>  |
| Real Estate Holding & Development | 0.0001  | 0.0652  | -0.0564 | 0.0103             | -0.4443  | 6.9938   | <b>1334.3431</b>   | <b>-39.3966</b> | <b>62.6196</b>  |
| Real Estate Investment Services   | 0.0001  | 0.0645  | -0.0562 | 0.0103             | -0.4496  | 6.9681   | <b>1319.5383</b>   | <b>-39.4239</b> | <b>62.4968</b>  |
| Banks                             | 0.0000  | 0.0409  | -0.0626 | 0.0087             | -0.7434  | 8.4350   | <b>2530.7558</b>   | <b>-40.4107</b> | <b>63.3847</b>  |
| Financial Data Providers          | -0.0003 | 0.0944  | -0.1168 | 0.0158             | 0.1909   | 8.2459   | <b>2205.1527</b>   | <b>-47.4146</b> | <b>35.4233</b>  |
| Financial Services                | 0.0001  | 0.0582  | -0.0948 | 0.0111             | -0.9072  | 9.5626   | <b>3695.2693</b>   | <b>-41.4335</b> | <b>40.5677</b>  |
| Real Estate                       | 0.0001  | 0.0711  | -0.0716 | 0.0092             | -0.5433  | 10.4826  | <b>4556.8906</b>   | <b>-38.0050</b> | <b>84.2505</b>  |
| Investment Bank Broker            | 0.0001  | 0.0527  | -0.0916 | 0.0109             | -0.8275  | 8.8429   | <b>2939.5488</b>   | <b>-41.9084</b> | <b>31.0142</b>  |
| Life Insurance                    | 0.0002  | 0.0633  | -0.0553 | 0.0108             | -0.2257  | 6.2772   | <b>872.3031</b>    | <b>-40.9936</b> | <b>32.6776</b>  |
| Insurance                         | 0.0002  | 0.0645  | -0.0529 | 0.0103             | -0.1926  | 6.5226   | <b>1000.8914</b>   | <b>-40.9327</b> | <b>32.0999</b>  |
| Retail REITs                      | 0.0001  | 0.0780  | -0.0898 | 0.0084             | -0.8108  | 21.9222  | <b>28749.1620</b>  | <b>-37.6617</b> | <b>124.0972</b> |
| Real Estate Service               | 0.0006  | 0.0733  | -0.0884 | 0.0158             | -0.1945  | 5.7758   | <b>626.2029</b>    | <b>-44.6157</b> | <b>29.0832</b>  |
| Investment Services               | 0.0001  | 0.0591  | -0.0574 | 0.0121             | -0.0652  | 6.0170   | <b>726.8652</b>    | <b>-41.2844</b> | <b>30.6462</b>  |
| Nonlife Insurance                 | 0.0001  | 0.0690  | -0.0623 | 0.0119             | 0.0168   | 6.3605   | <b>900.2077</b>    | <b>-44.2037</b> | 19.4633         |
| Property/Casualty Insurance       | 0.0002  | 0.0697  | -0.0688 | 0.0124             | 0.0235   | 6.3359   | <b>887.1656</b>    | <b>-44.8967</b> | 22.3959         |
| Hotel Lodge REITs                 | -0.0001 | 0.1039  | -0.1969 | 0.0116             | -3.0598  | 68.8497  | <b>348615.2743</b> | <b>-32.9051</b> | <b>321.5753</b> |
| Office REITs                      | 0.0002  | 0.1056  | -0.1392 | 0.0102             | -1.1365  | 39.6416  | <b>107428.7583</b> | <b>-34.8522</b> | <b>198.9745</b> |
| REITs                             | 0.0002  | 0.0915  | -0.1428 | 0.0092             | -1.8481  | 51.0929  | <b>185448.8537</b> | <b>-34.0063</b> | <b>213.2148</b> |
| Other Specialty REITs             | 0.0004  | 0.1187  | -0.1537 | 0.0118             | 0.1373   | 35.9021  | <b>86293.9416</b>  | <b>-37.2415</b> | <b>114.0058</b> |



**Table A4: Oil Exposures for Asia (1 Jan 2018–30 April 2020)**

This table reports the regression output of Equation 2 in the Asian region. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Sector returns are regressed on the five asset pricing factors of Fama and French (2015), as well as oil price returns and COVID-19 dummy. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non-financial industries (Top 25 oil positive exposures)**

| Subsector                | Constant       | Mkt-Rf        | SMB           | HML           | RMW            | CMA            | Oil            | Oil (-1)       | COVID         | Oil*<br>COVID | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|--------------------------|----------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|---------------|---------------|-----------------|---------------------|--------------------|
| Forestry                 | 0.0003         | -0.0634       | 0.0148        | 0.0997        | -0.3346        | <b>0.2350</b>  | -0.0042        | 0.0048         | -0.0014       | <b>0.1467</b> | <b>237.6465</b> | <b>411.3461</b>     | 0.0087             |
| Oil Crude Production     | 0.0000         | <b>1.0510</b> | <b>0.2006</b> | <b>0.5299</b> | -0.1103        | <b>-0.3034</b> | 0.0135         | <b>0.0905</b>  | -0.0006       | 0.0695        | <b>33.3910</b>  | <b>519.0491</b>     | 0.5613             |
| Oil Equipment & Services | <b>-0.0005</b> | <b>1.1005</b> | <b>0.1957</b> | <b>0.6785</b> | 0.0187         | <b>-0.2337</b> | <b>0.0315</b>  | <b>0.0789</b>  | 0.0009        | -0.0009       | <b>15.9363</b>  | <b>281.1123</b>     | 0.5011             |
| Oil, Gas, Coal           | 0.0000         | <b>1.0275</b> | <b>0.1747</b> | <b>0.5073</b> | -0.1185        | <b>-0.2776</b> | 0.0083         | <b>0.0804</b>  | 0.0005        | 0.0444        | <b>36.5391</b>  | <b>770.9528</b>     | 0.5936             |
| Energy                   | 0.0000         | <b>1.0308</b> | <b>0.1715</b> | <b>0.5069</b> | -0.1232        | <b>-0.2851</b> | 0.0069         | <b>0.0782</b>  | 0.0006        | 0.0428        | <b>32.3665</b>  | <b>732.9372</b>     | 0.6190             |
| Integrated Oil & Gas     | -0.0001        | <b>0.9850</b> | 0.0955        | <b>0.4846</b> | -0.1579        | <b>-0.1893</b> | -0.0116        | <b>0.0671</b>  | 0.0006        | <b>0.0780</b> | <b>40.2953</b>  | <b>753.4489</b>     | 0.5031             |
| Oil Refinery Marketing   | 0.0002         | <b>0.9156</b> | <b>0.1945</b> | <b>0.4243</b> | -0.0465        | <b>-0.2569</b> | -0.0140        | <b>0.0361</b>  | 0.0004        | 0.0658        | <b>35.4923</b>  | <b>649.5189</b>     | 0.3665             |
| Hotels & Motels          | -0.0001        | <b>0.7901</b> | -0.0167       | <b>0.2537</b> | -0.0910        | <b>-0.4492</b> | 0.0008         | -0.0009        | -0.0016       | 0.0310        | 16.7610         | <b>252.4951</b>     | 0.3862             |
| Computer Services        | <b>0.0004</b>  | <b>0.6851</b> | <b>0.1511</b> | <b>0.1858</b> | 0.0247         | <b>-0.2648</b> | 0.0009         | 0.0055         | 0.0001        | 0.0241        | <b>23.5765</b>  | <b>155.9864</b>     | 0.2581             |
| Health Care Providers    | <b>0.0005</b>  | <b>0.7143</b> | <b>0.2632</b> | 0.1114        | <b>-0.1720</b> | <b>-0.3930</b> | -0.0084        | -0.0136        | <b>0.0030</b> | <b>0.0425</b> | <b>36.1666</b>  | <b>57.8986</b>      | 0.2789             |
| Farming, Fishing         | -0.0002        | <b>0.7783</b> | <b>0.3179</b> | <b>0.4420</b> | 0.0277         | -0.0976        | 0.0050         | <b>0.0173</b>  | 0.0000        | 0.0133        | 14.3346         | <b>568.1300</b>     | 0.3952             |
| Health Care Facilities   | 0.0002         | <b>0.5687</b> | <b>0.1277</b> | <b>0.3200</b> | -0.0383        | <b>-0.3400</b> | 0.0012         | -0.0035        | -0.0012       | 0.0181        | <b>33.0869</b>  | <b>553.8605</b>     | 0.2326             |
| Fertilizers              | <b>0.0005</b>  | <b>0.6559</b> | <b>0.3693</b> | <b>0.2880</b> | 0.0234         | <b>-0.1865</b> | <b>-0.0252</b> | -0.0010        | 0.0003        | <b>0.0680</b> | <b>29.6677</b>  | <b>354.4503</b>     | 0.1813             |
| Vending/Catering         | 0.0002         | <b>0.8043</b> | <b>0.2680</b> | <b>0.5442</b> | 0.1741         | <b>-0.1847</b> | -0.0080        | <b>-0.0314</b> | -0.0036       | 0.0307        | <b>47.5135</b>  | <b>844.9294</b>     | 0.1871             |
| Tobacco                  | -0.0001        | <b>0.5733</b> | 0.0711        | <b>0.1927</b> | -0.1172        | <b>-0.1381</b> | -0.0084        | 0.0134         | -0.0010       | <b>0.0312</b> | <b>43.9531</b>  | <b>102.7853</b>     | 0.2159             |
| Multi utilities          | <b>-0.0006</b> | <b>0.7876</b> | <b>0.1334</b> | <b>0.4356</b> | -0.0093        | <b>-0.2105</b> | -0.0114        | 0.0147         | -0.0006       | 0.0367        | <b>37.6387</b>  | <b>316.9660</b>     | 0.2442             |
| Alternative Energy       | -0.0002        | <b>0.4807</b> | -0.0220       | <b>0.2945</b> | -0.0016        | <b>-0.3826</b> | 0.0078         | -0.0190        | 0.0009        | -0.0036       | <b>171.9680</b> | <b>1534.5354</b>    | 0.0401             |
| Alternative Electricity  | 0.0000         | <b>0.6182</b> | <b>0.2070</b> | <b>0.4207</b> | 0.0585         | <b>-0.3713</b> | 0.0022         | 0.0059         | 0.0006        | 0.0072        | <b>34.4193</b>  | <b>410.7507</b>     | 0.2250             |
| Aerospace                | -0.0002        | <b>0.9010</b> | 0.0968        | <b>0.3689</b> | -0.0777        | -0.1071        | 0.0073         | 0.0001         | -0.0002       | -0.0042       | <b>27.5412</b>  | <b>100.4256</b>     | 0.2926             |
| Aero/Defence             | -0.0001        | <b>0.9082</b> | <b>0.1264</b> | <b>0.3150</b> | -0.1218        | -0.0924        | 0.0106         | -0.0077        | -0.0006       | -0.0131       | 19.1806         | <b>72.4809</b>      | 0.3188             |
| General Mining           | <b>-0.0007</b> | <b>1.1392</b> | <b>0.3585</b> | <b>0.6898</b> | 0.0867         | <b>-0.2994</b> | -0.0183        | 0.0331         | -0.0010       | 0.0447        | <b>27.9975</b>  | <b>176.5585</b>     | 0.1728             |
| Plastics                 | 0.0002         | <b>0.7755</b> | <b>0.1870</b> | <b>0.4354</b> | 0.0765         | <b>-0.3746</b> | -0.0021        | 0.0304         | 0.0006        | 0.0114        | <b>37.5600</b>  | <b>26.6316</b>      | 0.3102             |
| Telecom Equipment        | -0.0003        | <b>0.8193</b> | <b>0.1746</b> | <b>0.3198</b> | -0.1808        | <b>-0.4813</b> | -0.0095        | -0.0063        | 0.0017        | 0.0240        | 14.2553         | <b>261.9182</b>     | 0.3033             |
| Transport Services       | 0.0002         | <b>0.8532</b> | <b>0.1708</b> | <b>0.2811</b> | -0.1332        | <b>-0.3053</b> | -0.0165        | -0.0010        | -0.0012       | <b>0.0358</b> | <b>60.6891</b>  | <b>684.3961</b>     | 0.5289             |
| Coal                     | -0.0003        | <b>0.8887</b> | <b>0.2358</b> | <b>0.6081</b> | 0.0362         | <b>-0.3011</b> | -0.0045        | 0.0205         | -0.0008       | 0.0103        | <b>23.5297</b>  | <b>157.7951</b>     | 0.3008             |

**Table A4: Oil Exposures for Asia (1 Jan 2018–30 April 2020) (continued)**

**Panel B: Non-financial industries (Top 25 oil negative exposures)**

| Subsector   | Constant      | Mkt-rf        | SMB           | HML           | RMW            | CMA            | Oil            | Oil (-1)       | COVID   | Oil*<br>COVID | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|---|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|---------|---------------|-----------------|---------------------|--------------------|
| Training,<br>Employment                                 | <b>0.0008</b> | <b>0.8002</b> | <b>0.3411</b> | <b>0.3239</b> | <b>0.4103</b>  | <b>-0.3151</b> | <b>-0.0654</b> | 0.0111         | -0.0025 | -0.0239       | <b>31.8566</b>  | <b>608.1787</b>     | 0.1238             |
| Machinery: Tools  | 0.0001        | <b>0.9810</b> | 0.1092        | <b>0.2936</b> | 0.2492         | <b>-0.0662</b> | <b>-0.0477</b> | <b>0.0659</b>  | -0.0008 | -0.0414       | <b>50.8190</b>  | <b>281.2316</b>     | 0.2080             |
| Recreation Vehicles                                     | 0.0002        | <b>0.9362</b> | 0.0514        | <b>0.2977</b> | 0.1216         | -0.0256        | -0.0447        | <b>0.0726</b>  | -0.0026 | -0.0239       | <b>59.5391</b>  | <b>184.7043</b>     | 0.1250             |
| Cosmetics   | <b>0.0006</b> | <b>0.7468</b> | 0.1569        | 0.0290        | -0.1957        | <b>-0.2404</b> | <b>-0.0461</b> | -0.0162        | -0.0016 | -0.0158       | <b>28.6405</b>  | <b>167.8004</b>     | 0.1375             |
| Prod Tech Equipment                                     | <b>0.0006</b> | <b>0.9114</b> | 0.0841        | 0.1737        | 0.0438         | <b>-0.3639</b> | <b>-0.0341</b> | -0.0084        | 0.0004  | -0.0391       | 20.1791         | <b>142.0934</b>     | 0.1887             |
| Diversified Materials<br>Machinery:<br>Construction     | 0.0001        | <b>0.9275</b> | 0.2031        | <b>0.2126</b> | 0.2241         | -0.0391        | -0.0256        | 0.0414         | -0.0014 | -0.0527       | <b>31.2722</b>  | <b>120.1707</b>     | 0.1640             |
| Machinery: Industrial<br>Electronic Equipment<br>Gauges | 0.0000        | <b>0.9657</b> | <b>0.2149</b> | <b>0.5005</b> | <b>0.2361</b>  | -0.1341        | <b>-0.0307</b> | <b>0.0627</b>  | 0.0004  | -0.0412       | <b>44.3255</b>  | <b>290.4202</b>     | 0.2569             |
| Recreational Services                                   | 0.0001        | <b>0.8603</b> | 0.1211        | <b>0.2707</b> | 0.1890         | -0.0932        | <b>-0.0333</b> | <b>0.0281</b>  | 0.0004  | -0.0278       | <b>103.3188</b> | <b>476.7383</b>     | 0.2630             |
| Copper  | 0.0003        | <b>0.7574</b> | 0.0474        | 0.1656        | 0.1388         | -0.1303        | <b>-0.0362</b> | <b>0.0203</b>  | 0.0001  | -0.0212       | <b>87.4537</b>  | <b>453.1793</b>     | 0.2599             |
| Machinery: Specialty                                    | <b>0.0005</b> | <b>0.4048</b> | 0.0485        | 0.0446        | 0.1003         | 0.1214         | <b>-0.0524</b> | <b>-0.0295</b> | -0.0012 | 0.0151        | <b>30.7271</b>  | <b>268.2292</b>     | 0.0571             |
| Ind. Engineering  | -0.0004       | <b>1.5357</b> | <b>0.7080</b> | <b>0.9708</b> | <b>-0.2336</b> | <b>-0.6150</b> | <b>-0.0625</b> | <b>0.0402</b>  | 0.0007  | 0.0367        | <b>30.8736</b>  | <b>196.1017</b>     | 0.3518             |
| Home Const.   | 0.0000        | <b>0.8214</b> | 0.0858        | <b>0.3722</b> | <b>0.2222</b>  | -0.0997        | <b>-0.0345</b> | <b>0.0514</b>  | -0.0013 | -0.0196       | <b>75.6782</b>  | <b>417.6816</b>     | 0.1864             |
| Form, Bulk Print  | 0.0000        | <b>0.9073</b> | 0.1550        | <b>0.3292</b> | 0.1347         | -0.0859        | <b>-0.0282</b> | <b>0.0308</b>  | 0.0003  | -0.0306       | <b>91.0347</b>  | <b>618.3736</b>     | 0.3400             |
| Glass<br>Electronic Office<br>Equipment                 | 0.0003        | <b>0.6543</b> | 0.1383        | 0.1203        | 0.0165         | 0.1013         | -0.0303        | 0.0065         | -0.0013 | -0.0245       | <b>46.3786</b>  | <b>758.8928</b>     | 0.1271             |
| Industrial Support<br>Services                          | 0.0002        | <b>0.6804</b> | 0.1702        | 0.2531        | <b>0.2308</b>  | 0.0496         | -0.0215        | 0.0231         | -0.0019 | -0.0424       | <b>82.1124</b>  | <b>452.2521</b>     | 0.1499             |
| Household<br>Furnishing                                 | 0.0001        | <b>0.8699</b> | 0.1547        | <b>0.3304</b> | 0.1453         | -0.2741        | <b>-0.0337</b> | <b>0.0288</b>  | -0.0011 | -0.0165       | <b>44.9265</b>  | <b>121.2439</b>     | 0.2379             |
| Electronic<br>Equipment                                 | 0.0000        | <b>0.5832</b> | 0.1009        | <b>0.2025</b> | <b>0.1810</b>  | 0.0497         | <b>-0.0369</b> | <b>0.0196</b>  | -0.0008 | -0.0086       | <b>109.5258</b> | <b>537.4104</b>     | 0.1396             |
| Commercial Vehicle<br>Lease                             | 0.0002        | <b>0.7728</b> | 0.2440        | <b>0.2890</b> | <b>0.1828</b>  | 0.0217         | <b>-0.0258</b> | <b>0.0406</b>  | -0.0009 | -0.0300       | <b>89.5714</b>  | <b>1073.0377</b>    | 0.2642             |
| Trucking  | -0.0001       | <b>0.7905</b> | <b>0.4803</b> | <b>0.2222</b> | -0.0002        | 0.0842         | <b>-0.0463</b> | <b>0.0036</b>  | 0.0000  | 0.0125        | <b>31.0509</b>  | <b>147.1824</b>     | 0.0973             |
| Apparel Retailer  | 0.0003        | <b>0.7786</b> | 0.0645        | 0.1658        | 0.1118         | -0.1337        | <b>-0.0285</b> | <b>0.0194</b>  | -0.0001 | -0.0207       | <b>81.8557</b>  | <b>423.8059</b>     | 0.3012             |
| Photography   | <b>0.0005</b> | <b>0.8654</b> | <b>0.2710</b> | <b>0.2394</b> | 0.0729         | <b>-0.2781</b> | <b>-0.0467</b> | <b>0.0408</b>  | -0.0025 | 0.0171        | <b>37.7767</b>  | <b>758.6188</b>     | 0.2125             |
| Alternative Fuels                                       | 0.0002        | <b>0.6056</b> | 0.1142        | <b>0.2478</b> | 0.1441         | -0.0155        | <b>-0.0424</b> | 0.0066         | -0.0012 | 0.0128        | <b>81.2346</b>  | <b>101.6816</b>     | 0.1107             |
|   | 0.0002        | <b>0.7306</b> | 0.0923        | <b>0.2327</b> | 0.0462         | -0.1576        | <b>-0.0498</b> | 0.0094         | -0.0012 | 0.0282        | <b>62.6001</b>  | <b>394.4345</b>     | 0.1429             |
|   | 0.0002        | <b>0.7399</b> | 0.0572        | <b>0.2354</b> | -0.0090        | <b>-0.2234</b> | -0.0153        | -0.0116        | -0.0011 | -0.0421       | <b>62.3304</b>  | <b>122.2725</b>     | 0.1822             |
|   | <b>0.0005</b> | <b>0.6180</b> | <b>0.5311</b> | -0.1959       | -0.0922        | <b>0.5229</b>  | -0.0220        | -0.0255        | -0.0009 | -0.0273       | <b>29.6637</b>  | <b>226.3303</b>     | 0.0221             |

**Table A4: Oil Exposures for Asia (1 Jan 2018–30 April 2020) (continued)**

**Panel C: Financial industries (Top 25 oil exposures)**

| Subsector                         | Constant | Mkt-Rf        | SMB            | HML           | RMW            | CMA            | Oil            | Oil (-1)       | COVID   | Oil*<br>COVID | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|-----------------------------------|----------|---------------|----------------|---------------|----------------|----------------|----------------|----------------|---------|---------------|-----------------|---------------------|--------------------|
| Reinsurance                       | -0.0006  | <b>0.5840</b> | <b>0.2255</b>  | 0.2189        | -0.0177        | -0.1472        | 0.0079         | 0.0007         | -0.0037 | 0.0141        | <b>91.7903</b>  | <b>689.1869</b>     | 0.0686             |
| Full Line Insurance               | -0.0001  | <b>0.8166</b> | <b>0.2655</b>  | <b>0.2859</b> | <b>0.0933</b>  | -0.2032        | 0.0146         | -0.0163        | -0.0018 | -0.0185       | <b>33.4781</b>  | <b>650.4167</b>     | 0.1019             |
| Health Care REITs                 | 0.0002   | <b>0.9148</b> | <b>0.1687</b>  | 0.2014        | <b>-0.0309</b> | -0.3436        | <b>-0.0238</b> | 0.0148         | -0.0025 | 0.0426        | <b>73.1009</b>  | <b>474.4516</b>     | 0.2389             |
| Consumer Lending                  | -0.0001  | <b>0.9116</b> | <b>-0.0841</b> | 0.3216        | <b>-0.3497</b> | <b>-0.5149</b> | <b>-0.0153</b> | -0.0285        | -0.0020 | 0.0231        | 19.9703         | <b>716.0716</b>     | 0.2395             |
| Mortgage Finance                  | 0.0003   | <b>0.9031</b> | <b>0.0387</b>  | 0.2652        | <b>-0.1839</b> | -0.3975        | <b>-0.0219</b> | <b>-0.0052</b> | -0.0021 | 0.0327        | <b>36.5888</b>  | <b>630.0834</b>     | 0.1978             |
| Financial Credit Services         | 0.0001   | <b>0.9263</b> | <b>0.1726</b>  | 0.1387        | -0.2638        | -0.5553        | <b>-0.0459</b> | <b>-0.0054</b> | -0.0036 | 0.0774        | <b>28.5886</b>  | <b>558.7420</b>     | 0.3060             |
| Diversified Financial Services    | 0.0004   | <b>1.0597</b> | <b>-0.0602</b> | 0.4974        | <b>-0.5720</b> | <b>-0.4658</b> | <b>-0.0109</b> | <b>-0.0020</b> | 0.0001  | 0.0004        | <b>24.9736</b>  | <b>191.4251</b>     | 0.3656             |
| Real Estate Holding & Development | 0.0001   | <b>1.0553</b> | <b>-0.0548</b> | 0.4906        | <b>-0.5648</b> | <b>-0.4668</b> | <b>-0.0114</b> | <b>-0.0019</b> | 0.0002  | 0.0013        | <b>31.2193</b>  | <b>137.2073</b>     | 0.7314             |
| Real Estate Investment Services   | 0.0001   | <b>0.9025</b> | <b>0.1037</b>  | 0.4188        | <b>-0.1547</b> | <b>-0.2549</b> | <b>-0.0161</b> | <b>0.0020</b>  | -0.0008 | 0.0106        | <b>30.8262</b>  | <b>137.3774</b>     | 0.7290             |
| Banks                             | 0.0000   | <b>0.9312</b> | <b>0.0777</b>  | 0.3830        | <b>-0.2635</b> | <b>-0.3221</b> | <b>-0.0169</b> | <b>-0.0002</b> | -0.0007 | 0.0111        | 18.5440         | <b>240.3319</b>     | 0.6541             |
| Financial Data Providers          | -0.0003  | <b>0.9981</b> | <b>0.1670</b>  | <b>0.2168</b> | <b>-0.3068</b> | <b>-0.4334</b> | <b>-0.0331</b> | <b>-0.0013</b> | -0.0012 | 0.0364        | <b>47.6097</b>  | <b>245.2719</b>     | 0.1531             |
| Financial Services                | 0.0002   | <b>0.9633</b> | <b>0.0319</b>  | 0.4751        | <b>-0.3930</b> | <b>-0.3904</b> | <b>-0.0117</b> | <b>0.0007</b>  | -0.0002 | -0.0082       | 19.9791         | <b>480.7196</b>     | 0.5140             |
| Real Estate Investment Bank       | 0.0001   | <b>0.9777</b> | <b>0.1396</b>  | <b>0.2127</b> | <b>-0.3190</b> | <b>-0.4040</b> | <b>-0.0320</b> | <b>-0.0006</b> | -0.0007 | 0.0331        | <b>26.4145</b>  | <b>355.0944</b>     | 0.7077             |
| Broker                            | 0.0002   | <b>1.0684</b> | <b>0.0677</b>  | 0.3804        | <b>-0.3960</b> | <b>-0.4852</b> | <b>-0.0182</b> | <b>0.0027</b>  | 0.0003  | -0.0012       | 17.9072         | <b>426.2978</b>     | 0.5109             |
| Life Insurance                    | 0.0002   | <b>1.0118</b> | <b>0.0862</b>  | 0.3495        | <b>-0.3190</b> | <b>-0.3786</b> | <b>-0.0197</b> | <b>0.0067</b>  | 0.0001  | -0.0005       | 20.4836         | <b>149.1775</b>     | 0.6390             |
| Insurance                         | 0.0002   | <b>0.6567</b> | <b>0.0813</b>  | <b>0.4316</b> | -0.0314        | -0.1061        | <b>-0.0130</b> | <b>-0.0107</b> | -0.0019 | -0.0144       | 22.8999         | <b>253.3048</b>     | 0.6075             |
| Retail REITs                      | 0.0002   | <b>1.1068</b> | <b>0.1823</b>  | <b>0.2573</b> | <b>-0.4336</b> | <b>-0.3216</b> | <b>-0.0269</b> | <b>0.0013</b>  | 0.0012  | 0.0081        | <b>44.1441</b>  | <b>1464.768</b>     | 0.3543             |
| Real Estate Service               | 0.0006   | <b>0.8208</b> | <b>0.1569</b>  | 0.2585        | <b>-0.0648</b> | -0.0406        | -0.0233        | <b>0.0183</b>  | -0.0003 | -0.0001       | <b>36.7128</b>  | <b>370.5445</b>     | 0.1425             |
| Investment Services               | 0.0001   | <b>0.8211</b> | <b>0.1511</b>  | 0.2664        | <b>-0.0459</b> | -0.0263        | -0.0268        | <b>0.0211</b>  | -0.0001 | 0.0013        | <b>25.0624</b>  | <b>464.4875</b>     | 0.5024             |
| Nonlife Insurance                 | 0.0001   | <b>0.7884</b> | <b>0.5703</b>  | <b>0.5425</b> | <b>0.4431</b>  | <b>-0.2090</b> | -0.0205        | 0.0277         | -0.0046 | -0.0126       | <b>62.0251</b>  | <b>672.2103</b>     | 0.2728             |
| Property/Casualty Insurance       | 0.0002   | <b>0.6194</b> | <b>0.3385</b>  | <b>0.3773</b> | 0.2773         | <b>-0.0498</b> | <b>-0.0126</b> | <b>0.0109</b>  | -0.0016 | -0.0298       | <b>66.1576</b>  | <b>708.5104</b>     | 0.2507             |
| Hotel Lodge REITs                 | 0.0000   | <b>0.6039</b> | <b>0.2940</b>  | <b>0.4048</b> | <b>0.2320</b>  | <b>-0.0816</b> | -0.0120        | 0.0104         | -0.0015 | -0.0391       | <b>157.1077</b> | <b>2048.178</b>     | 0.2660             |
| Office REITs                      | 0.0002   | <b>0.5840</b> | <b>0.2255</b>  | 0.2189        | -0.0177        | -0.1472        | 0.0079         | 0.0007         | -0.0037 | 0.0141        | <b>100.9971</b> | <b>1755.581</b>     | 0.1945             |
| REITs                             | 0.0002   | <b>0.8166</b> | <b>0.2655</b>  | <b>0.2859</b> | <b>0.0933</b>  | -0.2032        | 0.0146         | -0.0163        | -0.0018 | -0.0185       | <b>99.8985</b>  | <b>1749.757</b>     | 0.2289             |
| Other Specialty REITs             | 0.0002   | <b>0.5298</b> | <b>0.4587</b>  | <b>0.5087</b> | <b>0.4537</b>  | -0.1942        | -0.0120        | 0.0258         | 0.0015  | -0.0576       | <b>73.2337</b>  | <b>1877.8919</b>    | 0.1178             |

**Table A5: Descriptive statistics: Americas**

This table reports the summary statistics of returns by sector in the Americas region. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Panel D reports the summary statistics of the independent variables, including the five asset pricing factors of Fama and French (2015), as well as oil price returns. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non-financial industries (Top 25 oil positive exposures)**

| Subsector                   | Mean    | Maximum | Minimum | Standard-deviation | Skewness | Kurtosis | JB test            | ADF             | Q (10)          |
|-----------------------------|---------|---------|---------|--------------------|----------|----------|--------------------|-----------------|-----------------|
| Oil Crude Production        | -0.0005 | 0.1607  | -0.4160 | 0.0212             | -3.9315  | 86.9380  | <b>571554.7000</b> | <b>-44.7200</b> | <b>151.5329</b> |
| Oil Equipment & Services    | -0.0007 | 0.1570  | -0.3348 | 0.0210             | -2.2949  | 46.0792  | <b>150932.6000</b> | <b>-45.5400</b> | <b>153.3873</b> |
| Oil, Gas, Coal              | -0.0003 | 0.1332  | -0.2405 | 0.0166             | -2.3314  | 40.0626  | <b>112211.4000</b> | <b>-45.9500</b> | <b>175.5183</b> |
| Energy                      | -0.0003 | 0.1323  | -0.2385 | 0.0163             | -2.4415  | 42.3218  | <b>126257.8000</b> | <b>-45.7300</b> | <b>180.9419</b> |
| Integrated Oil & Gas        | -0.0002 | 0.1515  | -0.2010 | 0.0155             | -1.9247  | 37.5580  | <b>97229.7400</b>  | <b>-46.5900</b> | <b>214.8568</b> |
| Pipelines                   | 0.0001  | 0.1228  | -0.2251 | 0.0165             | -2.3768  | 40.5851  | <b>115417.1000</b> | <b>-44.1600</b> | <b>123.9392</b> |
| General Mining              | -0.0006 | 0.1365  | -0.1871 | 0.0232             | -0.2502  | 9.4369   | <b>3352.1340</b>   | <b>-42.5100</b> | <b>38.5571</b>  |
| Chemicals Synthetic Fibers  | -0.0006 | 0.1230  | -0.1728 | 0.0217             | -0.5401  | 8.4640   | <b>2494.6810</b>   | <b>-42.3800</b> | <b>51.4580</b>  |
| Copper                      | -0.0004 | 0.1523  | -0.1432 | 0.0211             | -0.0539  | 8.0120   | <b>2021.0100</b>   | <b>-42.4000</b> | <b>48.6751</b>  |
| Marine Transport            | -0.0002 | 0.0973  | -0.2045 | 0.0198             | -1.1811  | 14.0920  | <b>10342.6400</b>  | <b>-46.5400</b> | <b>78.7486</b>  |
| Plastics                    | -0.0007 | 0.1465  | -0.1967 | 0.0216             | -0.3120  | 11.2457  | <b>5498.9660</b>   | <b>-39.7700</b> | <b>84.9412</b>  |
| Nonferrous Metal            | -0.0004 | 0.1013  | -0.1083 | 0.0187             | -0.1094  | 5.8264   | <b>646.2689</b>    | <b>-39.7200</b> | <b>47.8077</b>  |
| Industrial Metal, Mining    | -0.0003 | 0.1196  | -0.1350 | 0.0176             | -0.3726  | 10.0419  | <b>4032.3630</b>   | <b>-43.7000</b> | <b>50.6464</b>  |
| Alternative Energy          | 0.0002  | 0.3752  | -0.1482 | 0.0253             | 1.3737   | 31.1075  | <b>64138.6900</b>  | <b>-43.7500</b> | <b>23.1950</b>  |
| Alternative Fuels           | 0.0012  | 0.4858  | -0.2987 | 0.0461             | 1.6098   | 21.4544  | <b>28220.5100</b>  | <b>-47.2600</b> | <b>26.5655</b>  |
| Precious Metal, Mining      | -0.0001 | 0.1198  | -0.1173 | 0.0197             | -0.1230  | 7.0978   | <b>1355.1990</b>   | <b>-42.9800</b> | <b>24.4594</b>  |
| Basic Resources             | -0.0002 | 0.1159  | -0.1170 | 0.0149             | -0.4749  | 10.6185  | <b>4740.0140</b>   | <b>-42.8400</b> | <b>49.5083</b>  |
| Gold Mining                 | -0.0001 | 0.1194  | -0.1276 | 0.0234             | -0.1451  | 6.0969   | <b>778.0357</b>    | <b>-44.1900</b> | <b>31.2643</b>  |
| Commercial Vehicle Lease    | 0.0003  | 0.2330  | -0.2484 | 0.0207             | -0.8013  | 29.7045  | <b>57553.9400</b>  | <b>-41.4500</b> | <b>95.2714</b>  |
| Platinum Precious Metal     | 0.0000  | 0.1228  | -0.1248 | 0.0253             | -0.2479  | 5.8430   | <b>669.7540</b>    | <b>-43.9740</b> | <b>14.2729</b>  |
| Renewable Energy Equipment  | 0.0002  | 0.3752  | -0.1483 | 0.0256             | 1.4486   | 29.8726  | <b>58746.6400</b>  | <b>-43.5037</b> | <b>20.2140</b>  |
| Building & Plumbing         | 0.0000  | 0.2208  | -0.2451 | 0.0259             | -0.6331  | 17.8255  | <b>17804.1200</b>  | <b>-40.9128</b> | <b>76.8278</b>  |
| Oil Refinery Marketing      | 0.0001  | 0.1204  | -0.2012 | 0.0179             | -1.1464  | 23.3435  | <b>33703.7900</b>  | <b>-44.9067</b> | <b>114.0609</b> |
| Electronic Office Equipment | 0.0001  | 0.1810  | -0.2081 | 0.0212             | -1.1810  | 20.3992  | <b>24793.4200</b>  | <b>-46.5576</b> | <b>58.4832</b>  |
| Machinery Constructions     | 0.0002  | 0.0967  | -0.1544 | 0.0167             | -0.6380  | 10.6190  | <b>4799.0890</b>   | <b>-44.7300</b> | <b>36.5428</b>  |

**Table A5: Descriptive statistics: Americas (continued)****Panel B: Non-financial industries (Top 25 oil negative exposures)**

| <b>Subsector</b>              | <b>Mean</b> | <b>Maximum</b> | <b>Minimum</b> | <b>Standard<br/>Deviation</b> | <b>Skewness</b> | <b>Kurtosis</b> | <b>JB test</b>     | <b>ADF</b>      | <b>Q (10)</b>   |
|-------------------------------|-------------|----------------|----------------|-------------------------------|-----------------|-----------------|--------------------|-----------------|-----------------|
| Airlines                      | 0.0001      | 0.1767         | -0.2367        | 0.0201                        | -1.4138         | 26.6200         | <b>45507.8847</b>  | <b>-39.4316</b> | <b>119.2491</b> |
| Household Equipment Products  | -0.0002     | 0.1666         | -0.3120        | 0.0228                        | -2.3311         | 39.8460         | <b>110924.1039</b> | <b>-44.9837</b> | <b>65.8038</b>  |
| Drug Retailers                | 0.0002      | 0.0990         | -0.1109        | 0.0129                        | -0.5938         | 14.1154         | <b>10049.0430</b>  | <b>-47.6342</b> | <b>132.6668</b> |
| Misc Consumer Staple          | 0.0007      | 0.1270         | -0.1939        | 0.0161                        | -0.6856         | 22.1375         | <b>29603.2935</b>  | <b>-46.1181</b> | <b>26.0601</b>  |
| Toys                          | 0.0004      | 0.1735         | -0.1578        | 0.0166                        | -0.5898         | 19.5832         | <b>22226.7396</b>  | <b>-43.4126</b> | <b>58.6136</b>  |
| Defense                       | 0.0007      | 0.0911         | -0.1224        | 0.0121                        | -0.7699         | 18.2857         | <b>18980.1413</b>  | <b>-45.7619</b> | <b>131.4667</b> |
| Multi utilities               | 0.0003      | 0.1085         | -0.1246        | 0.0116                        | -0.7412         | 29.4767         | <b>56550.1375</b>  | <b>-46.5844</b> | <b>255.1004</b> |
| Apparel Retailer              | 0.0002      | 0.1340         | -0.2408        | 0.0152                        | -1.7931         | 45.4098         | <b>145671.2578</b> | <b>-45.0634</b> | <b>122.3671</b> |
| Health Care Services          | 0.0005      | 0.0854         | -0.1243        | 0.0116                        | -0.6675         | 16.1916         | <b>14137.3359</b>  | <b>-49.4320</b> | <b>109.6547</b> |
| Recreational Services         | 0.0002      | 0.1478         | -0.2312        | 0.0172                        | -1.7174         | 36.1058         | <b>89085.1142</b>  | <b>-42.6264</b> | <b>164.2382</b> |
| Drug/Grocery Stores           | 0.0003      | 0.0919         | -0.1037        | 0.0091                        | -0.3145         | 25.7031         | <b>41481.1363</b>  | <b>-49.8265</b> | <b>251.7037</b> |
| Container & Packaging         | 0.0003      | 0.0923         | -0.1152        | 0.0116                        | -0.7981         | 18.8920         | <b>20514.5159</b>  | <b>-47.6255</b> | <b>198.8815</b> |
| Delivery Service              | 0.0002      | 0.0871         | -0.1037        | 0.0130                        | -0.4022         | 11.3401         | <b>5645.5484</b>   | <b>-47.4404</b> | <b>120.3403</b> |
| Soft Drinks                   | 0.0003      | 0.0615         | -0.1027        | 0.0098                        | -1.2410         | 22.3597         | <b>30635.4639</b>  | <b>-48.5847</b> | <b>197.0178</b> |
| Tobacco                       | 0.0001      | 0.0958         | -0.1172        | 0.0124                        | -1.1848         | 17.7623         | <b>17976.3223</b>  | <b>-47.1668</b> | <b>91.9219</b>  |
| Home Improvement Retailers    | 0.0007      | 0.1287         | -0.2363        | 0.0145                        | -2.3500         | 48.5315         | <b>168489.6256</b> | <b>-48.4856</b> | <b>183.2066</b> |
| Waste & Disposal Services     | 0.0005      | 0.0801         | -0.1151        | 0.0103                        | -1.0171         | 24.3081         | <b>36844.8085</b>  | <b>-51.7996</b> | <b>365.5877</b> |
| Distillers Vintners           | 0.0005      | 0.0746         | -0.1692        | 0.0119                        | -2.0522         | 34.3905         | <b>80594.1707</b>  | <b>-44.8102</b> | <b>63.6477</b>  |
| Aero/Defence                  | 0.0004      | 0.1052         | -0.1612        | 0.0131                        | -1.1644         | 31.2327         | <b>64535.2939</b>  | <b>-44.8656</b> | <b>225.0058</b> |
| Pharmaceuticals               | 0.0004      | 0.0680         | -0.0840        | 0.0105                        | -0.1937         | 11.4748         | <b>5787.8445</b>   | <b>-48.1462</b> | <b>179.5459</b> |
| Pharmaceuticals & Biotech     | 0.0005      | 0.0707         | -0.0830        | 0.0113                        | -0.1573         | 9.4605          | <b>3364.3694</b>   | <b>-47.6116</b> | <b>137.9440</b> |
| Nondurable Household Products | 0.0005      | 0.1225         | -0.0695        | 0.0102                        | 0.7155          | 19.9039         | <b>23143.1501</b>  | <b>-45.7031</b> | <b>71.4104</b>  |
| Biotechnology                 | 0.0006      | 0.0831         | -0.0857        | 0.0152                        | -0.1591         | 5.9816          | <b>723.0372</b>    | <b>-46.3015</b> | <b>55.0189</b>  |
| Conventional Electricity      | 0.0003      | 0.1098         | -0.1217        | 0.0108                        | -0.6414         | 31.1580         | <b>63892.5542</b>  | <b>-48.8554</b> | <b>337.5301</b> |
| Water                         | 0.0002      | 0.1188         | -0.1152        | 0.0128                        | -0.5126         | 20.6039         | <b>25005.5082</b>  | <b>-44.9068</b> | <b>203.4985</b> |

**Table A5: Descriptive statistics: Americas (continued)****Panel C: Financial industries (Top 25 oil exposures)**

| <b>Subsector</b>                  | <b>Mean</b> | <b>Maximum</b> | <b>Minimum</b> | <b>Standard Deviation</b> | <b>Skewness</b> | <b>Kurtosis</b> | <b>JB test</b>     | <b>ADF</b>      | <b>Q (10)</b>   |
|-----------------------------------|-------------|----------------|----------------|---------------------------|-----------------|-----------------|--------------------|-----------------|-----------------|
| Mortgage Finance                  | -0.0001     | 0.1894         | -0.3076        | 0.0178                    | -2.6706         | 74.0986         | <b>408800.9987</b> | <b>-46.1781</b> | <b>179.2750</b> |
| Investment Companies              | 0.0002      | 0.1692         | -0.2155        | 0.0139                    | -2.2092         | 82.1683         | <b>505591.0228</b> | <b>-44.6389</b> | <b>149.4423</b> |
| Closed End Investments            | 0.0002      | 0.1692         | -0.2155        | 0.0139                    | -2.2093         | 82.1691         | <b>505600.9756</b> | <b>-44.6389</b> | <b>149.4329</b> |
| Real Estate Holding & Development | -0.0004     | 0.0992         | -0.2404        | 0.0156                    | -4.2495         | 62.0868         | <b>286563.5826</b> | <b>-43.0425</b> | <b>116.6546</b> |
| Real Estate Investment Services   | -0.0001     | 0.0938         | -0.1694        | 0.0134                    | -2.0404         | 30.4056         | <b>61737.7354</b>  | <b>-42.4082</b> | <b>128.4410</b> |
| Financial Data Providers          | 0.0008      | 0.1072         | -0.1129        | 0.0118                    | -0.8845         | 20.5126         | <b>24914.8242</b>  | <b>-49.7586</b> | <b>219.1709</b> |
| Hotel, Lodge REIT                 | -0.0002     | 0.1729         | -0.2371        | 0.0178                    | -1.4911         | 40.0671         | <b>111205.2761</b> | <b>-42.7482</b> | <b>213.3476</b> |
| Diversified Financial Services    | 0.0001      | 0.1493         | -0.1620        | 0.0130                    | -1.0266         | 41.7921         | <b>121351.9765</b> | <b>-50.6414</b> | <b>413.5201</b> |
| Financial Credit Services         | 0.0006      | 0.1114         | -0.1322        | 0.0126                    | -1.0795         | 22.9109         | <b>32255.6737</b>  | <b>-49.4543</b> | <b>223.8215</b> |
| Mortgage REITs: Commercial        | 0.0003      | 0.2615         | -0.2641        | 0.0193                    | -0.0707         | 75.7473         | <b>425580.4886</b> | <b>-38.8497</b> | <b>154.1525</b> |
| Mortgage REITs: Residential       | 0.0000      | 0.2232         | -0.2864        | 0.0167                    | -2.3501         | 86.7621         | <b>565986.6201</b> | <b>-39.2936</b> | <b>320.5633</b> |
| Real Estate Services              | 0.0002      | 0.1100         | -0.1543        | 0.0153                    | -0.8405         | 14.5094         | <b>10879.7296</b>  | <b>-42.6992</b> | <b>67.2510</b>  |
| Divers REITs                      | -0.0002     | 0.1252         | -0.2244        | 0.0142                    | -3.4817         | 66.8337         | <b>331576.1734</b> | <b>-42.3082</b> | <b>280.2865</b> |
| Mortgage REITs                    | 0.0000      | 0.1706         | -0.2526        | 0.0153                    | -2.4288         | 74.5849         | <b>413984.2986</b> | <b>-39.1940</b> | <b>294.1924</b> |
| Insurance Brokers                 | 0.0007      | 0.2120         | -0.1080        | 0.0127                    | 2.3233          | 57.7316         | <b>242628.1825</b> | <b>-48.1104</b> | <b>143.8237</b> |
| Health Care REIT                  | 0.0000      | 0.1206         | -0.2699        | 0.0170                    | -3.0946         | 55.6246         | <b>225781.9924</b> | <b>-43.3765</b> | <b>211.3511</b> |
| Retail REITs                      | -0.0002     | 0.1191         | -0.2529        | 0.0155                    | -4.1248         | 76.8140         | <b>443623.9125</b> | <b>-43.5972</b> | <b>231.0494</b> |
| Financial Services                | 0.0004      | 0.1227         | -0.1468        | 0.0130                    | -1.0387         | 28.5369         | <b>52789.3347</b>  | <b>-50.7968</b> | <b>278.6555</b> |
| Infrastructure REITs              | 0.0006      | 0.1084         | -0.1522        | 0.0135                    | -0.3040         | 20.0595         | <b>23433.0945</b>  | <b>-49.2536</b> | <b>191.7841</b> |
| Full Line Insurance               | 0.0000      | 0.1279         | -0.1793        | 0.0141                    | -1.9592         | 34.1511         | <b>79270.5029</b>  | <b>-44.7084</b> | <b>137.7178</b> |
| Investment Bank, Broker           | 0.0004      | 0.1339         | -0.1513        | 0.0132                    | -0.9555         | 30.5753         | <b>61442.2090</b>  | <b>-51.4945</b> | <b>290.5993</b> |
| Banks                             | 0.0001      | 0.1250         | -0.1397        | 0.0133                    | -1.1297         | 27.7292         | <b>49587.8349</b>  | <b>-48.2805</b> | <b>217.8216</b> |
| Consumer Lending                  | 0.0004      | 0.1444         | -0.2046        | 0.0156                    | -1.1074         | 35.0314         | <b>82902.5762</b>  | <b>-43.3719</b> | <b>171.8713</b> |
| Asset Managers                    | 0.0003      | 0.1220         | -0.1403        | 0.0141                    | -0.8874         | 22.5653         | <b>31036.8209</b>  | <b>-47.5769</b> | <b>139.8120</b> |
| Life Insurance                    | 0.0001      | 0.1626         | -0.1770        | 0.0149                    | -1.3421         | 36.7097         | <b>91960.4827</b>  | <b>-45.0011</b> | <b>135.2156</b> |

**Table A5: Descriptive statistics: Americas (continued)**

**Panel D: Regressors**

| <b>Regressors</b> | <b>Mean</b> | <b>Maximum</b> | <b>Minimum</b> | <b>Standard Deviation</b> | <b>Skewness</b> | <b>Kurtosis</b> | <b>JB test</b>     | <b>ADF</b>      | <b>Q (10)</b>   |
|-------------------|-------------|----------------|----------------|---------------------------|-----------------|-----------------|--------------------|-----------------|-----------------|
| Mkt-Rf            | 0.0004      | 0.0934         | -0.1200        | 0.0107                    | -0.7333         | 24.5925         | <b>37665.9393</b>  | <b>-51.0795</b> | <b>342.6238</b> |
| SMB               | -0.0003     | 0.0575         | -0.0459        | 0.0058                    | 0.0547          | 11.4570         | <b>5752.3653</b>   | <b>-38.4193</b> | <b>128.4437</b> |
| HML               | -0.0004     | 0.0314         | -0.0472        | 0.0060                    | -0.1331         | 10.5914         | <b>4640.0788</b>   | <b>-36.8671</b> | <b>91.3441</b>  |
| RMW               | 0.0001      | 0.0163         | -0.0180        | 0.0034                    | 0.0405          | 4.6808          | <b>227.7175</b>    | <b>-40.0313</b> | <b>50.0518</b>  |
| CMA               | -0.0001     | 0.0196         | -0.0158        | 0.0031                    | 0.3532          | 5.5753          | <b>573.4547</b>    | <b>-41.2292</b> | 24.0709         |
| Oil               | -0.0002     | 0.3002         | -0.3884        | 0.0301                    | -0.1345         | 38.8658         | <b>103450.0475</b> | <b>-43.7411</b> | <b>113.9462</b> |

**Table A6: Oil Exposures for Americas (1 Jan 2018–30 April 2020)**

This table reports the regression output of Equation 2 in the Americas region. The top 25, bottom 25 non-financial and financial industries are presented in Panels A, B and C, respectively. The industries are ranked based on the slope coefficient on oil price return in Equation 1. Sector returns are regressed on the five asset pricing factors of Fama and French (2015), as well as oil price returns and COVID-19 dummy. The sample period is from 1 January 2018 to 30 April 2020. Bolded figures indicate statistical significance at 10% level at least.

**Panel A: Non-financial industries (Top 25 oil positive exposures)**

| Subsector                   | Constant       | Mkt-Rf        | SMB           | HML            | RMW            | CMA            | Oil           | Oil (-1) | COVID19 | Oil*<br>COVID19 | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|-----------------------------|----------------|---------------|---------------|----------------|----------------|----------------|---------------|----------|---------|-----------------|-----------------|---------------------|--------------------|
| Oil Crude Production        | <b>-0.0006</b> | <b>0.9594</b> | <b>0.1813</b> | <b>0.6877</b>  | <b>-0.2600</b> | -0.0086        | <b>0.3062</b> | -0.014   | 0.0012  | -0.0186         | <b>93.3477</b>  | <b>721.8328</b>     | 0.6598             |
| Oil Equipment & Services    | <b>-0.0007</b> | <b>0.9869</b> | <b>0.1871</b> | <b>0.7931</b>  | -0.1106        | 0.01           | <b>0.2639</b> | -0.0146  | 0.0001  | -0.0091         | <b>73.987</b>   | <b>1320.0225</b>    | 0.6439             |
| Oil, Gas, Coal              | <b>-0.0004</b> | <b>0.9113</b> | 0.0339        | <b>0.5613</b>  | <b>-0.1977</b> | 0.1761         | <b>0.2259</b> | -0.0005  | 0.0011  | -0.037          | <b>84.0453</b>  | <b>3357.6838</b>    | 0.7314             |
| Energy                      | <b>-0.0004</b> | <b>0.9003</b> | 0.0564        | <b>0.5297</b>  | <b>-0.2105</b> | 0.138          | <b>0.2142</b> | 0.0007   | 0.0011  | -0.0263         | <b>101.2405</b> | <b>3389.7237</b>    | 0.7331             |
| Integrated Oil & Gas        | <b>-0.0004</b> | <b>0.913</b>  | -0.0915       | <b>0.5105</b>  | -0.0841        | <b>0.2877</b>  | <b>0.1745</b> | -0.0034  | 0.0003  | -0.0071         | <b>83.7717</b>  | <b>3885.0037</b>    | 0.7150             |
| Pipelines                   | -0.0003        | <b>0.7909</b> | <b>0.1348</b> | <b>0.4077</b>  | <b>-0.3144</b> | -0.096         | <b>0.1586</b> | 0.0142   | 0.0015  | 0.0209          | <b>98.8488</b>  | <b>2193.1483</b>    | 0.5362             |
| General Mining              | -0.0007        | <b>0.7692</b> | <b>0.2700</b> | <b>0.3578</b>  | <b>0.2859</b>  | 0.3608         | <b>0.1859</b> | 0.0183   | 0.0011  | -0.0516         | 20.9393         | <b>440.9797</b>     | 0.2442             |
| Chemicals Synthetic Fibers  | -0.0007        | <b>0.5644</b> | -0.0245       | 0.1448         | 0.0941         | 0.2271         | <b>0.1152</b> | 0.032    | -0.0021 | 0.0125          | <b>27.6412</b>  | <b>389.0309</b>     | 0.1327             |
| Copper                      | <b>-0.0007</b> | <b>1.0765</b> | <b>0.3337</b> | <b>0.3716</b>  | <b>0.2603</b>  | <b>0.4765</b>  | <b>0.2018</b> | 0.0216   | 0.0037  | <b>-0.1570</b>  | <b>36.4043</b>  | <b>181.5022</b>     | 0.4465             |
| Marine Transport            | <b>-0.0004</b> | <b>0.9597</b> | <b>0.6382</b> | <b>0.1824</b>  | 0.0568         | <b>0.2912</b>  | <b>0.1363</b> | 0.0182   | 0.0012  | -0.0346         | 23.6018         | <b>111.9404</b>     | 0.4395             |
| Plastics                    | <b>-0.0008</b> | <b>0.6671</b> | -0.0852       | <b>0.4206</b>  | 0.0997         | -0.2255        | <b>0.1018</b> | 0.0372   | -0.0008 | 0.0082          | <b>79.3894</b>  | <b>543.6061</b>     | 0.1806             |
| Nonferrous Metal            | <b>-0.0006</b> | <b>0.8377</b> | 0.2507        | <b>0.2706</b>  | 0.1116         | <b>0.3238</b>  | <b>0.214</b>  | 0.0552   | 0.0029  | <b>-0.2060</b>  | <b>28.9448</b>  | <b>786.6872</b>     | 0.3765             |
| Industrial Metal, Mining    | <b>-0.0006</b> | <b>1.0425</b> | <b>0.1840</b> | <b>0.2946</b>  | <b>0.2242</b>  | <b>0.4581</b>  | <b>0.1613</b> | 0.019    | 0.0022  | <b>-0.1226</b>  | <b>34.9063</b>  | <b>140.6977</b>     | 0.5411             |
| Alternative Energy          | -0.0003        | <b>0.9487</b> | <b>0.2840</b> | 0.1423         | -0.1785        | <b>-0.7049</b> | <b>0.1198</b> | 0.008    | 0.0033  | -0.0513         | 22.2705         | 27.235              | 0.2414             |
| Alternative Fuels           | 0.0009         | <b>1.0593</b> | <b>0.6022</b> | 0.1128         | <b>-0.6791</b> | <b>0.6271</b>  | <b>0.1036</b> | 0.0598   | 0.0044  | -0.0221         | <b>31.155</b>   | <b>106.6513</b>     | 0.0886             |
| Precious Metal, Mining      | -0.0004        | <b>0.2929</b> | <b>0.3014</b> | <b>-0.2996</b> | -0.2566        | <b>1.01</b>    | <b>0.1237</b> | 0.0156   | 0.0039  | -0.0600         | 20.296          | <b>1022.8793</b>    | 0.0759             |
| Basic Resources             | <b>-0.0005</b> | <b>0.7286</b> | <b>0.2062</b> | 0.0340         | 0.0378         | <b>0.6373</b>  | <b>0.1274</b> | 0.0168   | 0.0026  | <b>-0.0743</b>  | 20.3889         | <b>441.1162</b>     | 0.3794             |
| Gold Mining                 | -0.0003        | <b>0.193</b>  | <b>0.3213</b> | <b>-0.3620</b> | -0.3012        | <b>1.0335</b>  | <b>0.0946</b> | 0.0031   | 0.0035  | -0.0164         | <b>31.7248</b>  | <b>647.8513</b>     | 0.0372             |
| Commercial Vehicle Lease    | -0.0001        | <b>1.2514</b> | <b>0.6645</b> | <b>0.4504</b>  | <b>0.4768</b>  | -0.2302        | <b>0.0726</b> | 0.0073   | 0.0031  | 0.0227          | <b>52.7993</b>  | <b>1147.7444</b>    | 0.5996             |
| Platinum Precious Metal     | -0.0002        | <b>0.2576</b> | <b>0.3580</b> | <b>-0.3515</b> | -0.3571        | 1.0084         | <b>0.128</b>  | 0.0282   | 0.0037  | -0.0814         | <b>18.0495</b>  | <b>293.9265</b>     | 0.0431             |
| Renewable Energy Equipment  | -0.0003        | <b>0.9275</b> | <b>0.3289</b> | 0.1287         | -0.1244        | -0.7636        | <b>0.12</b>   | 0.0098   | 0.0037  | <b>-0.0678</b>  | 21.2427         | 26.9765             | 0.2283             |
| Building & Plumbing         | -0.0004        | <b>1.0619</b> | <b>0.4969</b> | <b>0.5284</b>  | <b>0.3463</b>  | -0.1915        | <b>0.0523</b> | 0.0236   | 0.0034  | 0.0568          | <b>36.3943</b>  | <b>595.9485</b>     | 0.2846             |
| Oil Refinery Marketing      | -0.0002        | <b>1.0412</b> | 0.0255        | <b>0.5026</b>  | 0.0735         | -0.1848        | <b>0.049</b>  | 0.0048   | 0.001   | 0.0620          | <b>49.3576</b>  | <b>1388.8458</b>    | 1388.8458          |
| Electronic Office Equipment | -0.0001        | <b>1.1103</b> | <b>0.4093</b> | <b>0.2134</b>  | <b>0.2966</b>  | 0.0579         | <b>0.0373</b> | -0.0038  | -0.0023 | 0.0830          | 24.5102         | <b>41.9148</b>      | 41.9148            |
| Machinery Constructions     | -0.0002        | <b>1.0307</b> | <b>0.1646</b> | 0.0883         | <b>0.3142</b>  | <b>0.4543</b>  | <b>0.1166</b> | 0.0106   | 0.001   | <b>-0.0684</b>  | 24.7725         | <b>149.4084</b>     | 149.4084           |



**Table A6: Oil Exposures for Americas (1 Jan 2018–30 April 2020) (continued)**

**Panel B: Non-financial industries (Top 25 oil negative exposures)**

| Subsector                                       | Constant | Mkt-Rf        | SMB            | HML            | RMW            | CMA            | Oil            | Oil (-1)       | COVID   | Oil*<br>COVID | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|---|----------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|---------|---------------|-----------------|---------------------|--------------------|
| Airlines  | 0.0000   | <b>1.1245</b> | <b>0.3364</b>  | <b>0.4332</b>  | <b>0.6140</b>  | -0.3783        | <b>-0.1279</b> | 0.0105         | -0.0037 | <b>0.1077</b> | <b>60.2851</b>  | <b>1585.9013</b>    | 0.4162             |
| Household Equipment<br>Products                 | -0.0006  | <b>1.1573</b> | 0.1476         | 0.0966         | <b>0.5467</b>  | <b>0.3681</b>  | -0.0324        | -0.0143        | 0.0005  | -0.0247       | 26.3940         | 2.4375              | 0.2793             |
| Drug Retailers                                  | -0.0002  | <b>0.8984</b> | <b>-0.1049</b> | <b>-0.2154</b> | <b>0.1937</b>  | <b>0.5543</b>  | -0.0340        | 0.0091         | -0.0009 | -0.0084       | <b>49.1237</b>  | <b>221.1871</b>     | 0.4630             |
| Misc Consumer Staple                            | 0.0002   | <b>0.7296</b> | <b>0.2168</b>  | <b>-0.5837</b> | <b>0.5642</b>  | <b>0.7594</b>  | -0.0276        | 0.0058         | 0.0007  | -0.0165       | <b>29.8311</b>  | 1.8807              | 0.2082             |
| Toys  | 0.0000   | <b>1.0364</b> | 0.0366         | <b>-0.3398</b> | <b>0.2089</b>  | <b>-0.4126</b> | -0.0031        | -0.0154        | -0.0041 | -0.0408       | <b>35.4013</b>  | <b>545.8521</b>     | 0.4683             |
| Defense   | 0.0003   | <b>0.9054</b> | <b>-0.1490</b> | <b>-0.1276</b> | <b>0.1973</b>  | <b>0.4674</b>  | <b>-0.0360</b> | -0.0026        | -0.0009 | 0.0259        | <b>35.1955</b>  | <b>404.2463</b>     | 0.5615             |
| Multi utilities                                 | 0.0000   | <b>0.7340</b> | <b>-0.3012</b> | -0.0809        | <b>0.3054</b>  | <b>0.7833</b>  | <b>-0.0445</b> | -0.0265        | -0.0009 | <b>0.0487</b> | <b>41.9143</b>  | <b>1982.2484</b>    | 0.4207             |
| Apparel Retailer                                | -0.0002  | <b>1.0161</b> | <b>0.4274</b>  | 0.0014         | <b>0.9887</b>  | <b>0.2909</b>  | -0.0141        | -0.0217        | 0.0013  | -0.0023       | <b>76.8402</b>  | <b>446.4597</b>     | 0.5494             |
| Health Care Services                            | 0.0000   | <b>0.8442</b> | <b>-0.1197</b> | <b>-0.4367</b> | -0.0351        | <b>0.3382</b>  | -0.0072        | -0.0061        | 0.0003  | -0.0138       | <b>52.4777</b>  | <b>177.0647</b>     | 0.5508             |
| Recreational Services                           | -0.0002  | <b>1.0150</b> | <b>0.2914</b>  | <b>0.3670</b>  | <b>0.3460</b>  | <b>-0.8857</b> | <b>-0.0738</b> | -0.0224        | 0.0011  | <b>0.1139</b> | <b>148.9426</b> | <b>1633.7838</b>    | 0.5206             |
| Drug/Grocery Stores                             | -0.0001  | <b>0.7659</b> | <b>-0.2180</b> | <b>-0.2719</b> | <b>0.2085</b>  | <b>0.7666</b>  | <b>-0.0206</b> | -0.0107        | -0.0011 | 0.0165        | <b>64.3374</b>  | <b>1093.9735</b>    | 0.6945             |
| Container & Packaging                           | -0.0001  | <b>0.8961</b> | <b>0.0916</b>  | -0.0151        | <b>0.1358</b>  | <b>0.3925</b>  | <b>-0.0236</b> | -0.0120        | 0.0009  | 0.0234        | <b>41.4278</b>  | <b>365.7260</b>     | 0.6577             |
| Delivery Service                                | -0.0002  | <b>0.9307</b> | 0.0369         | -0.0564        | <b>0.5110</b>  | <b>0.3110</b>  | -0.0019        | -0.0002        | 0.0002  | -0.0161       | <b>36.9683</b>  | <b>114.6395</b>     | 0.5440             |
| Soft Drinks                                     | -0.0001  | <b>0.7395</b> | <b>-0.2884</b> | <b>-0.1415</b> | <b>0.3523</b>  | <b>0.6293</b>  | <b>-0.0268</b> | -0.0120        | -0.0013 | <b>0.0314</b> | <b>44.0590</b>  | <b>396.6531</b>     | 0.5892             |
| Tobacco   | -0.0002  | <b>0.7809</b> | <b>-0.1890</b> | -0.0869        | <b>0.4551</b>  | <b>0.6223</b>  | <b>-0.0261</b> | -0.0136        | -0.0013 | 0.0314        | 25.6360         | <b>70.1333</b>      | 0.4069             |
| Home Improvement<br>Retailers                   | 0.0001   | <b>1.0704</b> | 0.0439         | <b>-0.1154</b> | <b>0.4857</b>  | <b>0.2804</b>  | <b>-0.0462</b> | -0.0115        | 0.0025  | <b>0.0693</b> | <b>43.1915</b>  | <b>350.7511</b>     | 0.5872             |
| Waste & Disposal<br>Services                    | 0.0002   | <b>0.7373</b> | <b>-0.1296</b> | -0.0560        | <b>0.1452</b>  | <b>0.4430</b>  | <b>-0.0379</b> | -0.0038        | -0.0003 | <b>0.0561</b> | <b>79.8722</b>  | <b>627.1881</b>     | 0.5313             |
| Distillers Vintners                             | 0.0002   | <b>0.6847</b> | -0.0937        | <b>-0.1014</b> | <b>0.2143</b>  | <b>0.2587</b>  | <b>-0.0224</b> | -0.0070        | -0.0004 | 0.0284        | <b>30.4820</b>  | <b>44.9087</b>      | 0.3381             |
| Aero/Defence                                    | 0.0001   | <b>1.0048</b> | -0.0303        | <b>0.1033</b>  | <b>0.3484</b>  | <b>0.1054</b>  | <b>-0.0238</b> | -0.0078        | -0.0013 | 0.0312        | <b>57.0279</b>  | <b>420.3487</b>     | 0.6651             |
| Pharmaceuticals<br>Pharmaceuticals &<br>Biotech | 0.0000   | <b>0.8547</b> | <b>-0.2293</b> | <b>-0.4395</b> | <b>-0.2920</b> | <b>0.5957</b>  | <b>-0.0275</b> | 0.0034         | -0.0006 | <b>0.0391</b> | <b>49.6342</b>  | <b>277.9782</b>     | 0.6865             |
| Nondurable Household<br>Products                | -0.0001  | <b>0.9051</b> | <b>-0.1448</b> | <b>-0.5361</b> | <b>-0.4797</b> | <b>0.4088</b>  | <b>-0.0246</b> | 0.0044         | -0.0003 | <b>0.0342</b> | <b>37.1844</b>  | <b>156.4921</b>     | 0.7175             |
| Biotechnology                                   | 0.0001   | <b>0.6013</b> | <b>-0.3385</b> | <b>-0.3981</b> | <b>0.1384</b>  | <b>1.0228</b>  | -0.0117        | -0.0093        | -0.0002 | 0.0104        | <b>32.8076</b>  | <b>387.1245</b>     | 0.3693             |
| Conventional Electricity                        | -0.0001  | <b>1.0160</b> | 0.0564         | <b>-0.7406</b> | <b>-0.8727</b> | 0.0110         | -0.0196        | 0.0053         | 0.0006  | 0.0257        | 24.6703         | <b>67.9514</b>      | 0.6240             |
| Water   | 0.0000   | <b>0.7098</b> | <b>-0.2661</b> | -0.0676        | <b>0.2625</b>  | <b>0.6947</b>  | <b>-0.0381</b> | <b>-0.0278</b> | -0.0011 | <b>0.0608</b> | <b>45.1647</b>  | <b>1587.7692</b>    | 0.4616             |
|   | -0.0001  | <b>0.7781</b> | <b>-0.2089</b> | <b>-0.1210</b> | <b>0.2300</b>  | <b>0.8824</b>  | <b>-0.0232</b> | <b>-0.0272</b> | -0.0011 | 0.0348        | <b>72.4761</b>  | <b>1754.2157</b>    | 0.3862             |

**Table A6: Oil Exposures for Americas (1 Jan 2018–30 April 2020) (continued)**

**Panel C: Financial industries (Top 25 oil exposures)**

| Subsector                         | Constant       | Mkt-Rf        | SMB            | HML            | RMW            | CMA            | Oil            | Oil (-1) | COVID   | Oil*<br>COVID | Q (10)          | Q <sup>2</sup> (10) | Adj R <sup>2</sup> |
|-----------------------------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|----------|---------|---------------|-----------------|---------------------|--------------------|
| Mortgage Finance                  | -0.0002        | <b>0.8148</b> | <b>0.3195</b>  | 0.7608         | 0.0899         | <b>-0.6860</b> | -0.0086        | -0.0321  | 0.0027  | 0.1549        | <b>163.5053</b> | <b>1971.6542</b>    | 0.4681             |
| Investment Companies              | 0.0001         | <b>0.5817</b> | 0.1427         | 0.6075         | -0.0269        | <b>-0.4505</b> | -0.0067        | 0.0013   | 0.0020  | 0.1257        | <b>131.0001</b> | <b>1913.8763</b>    | 0.3972             |
| Closed End Investments            | 0.0001         | <b>0.5817</b> | 0.1427         | 0.6075         | -0.0269        | <b>-0.4505</b> | -0.0067        | 0.0013   | 0.0020  | 0.1257        | <b>130.9954</b> | <b>1913.7905</b>    | 0.3972             |
| Real Estate Holding & Development | <b>-0.0005</b> | <b>0.7758</b> | 0.1054         | <b>0.2777</b>  | <b>0.1761</b>  | 0.1692         | 0.0139         | -0.0099  | -0.0018 | 0.0736        | <b>38.7115</b>  | <b>24.5365</b>      | 0.3658             |
| Real Estate Investment Services   | <b>-0.0004</b> | <b>0.8775</b> | <b>0.1851</b>  | <b>0.1411</b>  | <b>0.1893</b>  | 0.0363         | 0.0184         | -0.0107  | 0.0004  | 0.0441        | <b>72.7539</b>  | <b>223.5459</b>     | 0.5789             |
| Financial Data Providers          | <b>0.0003</b>  | <b>0.8823</b> | -0.0661        | 0.0153         | -0.0545        | -0.1144        | 0.0021         | -0.0027  | 0.0013  | <b>0.0691</b> | 23.6853         | <b>444.2890</b>     | 0.7010             |
| Hotel, Lodge REIT                 | -0.0003        | <b>0.9931</b> | <b>0.5353</b>  | <b>0.4273</b>  | <b>0.6317</b>  | <b>-0.3298</b> | -0.0124        | -0.0169  | -0.0010 | 0.0926        | <b>107.1952</b> | <b>509.3431</b>     | 0.5121             |
| Diversified Financial Services    | -0.0001        | <b>0.9494</b> | -0.0730        | <b>0.3663</b>  | <b>0.1208</b>  | <b>-0.1834</b> | 0.0059         | -0.0008  | -0.0007 | <b>0.0537</b> | <b>48.6976</b>  | <b>1371.5855</b>    | 0.7144             |
| Financial Credit Services         | 0.0001         | <b>0.9697</b> | -0.0969        | <b>0.1527</b>  | <b>-0.1269</b> | <b>-0.4107</b> | -0.0049        | -0.0092  | 0.0013  | <b>0.0717</b> | <b>38.2757</b>  | <b>986.4489</b>     | 0.7850             |
| Mortgage REITs:                   |                |               |                |                |                |                |                |          |         |               |                 |                     |                    |
| Commercial                        | 0.0002         | <b>0.7007</b> | 0.1147         | <b>0.5781</b>  | 0.0997         | <b>-0.3481</b> | -0.0367        | -0.0062  | 0.0001  | 0.1306        | <b>226.9307</b> | <b>2031.9084</b>    | 0.2351             |
| Mortgage REITs:                   |                |               |                |                |                |                |                |          |         |               |                 |                     |                    |
| Residential                       | 0.0000         | <b>0.6489</b> | 0.1120         | <b>0.6483</b>  | <b>0.3634</b>  | <b>-0.2403</b> | <b>-0.0360</b> | -0.0288  | -0.0002 | 0.1228        | <b>300.8885</b> | <b>2521.7009</b>    | 0.2934             |
| Real Estate Services              | -0.0003        | <b>1.0118</b> | <b>0.2986</b>  | 0.0458         | 0.0976         | -0.1398        | 0.0160         | -0.0109  | 0.0021  | 0.0249        | <b>48.5719</b>  | <b>675.7752</b>     | 0.5813             |
| Divers REITs                      | -0.0004        | <b>0.7684</b> | 0.0549         | <b>0.3409</b>  | <b>0.3727</b>  | 0.0190         | -0.0152        | 0.0053   | -0.0009 | 0.0793        | <b>196.3176</b> | <b>1916.5236</b>    | 0.4026             |
| Mortgage REITs                    | -0.0001        | <b>0.6353</b> | 0.1008         | <b>0.5381</b>  | <b>0.3537</b>  | <b>-0.1844</b> | <b>-0.0318</b> | -0.0157  | 0.0000  | 0.0998        | <b>245.0888</b> | <b>2536.3580</b>    | 0.2964             |
| Insurance Brokers                 | 0.0003         | <b>0.8431</b> | <b>-0.2361</b> | 0.0607         | -0.0222        | <b>0.2191</b>  | <b>-0.0200</b> | 0.0030   | 0.0003  | 0.0738        | <b>35.0792</b>  | 2.1138              | 0.5060             |
| Health Care REIT                  | -0.0002        | <b>0.8241</b> | 0.1829         | 0.0496         | <b>0.5275</b>  | <b>0.1813</b>  | <b>-0.0551</b> | -0.0296  | -0.0008 | 0.1393        | <b>174.5905</b> | <b>1301.0526</b>    | 0.3067             |
| Retail REITs                      | -0.0003        | <b>0.8168</b> | <b>0.2362</b>  | <b>0.3673</b>  | <b>0.5350</b>  | 0.0181         | <b>-0.0603</b> | -0.0254  | -0.0013 | 0.1470        | <b>201.5089</b> | <b>1057.2965</b>    | 0.4245             |
| Financial Services                | 0.0000         | <b>1.0570</b> | <b>-0.1313</b> | <b>0.3945</b>  | <b>-0.1966</b> | <b>-0.2568</b> | -0.0114        | -0.0054  | 0.0013  | 0.0535        | <b>89.9871</b>  | <b>1176.6462</b>    | 0.8679             |
| Infrastructure REITs              | 0.0001         | <b>0.8185</b> | <b>-0.3940</b> | <b>-0.2672</b> | -0.0228        | <b>0.6610</b>  | <b>-0.0183</b> | -0.0183  | -0.0002 | 0.0654        | 22.2464         | <b>669.3488</b>     | 0.3953             |
| Full Line Insurance               | -0.0001        | <b>0.9046</b> | -0.0567        | <b>0.6540</b>  | <b>-0.1379</b> | <b>-0.2804</b> | -0.0122        | -0.0194  | -0.0005 | 0.0507        | <b>75.7982</b>  | <b>1190.3579</b>    | 0.6313             |
| Investment Bank, Broker           | 0.0000         | <b>1.0776</b> | <b>-0.1469</b> | <b>0.3976</b>  | <b>-0.1905</b> | <b>-0.2278</b> | <b>-0.0141</b> | -0.0066  | 0.0011  | <b>0.0525</b> | <b>85.9474</b>  | <b>1138.5571</b>    | 0.8673             |
| Banks                             | 0.0000         | <b>0.9299</b> | <b>-0.1197</b> | <b>0.9047</b>  | <b>-0.1957</b> | <b>-0.3520</b> | -0.0097        | 0.0015   | 0.0013  | <b>0.0427</b> | <b>128.3941</b> | <b>920.4079</b>     | 0.8126             |
| Consumer Lending                  | 0.0001         | <b>1.0574</b> | -0.0067        | <b>0.4974</b>  | <b>0.1382</b>  | <b>-0.8111</b> | -0.0204        | -0.0224  | 0.0000  | 0.0547        | <b>170.2388</b> | <b>2818.1792</b>    | 0.6621             |
| Asset Managers                    | -0.0002        | <b>1.1313</b> | -0.0834        | <b>0.4298</b>  | <b>-0.1493</b> | 0.0497         | -0.0039        | -0.0079  | 0.0032  | 0.0226        | <b>69.2811</b>  | <b>1219.4295</b>    | 0.8255             |
| Life Insurance                    | -0.0002        | <b>1.0807</b> | -0.0930        | <b>0.8266</b>  | -0.0770        | -0.1648        | -0.0063        | 0.0081   | 0.0021  | 0.0258        | <b>78.0576</b>  | <b>953.9218</b>     | 0.7731             |