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RESILIENCE TO CRUDE OIL: AUSTRALIAN EVIDENCE ON LITIGATION FUNDING

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Abstract

Using daily data from January 2011 to November 2020, this study examines the return shocks between crude oil and litigation funding in Australia. Based on Diebold and Yilmaz's (2012) return spillover effects, we find evidence that litigation funding and the crude oil market share a lower degree of return shock connectedness, relative to the overall stock market. Further, the oil price crashes (including the COVID-19-induced oil price crash) are also weakly correlated to the return shocks connectedness between litigation funding and the crude oil market. Our findings suggest that litigation funding is mainly immune from economic disruptions. These findings are of interest to policymakers, market participants, and crude oil investors in comprehending the spillover effects of crude oil on other sectors of the economy.

Keywords: Return Spillovers; Crude Oil; Litigation Funding; Stock Market

JEL Codes: G11; G12

1. Introduction

With the financialization of the oil market, crude oil price movements can have a significant impact on other markets (Zhang, 2017). Previous studies discuss the dynamic relationship between crude oil and other asset classes. They argue that events associated with the crude oil market (such as an oil price crash) can adversely affect other markets (e.g., Broadstock et al., 2012; Abhyankar et al., 2013; Narayan & Sharma, 2014; Yang et al., 2015; Maghyereh et al., 2016; Ghosh & Kanjilal, 2016; Kang et al., 2017; Zhang, 2017; Balcilar et al., 2017; Yip et al., 2017; Maghyereh et al., 2019; Corbet et al., 2020; Bonato et al., 2020; Cevik et al., 2020; Saeed et al., 2021). It has been observed that crude oil is closely associated with economic activities and the growth of an economy (Darby, 1982; Hamilton, 1983).

Oil is considered an important input factor; thus, oil price movements reflect risk levels similar to macroeconomic announcements (Gisser & Goodwin, 1986; Ratti & Vespignani, 2016; Jareño et al., 2021). Oil price changes are significantly related to inflation, interest rates, and the real output of an economy. Therefore, to find an alternative asset class that shares a lower degree of correlation with oil price movements, the present study examines the dynamic relationship between litigation funding and the crude oil market in Australia.

Litigation funding is an alternative emerging asset class that acts as a potential diversification candidate during crisis periods. Recently, Singh (2021) investigated the dynamic relationship between litigation funding, gold, bitcoin, and the Australian stock market. The author finds that litigation funding is relatively immune from market shocks and provides potential portfolio diversification benefits, like gold, during uncertain times. Ex-ante, it remains unclear how litigation funding is related to other asset classes, such as crude oil returns. Since crude oil price changes are tightly connected to macroeconomic movements, we believe that litigation funding provides a potential diversification opportunity for crude oil investors. It is because the outcome of a legal case is highly contingent. Therefore, litigation funding is likely to be uncorrelated to macroeconomic disruptions, thus, oil price movements in Australia.

Litigation funding is gaining momentum in Australia; however, there remains a lack of understanding regarding how litigation funding relates to the crude oil market. Litigation funding covers lawsuit-related expenses by a third party using the legal outcome as collateral (Singh, 2021). For funding lawsuit-related expenses, litigation funders get a portion of any awarded amount if the case is won. However, litigation funding is not like a standard loan, as the litigation funders bear losses in the event the case is lost.

Several factors are leading to this growth of the litigation funding market in Australia. In particular, lawyers are forbidden to assume *contingency fees* using lawsuit-related outcomes as collateral in Australia (Singh, 2021). Hence, this phenomenon provides ample opportunity for litigation funders to grow and prosper. The litigation funding space is primarily dominated by the presence of a few sophisticated investors, comprising private equity (PE) investors, hedge funds, endowments, and foundations. However, some litigation funders have also opted to raise money from the equity market providing public investors with an alternative equity asset class that is arguably uncorrelated to macroeconomic disruptions.

Amid the growing role of litigation funding as an emerging equity asset class, it has become imperative to examine the dynamics of litigation funding and its relationship with other markets. This study, therefore, investigates return shock connectedness between litigation funding and the crude oil market using daily data from January 2011 to November 2020. If litigation funding is uncorrelated with other markets, then one should expect lower return shock connectedness or return spillover effects between litigation funding and the crude oil market. Our sample period from 2011 to 2020 allows us to uncover the dynamics of return spillover effects during normal, bullish, and bearish market states. The study also compares return shocks between litigation funding and the crude oil market with that of the overall stock market (S&P/ASX 200 benchmark equity market index) and crude oil in the context of the Australian market.

The whole idea is to comprehend the dynamic relationship between litigation funding and the crude oil market and to examine whether events associated with the crude oil market influence the return shock connectedness between litigation funding and the crude oil market. For comparison purposes, we also examine the relationship between S&P/ASX 200 and the crude oil market and explore to what extent the events associated with the crude oil market influence the return shocks connectedness between S&P/ASX 200 and the crude oil market. As noted earlier, litigation funding is countervailing and uncorrelated with other markets. Hence, this phenomenon makes litigation funding a reasonable equity asset class, and a potential diversification candidate for investment strategies (Markowitz, 1952). According to one estimate, the returns to litigation funders could be three times the investment amount.[1]

The present study focuses on Omni Bridgeway (earlier IMF Bentham), a publicly listed litigation funder in Australia. It is one of the oldest and largest publicly listed litigation funders in Australia, listed on the Australian Securities Exchange (ASX) since the year 2001. Omni Bridgeway deals in dispute resolution finance across different areas, e.g., arbitration, commercial, corporate funding, insolvency, patent, and whistle-blower. Owing to the COVID-19-induced disruptions, the company has recorded a

[1] For details and discussion on investment approach at Therium Capital Management, please refer to: *Investing in legal futures*. (2019, December 10). The Practice. https://thepractice.law.harvard.edu/article/investing-in-legal-futures/

significant increase in funding applications (Investor Presentation Report of Omni Bridgeway, May 2020). Increased interest in litigation funding in the aftermath of the COVID-19 pandemic provides further support to our assertion that litigation funding is essentially immune from economic shocks. The company has generated returns equivalent to 134% of the invested capital (Singh, 2021).

This study, therefore, considers Omni Bridgeway and its dynamic relationship with the crude oil market in the context of the Australian market. The litigation funding business provides unique diversification opportunities to energy investors as litigation funding can remain immune from economic shocks. Using daily data from January 2011 to November 2020 and the spillover effects framework of Diebold and Yilmaz (2012), we find evidence that litigation funding and the crude oil market share a lower degree of return shock connectedness with each other. The total return spillover effects between litigation funding and the crude oil market are equal to only 1% on a static basis. On the other hand, the total return spillover effects are equal to 3.4% between S&P/ASX 200 and the crude oil market on a static basis. These static findings suggest that both litigation funding and the crude oil market are mainly uncorrelated to each other.

The main advantage of using the spillover effects framework of Diebold and Yilmaz (2012) is that we can also analyse the dynamics of the return shocks connectedness between the undertaken variables (Lundgren et al., 2018; Ferrer et al., 2018; Saeed et al., 2021). Moreover, the spillover effects framework of Diebold and Yilmaz (2012) uses a vector autoregression (VAR) specification, which considers all the variables as part of an endogenous framework (Sims, 1980). The VAR specification further helps in the creation of a total spillover index (TSI), capturing the return spillover effects between the undertaken variables in the form of a time-varying index. During the COVID-19 pandemic, litigation funding and the crude oil market witnessed an increased level of return shock connectedness. However, this increased level of return shocks connectedness is well below the return shock connectedness observed between S&P/ASX 200 and the crude oil market in the aftermath of the COVID-19 pandemic.

Relative to the previous trend, there is a sudden jump in the return shock connectedness between S&P/ASX 200 and the crude oil market after the declaration of the COVID-19 pandemic by the World Health Organization (WHO) on 11th March 2020. Interestingly, we do not observe this kind of elevated trend in the case of litigation funding and the crude oil market. During the COVID-19 economic shock, the return shocks connectedness between litigation funding and the crude oil market barely crossed its previous highest level of connectedness observed in the periods between 2015 and 2017.

The dynamics of return shocks connectedness between litigation funding and the crude oil market are also confirmed by Markov regime-switching models. The probability of high return shocks connectedness between litigation funding and the crude oil market increases during the oil price crash periods from July 2014 to January 2016 (Saeed et al., 2021), and from March 2020 to November 2020 (our sample period's end date). We consider the period from July 2014 to January 2016, and the period from March 2020 to November 2020 (related to the COVID-19 pandemic, when the oil prices became negative for the first time) as the period representing the oil price crash (Corbet et al., 2020).

The findings are of interest to policymakers, market participants, and crude oil investors in comprehending the spillover effects of crude oil on other sectors of the economy. They can consider litigation funding as a potential candidate for portfolio diversification and other investment strategies. Particularly, we also examine the impact of the oil price crash on the return shocks connectedness between litigation funding and the crude oil market. If litigation funding is essentially uncorrelated with other markets, then one should expect litigation funding to remain immune from the oil price crashes as well. The findings are also of interest to policymakers who are usually interested in comprehending the spillover effects of the oil price crash on other sectors of the economy.

Following the previous studies (e.g., Lundgren et al. (2018), Kocaarslan and Soytas (2019), Nazlioglu et al. (2020), Demirer et al. (2020), Batten et al. (2021), and Saeed et al. (2021)), we also consider five other financial and macroeconomic variables to document the relationship between the oil price crash and the return shocks connectedness between litigation funding and the crude oil market that are available at the daily frequency: (1) the Chicago Board Options Exchange (CBOE) Crude Oil Volatility Index, (2) S&P/ASX 200 VIX Index, (3) Bloomberg Australian Government Bond Index, (4) Bloomberg Australian Non-Government Bond Index, and (5) Australian Dollar Currency Index. We find evidence that the oil price crashes are weakly related to the return shocks connectedness between litigation funding and the crude oil market. This suggests that litigation funding is mainly uncorrelated to the crude oil market. On the other hand, the oil price crashes strongly influence the return shocks connectedness between S&P/ASX 200 and the crude oil market.

The rest of the paper is organized as follows. Section 2 discusses a brief literature review, and section 3 highlights data and stylized facts of the undertaken variables. Empirical methods are discussed in section 4. Section 5 examines the dynamic relationship between litigation funding and the crude oil market, and lastly, section 6 concludes the paper.

2. Brief Literature Review

Our study contributes to the literature by examining the dynamic relationship between litigation funding, as an emerging equity asset class, and the crude oil market. It determines whether litigation funding and the crude oil market affect each other or not. As an important input factor, oil price movements can have a significant impact on other markets (Zhang, 2017). Crude oil's role in influencing equity markets has gained growing attention over recent years (Kilian & Park, 2009; Fang & You, 2014; Kang et al., 2016; Olayeni et al., 2020; Cevik et al., 2020; Zhao et al., 2021; Cao & Cheng, 2021).

Filis et al. (2011) examine the dynamic connectedness between stock market prices and oil prices for oil-importing and exporting countries. The authors report that oil prices negatively affect the stock markets, irrespective of the origin of the oil price shock. While examining the relationship between oil price shocks and stock returns of three large Newly Industrialized Economies (NIEs), Fang and You (2014) argue that the three large NIEs are partially integrated. Kang et al. (2016) also investigate the relationship between oil price shocks and the US stock market. The authors support that oil price shocks are of comparable importance in explaining US real stock returns.

Cevik et al. (2020) also examine the relationship between crude oil prices and stock market returns in Turkey and document significant spillover effects from crude oil price changes to stock market returns in 1993 and 2008-2009. Chang et al. (2020) examine the asymmetric effects of oil prices on sectoral Islamic stocks and report that oil prices are negatively related to Islamic stocks. By focusing on the effect of the oil price shocks on the sovereign bond markets, Demirer et al. (2020) conclude that, unlike the stock markets, the effect of the oil price shocks on the sovereign bond markets is heterogeneous in terms of size and sign. Using Granger causality tests, Zhao et al. (2021) conclude the existence of bilateral contagion effects between the oil and the Chinese stock market. Further, Cao and Cheng (2021) examine the time-frequency spillover effects between food and crude oil prices under the influence of the COVID-19 pandemic. The authors document weaker spillovers between the food and the oil market during the pandemic than during the financial crisis.

We extend this literature by investigating the dynamic relationship between litigation funding, an emerging publicly listed equity asset class, and the crude oil market. Our findings support a lower degree of return shocks connectedness between litigation funding and the crude oil market. Relative to the Australian stock market, the total return spillover effects are equivalent to only 1% between litigation funding and the crude oil market. Moreover, the oil price crashes are also weakly correlated to the return shocks connectedness between litigation funding and the crude oil market. The overall findings are consistent with the assertion that litigation funding is essentially uncorrelated with other markets.

In terms of methodology, the relationship between crude oil and other markets has evolved quite rapidly, ranging from static to dynamic models (Aloui & Jammazi, 2009; Arouri et al., 2011; Antonakakis & Filis, 2013; Awartani & Maghyereh, 2013; Mensi et al., 2013; Zhang, 2017). This study examines the dynamic relationship between litigation funding and the crude oil market using the spillover effects framework of Diebold and Yilmaz (2012) across different periods, including normal, bullish, and bearish market states. The model has widely been used by previous studies (e.g., Zhang & Wang, 2014; Antonakakis & Kizys, 2015; Yarovaya et al., 2016; Liu & Gong, 2020; Li & Zhong, 2020; Tiwari et al., 2020; Akhtaruzzaman et al., 2021; Singh, 2020; Singh, 2021). The presence of spillover effects facilitates market participants and policymakers to better understand the dynamics of the crude oil market, and its effects on other markets.

Unlike other econometric models, the spillover effects framework of Diebold and Yilmaz (2012) facilitates the creation of a dynamic total spillover index to gauge the time-varying relationship between the undertaken variables. The time-varying spillover effects between litigation funding and the crude oil market are further compared with the dynamic return spillover effects between the crude oil and the overall Australian stock market. In this regard, our study contributes to the literature by investigating the dynamic relationship between the crude oil market and an emerging equity asset class, i.e., litigation funding, in the context of the Australian market.

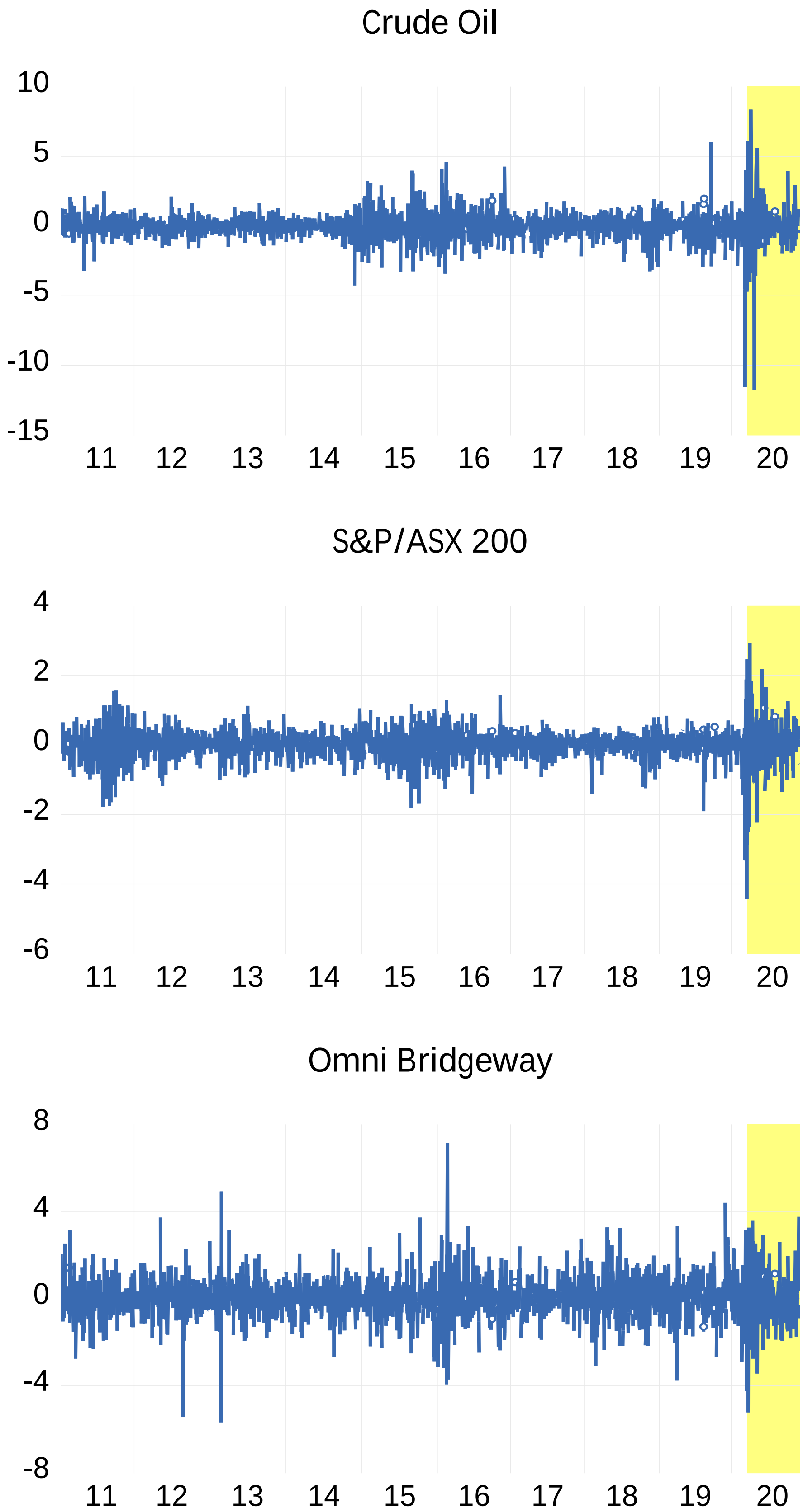
3. Data and Stylized Facts

We gather data relating to litigation funding (Omni Bridgeway's stock prices), crude oil prices, S&P/ASX 200 index prices, and other control variables from Refinitiv's Eikon platform. To avoid the impact of exchange rates, we express all the variables in Australian dollar terms. The sample period, which is at the daily frequency, ranges from January 2011 to November 2020. The main dataset covers ICE Europe Brent Crude Oil Future prices, S&P/ASX 200 index prices, and Omni Bridgeway's stock prices. The S&P/ASX 200 is the benchmark equity market index of Australia.

Given that our analyses require stationary variables, we consider daily log returns for Omni Bridgeway, S&P/ASX 200, and crude oil prices. Figure 1 displays the plots of the returns of crude oil, S&P/ASX 200, and Omni Bridgeway across the sample period from January 2011 to November 2020. The highlighted portion is the period after the COVID-19 pandemic. Further, Table A1 (in the appendix) reports the descriptive statistics for crude oil, S&P/ASX 200, and Omni Bridgeway across the full sample period. The highest level of returns is observed by Omni Bridgeway (0.02%), followed by S&P/ASX 200 (0.006%) and crude oil (-0.007%).

On the other hand, the crude oil returns are highly volatile, followed by Omni Bridgeway and the S&P/ASX 200 index in terms of standard deviation. All the variables are stationary, as indicated by the unit root tests. We use three different versions of the unit root tests, comprising the Augmented Dickey-Fuller test (ADF), Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test, and Zivot-Andrews structural break test. All the unit root tests support a stationary distribution of the respective return series, i.e., crude oil, S&P/ASX 200, and Omni Bridgeway.

Figure 1: Plots of the returns of Crude Oil, S&P/ASX 200 and Omni Bridgeway



4. Methods

In this study, we use three different return series to model the return spillover effects, i.e., crude oil, S&P/ASX 200, and Omni Bridgeway across the sample period from January 2011 to November 2020. Using the spillover effects framework of Diebold and Yilmaz (2012), we compute total return shocks connectedness (total return spillovers) separately for the two pairs: crude oil and Omni Bridgeway, and crude oil and S&P/ASX 200.

By using the generalized forecast error variance decompositions (FEVDs), the return spillover effects capture cross-market return shocks in terms of their total contribution (Singh & Singh, 2016; Singh & Kaur, 2017; Singh, 2020; Singh, 2021; Singh, 2022). The generalized version captures percentage of variance to variable *i* due to innovations to variable *j*. Further, the generalized version uses the historical errors, where the shocks are not orthogonalized as the sum of the contributions is certainly not equal to 1 (Antonakakis et al., 2018; Corbet et al., 2020).

As part of a publicly listed equity asset class and a portfolio, litigation funding can also influence the crude oil market due to information transmission and flow of funds across different asset classes. We, therefore, employ a VAR framework to account for such portfolio flow of funds under an endogenous framework. Consider an N-dimensional vector, X_t, depicting the returns of two different pairwise return series, i.e., crude oil and Omni Bridgeway, and crude oil and S&P/ASX 200, in a VAR specification (Sims, 1980). Under the VAR framework, a dependent variable is a function of its own lagged values and the lagged values of another variable. A VAR *(p)* model can be specified as, $X_t = \sum_{i=1}^{p} \Phi_i X_{t-i} + \varepsilon_t$, where ε_t is a vector of IID innovations, and X_t is a vector of *N* endogenous variables. The moving average representation is defined as $X_t = \sum_{i=0}^{\infty} \mathrm{A}_i \varepsilon_{t-i}$, where *N*×*N* coefficient matrices A_i follows the recursion $A_i = \Phi_1 A_{i-1} + \Phi_2 A_{i-2} + \cdots + \Phi_p A_{i-p}$. A VAR model requires the inclusion of a certain number of lags as part of an endogenous setting. We use the Akaike Information Criterion (AIC) to ascertain the optimal number of lags and append 24- and 16-days lagged values in the case of pairs 'crude oil-S&P/ASX 200' and 'crude oil-Omni Bridgeway', respectively. For *H*-step-ahead FEVDs, we have:

$$\theta_{ij}^{g}(H) = \frac{\sigma_{ii}^{-1} \sum_{h=0}^{H-1} (e_i' A_h \Sigma e_j)^2}{\sum_{h=0}^{H-1} (e_i' A_h \Sigma A_h' e_i)} \tag{1}$$

Where Σ is the estimated variance matrix of the error vector, σ_{ii} is the *i*[th] element on the variance matrix for the error vector, and e_i is the selection vector. Since the sum of the elements is not equal to unity in each of the row (Corbet et al., 2020), the normalization of each variance decomposition matrix is done by the sum of the rows:

$$\tilde{\theta}_{ij}^{g}(H) = \frac{\theta_{ij}^{g}(H)}{\sum_{j=1}^{N} \theta_{ij}^{g}(H)} \tag{2}$$

Using the contributions of the respective pairwise return series, total spillover index (TSI) is defined as:

$$S^{g}(H) = \frac{\sum_{\substack{i,j=1 \\ i \neq j}}^{N} \tilde{\theta}_{ij}^{g}(H)}{\sum_{i,j=1}^{N} \tilde{\theta}_{ij}^{g}(H)} \cdot 100 = \frac{\sum_{\substack{i,j=1 \\ i \neq j}}^{N} \tilde{\theta}_{ij}^{g}(H)}{N} \cdot 100 \tag{3}$$

TSI measures the contribution of return spillover effects across the two different return series to the total forecast error variance (Diebold & Yilmaz, 2012). The study considers a rolling window estimation of

200 days with 10-days ahead variances. As part of our robustness findings, we also consider a rolling window estimation of 250 days with 5- and 10-days ahead variances. In the second part of the analysis, we also examine the impact of the oil price crash on the return shocks connectedness between litigation funding and the crude oil market. To examine the impact of the oil price crash on the return shocks connectedness, we conduct the following regression analysis:

$$TSI_t = Intercept + \varphi Crash_t + \omega X_t + \varepsilon_t \quad (4)$$

Where TSI_t is the total return spillover index (equation (3)) between litigation funding and the crude oil market, and S&P/ASX 200 and the crude oil market. $Crash_t$ is an indicator variable capturing the oil price crashes, i.e., it is equal to 1 for the period between July 2014 and January 2016 (Saeed et al., 2021), and between March 2020 and November 2020 (Corbet et al., 2020), and 0 otherwise. ε_t is the error term. We also include other explanatory variables (X_t) related to Chicago Board Options Exchange (CBOE) Crude Oil Volatility Index, S&P/ASX 200 VIX Index, Bloomberg Australian Government Bond Index, Bloomberg Australian Non-Government Bond Index, and Australian Dollar Currency Index (Lundgren et al., 2018; Kocaarslan & Soytas, 2019; Nazlioglu et al., 2020; Demirer et al., 2020; Batten et al., 2021; Saeed et al., 2021). Our main coefficient of interest is φ, which captures the impact of the oil price crash on the total spillover index between litigation funding and the crude oil market. If litigation funding and the crude oil market are weakly correlated or uncorrelated to each other, then one should expect the impact of the oil price crash to be weakly related to the total return spillover index between litigation funding and the crude oil market.

5. Empirical Findings

Table 1 reports the static total return spillover effects between our undertaken variables of interest, i.e., crude oil, S&P/ASX 200 and Omni Bridgeway's return series across the full sample period.

Table 1: Total Return Spillovers

Panel A: Total Return Spillovers - Crude Oil and S&P/ASX 200			
	Crude	**ASX**	**From Contributions**
Crude	97.6	2.4	2
ASX	4.3	95.7	4
To Contributions	4	2	7
Net Contributions	2	-2	**3.40%**
Panel B: Total Return Spillovers – Crude Oil and Omni Bridgeway			
	Crude	**Omni**	**From Contributions**
Crude	98.9	1.1	1
Omni	1	99	1
To Contributions	1	1	2
Net Contributions	0	0	**1.00%**

Note: *This table presents the static total return spillover effects between the crude oil and S&P/ASX 200 in Panel A, and crude oil and litigation funding (Omni Bridgeway) in Panel B. These return spillover effects are reported across the sample period from January 2011 to November 2020.*

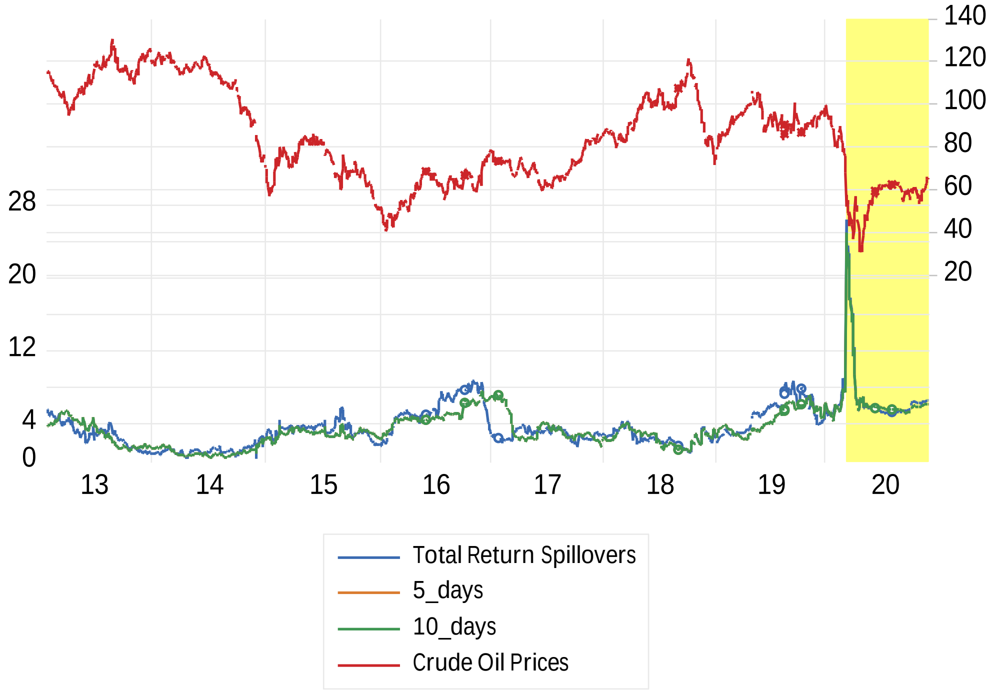
Panel A of Table 1 presents the total return spillover effects between the crude oil and S&P/ASX 200. Panel B of Table 1 presents the total return spillover effects between the crude oil and litigation funding (Omni Bridgeway). The total return spillover effects between the crude oil and S&P/ASX 200 are equal to 3.4%, whereas, on the other hand, the total return spillover effects between the crude oil and litigation funding (Omni Bridgeway) are equal to only 1%. This implies that litigation funding and the crude oil market are not highly correlated to each other, especially as compared to the overall stock market (S&P/ASX 200).

The main advantage of Diebold and Yilmaz's (2012) spillover effects framework is that we can examine the total return spillover effects in a dynamic or time-varying manner. Another advantage of Diebold and Yilmaz's (2012) spillover effects framework is that we can compute the net contributions for the respective variables. The net contributions are determined after taking the difference between 'contributions to' and 'contributions from' other variables as part of the endogenous framework. Therefore, we also compute the net contributions for the respective pairs. For the crude oil and S&P/ASX 200 pair, the crude oil is found to be the net transmitter of return spillover effects to the overall stock market (S&P/ASX 200), and S&P/ASX 200 is found to be the net receiver of the return spillover effects from the crude oil market. However, for the crude oil and Omni Bridgeway pair, the net contributions are equivalent to zero. This suggests that both litigation funding and the crude oil market are essentially uncorrelated to each other.

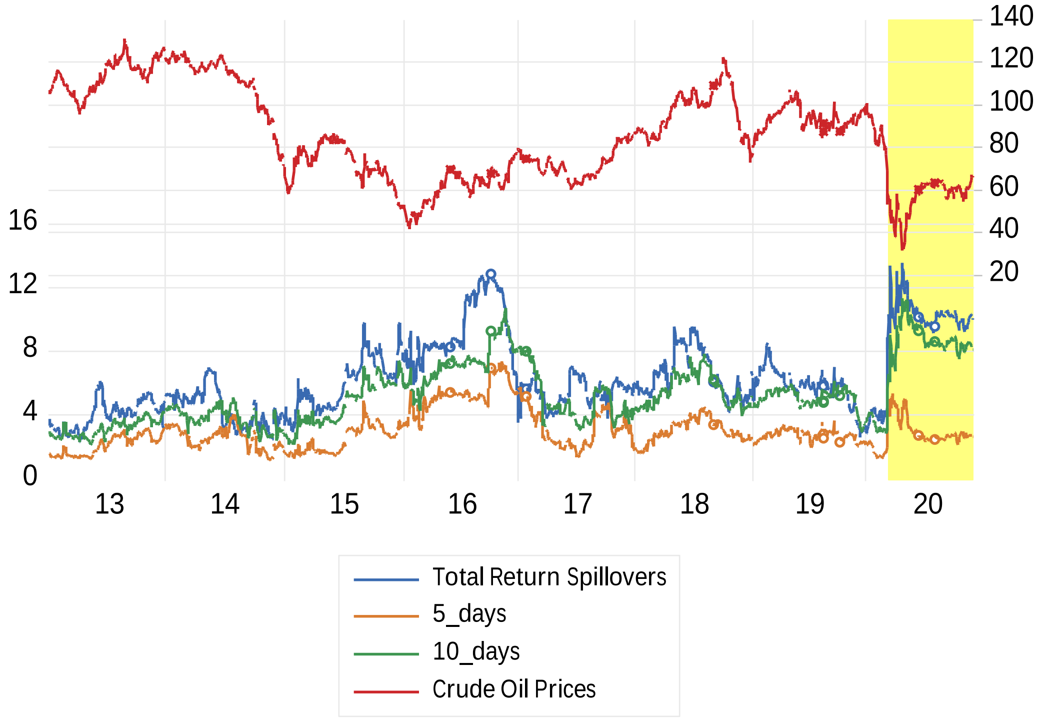
We also examine the time-varying return spillover effects for the respective pairs. For this purpose, we consider a rolling window estimation of 200 days with 10-days ahead variances across the sample period from January 2011 to November 2020. As part of our robustness findings, we also consider a rolling window estimation of 250 days with 5- and 10-days ahead variances across the same period. Figure 2 displays the plots of the total spillover indices for the respective pairs, i.e., crude oil and S&P/ASX 200 coupled with oil price movements in Panel A of Figure 2, and crude oil and Omni Bridgeway, along with oil price movements in Panel B of Figure 2.

Figure 2: Plots of the Total Spillover Indices

Panel A: Crude Oil and S&P/ASX 200



Panel B: Crude Oil and Omni Bridgeway

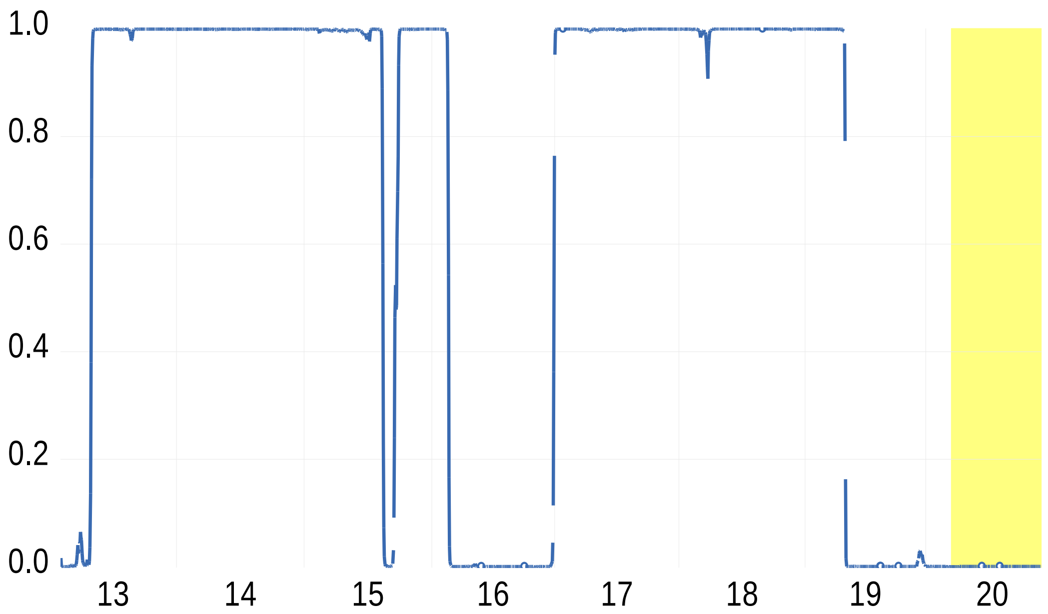


The graphical movements of the respective pairs support that the relationship between the crude oil and S&P/ASX 200, and the crude oil and Omni Bridgeway is dynamic or time-varying across the sample period. For the crude oil and S&P/ASX 200 pair, the total return spillover index increased between the periods 2015 and 2017, and then the dynamic relationship reached its highest level in the aftermath of the COVID-19 pandemic. Crude oil prices fell sharply after the COVID-19 pandemic, and the total spillover index between the crude oil and S&P/ASX 200 touched its all-time highest level of greater than 24% when COVID-19 was declared a pandemic by the WHO on 11th March 2020. Overall, the graphical movements of total return spillovers and crude oil prices suggest that return spillovers increase during low oil prices. All the total spillover indices depict a similar kind of trend in the case of crude oil and S&P/ASX 200.

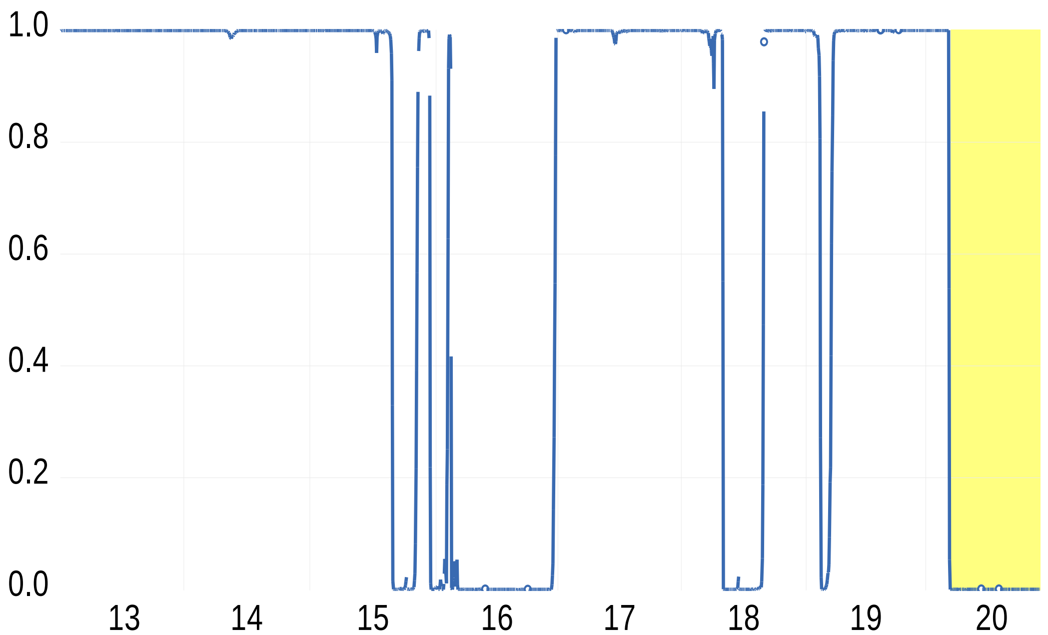
On the other hand, the dynamic relationship between crude oil and litigation funding (Omni Bridgeway) reached its highest level greater than 12% after the declaration of the COVID-19 pandemic. In relative terms, the total spillover index between the crude oil and S&P/ASX 200 observed an elevated level, which was twice the level recorded between the crude oil and litigation funding in the aftermath of the COVID-19 pandemic and the fall in oil prices. Moreover, the return shocks connectedness between litigation funding and the crude oil market barely crossed its previous highest level observed in the periods between 2015 and 2017 during the COVID-19 economic shock. All the total spillover indices depict a similar kind of trend. This further suggests that relative to S&P/ASX 200, the return shocks connectedness between the crude oil and litigation funding remained subdued even after the COVID-19-induced economic disruptions. Our findings suggest that relative to the stock market, litigation funding is essentially uncorrelated to the crude oil market.

Figure 3: Plots of the Markov regime-switches – Regime 1

Panel A: Crude Oil and S&P/ASX 200



Panel B: Crude Oil and Omni Bridgeway



Further, we also investigate the dynamic relationship between the crude oil, S&P/ASX 200, and Omni Bridgeway via Markov regime-switching models. The idea is to comprehend whether the return shocks connectedness between the crude oil and S&P/ASX 200, and the crude oil and litigation funding vary across different regimes. Our Markov regime-switching models suggest that the return shocks connectedness is relatively lower in the first regime (regime-1), and the return shocks connectedness is relatively higher in the second regime (regime-2). Therefore, we display the Markov regime-switching filtered probabilities of remaining in regime-1 in Figure 3 across the undertaken sample period. Panel A of Figure 3 displays the filtered probability of remaining in regime-1 for the crude oil and S&P/ASX 200 pair. Panel B of Figure 3 displays the filtered probability of remaining in regime-1 for the crude oil and Omni Bridgeway pair.

Both the filtered probabilities suggest that the relationship between the crude oil and S&P/ASX 200, and the crude oil and Omni Bridgeway is indeed dynamic. The probability of remaining in regime-1 varies considerably across the sample period for the respective pairs. Particularly, the probability of remaining in regime-1 decreased suddenly in the aftermath of the COVID-19 pandemic in the case of crude oil and S&P/ASX 200, and crude oil and Omni Bridgeway. In other words, the probability of high return shocks connectedness increased for the respective pairs after the COVID-19 pandemic. Similarly, the probability of high return shocks connectedness between the crude oil and S&P/ASX 200, and the crude oil and Omni Bridgeway was greater between the periods 2015 and 2017. To further gauge the impact of the oil price crash on the return shocks connectedness between the crude oil and S&P/ASX 200, and the crude oil and litigation funding, we regress the respective total spillover indices against the *crash* variable and other explanatory variables. Table 2 presents our results related to the impact of the oil price crash on the return shocks connectedness between the crude oil and S&P/ASX 200, and the crude oil and Omni Bridgeway (litigation funding). The respective total spillover indices (TSI) are regressed against the *crash* variable, and other explanatory variables (as in equation (4)). Standard errors based on the Newey-West estimator are reported in parentheses (Newey & West, 1987). We also consider the alternative measures of the total spillover indices based on the rolling window estimation of 250 days with 5- and 10-days ahead variances for the respective pairs.

Table 2: Regression Analysis

	Crude Oil – S&P/ASX 200			Crude Oil – Omni Bridgeway		
Variables	**TSI**	**10 Days**	**5 Days**	**TSI**	**10 Days**	**5 Days**
Constant	0.4713	0.4031	0.4031	3.4705***	3.5910***	2.4073***
	-0.6817	-0.5997	-0.5997	-7.4217	-8.4448	-10.4073
Crash	-1.1903***	-1.3234***	-1.3234***	-0.6207*	-0.2288	-0.9040***
	(-4.8151)	(-5.8908)	(-5.8908)	(-1.9205)	(-0.8105)	(-5.7303)
Crude Vol	0.0303***	0.0290***	0.0290***	0.0242***	0.0225***	0.0098***
	-2.6094	-2.7324	-2.7324	-4.4323	-4.7769	-3.3417
ASX Vol	0.1435**	0.1443**	0.1443**	0.1149***	0.0318	0.0218
	-2.213	-2.367	-2.367	-2.9775	-0.905	-1.0023
Govt. Bond	1.0897	0.4417	0.4416	-5.2865***	-4.8543***	-0.8224
	-0.4513	-0.1934	-0.1933	(-2.8917)	(-2.7658)	(-0.9705)
Non-Govt. Bond	-4.8052	-3.5487	-3.5484	8.7593***	8.4670***	1.0756
	(-0.9688)	(-0.7527)	(-0.7527)	-2.6587	-2.6095	-0.638
Dollar Index	-0.3824	-0.3131	-0.3131	0.5058**	0.4675**	0.158
	(-1.0955)	(-0.9137)	(-0.9137)	-2.4048	-2.4014	-1.6093
Adjusted R^2	0.39	0.41	0.41	0.27	0.23	0.15
p-value	0	0	0	0	0	0

*Note: This table presents the regression results related to the impact of the oil price crash on the return shocks connectedness between the crude oil and S&P/ASX 200, and the crude oil and Omni Bridgeway (Litigation Funding). The respective total spillover indices are regressed against the 'crash' variable, and other explanatory variables. TSI is the total spillover index based on the rolling window estimation of 200 days with 10-days ahead variances. 10 Days is the rolling window estimation of 250 days with 10-days ahead variances. 5 Days is the rolling window estimation of 250 days with 5-days ahead variances. Standard errors based on the Newey-West estimator are reported in the parentheses. ***, **, * indicate significance at 1%, 5%, and 10% levels, respectively.*

For the crude oil and S&P/ASX 200 pair, our variable of interest, i.e., *crash*, is negative and statistically significant capturing the dynamic relationship between the crude oil and S&P/ASX 200. The findings suggest that the return shocks connectedness or the total return spillovers between the crude oil and S&P/ASX 200 decrease during the oil price crashes. However, the crude oil volatility and S&P/ASX 200 implied volatility increase the return shocks connectedness between the crude oil and S&P/ASX 200. On the other hand, the *crash* variable is weakly correlated to the total spillover indices between the crude oil and Omni Bridgeway across the three alternative measures of the return spillover effects.

The coefficient of the crash variable is negative but statistically significant in the case of TSI and 5-days ahead error variances at the 10% and 1% significance levels, respectively. This implies that the return spillover effects between litigation funding and the crude oil market decrease during the oil price crashes. However, the results are relatively weaker in statistical terms owing to a lower degree of return shocks connectedness observed between the crude oil and litigation funding. The crude oil volatility is also positively related to the return shocks connectedness between the crude oil and litigation funding. Moreover, the Australian Government Bond Index, Australian Non-Government Bond Index, and the Australian Dollar Currency Index are also significantly related to the return shocks connectedness between the crude oil and litigation funding in the case of TSI and 10-days ahead error variances.

Overall, our findings suggest that litigation funding is mainly immune from oil price crashes as compared to the stock market (S&P/ASX 200). It is consistent with our finding that litigation funding acts as a reasonable diversification candidate for investment strategies, especially in the context of crude oil investors.

6. Conclusion

This paper examines the dynamic relationship between crude oil and litigation funding in the context of the Australian market. The litigation funding business involves third-party financing to cover lawsuit-related expenses using the legal outcome as collateral. Since the outcome of a legal case is contingent, litigation funding is expected to be uncorrelated with other markets. Using daily data from January 2011 to November 2020, this study examines the return shock connectedness between crude oil and litigation funding and relates the total return spillover effects to episodes of the oil price crashes in the context of the Australian economy. Based on Diebold and Yilmaz's (2012) return spillover effects, we find evidence, that relative to the stock market (S&P/ASX 200), litigation funding shares a lower degree of return shocks connectedness with the crude oil market.

Moreover, the episodes of the oil price crashes are also only weakly correlated to the return shocks connectedness between the crude oil and litigation funding. On the other hand, the oil price crashes are strongly correlated to the return shocks connectedness between the crude oil and S&P/ASX 200. Overall, the findings suggest that litigation funding acts as a potential diversification candidate for different investment strategies, especially in the context of crude oil investors during times of uncertainty, like the COVID-19 pandemic. These findings are of interest to policymakers, market participants, and crude oil investors in comprehending the spillover effects of crude oil on other sectors of the economy.

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Appendix

Table A1: Returns - Descriptive Statistics

This table reports the descriptive statistics for the respective variables. The study uses three different unit root tests including the ADF, KPSS and Zivot-Andrews (with a structural break) tests. ADF is Augmented Dickey-Fuller and KPSS is Kwiatkowski–Phillips–Schmidt–Shin. The critical values are reported in the parentheses. *** indicates significance at the 1% level.

Statistics	Crude Oil	S&P/ASX 200	Omni Bridgeway
Mean	-0.0066	0.0058	0.0200
Median	0.0054	0.0273	0.0000
Std. Dev.	1.0156	0.4520	0.9252
Observations	2,348	2,348	2,348
ADF	-48.0225***	-33.8218***	-48.5510***
(Critical value at 1%)	(-3.96)	(-3.96)	(-3.96)
KPSS	0.0449	0.0256	0.0337
(Critical value at 1%)	(0.2160)	(0.2160)	(0.2160)
Zivot-Andrews	-18.3024***	-17.7826***	-20.1589***
(Critical value at 1%)	(-5.5700)	(-5.5700)	(-5.5700)