Journal of
Risk and Financial Management

MDPI

Article

Sectoral Performance and the Government Interventions during COVID-19 Pandemic: Australian Evidence

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Abstract: This study explores the contrasting impacts of the COVID-19 pandemic on various industries in Australia. Considering all daily announced information, we analyzed the diverse impacts of COVID-19 on the sectoral stock returns from 26 January to 20 July 2020. Sixteen out of twenty examined stock indices negatively react to the daily rise in COVID-19 confirmed cases. Several actions from the Australian government to control the pandemic are relatively ineffective in boosting the overall financial market; however, some positive interactions are captured in five sectors of industrials, health care, metals and mining, materials, and resources. The result shows that all industries that benefited from government financial assistance are either shielded or less severely affected by the pandemic. While sectors that did not directly receive financial remedies relatively showed no enhancement in their overall performance. Having achieved short-term success in helping the economy, the government recorded an all-time high deficit since 2004 that might eventually lead to adverse effects on the overall economy. The Australian equity market is found to be rationally distinct to the crude oil price risk, while positive correlations between AUD/USD rate and real estate-related sectors are reported.

Keywords: COVID-19; stock market; sectoral performance; Government interventions; Australian evidence

Citation: Huynh, Nhan, Dat Nguyen, and Anh Dao. 2021. Sectoral Performance and the Government Interventions during COVID-19 Pandemic: Australian Evidence. *Journal of Risk and Financial Management* 14: 178. https://doi.org/10.3390/jrfm14040178

Academic Editors: Michael McAleer, Thanasis Stengos and Craig M. Lewis

Received: 8 March 2021
Accepted: 8 April 2021
Published: 12 April 2021

1. Introduction

The overall economies, especially, the financial markets speedily reflect the information of all major events. In line with the efficient market hypothesis, the reactions of the stock market to several circumstances have been explored by many prior studies. These findings include terrorist attacks (Choudhry 2005; Karolyi and Martell 2006; Corbet et al. 2018), market disasters (Wachter 2013; Kowalewski and Śpiewanowski 2020), natural and environmental disasters (Wang and Kutan 2013; Guo et al. 2020), and political actions (Kim and Mei 2001; Vuchelen 2003; Shanaev and Ghimire 2019). Especially, the pandemics' effects on the financial market performance are also documented in various studies, including the 2002 severe acute respiratory syndrome (SARS) outbreak (Chen et al. 2018), the 2009 influenza A (H1N1) (Peckham 2013), and the 2013 Ebola virus disease (Del Giudice and Paltrinieri 2017; Ichev and Marinč 2018). In 2020, an ongoing global pandemic of coronavirus disease 2019 (COVID-19) has caused the worst crashes across world economies since the turmoil of the 2007 global financial crisis (GFC). Since the first confirmed case of coronavirus in Wuhan, China in December 2019, this deathly disease has rapidly spread out internationally. As of March 2021, there have been more than 125 million confirmed cases globally, including over 2.7 million deaths[1]. In the June 2020 report of the International Monetary Fund (IMF), the global growth is projected at

−4.9% in 2020, which is the lowest rate since the 2007 GFC (1.7%). When the first wave of COVID-19 outbreak stroke from January to March, the US, UK, and Australian stock indices experience the fastest fall (more than 20%) in history amid extraordinary volatility (Banerji 2020). The governments, as well as international organizations, have hastened to find optimal measures to contain the outbreak. As its unpredictable and complicated movements, the economic consequences of the COVID-19 pandemic will probably exceed those of the 2007 GFC (Ilzetzki et al. 2020).

For Australia, the second wave of this pandemic started in July since the first infected case was reported in February 2020. With stricter lockdown policies, the government strived to control the pandemic. The Australian economy has been devasted by the spread of COVID-19 from the international trade, tourism, airline industry, retail, and service sectors to many other industries. In opposition, a few sectors can benefit from the pandemic such as healthcare, biotech, or household staples as they are always essential, even during the recession. As people are required to isolate themselves, the segment of information technology is less likely to be impacted as it could provide services that support working and studying from home. Data from the Australian Bureau of Statistics (ABS)[2] reveals that the 2020 first quarter GDP has diminished by 0.3%, amid the severe effect of the bush fires in 2019 and the first stage of the COVID-19 pandemic. The greatest obstacle to the Australian economy is that the demand for household spending fell (by 1.1%) for the first time since 2008. The ABS also identified the most affected sectors by the pandemic including transportation, art and entertainment, and retails. Consequently, it is exceedingly anticipated that the COVID-19 pandemic will have ominously unpredictable effects across the Australian industries. This contagion also worsens the level of uncertainty and confidence, augments the risk aversion, and accumulates the disorder in overall financial markets (Zhang et al. 2020). To secure the current financial positions, many investors are trying to liquidate their assets including their stocks; thus, it simultaneously distresses the stock market performance (Okorie and Lin 2021). These economic consequences will directly and inversely demonstrate the performance of sectoral indices of the financial market (Liu and Sinclair 2008).

This study seeks to examine the contrasting impacts of COVID-19 on the Australian economy based on sectoral analyses. This study includes main market-cap indices as well as sectoral indices listed on the Australian Stock Exchange (ASX). In this study, we employ the main indicator of the daily number of confirmed cases to comprehensively investigate varying impacts of the outbreak on the country's overall economy from January 2020. We also capture the effects of COVID-19 on the financial market by including the interactions between infected rate and three indicators of Australian government intervention, the foreign exchange market, and Brent crude oil prices.

Our findings indicate that the overall Australian stock markets react intensely with negative returns to the daily increase in COVID-19 confirmed cases. The levels of negative impacts were diverse among different industries depending on its characteristics and the economical stimulations from the government. Our findings suggest that financial supports are more effective than other policies in uplifting sectoral performance. Further, all Australian industries were possibly separated from the crude oil price risk during the pandemic. More interestingly, the positive correlations between AUD/USD rate and real estate-related sectors are captured during the financial downturn.

This study contributes to the extant literature in two folds. From different regimes in terms of sectoral analyses, this study explores the overall Australian financial market with respect to the COVID-19 pandemic. Hence, our study extends the current finance literature regarding the stock market reactions during extreme events. Additionally, the sectoral analyses also propose implications for suitable policy adjustments for each sector to minimize the impacts of extreme events on the overall financial market. Considering the interventions of the Australian government, this paper sheds light on the overall opposing interactions between how different industries performed. From a broader perspective, this

study proposes perceptions to improve and strengthen the current policies required for the financial markets and the overall economy.

This study proceeds as follows. Section 2 depicts data required for the study, as well as the methodology to investigate the influence of COVID-19 on the performance of Australian industries. Section 3 reports the key findings of the empirical analysis and Section 4 concludes the study.

2. Data and Methodology

To capture the effects of the COVID-19 pandemic on the Australian stock market, we use three daily indices based on the market capitalisation, including: ASX All Ordinaries, S&P/ASX50, and the S&P/ASX300 (See Appendix A for detailed information). This study also examines the performance of 17 sectoral stock indices on daily basis to compare contrasting movements during the outbreak. The sectoral classifications are based on the Global Industry Classification Standard (GICS). Data for sectoral indices is the S&P/ASX 300, which covers the large-cap, mid-cap, and small-cap components of the S&P/ASX Index Series to prevent a possible bias toward domination of large-cap stocks. All stock index data is obtained from the S&P Dow Jones Indices Database. Figure 1 indicates the daily growth in COVID-19 confirmed cases in Australia and the ASX All Ordinaries returns from 25 January until 20 July 2020. Considering the COVID-19 impacts on the overall Australian economy, we only examine the data from January to July 2020 as the second wave of infections largely localized in Melbourne, Victoria from July to September.

The corresponding COVID-19 data in Australia is obtained from the Our World in Data. We prefer to use the daily number of confirmed cases per million to compute the daily growth rate to avoid possible biases toward extreme case numbers. We also collect the COVID-19 Government Response Index (GRI) from the Oxford University database to estimate the response of the Australian government during the pandemic. This study also includes two control variables, which are obtained from the Investing.com Database. The first indicator is the AUD/USD exchange rate, which is obtainable on daily basis. The second indicator is Brent crude oil prices in USD per barrel to capture the oil price risk exposure (Elyasiani et al. 2011; Akhtaruzzaman et al. 2020). All daily nominal data in this study spans from 26 January 2020 to 20 July 2020. Table 1 features the list of examined stock market indices, their abbreviations, and basic statistics (See Appendix A for detailed explanations of the indices).

The extent to which the catastrophic impact of the pandemic on the economy is still evolving unpredictably, therefore we do not employ the method of a classical event for this study. The approach of Ordinary Least Square (OLS) regression is employed in this study. This method is considered appropriate to recognize and measure the consequences of the independent variables since there are no interactions between the chosen variables, which is shown in the correlation matrix in Table 3. The dependent variables (stock index returns) are regressed on the lagged values of the independent variables, which are daily growth in COVID-19 confirmed cases and controlling for the COVID-19 Government Response Index (GRI). We also include two control variables as the parameter of foreign exchange market—daily AUD/USD exchange rate (FX) return, and the oil price risk—crude oil price return (OIL). As the stock market data is available for the trading days only (excluding the weekends and Australian public holidays), the COVID-19, GRI data in day (t−1) of Monday is the average of the previous three days (Friday, Saturday, and Sunday). This method is to take into account the reaction of the stock market regarding all information announced during the weekends.

In our models, the interaction variables of $GRI_{t-1} \times CASE_{t-1}$ show whether the equity market reactions to the growth in COVID-19 confirmed cases depend on government actions. In this study, we also consider the daily lagged returns crude oil price (OIL_{t-1}) and AUD/USD rate (FX_{t-1}) to capture the oil price risk and forex market exposure to the performance of Australian stock index returns. Using the Ordinary Least Square (OLS) regression, we estimated the stock indices in the following econometric models:

$$RET_{i,t} = c + \alpha_1 CASE_{t-1} + \varepsilon_{i,t} \quad (1)$$

$$RET_{i,t} = c + \alpha_1 CASE_{t-1} + \beta_1 (GRI_{t-1} \times CASE_{t-1}) + \varepsilon_{i,t} \quad (2)$$

$$RET_{i,t} = c + \alpha_1 CASE_{t-1} + \beta_1 (GRI_{t-1} \times CASE_{t-1}) + \beta_2 OIL_{t-1} + \gamma FX_{t-1} + \varepsilon_{i,t} \quad (3)$$

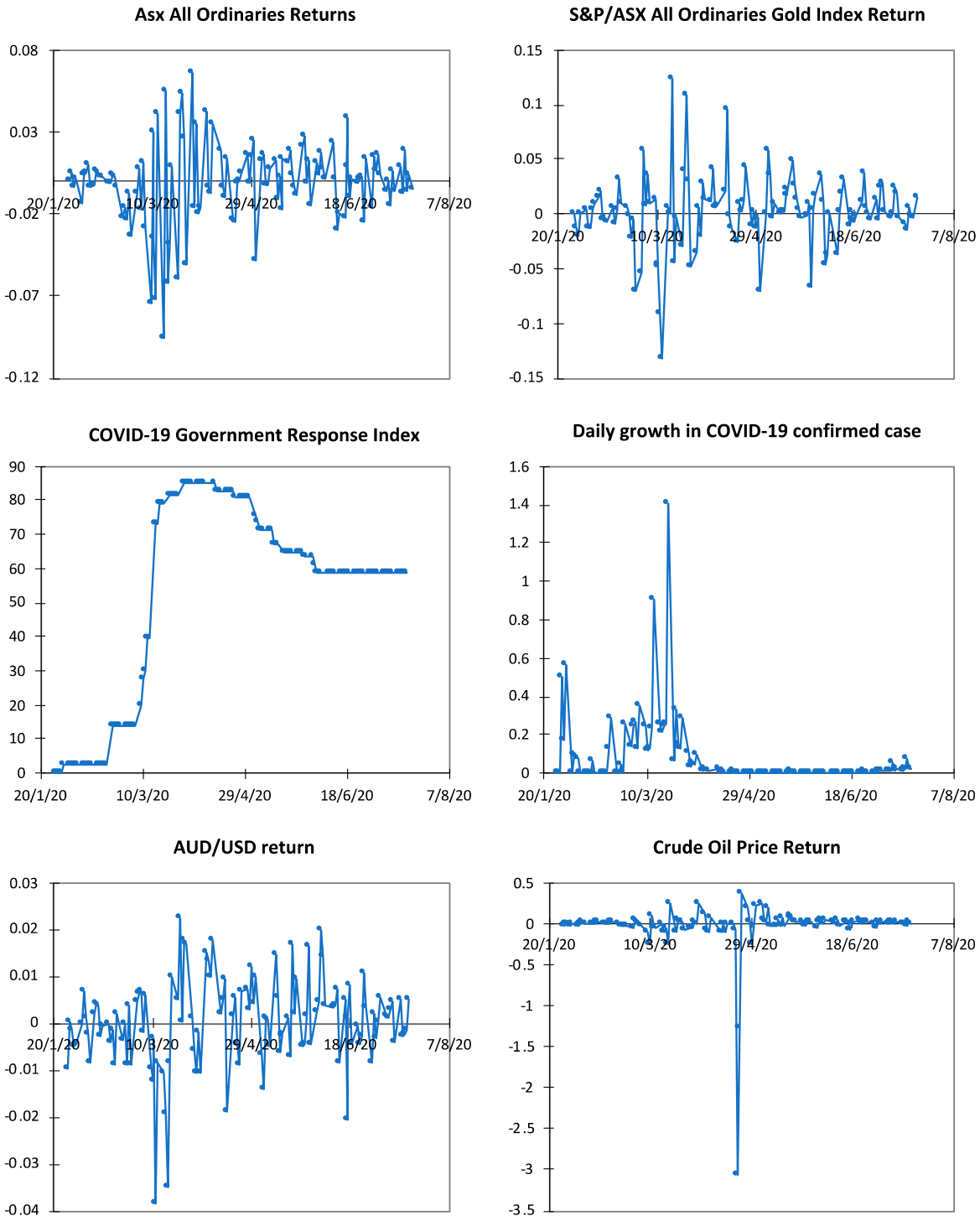


Figure 1. Australian COVID-19 data, stock market, gold index, and independent variables.

Table 1. Variable.

Market-Cap Index	Abbreviation	Source
ASX ALL ORDINARIES	ASX	S&P Dow Jones Indices Database
S&P/ASX 50	ASX50	S&P Dow Jones Indices Database
S&P/ASX 300	ASX300	S&P Dow Jones Indices Database
Sectoral Index		
S&P/ASX All Ordinaries Gold Index	Gold	S&P Dow Jones Indices Database
S&P/ASX All Technology Index	Technology	S&P Dow Jones Indices Database
S&P/ASX 300 Real estate investment trusts (A-REITs) and mortgage REITs	REIT	S&P Dow Jones Indices Database
S&P/ASX 300 Consumer Discretionary	Con-discretionary	S&P Dow Jones Indices Database
S&P/ASX 300 Consumer Staples	Consumer Staples	S&P Dow Jones Indices Database
S&P/ASX 300 Energy	Energy	S&P Dow Jones Indices Database
S&P/ASX 300 Financials excluding A-REITs	Fin Ex	S&P Dow Jones Indices Database
S&P/ASX 300 Health Care	Health Care	S&P Dow Jones Indices Database
S&P/ASX 300 Industrials	Industrials	S&P Dow Jones Indices Database
S&P/ASX 300 Information Technology	IT	S&P Dow Jones Indices Database
S&P/ASX 300 Materials	Materials	S&P Dow Jones Indices Database
S&P/ASX 300 Metals and Mining	Metals and Mining	S&P Dow Jones Indices Database
S&P/ASX 300 Real Estate	Real Estate	S&P Dow Jones Indices Database
S&P/ASX 300 Resources	Resources	S&P Dow Jones Indices Database
S&P/ASX 300 Communication Services	Communication	S&P Dow Jones Indices Database
S&P/ASX 300 Utilities	Utilities	S&P Dow Jones Indices Database
S&P/ASX 300 Banks	Bank	S&P Dow Jones Indices Database
Independent Variable		
Daily growth in COVID-19 confirmed cases	CASE	Our World in Data
COVID-19 Government Response Index	GRI	Blavatnik School of Government database, University of Oxford
Control Variable		
Daily AUD/USD exchange rate return	FX	Investing Database
Daily Brent crude oil prices return	OIL	Investing Database

3. Results and Discussion

3.1. Empirical Results

This section describes the employed methodology and the according empirical results. The average daily returns of all examined variables are reported in Table 2. Overall, all indices experienced negative returns during the pandemic. The results of unit root test (ADF and PP tests) suggest that all data series (except GRI[3]) are stationary, which means that those variables follow the random walk. Hence, our data is suitable for further time-series analyses in the OLS regression.

The correlation matrix for the four main dependent variables and four independent variables in this study is reported in Table 3. All stock indices are strongly and negatively correlated with the growth in COVID-19 confirmed cases. The graphical correlation matrix for all variables is reported in Appendix B.

Table 2. Basic statistics.

Market-Cap Index	Obs	Mean	S.D.	Jarque–Bera Test	ADF Test	PP Test
ASX	122	−0.001	0.025	41.51 *	−3.734 *	−13.942 *
ASX50	122	−0.001	0.025	40.69 *	−3.947 *	−14.676 *
ASX300	122	−0.001	0.025	42.18 *	−3.776 *	−14.151 *
Sectoral Index						
Gold	122	0.002	0.033	90.78 *	−5.446 *	−8.223 *
Technology	122	0.001	0.031	27.23 *	−3.627 *	−12.466 *
REIT	122	−0.002	0.034	99.35 *	−4.120 *	−11.250 *
Con-Discretionary	122	−0.001	0.028	41.33 *	−3.837 *	−12.303 *
Consumer Staples	122	0.000	0.020	112.13 *	−6.948 *	−16.417 *
Energy	122	−0.003	0.039	205.67 *	−3.848 *	−12.009 *
Fin Ex	122	−0.001	0.032	23.80 *	−3.932 *	−13.456 *
Health Care	122	0.000	0.029	71.45 *	−4.839 *	−20.482 *
Industrials	122	−0.002	0.027	143.41 *	−3.904 *	−11.603 *
IT	122	0.001	0.031	18.57 *	−3.607 *	−12.181 *
Materials	122	0.000	0.026	43.31 *	−4.173 *	−13.378 *
Metals and Mining	122	0.001	0.027	53.78 *	−4.438 *	−13.303 *
Real Estate	122	−0.002	0.034	107.10 *	−4.084 *	−11.417 *
Resources	122	0.000	0.028	78.16 *	−4.088 *	−13.356 *
Communication	122	−0.001	0.020	49.08 *	−5.036 *	−14.518 *
Utilities	122	0.000	0.019	157.42 *	−5.189 *	−12.171 *
Bank	122	−0.002	0.035	19.41 *	−4.045 *	−13.201 *
Independent Variable						
CASE	122	0.077	0.179	4363.54 *	−1.929	−7.374 *
GRI	122	52.525	29.255	15.70 *	−1.421	0.188
Control Variable						
FX	122	0.000	0.009	55.17 *	−4.726 *	−8.680 *
OIL	122	−0.030	0.311	294.59 *	−4.336 *	−7.675 *

Note: This table presents the basic statistics for all examined variables in this study. The results of Jarque–Bera test, Dickey–Fuller test (ADF—stationary), and Phillips–Perron test (PP—no intercept) results. * indicates significance at the 5%.

Table 3. Correlation matrix.

Variable	*ASX*	*ASX50*	*ASX300*	*GOLD*	*CASE*	*GRI*	*FX*	*OIL*
ASX	1.000							
ASX50	0.993 *	1.000						
ASX300	0.999 *	0.996	1.000					
GOLD	0.106	0.074	0.100	1.000				
CASE	−0.327 *	−0.277 *	−0.314 *	−0.084	1.000			
GRI	0.163	0.146	0.159	0.161	−0.122	1.000		
FX	0.098	0.079	0.096	0.164	−0.066	0.157	1.000	
OIL	0.000	0.006	0.002	−0.044	0.061	−0.086	0.117	1.000

Note: The Pearson coefficients are reported, and * indicates significance at the 5%.

The OLS regression results for three Australian market cap indices during the COVID-19 outbreak are tabulated in Table 4. The market capitalised index returns are negatively correlated with the daily growth in confirmed COVID-19 cases in Australia in three regressed models. Both small stocks and blue chip stocks are critically impacted by the pandemic. We also consider how the Australian government interventions interact with the impact of COVID-19 on the stock market returns in Model 2 by using the interaction term of *Government Response Index* × *Growth in confirmed cases.* This statistically insignificant interaction term in Model 2 indicates that the overall Australian financial market still sharply deteriorated regardless of the government reactions. This result remains robust when we consider the influence of oil price risk and foreign exchange market on the stock index returns in Model 3. Hence, the Australian government reactions may not be enough

in maintaining investor confidence during the pandemic. Our findings also reveal that the market capitalised index returns are not exposed to the fluctuations of crude oil and the forex market.

Table 4. Impacts of COVID-19 and government interventions on market cap indices.

Model	Variable	Market-cap Index					
		ASX		ASX50		ASX300	
		Coefficient	t-Stat	Coefficient	t-Stat	Coefficient	t-Stat
(1)	Constant	0.003	(1.10)	0.002	(0.80)	0.002	(1.03)
	$CASE_{t-1}$	−0.045	(−3.79) **	−0.039	(−3.16) **	−0.044	(−3.63) **
	F-stat	14.33 **		9.97 **		13.17 **	
	R-square	0.107		0.077		0.099	
(2)	Constant	0.003	(1.25)	0.002	(0.97)	0.003	(1.19)
	$CASE_{t-1}$	−0.071	(−3.15) **	−0.069	(−2.93) **	−0.071	(−3.10) **
	$GRI_{t-1} \times CASE_{t-1}$	0.000	(1.35)	0.001	(1.48)	0.000	(1.39)
	F-stat	8.13 **		6.14 **		7.60 **	
	R-square	0.120		0.094		0.113	
(3)	Constant	0.003	(1.20)	0.002	(0.94)	0.003	(1.15)
	$CASE_{t-1}$	−0.068	(−3.00) **	−0.067	(−2.81) **	−0.068	(−2.95) **
	$GRI_{t-1} \times CASE_{t-1}$	0.000	(1.24)	0.001	(1.40)	0.000	(1.29)
	OIL_{t-1}	0.001	(0.11)	0.001	(0.16)	0.001	(1.12)
	FX_{t-1}	0.164	(0.71)	0.119	(0.62)	0.159	(68)
	F-stat	4.15 **		3.10 **		3.88 **	
	R-square	0.124		0.096		0.117	

Note: This table presents the regression results for three market-cap indices performance during the pandemic from 26 January to 20 July 2020. The dependent variable is daily returns ($RET_{i,t}$) of three main market cap indices are regressed on two independent variables and two control variables. One-day lagged values of all independent and control variables are used in the models. t-statistics are reported in parentheses with their associated coefficients, ** indicate significance at the 1%.

The data shown in Table 5 indicates the levels of impacts of COVD-19 on Australian industries. Overall, all sectors were adversely affected by the increase in the number of COVID cases. However, the magnitudes of impact vary in different industries. Four sectors of Gold, Consumer Staples, Real Estate, and Communication are insignificantly associated with the growth in COVID-19 confirmed cases. This result corroborates that gold is considered as the haven asset for the financial markets during the crisis period (Akhtaruzzaman et al. 2021; Ji et al. 2020). Three sectors; Health Care, Financial excluding REIT, and Bank were likely less affected by the outbreak while the remaining ten sectors were harshly affected by the coronavirus outbreak in the country. Our findings remain robust in Model 2 and 3 when we include the factor of government interventions and two control variables of oil price and forex rate returns.

In the second model, we also look at how government measures to curb the increase in COVID-19 cases affecting the sectoral returns. The interaction term of *Government Response Index* × *Growth in confirmed cases* only enters positive and statistically significant for five sectors, including Health Care, Industrials, Materials, Metals and Mining, and Resources. This result suggests that the negative impacts of the rise in COVID-19 cases on those sectoral index returns are alleviated when the Australian government increases the levels of responses. We also consider the influences of exchange rate and oil price risk on the performance of Australian sectors during the COVID-19 pandemic in Model 3. We find that the performance of the Australian equity market is reasonably unconnected to the oil price risk exposure during the COVID-19 outbreak. For the foreign exchange market, all but A-REIT and Real Estate indices are not affected by the AUD/USD rate fluctuations. Both REIT and Real Estate index returns are positively and significantly associated with the variations of AUD/USD rate.

Table 5. Impacts of COVID-19 on Australian stock market sectoral returns.

Sector	Model 1				Model 2					Model 3						
	Constant	$CASE_{t-1}$	*F-Stat*	*R-Square*	*Constant*	$CASE_{t-1}$	$GRI_{t-1} \times CASE_{t-1}$	*F-Stat*	*R-Square*	*Constant*	$CASE_{t-1}$	$GRI_{t-1} \times CASE_{t-1}$	OIL_{t-1}	FX_{t-1}	*F-Stat*	*R-Square*
Gold	0.003 (1.03)	−0.015 (−0.92)	0.85	0.007	0.004 (1.09)	−0.033 (−1.04)	0.000 (0.66)	0.64	0.011	0.003 (0.91)	−0.025 (−0.79)	0.000 (0.46)	−0.006 (−0.65)	0.056 (1.74)	1.13	0.037
Technology	0.006 (1.99)	−0.063 (−4.28) **	18.35 **	0.133	0.006 (2.13) *	−0.091 (−3.29) **	0.001 (1.21)	9.95 **	0.143	0.006 (2.04) *	−0.086 (−3.07) **	0.000 (1.03)	0.001 (0.16)	0.381 (1.35)	5.45 **	0.157
A-REIT	0.004 (1.16)	−0.072 (−4.52) **	20.44 **	0.146	0.003 (1.08)	−0.057 (−1.90)	0.000 (−0.55)	10.31 **	0.148	0.003 (0.93)	−0.046 (−1.54)	0.000 (−0.90)	0.000 (0.00)	0.882 (2.73) **	7.29 **	0.200
Consumer Discretionary	0.004 (1.45)	−0.058 (−4.31) **	18.57 **	0.134	0.004 (1.51)	−0.071 (−2.79) **	0.000 (0.63)	9.44 **	0.137	0.004 (1.46)	−0.068 (−2.61) **	0.000 (0.48)	0.002 (0.26)	0.283 (1.08)	5.02 **	0.147
Consumer Staples	0.001 (0.59)	−0.016 (−1.66)	2.74	0.022	0.001 (0.62)	−0.022 (−1.18)	0.000 (0.37)	1.43	0.023	0.002 (0.78)	−0.026 (−1.34)	0.000 (0.49)	0.005 (0.84)	−0.221 (−1.15)	1.17	0.038
Energy	0.003 (0.73)	−0.075 (−4.01) **	16.10 **	0.118	0.003 (0.94)	−0.129 (−3.69) **	0.001 (1.83)	9.88 **	0.142	0.003 (0.85)	−0.128 (−3.60) **	0.001 (1.81)	−0.008 (−0.70)	0.038 (0.11)	5.00 **	0.146
Financial excluding REIT	0.003 (1.01)	−0.059 (−3.79) **	14.34 **	0.107	0.003 (1.07)	−0.074 (−2.50) *	0.000 (0.60)	7.32 **	0.109	0.003 (1.01)	−0.070 (−2.32) *	0.000 (0.47)	0.002 (0.17)	0.308 (1.01)	3.91 **	0.118
Health Care	0.001 (0.18)	−0.010 (−0.69)	0.48	0.004	0.001 (0.44)	−0.061 (−2.24) *	0.001 (2.19) *	2.65	0.043	0.002 (0.59)	−0.065 (−2.37) *	0.001 (2.29) *	0.007 (0.81)	−0.305 (−1.09)	1.74	0.056
Industrials	0.002 (0.84)	−0.048 (−3.76) **	14.14 **	0.105	0.003 (1.09)	−0.092 (−3.82) **	0.001 (2.13) *	9.54 **	0.138	0.002 (0.99)	−0.086 (−3.55) **	0.001 (1.90) *	0.001 (0.09)	0.429 (1.76)	5.62 **	0.161
Information Technology	0.005 (1.88)	−0.057 (−3.86) **	14.90 **	0.110	0.005 (2.03) *	−0.088 (−3.16) **	−0.001 (1.32)	8.37 **	0.123	0.006 (1.94)	−0.083 (−2.93) **	0.000 (1.13)	0.001 (0.14)	0.404 (1.42)	4.72 **	0.139
Materials	0.003 (1.14)	−0.032 (−2.47) *	6.11 *	0.048	0.003 (1.41)	−0.078 (−3.26) **	0.001 (2.27) *	5.75 **	0.088	0.003 (1.31)	−0.077 (−3.18) **	0.001 (2.25) *	−0.005 (−0.67)	0.028 (0.12)	2.95 *	0.092
Metals and Mining	0.003 (1.13)	−0.028 (−2.10) *	4.42 *	0.035	0.004 (1.42)	−0.079 (−3.12) **	0.001 (2.34) *	5.03 **	0.078	0.003 (1.32)	−0.079 (−3.07) **	0.001 (2.33) *	−0.006 (−0.75)	−0.012 (−0.05)	2.63 *	0.083
Real Estate	0.004 (1.17)	−0.073 (−4.62) **	21.38 **	0.151	0.003 (1.10)	−0.060 (−1.98) *	0.000 (−0.52)	10.76 **	0.153	0.003 (0.95)	−0.048 (−1.63)	0.000 (−0.86)	0.000 (0.02)	0.802 (2.67) **	7.43 **	0.203
Resources	0.003 (1.05)	−0.038 (−2.77) **	7.65 **	0.060	0.004 (1.34)	−0.091 (−3.53) **	0.001 (2.40) *	6.86 **	0.103	0.003 (1.24)	−0.091 (−3.47) **	0.001 (2.39) *	−0.006 (−0.77)	−0.009 (−0.04)	3.54 **	0.108

Table 5. *Cont.*

Sector	Model 1				Model 2					Model 3						
	Constant	***$CASE_{t-1}$***	***F-Stat***	***R-Square***	***Constant***	***$CASE_{t-1}$***	***$GRI_{t-1} \times CASE_{t-1}$***	***F-Stat***	***R-Square***	***Constant***	***$CASE_{t-1}$***	***$GRI_{t-1} \times CASE_{t-1}$***	***OIL_{t-1}***	***FX_{t-1}***	***F-Stat***	***R-Square***
Communication Services	0.001 (0.41)	−0.020 (−1.93)	3.73	0.030	0.001 (0.43)	−0.023 (−1.18)	0.000 (0.20)	1.87	0.031	0.001 (0.45)	−0.023 (−1.13)	0.000 (0.15)	0.002 (0.40)	0.057 (0.28)	0.99	0.033
Utilities	0.003 (1.47)	−0.037 (−3.99) **	15.90 **	0.117	0.003 (1.62)	−0.056 (−3.24) **	0.000 (1.34)	8.91 **	0.130	0.003 (1.68)	−0.058 (−3.27) **	0.000 (1.38)	0.003 (0.47)	−0.095 (−0.53)	4.51 **	0.134
Banks	0.003 (0.88)	−0.059 (−3.50) **	12.24 **	0.093	0.003 (0.95)	−0.075 (−2.34) **	0.000 (0.59)	6.27 **	0.095	0.003 (0.89)	−0.071 (−2.81) *	0.000 (0.47)	0.001 (0.10)	0.293 (0.89)	3.31 *	0.102

Note: This table presents the OLS regression for the Australian stock market sectoral performance during the COVID-19 pandemic from 26 January 2020 to 20 July 2020. The dependent variables are 17 the sectoral stock index returns ($RET_{i,t}$) are regressed on two independent variables and two control variables. One-day lagged values of all independent and control variables are used in the models. t-statistics are reported in parentheses under their associated coefficients, **, and * indicate significance at the 1% and 5%, respectively.

3.2. Result Summary and Discussion

All in all, the subsection summarises the results of overall Australian financial market performance during the COVID-19 pandemic in Table 6. All Australian market-cap indices performed abysmally during the examined period regardless of the market capitalizations. For the sectoral analysis, ten of seventeen Australian sectors are severely distressed by the growth in COVID-19 confirmed case. The ten sectors are Technology, A-REIT, Consumer Discretionary, Industrial, Information Technology, Materials, Metals and Mining, Utilities, Resources, and Energy.

Table 6. Result summary.

Significantly Negative Impact		Negative Impact	No Significant Impact
All market-cap indices	Materials [a]	Health Care [a]	Gold
Technology	Metals and Mining [a]	Financial excluding REIT	Consumer Staples
A-REIT [b]	Resources [a]	Banks	Communication services
Consumer Discretionary	Utilities		Real Estate [b]
Industrials [a]	Energy		
Information Technology			

[a] Sectors are affected by the government interventions (using the GRI index).
[b] Sectors are exposed to the AUD/USD rate fluctuations.

Note: This table summarises the results from three regression models examining the Australian stock market performance during the COVID-19 pandemic from 26 January 2020 to 20 July 2020. The levels of impact of COVID on the sectors are classified into three groups according to the results of three models in Table 5: significantly negative impact (0.01 significance level), negative impact (0.05 significance level), no significant impact (statistically insignificant).

Unsurprisingly, the Gold index seems not to be significantly affected by the pandemic. This is consistent with studies of Akhtaruzzaman et al. (2021) and Ji et al. (2020), which show Gold index remains robust during crisis periods as it is considered a haven asset. Remarkably, Consumer Staples, and Communicating Services, and Real Estate are also the group of least suffered industries in Australia. Consumer Staples did not suffer much due to their essential and irreplaceable nature even at the peak of the coronavirus outbreak. The consequences of travel restrictions and the social distancing caused by the pandemic have motivated the development of online connection services. Additionally, the Federal and State Governments spent a significant amount of money on advertising to inform the public on how to stop the spread of the virus. Therefore, the communication service industry still has great potentials to develop in the complicated pandemic situation. Likewise, the Federal Government introduced the *First Home Loan Deposit Scheme* in January 2020 and *Home Builder Grant* in June 2020. State and Territory Governments issued various land tax and rent relief measures to help commercial landlords and tenants, which is reported in Table 7. Together, these policies may have helped to relieve the downward pressure on the Real Estate sector.

All Australian sectors are not exposed to the crude oil price risks during the pandemic. Previous findings suggest that sectors which heavily consume oil or are directly associated with oil production are significantly exposed to oil price risk (Elyasiani et al. 2011; Akhtaruzzaman et al. 2020). In terms of the exposures to AUD/USD rate fluctuations, Real estate investment trusts (A-REITs) and mortgage REITs, and Real Estate sectors show positive associations. This result is incomparable to those findings of (Hiang Liow et al. 2006) and Ngo (2017), which suggest that REIT and Real Estate returns are adversely influenced by the increase of the home currency. However, our study is conducted in the COVID-19 period, which negatively crashed down the foreign consumers' demand, regardless of the depreciation of the Australian dollar against other currencies. In the situation of international travel restrictions and financial turmoil, the loss of international investors means lower cash flows and returns for REIT and Real Estate sectors. Further, a weakening Australian dollar also poses a significant risk the overseas landlords as it diminishes their rental revenue yield. Hence, the depreciation of the Australian dollar during the COVID-19 pandemic cannot be the driving force to improve returns on investment in the real estate and rental sectors.

Table 7. Summary of the Australian government interventions during the COVID-19 pandemic.

Scheme	Description	Date	Sectors
First Home Loan Deposit Scheme	The package allows first home buyer to purchase a home with a deposit as small as 5% without needing to pay lender mortgage insurance. It guarantees to a participating lender up to 15 percent of the value of the property purchased that is financed by an eligible first home buyer's home loan. *Source: www.nhfic.gov.au/what-we-do/fhlds/ (accessed on 15 January 2021)*	1 January 2020	Real Estate, Financial ex-REIT, Banks
Home Builder Grant	It is tax-free grant program to help the residential construction market to get through the Coronavirus pandemic. It will provide eligible owner-occupiers (including first home buyers) with a grant of $25,000 to build a new home or substantially renovate an existing home. *Source: www.sro.vic.gov.au/homebuilder-grant-guidelines (accessed on 15 January 2021)*	4 June 2020	Real Estate, Financial ex-REIT, Banks
COVID-19: Land tax relief for landowners	States and territory governments have announced a range of land tax measures: • Victoria: up to 50% reduction in land tax • New South Wales: 25% reduction in 2020 land tax for landlords of commercial and residential properties 25% • South Australia: up to 25% reduction in 2020 land tax • Western Australia: up to 25% reduction in 2020 land tax and interest-free payment arrangement and waive for late payment penalties. • Tasmania: deferral or payment arrangement for land tax in case of financial hardship • Queensland: up to 25% reduction in 2020 land tax • ACT: Land tax credit • Northern Territory: No land tax *Source: www.pitcher.com.au/land-tax-relief-landlords/ (accessed on 15 January 2021)*	13 April 2020	Real Estate
Coronavirus Small and Medium Enterprises (SME) Guarantee Scheme	This package provides up to $40 billions of lending to SMEs by guaranteeing 50 per cent of new loans issued by participating lenders. It also supports lenders' ability to provide credit and ensure that SMEs benefit from low interest rates. *Source: treasury.gov.au/coronavirus/coronavirus-sme-guarantee-scheme (accessed on 15 January 2021)*	23 March 2020 to 30 September 2020	Financial ex-REIT, Banks
Relief for commercial tenants	It includes temporary hold on evictions and a mandatory code of conduct for commercial tenancies to support small and medium sized enterprises (SMEs) affected by coronavirus. *Source: www.business.gov.au/risk-management/emergency-management/coronavirus-information-and-support-for-business/relief-for-commercial-tenancies (accessed on 15 January 2021)*	29 March 2020	Real Estate
Coronavirus (COVID-19): National Health Plan resources	The $2.4 billion package provides unprecedented support across primary care, aged care, hospitals, research and the national medical stockpile. It also includes $30 million for the Communication sector to support a national communications campaign across all media. *Source: www.health.gov.au/resources/collections/coronavirus-covid-19-national-health-plan-resources (accessed on 15 January 2021)*	11 March 2020	Healthcare, Communication

Note: This table presents the economic interventions of Australian authorities during the COVID-19 pandemic (From January 2020 to September 2020). The information is summarised from various the Australian government websites.

Three industries of Health Care, Financial excluding REIT, and Banks still experience negative impact from the COVID-19 but at lower levels. This can be plausibly explained by various policies taken by the Australian Federal Government just before and after the outbreak struct. All detailed information about the government policies is available in Table 7. The heavy spending on medical equipment and research ($2.4 billion in March 2020) and pledging of further spending on healthcare may instil confidence in investors to invest more in the Healthcare sector. Banks and Financial excluding REIT may also stand to benefit from actions taken by the government to prop up the housing market as people are likely to take out more loans to purchase or build houses. The Australian Government also introduced the *Coronavirus Small and Medium Enterprises (SME) Guarantee Scheme* which enhances lenders' ability to issue new loans for small and medium businesses by guaranteeing 50 percent (up to $40 billion in total) of these new loans.

Our findings indicate that the influences of daily government interventions were only significant for Health Care, Industrials, Materials, Metals and Mining, and Resources sectors. However, the effectiveness of these policies on the stock returns measured by the GRI index is not well materialized. Industries that fare better are those of haven assets, household staples, and sectors that receive significant financial support from the government. Despite showing some positive responses to the government actions to stop the spread of COVID-19, Industrials, Materials, Mining, and Resource indices still perform very poorly. The justification for these mixed results can be viewed from different angles. On one hand, non-financial interventions designed to reduce infected cases may fasten the reopening of borders, which is crucial for these four industries as their main business activities involve interstates travel of the workforce and exports. This may have sustained a level of investor confidence in the viability of these sectors. On the other hand, the unpredictability of this pandemic has put these industries on hold indefinitely, which causes their revenues to plummet considerably during our examined period. Hence, the optimism of resuming business alone cannot enhance the overall performance of those industries when new revenues are not being generated. In summary, measures taken to curb the spread of the virus can only partially improve investor confidence, and financial supports from governments are more crucial in enhancing the sectoral performance during the pandemic.

The overwhelming positive effects of the government stimulus package on the financial market raise competing implications for policy development during global crises. On one hand, the success of government financial supports is undeniable; however, it comes at an enormous cost Figure 2 graphically presents the data for Expenses and Fiscal Balance of the Australian Federal Government from 2019 to 2020, which is obtained from the Australian Bureau of Statistics (ABS). The government spending for each of the second and third quarter of 2020 is about $77 billion (equate to approximately 44%) higher than the average quarterly spending ($176 billion) of the previous four quarters. The average ratio of consolidated Fiscal Balance of the Australian Government over the nominal GDP from 2003 to 2020 is only −2.2% according to ABS reports. However, the recorded deficit ratio is approximate 7.27% in the third quarter of 2020. The fiscal deficit reached an all-time high of 11.47% in the last quarter of 2020, which was relatively explained by the financial provisions during the COVID-19 outbreak. The finance deficit can eventually lead to either higher taxes or inflation and punitive economic austerity.

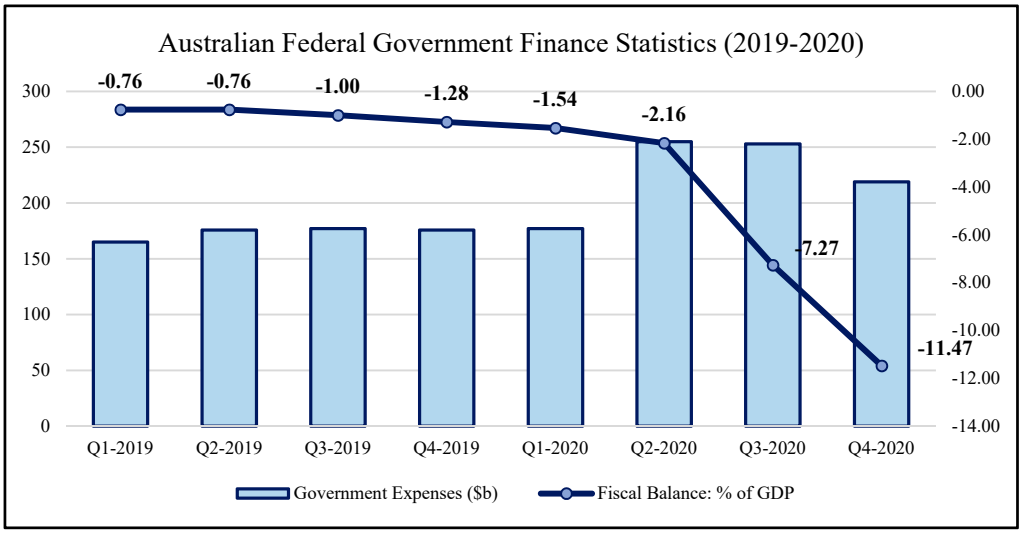


Figure 2. Expenses and fiscal balance of the Australian Federal Government.

4. Conclusions

This study examines the impacts of COVID-19 on the Australian financial market by considering the adverse impacts of twenty stock market indices over the period 26 January–20 July 2020 by considering all information of COVID-19 and government responses. We comprehensively explore the erratic influences of the pandemic on the sectoral performance of the Australian economy. Encompassing the rich literature in this field, we find that this pandemic interacts deleteriously with stock index returns for all levels of market capitalization. Contemplating the authority interventions, foreign exchange, and the oil price risk, this paper sheds light on the overall opposing interactions between how different industries performed. We demonstrate that sixteen out of twenty sectoral indices in Australia are significantly stricken by the increase in COVID-19 confirmed cases. The four least deteriorated industries during the pandemic are due to their unique characteristics and the stimulus packages from the government. Further, the financial supports from the Australian government were relatively more effective in enhancing the financial market performance compared to other measures.

Our analysis also proposes that the Australian equity market is rationally distinct to crude oil price volatilities during the COVID-19 outbreak. As heavy oil consumers or oil producers are significantly exposed to the oil price risk, further studies need to dissect the sub-sectors to clearly determine the levels of this exposure. Our findings also suggest that depreciation of the Australian dollar cannot improve the performance of real estate-related sectors during the phase of international travel being constricted and financial chaos. Due to data constraint, the study levered index data as a proxy to implement the analysis. The limitation of this study is identified as potential bias arising from the utilization of aggregate indices. Since, this will not allow a thorough measurement of the pandemic's impacts on sub-sectors as compared to sectoral-portfolio data, which is suggested as a more sufficient alternative for the latter research. Despite the inherent limitations, this study also opens up paths for future studies on the ongoing pandemic while contributing to the blooming literature on the collisions of COVID-19 on the financial market. From the starting point of studies in the impacts of this pandemic on the financial market, the short-term measures and long-term resilience should be premeditated to assist the overall economic recovery.

Author Contributions: Conceptualization, N.H.; methodology, N.H.; software, N.H.; validation, N.H., D.N., and A.D.; formal analysis, N.H., D.N., and A.D.; investigation, N.H., D.N., and A.D.; data curation, N.H.; writing—original draft preparation, N.H., D.N., and A.D.; writing—review and editing, N.H., D.N., and A.D.; visualization, N.H., D.N., and A.D. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

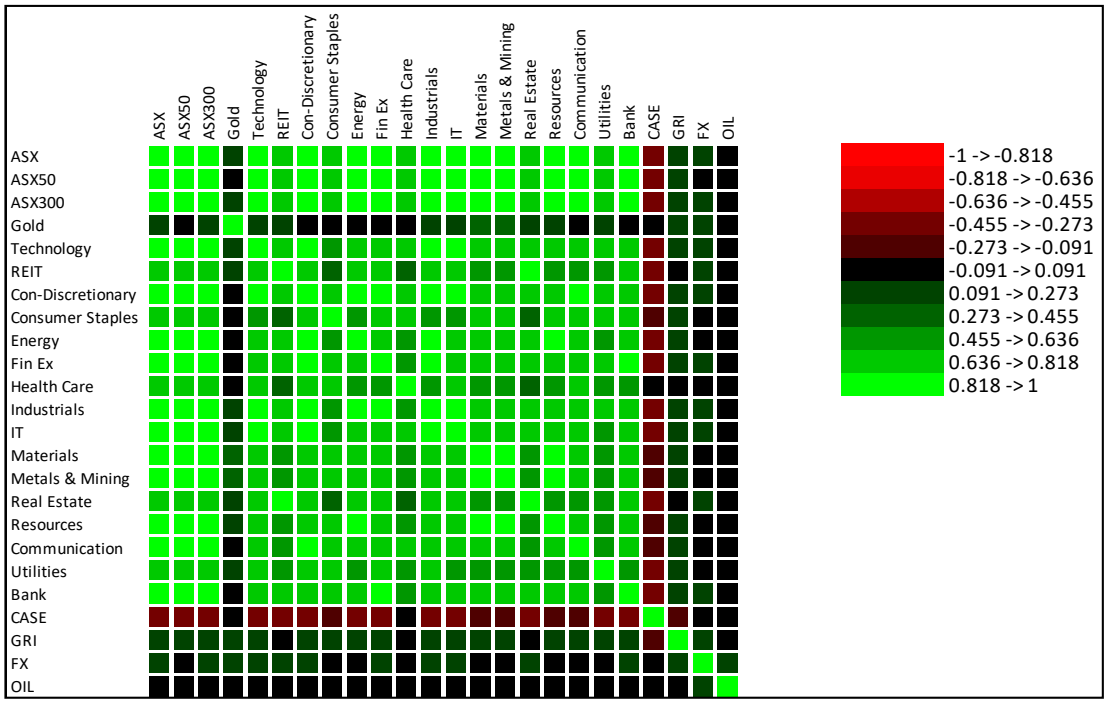
Appendix A. Variables

In Australian stock market, all ASX listed entities are reclassified according to GICS meet the global standard. GICS is cooperatively established by MSCI and S&P Dow Jones to systematize the international industry descriptions. The detailed classifications of all are the ASX website. The information for all dependent variables is summarised by authors from the S&P Dow Jones Indices Database and the ASX website.

Dependent Variable		
Market-Cap Index	**Description**	**Source**
ASX ALL ORDINARIES	The index represents the 500 largest companies in the Australian equities market. Index constituents are drawn from eligible companies listed on the Australian Securities Exchange. Liquidity is not considered as criteria for inclusion, except for foreign domiciled companies.	S&P Dow Jones Indices Database
S&P/ASX 50	The S&P/ASX 50 is Australia's most prominent large-cap equity index and is designed to represent 50 of the largest and most liquid stocks listed on the ASX by float-adjusted market capitalization.	S&P Dow Jones Indices Database
S&P/ASX 300	The S&P/ASX 300 is designed to provide investors with broader exposure to the Australian equity market. The index is liquid and float-adjusted, and it measures up to 300 of Australia's largest securities by float-adjusted market capitalization. The S&P/ASX 300 index covers the large-cap, mid-cap, and small-cap components of the S&P/ASX Index Series. This index is designed to address investment managers' needs to benchmark against a broad opportunity set characterized by sufficient size and liquidity.	S&P Dow Jones Indices Database
Sectoral Index		
S&P/ASX All Ordinaries Gold Index	S&P/ASX All Ordinaries Gold Index includes companies in the gold sub-industry of the All Ordinaries Index. The index includes a wide range of companies within the GICS® gold sub-industry, and therefore, serves as an ideal broad market indicator for the gold industry.	S&P Dow Jones Indices Database
S&P/ASX All Technology Index	The S&P/ASX All Technology Index is designed to be a comprehensive measure of technology-oriented companies listed on the ASX that meet certain investability constraints. It includes companies classified under the GICS® Information Technology sector, as well as additional relevant sub-industries in other sectors.	S&P Dow Jones Indices Database
S&P/ASX 300 A-REIT	A sector subindex of the S&P/ASX 300, this index tracks the performance of Australian real estate investment trusts (A-REITs) and mortgage REITs.	S&P Dow Jones Indices Database
S&P/ASX 300 Consumer Discretionary	The S&P/ASX 300 Consumer Discretionary provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® consumer discretionary sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Consumer Staples	The S&P/ASX 300 Consumer Staples provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® consumer staples sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Energy	The S&P/ASX 300 Energy provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® energy sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Financials excluding A-REITs Index	A sector sub-index of the S&P/ASX 300, this index contains companies involved in activities such as banking, mortgage finance, consumer finance, specialized finance, investment banking and brokerage, asset management and custody, corporate lending, insurance, and financial investment, excluding Australian real estate investments trusts (A-REITs), mortgage REITs, equity REITs, and real estate management & development companies.	S&P Dow Jones Indices Database
S&P/ASX 300 Health Care	The S&P/ASX 300 Health Care provides investors with benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® health care sector and sub-industries	S&P Dow Jones Indices Database
S&P/ASX 300 Industrials	The S&P/ASX 300 Industrials provides investors with sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® industrials sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Information Technology	The S&P/ASX 300 Information Technology provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® information technology sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Materials	The S&P/ASX 300 Materials provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® materials sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Metals and Mining	The S&P/ASX 300 Metals and Mining Index is based on the S&P/ASX 300 Index, and is comprised of companies that are classified as being in the Metals and Mining industry1. It includes producers of aluminium, gold, steel, precious metals and minerals and also diversified metals and minerals.	S&P Dow Jones Indices Database

Dependent Variable		
Market-Cap Index	**Description**	**Source**
S&P/ASX 300 Real Estate	The S&P/ASX 300 Real Estate comprises stocks included in the S&P/ASX 300 that are classified as members of the GICS® real estate sector.	S&P Dow Jones Indices Database
S&P/ASX 300 Resources	A sector sub-index of the S&P/ASX 300 Index, this index provides investors with a sector exposure to the Resources sector of the Australian equity market as classified as members of the GICS® resources sector. Resources are defined as companies classified in the Energy sector (GICS® Tier 1), as well as companies classified in the Metals and Mining Industry (GICS® Tier 3)	S&P Dow Jones Indices Database
S&P/ASX 300 Communication Services	The S&P/ASX 300 Communication Services provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® communication services sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Utilities	The S&P/ASX 300 Utilities provides investors with a sector benchmark that reflects those companies included in the S&P/ASX 300 that are classified as members of the GICS® utilities sector and sub-industries.	S&P Dow Jones Indices Database
S&P/ASX 300 Banks	The S&P/ASX 300 Banks (Industry) provides investors with a benchmark that is designed to measure constituents in the S&P/ASX 200 that are classified as members of the GICS® Banks industry and sub-industries.	S&P Dow Jones Indices Database
Independent Variable		
Daily growth in COVID-19 confirmed cases	The growth rate in coronavirus-related data is calculated from the Coronavirus Pandemic (COVID-19) data on daily basic.	Our World in Data: https://ourworldindata.org/coronavirus-data
COVID-19 Government Response Index	Oxford COVID-19 Government Response Tracker (OxCGRT), systematically collects information on several different common policy responses that governments have taken to respond to the pandemic on 17 indicators such as school closures and travel restrictions. The higher value, the more references to levels of pandemic in the country.	Blavatnik School of Government database, University of Oxford
Control Variables		
AUD/USD exchange rate	Daily exchange rate between Australian dollar and U.S dollar on daily basic.	Investing Database
Brent crude oil prices per barrel (USD)	Brent crude oil prices in USD per barrel on daily basic.	Investing Database

Appendix B. Graphical Correlation Matrix



Notes

[1] The data was retrieved on 27th March 2021 from the World Health Organization (WHO): https://covid19.who.int/ (accessed on 27 March 2021).

[2] The data was retrieved from the Mar 2020 Issue—Australian National Accounts: National Income, Expenditure and Product on the Australian Bureau of Statistics (ABS) website.

[3] The data for GRI is not stationary as the index increases overtime during the pandemic and gradually falls according to the updated government policies.

References

Akhtaruzzaman, Md, Sabri Boubaker, Mardy Chiah, and Angel Zhong. 2020. COVID−19 and Oil Price Risk Exposure. *Finance Research Letters* 101882. [CrossRef]

Akhtaruzzaman, Md, Sabri Boubaker, and Ahmet Sensoy. 2021. Financial Contagion during COVID–19 Crisis. *Finance Research Letters* 38: 101604. [CrossRef] [PubMed]

Banerji, Gunjan. 2020. Why Did Stock Markets Rebound From Covid in Record Time? Here Are Five Reasons. *Wall Street Journal*, September 15, sec. Markets. Available online: https://www.wsj.com/articles/why-did-stock-markets-rebound-from-covid-in-record-time-here-are-five-reasons-11600182704 (accessed on 20 January 2021).

Chen, Mei-Ping, Chien-Chiang Lee, Yu-Hui Lin, and Wen-Yi Chen. 2018. Did the S.A.R.S. Epidemic Weaken the Integration of Asian Stock Markets? Evidence from Smooth Time-Varying Cointegration Analysis. *Economic Research-Ekonomska Istraživanja* 31: 908–26. [CrossRef]

Choudhry, Taufiq. 2005. September 11 and Time-Varying Beta of United States Companies. *Applied Financial Economics* 15: 1227–42. [CrossRef]

Corbet, Shaen, Constantin Gurdgiev, and Andrew Meegan. 2018. Long-Term Stock Market Volatility and the Influence of Terrorist Attacks in Europe. *The Quarterly Review of Economics and Finance* 68: 118–31. [CrossRef]

Del Giudice, Alfonso, and Andrea Paltrinieri. 2017. The Impact of the Arab Spring and the Ebola Outbreak on African Equity Mutual Fund Investor Decisions. *Research in International Business and Finance* 41: 600–12. [CrossRef]

Elyasiani, Elyas, Iqbal Mansur, and Babatunde Odusami. 2011. Oil Price Shocks and Industry Stock Returns. *Energy Economics* 33: 966–74. [CrossRef]

Guo, Mengmeng, Yicheng Kuai, and Xiaoyan Liu. 2020. Stock Market Response to Environmental Policies: Evidence from Heavily Polluting Firms in China. *Economic Modelling* 86: 306–16. [CrossRef]

Hiang Liow, Kim, Muhammad Faishal Ibrahim, and Qiong Huang. 2006. Macroeconomic Risk Influences on the Property Stock Market. " *Journal of Property Investment & Finance* 24: 295–323. [CrossRef]

Ichev, Riste, and Matej Marinč. 2018. Stock Prices and Geographic Proximity of Information: Evidence from the Ebola Outbreak. *International Review of Financial Analysis* 56: 153–66. [CrossRef]

Ilzetzki, Ethan, Carmen Reinhart, and Kenneth Rogoff. 2020. *Will the Secular Decline In Exchange Rate and Inflation Volatility Survive COVID-19?* w28108. Cambridge: National Bureau of Economic Research. [CrossRef]

Ji, Qiang, Dayong Zhang, and Yuqian Zhao. 2020. Searching for Safe-Haven Assets during the COVID-19 Pandemic. *International Review of Financial Analysis* 71: 101526. [CrossRef]

Karolyi, George Andrew, and Rodolfo Martell. 2006. Terrorism and the Stock Market. *SSRN Electronic Journal*. [CrossRef]

Kim, Harold Y, and Jianping P Mei. 2001. What Makes the Stock Market Jump? An Analysis of Political Risk on Hong Kong Stock Returns. *Journal of International Money and Finance* 20: 1003–16. [CrossRef]

Kowalewski, Oskar, and Piotr Śpiewanowski. 2020. Stock Market Response to Potash Mine Disasters. *Journal of Commodity Markets* 20: 100124. [CrossRef]

Liu, Xiaohui, and Peter Sinclair. 2008. Does the Linkage between Stock Market Performance and Economic Growth Vary across Greater China? *Applied Economics Letters* 15: 505–8. [CrossRef]

Ngo, Thanh. 2017. "Exchange Rate Exposure of REITs". *The Quarterly Review of Economics and Finance* 64: 249–58. [CrossRef]

Okorie, David Iheke, and Boqiang Lin. 2021. Stock Markets and the COVID-19 Fractal Contagion Effects. *Finance Research Letters* 38: 101640. [CrossRef] [PubMed]

Peckham, Robert. 2013. Economies of Contagion: Financial Crisis and Pandemic. *Economy and Society* 42: 226–48. [CrossRef]

Shanaev, Savva, and Binam Ghimire. 2019. Is All Politics Local? Regional Political Risk in Russia and the Panel of Stock Returns. *Journal of Behavioral and Experimental Finance* 21: 70–82. [CrossRef]

Vuchelen, Jef. 2003. Electoral Systems and the Effects of Political Events on the Stock Market: The Belgian Case. *Economics & Politics* 15: 85–102. [CrossRef]

Wachter, Jessica A. 2013. Can Time-Varying Risk of Rare Disasters Explain Aggregate Stock Market Volatility? *The Journal of Finance* 68: 987–1035. [CrossRef]

Wang, Lin, and Ali M Kutan. 2013. The Impact of Natural Disasters on Stock Markets: Evidence from Japan and the US. *Comparative Economic Studies* 55: 672–86. [CrossRef]

Zhang, Dayong, Min Hu, and Qiang Ji. 2020. Financial Markets under the Global Pandemic of COVID-19. *Finance Research Letters* 36: 101528. [CrossRef] [PubMed]