

MARKET RETURNS UNDER VOLATILITY, LIQUIDITY, INFORMATION ASYMMETRY, DISPOSITION EFFECT DURING COVID

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ABSTRACT

Covid-19 has affected financial and stock markets globally. It is one of the biggest natural disasters in known history. It has impacted stock markets adversely. This paper examines the moderating effect of volatility, liquidity, information asymmetry, and disposition effect on stock returns in wake of covid-19 pandemic. Moderated OLS regression technique is used to run the analysis in STATA. The results suggest that covid-19 total reported cases impact returns significantly while volatility and information asymmetry also have a significant effect on returns and strengthen the impact of covid-19 on returns. The disposition effect impacts return negatively and significantly and strengthens the impact of covid-19 total cases on returns while covid-19 total deaths do not have any significant impact on returns and no moderation is proved as such. This study gives insight to managers and investors in emerging markets to consider major shifts in the market during unpredictable events like covid-19. On the academic level, this study provides a stepping-stone for understanding markets better during black swan events (Like covid). The findings are largely in line with the earlier literature on natural disasters.

Keywords: Liquidity, Volatility, Disposition Effect, Returns, Information Asymmetry, Covid-19

INTRODUCTION

Covid-19 has proven to be one of the most devastating pandemics in known human history. It has not only claimed hundreds of thousands of human lives but has also severely damaged the world economy. Pandemics and worldwide outbreaks have proven to have negatively affected asset returns and the impact of these natural disasters can be seen as far as 40 years after the event has passed as investigated (Taylor, 2020). Covid-19 has also put the world to a standstill in just a matter of a few months. Financial markets are one of the hardest-hit sectors in Corona pandemic. As the countries imposed lockdowns to contain corona outbreak, almost all the major stock markets in the world went down by March 2020 (Zhang et al., 2020). In turn, stock market returns are specifically negatively affected by the Coronavirus. Investors are apparently reacting to not only increasing corona cases but also to the growing number of deaths due to corona as evidenced by the analysis by (Ashraf, 2020b).

As the returns are dipping, certain other market factors are also showing significant swings. Market volatility is one of the many important factors which need attention. Volatility swings occur due to many reasons the leading of which is policy news (Baker et al., 2019). Since the covid-19 outbreak, major economies have announced many important policies and the impacts of this news can be seen in market volatility. Market volatility is on the rise in the world markets as an after-effect of corona outbreak (Zhang et al., 2020).

Volatility and liquidity co-exist. Extreme events also impact market liquidity. (Ruenzi et al., 2020) explain that when market liquidity is low, stock returns are also low. This reflects that extreme events like the ongoing Corona pandemic have not only disturbed the volatility cycle but have also upset the market liquidity. Research is needed to further understand the specific impact of Coronavirus on market liquidity. One of the objectives of this study is to learn the behavior of market liquidity during the Covid-19 pandemic.

Another important factor that prevails in the stock markets is information asymmetry. Informational differences and imbalances are not new and it is quite logical to say that this imbalance

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aggrieves during major setbacks. Asymmetry in the markets is a sign of market inefficiency and (Mensi et al., 2020) state that markets has become more inefficient during Covid-19 period which shows asymmetry in the markets. Information asymmetry indicates that bad news affects stock returns more than good news and investor largely feel under confident in tough or uncertain conditions (Omokehinde et al., 2017). Currently, the market situation is particularly not good due to covid-19 and a lot of information asymmetry can be observed in stock returns, which is why this study endeavors to investigate the impact of information asymmetry on stock returns.

As information asymmetry shows the impact of good or bad news and investors' subsequent reaction which is captured in stock returns, investors exhibit other behavioral biases too. Investors tend not to invest, show fear of loss, and risk aversion when market conditions are not favorable. Investors like gains and dislike capital losses; this phenomenon is known as disposition effect (Rau, 2014).

Khan, (2020) shows that disposition effect affects investment decisions. Disposition effect is not uniform but it varies with the market conditions (Lee et al., 2013). Markets are bullish, bearish or neutral according to the level of business which totally depends upon external factors. In the wake of Covid-19, markets are actually facing extreme ups and downs which provide a fertile ground to study the effects of disposition effect on stock returns during Corona pandemic which is one of the objectives of this study.

Theoretical background

Investors are not rational; this much has been established through behavioral finance because investors choose, they have preferences and they will always avoid loss. (Tversky & Kahneman, 1992) in their famous cumulative prospect theory state that individual choices are orderly but not rational in the competitive environment. Also, people tend to avoid risk and seek only gains in events of low probability. When looked at through covid-19 scenario, it would be interesting to see how investors behave in this situation because of the uncertainty this whole covid-19 fiasco induces in the markets. Speaking of uncertainty, (Gurevich et al., 2009) state that investors' attitude towards stocks varies depending upon many factors one of which is trading volume. This implies that low or high trading volume is an indication of investors' preference to buy or sell. Investors show disposition effect when they do not want to trade their losing stocks, on when they are avoiding risk of loss. (Wen et al., 2014) speak about inconsistent risk-return relationship with respect to investors' choices and state that investors' current risk preferences are defined by last period's risk preferences and disturbances. This indicates that investment decisions in the beginning and in the middle of an event can be very different. (Li & Yang, 2013) state that disposition effect can be very well explained by investors' more trading in rising markets and less trading in falling markets. Overall, prospect theory explains individual preferences for investment with respect to different market conditions. Market quality is defined by liquidity, volatility and information in the market, and investor preferences also change and are changed due to these. (Pasquariello, 2014) studies these market factors under prospect theory and states that investor behavior has significant impact on these too. There is much more to look into after the novel corona pandemic as markets have changed to a great extent. A fresh insight is required to see how stock returns are dealing with the ongoing and persistent Covid-19 development.

Keeping in mind the above, this study focuses on finding the impact that Covid-19 is exerting on stock market returns. To do so, this study wants to examine the moderating role of volatility, liquidity and information asymmetry and disposition effect on returns.

Contribution

This study contributes to the ongoing Covid-19 research in two ways. First, it incorporates the three major market factors namely, volatility, liquidity and information asymmetry and studies their impact in the wake of covid-19 exclusively. Secondly, this study focuses on Disposition effect and stock market returns under disposition effect and contributes to the ongoing covid-19 research in context of behavioral biases. The findings can be helpful to policy makers and investors and other market players especially because this research considers the post Covid-19 scenario.

REVIEW OF LITERATURE

Covid-19 and stock Returns

Finance markets are not only affected negatively by financial crises but the impact is also great in case of naturally occurring events. (Wang & Kutan, 2013) studied this and state that almost all stock markets are greatly affected by natural disasters due to the increased risk. The effect of natural disasters is reflected in stock prices and subsequent lower returns. Covid-19 is one of the biggest shocks to the

financial markets in the known human history (Baker et al., 2020). Stock returns on both market levels as well as on company level have been greatly affected. (Mukhopadhyay et al., 2020) studied the impact of covid-19 on Japanese and American stocks and state that both stock markets are facing low stock returns and a big shock despite of the fact that Japan is not as severely hit as US. This negative impact is mainly due to the companies with Chinese exposure and US exposure. (Mazur et al., 2020) state that the impact of Covid-19 shock has been greatest in March 2020. This shock has mainly been devastating for the stocks of some sectors namely; real estate, hospitality, entertainment and petroleum as the returns in these sectors have fallen drastically but some sectors have not shown any significant decrease in returns. Further evidence of Covid-19 affecting stock market returns negatively is presented by (Corbet, Hou, et al., 2020; Huo & Qiu, 2020; Okorie & Lin, 2020). Adding to this, (Cepoi, 2020) states that returns have particularly fallen for middle and superior stocks, the inferior stocks' returns have not changed much. These findings are confirmed by (Ali et al., 2020) who further add that stock returns are especially hurt after covid-19 was declared a pandemic. (Al-Awadhi et al., 2020; Ashraf, 2020b) state that Covid-19 has affected stock returns negatively in two ways; the news of new cases and the news of Covid-deaths have both decreased the stock returns and hence become significant variables. (Ashraf, 2020a) also confirms the findings that Covid 19 has affected stock markets negatively and strongly due to which, the stock returns have suffered a decline.

Based on the literature reviewed above, this study establishes the following hypothesis

H1: Covid-19 has a significant negative impact on stock market returns.

Covid-19, Volatility, and Returns

It is evident from previous literature that extreme events inject increased volatility in stock markets which becomes a leading cause for lower prices (Mnasri & Nechi, 2016). (Liu & Pan, 2020) state that market volatility is a technical variable that has the ability to predict future returns. Thus volatility has impact on stock returns. (Kennedy & Nourizad, 2016) investigated volatility and return relationship and state that negative returns and volatility are directly related, i.e. the more a market is volatile the more returns will fall and vice versa. (Dutta, 2017) conclude that returns are highly sensitive to market shocks and these shocks actually increase volatility. As stated earlier, Covid-19 has induced one of the greatest shocks in the financial markets and has negatively affected the overall stock returns. The negative reaction of Covid-19 on returns is induced by major market factors namely, volatility, liquidity and Information Asymmetry. (Ashraf, 2020a) states that the pandemic period has witnessed high volatility in stock markets which in turn impacted returns negatively. (Mazur et al., 2020; Salisu et al., 2020) investigated the covid-19 scenario and state that this unprecedented event has increased market volatility and due to this high volatility, returns have been negatively impacted.

Covid-19, Liquidity and Returns

Liquidity and returns go hand in hand. Market liquidity in indication of easy trade but research also suggests that liquidity decreases during periods of low market returns (Atilgan, Ozgur Demirtas, & Gunaydin, 2016) and (Kinader & Wagner, 2017). Thus liquidity and returns are positively related. (Brana & Prat, 2016; Broman, 2016; Febi et al., 2018; French & Taborda, 2018) suggest that high liquidity is correlated with high returns or it can be said that high liquidity is indication that returns will be higher. (Dinh, 2017; Sadaqat & Anwar Butt, 2017) liquidity has a highly significant impact on returns. The impact of illiquidity is strong on negative returns than on positive returns as put forth by (Xu et al., 2019). Their research shows that when liquidity is low, returns are negative and the impact is much greater than the high liquidity-high return relationship. This gives the hint of risk averse attitude in the market. (Nguyen et al., 2020) talk about investor attitude and state that liquidity and higher returns are positively related to each other. This is an investor intense market has both higher liquidity and higher returns. (Ruenzi et al., 2020) state that during extreme events, when market liquidity is lower, returns on stocks are also lower. This indicates that extreme events can exert significant pressure on stock markets.

Covid-19, Information Asymmetry and Returns

Information asymmetry is another important stock market phenomenon which affects returns. lower information asymmetry invites more investment and vice versa (Jin et al., 2019). This indicates that information asymmetry affects stock prices and subsequent returns in both positive and negative ways. Asymmetric information can be induced in the market in many ways from market conditions to internet & media (Gao et al., 2018). Information asymmetry affects stock returns negatively and significantly when volatility is high as put by (Zhu et al., 2017). Stock prices and subsequent abnormal returns are

significantly related to the information asymmetry when there is a bad news, but the impact of good news is also significant on abnormal returns (Omokehinde et al., 2017; Wu, 2019; Yang et al., 2017). The stock returns are particularly affected when the market is bearish as compared to bullish (Xiao et al., 2018). So another perspective is that market state contributes into the information asymmetry-return relationship. Covid-19 has induced much information in the markets which is reflected in the stock prices and returns. Information flow due to lockdown and severity of the situation was evident in the early phase of Covid-19 in Chinese stock market but not in any other country as put forth by (Corbet, Greg, et al., 2020; Yarovaya et al., 2020). Since Covid-19 is injecting information asymmetry in stock markets, it is necessary to see what impact does this kind of asymmetry has on stock returns (positive or negative).

Based on the literature cited above, following hypotheses are made;

H2a: Volatility has a negative impact on stock returns.

H2b: Volatility Moderates the relationship between Covid-19 and stock market returns such that when there is high volatility, stock returns are low.

H3a: liquidity has a positive impact on stock returns.

H3b: Liquidity Moderates the relationship between Covid-19 and Stock returns such that when there is high (low) liquidity, stock returns are High (low).

H4a: Information asymmetry has a negative impact on stock returns.

H4b: Information Asymmetry Moderates the Relationship between Covid-19 and Stock returns such that when there is High (low) information asymmetry returns are low (high).

Disposition effect and Returns

Disposition effect is the behavior of investors to sell winning stocks quickly and to hold losing stocks for long. (Farag & Cressy, 2010) indicate that disposition effect can happen due to unobservable factors in the market too. Research suggests that disposition effect is more evident in the trade of stocks than in any other assets (Chang et al., 2016). This behavioral bias is evident in bearish markets more than bullish ones (Lee et al., 2013; Muhl & Talpsepp, 2017) and the effect of disposition of investors is a short term phenomena i.e. it is more visible in short time windows than long time horizons. In the short time horizons, investors with high Disposition effect tend to realize lower returns (Effect, 2014; Sarmiento et al., 2019). In this regard (Goetzmann & Massa, 2008) investigated disposition prone investors and state that such investors increase their holding due to fear of loss which results in not only drop in returns but also affects volume and volatility. (Ben-david & Hirshleifer, 2012) state that investors with disposition effect tend to sell their stocks only when they had high returns in the past, otherwise not. This indicates that high disposition effect reduces returns because investors fear further losses based on their experience of past returns. (Henderson et al., 2018; Trejos et al., 2018) however are of the view that DE actually results in higher returns than otherwise because investors only sell the winners and keep the losers which gives them only gains and not losses. (Hur & Singh, 2019) also report mixed results and state that In the long run DE has negative relationship with returns, i.e. stronger DE results in lower returns but in short run stronger DE results in higher returns. Thus, the literature has mixed views on how DE affects returns. this study however wants to investigate if investor disposition is actually resulting in lower returns in Covid-19 scenario or not. Keeping in mind the above literature, the following hypothesis is made on moderating role of disposition effect on stock returns;

H5a: Disposition effect has a negative impact on returns.

H5b: Disposition effect negatively moderates the relationship between Covid-19 and stock return such that the impact of covid-19 on returns strengthens.

DATA AND METHODOLOGY

This study centers on Pakistani stock market being an emerging and growing financial market. Pakistan Stock exchange was established in 2016 after merger of Karachi, Lahore and Islamabad stock exchanges. PSX has been termed as Frontier market on sept 8, 2021 by MSCI inc. there are 375 total listed companies in PSX with a total market capitalization of USD 52 billion as of recent statistics.

Daily KSE 100 stock index is taken from Pakistan stock exchange from January 2020 to July 2020. KSE 100 index is major stock index in PSX which track performance of companies largest by market capitalization from each sector, listed in PSX. It has a base value of 1000 as of Nov, 1999.

All the subsequent variables are calculated from the data collected from the daily returns data obtained from PSX. This study wants to check the impact of Covid-19 on stock returns with moderating

effect of important and relevant market-centered variables and relevant behavioral bias. The econometric models take the following form

$$RT_t = \beta_0 + \beta_1 C19_t + \beta_2 MKTV_{it} + \beta_3 C19_t * MKTV_{it} + \varepsilon_0 \quad 1$$

$$RT_t = \beta_0 + \beta_1 C19_t + \beta_2 DE_t + \beta_3 C19_t * DE_{it} + \varepsilon_1 \quad 2$$

Where $MKTV_i$ are the market centered variables namely; realized volatility, liquidity and Information Asymmetry while DE represents Disposition effect. This study takes Disposition effect as the behavioral bias to see its impact in strengthening or weakening of covid-19 crisis. Covid-19 total cases and total death cases are taken from world health organization and covid.govt.pk. Other variables are measured as follows;

Returns

Returns are measured with the standard formula

$$R_t = \ln(p_t/p_{t-1})$$

Where p is the price and t represents time today and t-1 represents immediately previous time.

Realized Volatility

This study follows (Liu & Pan, 2020) in calculating realized volatility from KSE-100 index prices with the following formula;

$$RV_t = \sum_{i=1}^N r_{i,t}^2$$

Liquidity

Hui Heubel Liquidity ratio is the liquidity ratio originally applied to stock markets as mentioned by (Sarr & Tanny Lybek, 2002). HHL ratio is a more detailed measure of liquidity as it considers market factors in greater details. The formula of LLH is as follow;

$$\frac{(P_{max} - P_{min})}{P_{min}} \left[\frac{V}{(S * P)} \right]$$

Information Asymmetry

Bid-Ask spread is one of the most widely used proxy of measuring information asymmetry. In cases where Bid-ask prices are not available, still spread can be calculated through Index data of high and low prices. This measure is proposed by (Abdi & Ranaldo, 2017). The proxy for information asymmetry is calculated as follows

$$\text{Information Asymmetry (Spread)} = 2\sqrt{(E(ct - \eta t)(ct - \eta t + 1))}$$

Where, c is the log of close price at day t and η is the average of high and low price at day t and day t+1 respectively.

Disposition Effect

Present study follows the method used by (Abraham, 2016) and measures Disposition effect as follows;

$$\alpha_{t+1} = \left[\left(\sum_j^n S_+ - \sum_j^n S_- \right) \right] / \left[\left(\sum_j^n S_+ + \sum_j^n S_- \right) \right]$$

Where

α = disposition effect

S_+ = trading volume if index increased the previous day

S_- = trading volume if index decreased the previous day

j = start of the period

n = end of the period

METHODOLOGY

Structural equation modeling (SEM) is used to test the proposed models (The path analysis technique will be used to measures to the extent that the model fits a data set and allowed testing of interrelationships between a range of variables simultaneously). To check and estimate multivariate causal relationships structural equation modeling is a dominant, technique found increasingly in scientific studies. Structure equation modeling is different from other modeling methods as this technique tests the direct and indirect relationship between variables. SEM is powerful in developing and testing the structural hypothesis with both direct and indirect causal effects. Mediation is the most common purpose of SEM, which assumes that a variable can effect directly and indirectly an outcome through another variable (Fan et al., 2016). Therefore, as (Rigdon, 2016) claimed, that three types of variables can be consider in a SEM model: proxies' variables, observed variables and unobserved conceptual variables. Before applying SEM, the basic assumptions of SEM are checked as put forward

by (Hoyle & Gottfredson, 2015; Mueller, 1997) such as normality, missing data, Measurement & Sampling Errors of data and Model Fit Indexes.

STATA software is used for the data analysis. STATA is the best suitable software when it comes to estimation of complex analysis techniques (Hoyle & Gottfredson, 2015). Stata is an easy to use and less tedious software and has the capability to perform complex models analysis easily. STATA is preferred because of its ability to use full information maximum likelihood (FIML) for dealing with the missing data (Williams et al., 2018).

RESULTS AND DISCUSSION

This section represents the results. Table 1 represents descriptive stats of the variables. The statistics in table 1 show the series are well within the acceptable ranges and are normally distributed. Table 2 shows the correlation results. None of the variables are particularly significantly correlated with each other which indicate there is no particular issue of multi-collinearity in the data. After the descriptive statistics, next are given the results of the proposed model.

Table No. 1 Descriptive stats

	Covid DT	Covid CT	RETU RN	Liquidity	Disposition Effect	Realized Volatility	Information Asymmetry
Mean	33.313	231.4	0.0037	1017.0			
	15	68	57	34	19.01046	-3.82E-05	11.17275
Median	27.667	187.2	0.0027	571.77			
	55	385	32	11	18.93723	-9.54E-05	11.14528
Maximum	75.093	515.8	0.0423	10585.			
	28	449	72	2	19.62466	0.002073	11.36333
Minimum			-	-			
	0	0	0.0326	5606.0	18.28932	-0.001906	11.02549
Std. Dev.	27.709	193.0	0.0132	3301.0			
	6	194	57	94	0.355653	0.000796	0.09095
Skewness	0.2192	0.221	0.1061	0.6768			
	54	319	82	23	0.189989	0.255653	0.691674
Kurtosis	1.5468	1.511	4.8520	4.1712			
Jarque-Bera	91	215	01	25	2.205935	4.039458	2.521148
	3.0717	3.216	4.6333	4.2721	1.033228	1.789209	2.857269
Probability	0.2152	0.200	0.0986	0.1181			
	67	233	01	17	0.596537	0.408769	0.239636
Sum	1066.0	7406.	0.1202	32545.			
Sum Sq. Dev.	21	975	17	09	608.3346	-0.001224	357.5279
	23802.	11549	0.0054	3.38E	3.921167	1.96E-05	0.256427
Observations	48	51	48	+08			
	134	134	134	134	134	134	134

Table No. 2 Correlation Analysis

	Covid DT	Covid CT	Return	Liquidity	Disposition effect	Realized Volatility	Info Asymmetry
CovidDT	1	0.999	0.1273		0.305870	0.0951247	-
		521	46	-0.05024	739	27	0.244856051
CovidCT	0.999	1	0.1257		0.296057	0.0954953	-
	521		52	-0.04714	213	99	0.246597666

	0.127	0.125			0.032409	0.0552782	-
Return	346	752	1	0.053807	55	46	0.072193658
	-	-			-	-	
Liquidity	0.050	0.047	0.0538		0.028606	0.1615132	-
	24	14	07	1	765	86	0.073163901
						-	
Disposition effect	0.305	0.296	0.0324			0.2195801	
	871	057	1	-0.02861	1	08	0.104938324
	-	-	-		-		
Realized Volatility	0.095	0.095	0.0552			0.219580	
	12	5	8	-0.16151	108	1	0.262963589
	-	-	-				
Information Asymmetry	0.244	0.246	0.0721		0.104938	0.2629635	
	86	6	9	-0.07316	324	89	1

This study wanted to check the impact of different market and behavioral factors on market returns under covid-19 scenario. To fully understand how each variable is impacting or explaining market returns, moderated OLS is performed. First, the linear regression is performed on the variables. Table 3 shows two results in parallel. First regression analysis is performed on total covid-19 cases in Pakistan with Information Asymmetry, Liquidity, Realized Volatility and Disposition Effect. The Second Regression analysis is performed on total deaths in Pakistan with Information Asymmetry, Liquidity, Realized Volatility and Disposition Effect.

Table 3 presents the linear regression results with Total Covid Cases and Total Covid 19 Deaths in Pakistan. The left-hand side of the table shows that total number of Covid-19 cases does not impact market returns significantly (p-value 0.3024 with positive coefficient sign). Information asymmetry has a strong positive impact on market returns (p – value 0.000) which indicates that due to rising number of cases, information in the market has been disrupted. Liquidity (p-value 0.3742) does not have a significant impact on market returns, though the sign of the coefficient is positive. This could be due to smaller time horizon of the event. Realized volatility has a strong negative impact on market returns. As (Mnasri & Nechi, 2016) stated that extreme events induces more volatility in market which affects market returns. The results show here that during pandemic, PSX has become more volatile which has caused returns to shrink. Disposition effect (p-value= 0.0027), which reflects behavior of investors, shows a strong negative impact on returns. (Lee et al., 2013; Muhl & Talpsepp, 2017) state that disposition effect is more reflective in bearish markets is more visible. The negative impact is more pronounced here due to the fact that investors hold securities due to fear of loss resulting in drop in returns (Goetzmann & Massa, 2008). Value of R^2 (0.7935) suggests that the variables substantially explain changes in returns.

Right hand side of table 4.3 shows the regression results with total covid-19 deaths. The total number of covid-19 related deaths (P-value= 0.4011) do not impact returns impact stock returns. Information asymmetry (p-value 0.000) has a strong positive impact on stock returns. Liquidity (p-value 0.51) is not a significant explainer of market returns. Realized volatility (p-value=-0.0522) is impacts returns negatively at 10% significance level. Disposition effect (P-value= 0.027) has a strong negative impact on returns. Overall, OLS results indicate that covid-19 has significantly increased volatility, information asymmetry and disposition effect.

Table No. 3 Linear Regression Results

Total Covid Cases				Total Covid Deaths			
	Coeff	P-value	R-squared		Coeff	P-value	R-squared
COVCT	5.93E-07	0.3024	0.79355	COVDT	0.00034	0.4011	0.765067
IA	1.320131	0.0000		IA	1.285942	0.0000	
LIQ	0.001397	0.3742		LIQ	0.001301	0.51	
RV	-0.3148	0.0296		RV	-0.3461	0.0522	
DE	-2.97E-11	0.0027		DE	-2.62E-11	0.0272	

But no conclusions are to be drawn on these results alone. The main objective of this study is to see the role that covid-19 has on returns when moderated by these variables. For this reason, the

moderating impact of volatility, liquidity, information asymmetry and disposition effect is checked on return-Covid-19. Table 4 lays out the results.

Table 4 Moderating effects of volatility, Liquidity, Information asymmetry and Disposition effect on Return-Covid 19

Total Covid Cases				Total Covid deaths			
Variables	Coeff	P-values	R-sqd	Variables	Coeff	P-values	R-sqd
	0.00940						
COVCT	8	0.0352		COVDT	8.44E-07	0.5743	
RV	-0.68019	0.006		RV	-0.78180	0.036	
	0.00103				0.00025		0.07568
COVCT*RV	3	0.0496	0.08857	COVDT*RV	8	0.866	5
					-3.81E-		
COVCT	-0.02057	0.0785		COVDT	06	0.8522	
LIQ	0.02573	0.0281		LIQ	0.00675	0.0213	
COVCT*LI			0.10701	COVDT*LI			
Q	0.02416	0.0669	2	Q	5.14E-07	0.8333	0.06113
			0.06028			0.0584	
COVCT	0.00093	0.0235	5	COVDT	1.14E-06	2	
DE	-5.39E11	0.0453	0.02260	DE	8.05E-12	0.073	0.02260
COVCT*DE	6.05E-12	0.0371	1	COVDT*DE	1.33E-15	0.0574	1
	0.33728						
COVCT	8	0.0286		COVDT	-4.09E05	0.8717	
	0.22667						
IA	4	0.0178	0.10869	IA	0.00804	0.5926	0.02303
COVCT*IA	-0.03002	0.0293	1	COVDT*IA	3.81E-06	0.8666	9

Since previous research suggests that any natural disaster has unprecedented and surprising results on financial markets, to fully capture this impact, Covid total cases and covid-19 deaths are treated separately. The lefthand side of table 4.4 shows that total covid-19 cases reported in Pakistan have a positive direct impact on returns when moderated with all variable. This indicates that covid-19 total number of cases are making investors earn abnormal high returns which is contrary to the hypothesis *H1*. But this is quite justifiable as explained by (Worthington & Valadkhani, 2004). Authors say that returns during natural disasters can be both positive and negative. It totally depends on the event itself. But covid-19 death cases show no significant impact on returns at all. Which is again not an expected return but this again is justified. Some natural disasters have positive or even adverse impact on the returns but some disasters seem to pass without any significant impact on market returns (Koerniadi et al., 2012).

Volatility has an individual negative impact on returns which is as expected. It explains that the higher the volatility the lower the returns. The interaction term COVCT*RV is also significant with p-value of 0.0496 which shows that volatility positively moderates this relationship such that the more there is volatility, the more it will increase the impact of covid-19 total cases on returns and the lesser will be the returns. On left hand side of the table, volatility still exhibit individual direct significant impact on returns with p-value of but the interaction term COVDT*RV is not significant which indicates that covid-19 total deaths do not do much on returns even when there is increased volatility in the market.

Liquidity has a direct positive impact on returns with a significant p value of 0.0281 which indicates that liquidity and returns move in the same direction, the results are as expected. It moderates the impact of covid-19 total cases on market returns with an interaction term COVCT*LIQ of p-value 0.0669 which is significant at 10% significance level. The interaction term is positively significant which confirms the hypothesis *H3b*. On the other hand, liquidity fails to exert any moderating impact on return-covid-19 deaths as the interaction term COVDT*LIQ with p-value=0.8333 is insignificant. This indicates that since covid-19 total deaths have no significant impact on the returns, liquidity also does not enhance this relationship any particularly.

Disposition effect has a direct negative significant impact on market returns with a p-value of 0.0453 as indicated from the lefthand side of the table. This indicates that the greater the investor exhibit disposition, the lesser the returns. The interaction term COVCT*DE is also significant and positive with a p-value of 0.0371 confirming the hypotheses *H5a and H5b* which indicates that the more investors show disposition effect, the more significant negative impact covid-19 has on the market returns. The righthand side of the table shows that DE with p-value= 0.073 is positively significant at 10% which is contrary to the hypothesis *H5a*. This reverse sign while the interaction term COVDT*DE with p-value=0.0574 is also positively significant at 10 percent significance level.

Lastly, information asymmetry has a direct positive impact on returns with p-value 0.0178 which indicates that the greater the information asymmetry the higher the returns in line with the previous research (Yassin et al., 2015). But as a moderator, this impact is significantly reversed as the interaction term COVCT*IA is negatively significant with a p value of 0.0293. This indicates that covid-19 total cases impact the returns and returns are increasing but with information asymmetry in the market, this impact lowers which is well in line with most research which indicates that in case of natural disasters, information asymmetry tends to lower the returns as indicated by (Jin et al., 2019) also. On the other hand, return-Covid deaths are not moderated significantly by information asymmetry as neither the Individual impact on information asymmetry is associated with returns nor is the interaction term COVDT*IA (p-value 0.866) exerting significant impact on returns. This indicates total number of covid related deaths does not significantly affects market returns.

Overall, the results suggest that Pakistan stock market is affected much because of the increasing number of covid-19 cases on daily basis. Much of this effect is visible through the variables studied in this research. But no significant impact is seen because of the growing number of deaths due to covid-19 on daily basis. Perhaps, the effect is captured in totality in the daily cases count so daily death count becomes insignificant. This contradicts some earlier research done by (Al-Awadhi et al., 2020; Ashraf, 2020b).

Some variables (disposition effect, information asymmetry) in this study show contradictory results from the previous research ((*Effect, 2014; Sarmiento et al., 2019*) indicate disposition effect is negatively related with market returns as investors tend to hold their securities due to fear of loss and (*Zhu et al., 2017*) state that information asymmetry effects market returns negatively due to rise in volatility). This is probably due to, as (Wen et al., 2014) put, the market indicators behave differently during the earlier, middle and later stage of the events, so taking this as the middle stage, the results swings can be justified. Overall, the results suggest that covid-19 has fairly rocked the Pakistani stock market and has received major disturbing blows due to this catastrophic event. Investors also exhibit disposition effect and do not want to trade their losing stocks, which is affecting overall stocks returns.

CONCLUSION

Since the covid-19 catastrophe broke out, financial markets are not performing well. Stock markets are also not performing desirably. Pakistan's stock market has also not received the news well and market is behaving unconventionally. Stock markets are facing volatility and liquidity swings, information asymmetry is also high due to covid-19 contagion and investor are showing disposition effect due to fear of loss because they do not want to trade their losing stocks especially in the covid-19 struck market.

This study wanted to inspect the impact that covid-19 has on stock returns with moderating impact of volatility, liquidity, information asymmetry and disposition effect. To understand the impact of covid-19 in detail, the impact was categorized into total covid-19 reported cases and total deaths due to covid-19. The results suggested that covid-19 total reported cases significantly impact stock returns and investors see abnormal positive returns in this catastrophe. Liquidity has a significant impact on returns but it does not have any moderating impact on the return-covid relationship. Volatility, information asymmetry and disposition effect also have significant direct impact and moderating impact on returns in wake of covid-19 total reported cases. Covid-19 total death cases do not have any significant impact on returns and also it is not significantly moderated by any of the variables studied in this study.

This study contributes in the ongoing covid-19 research and shows how this natural disaster is affecting stock markets. Since little is known about how corona contagion is affecting stock markets and especially emerging markets like Pakistan's stock market, so this paper is a contribution to the literature in this regard. This study has significant managerial social and academic implications. This study provides an insight to managers of emerging markets to assess and monitor market returns during

black swan events ((Yarovaya et al., 2021) term covid as a lack swan event because it was a sudden unpredictable crisis) and device policies accordingly as it is shown through this study that markets respond differently during crises and unusual circumstances. On academic level, this study presents an insight on how a black swan event affects an emerging stock market. Covid-19 in an ongoing crisis in the present world which was unprecedented and markets were not prepared to deal with it. This study presents how market performance is disrupted despite all the policies in place due the occurrence of a pandemic with unprecedented force. For investors, this study is helpful in understanding markets better during crisis times and making investment decisions wisely during black swan events.

Nevertheless, this study is not without limitations. First, the time horizon of this study is small even though data frequency is daily but still better results can be achieved in the longer time horizon for which the same study can be reproduced with a longer time horizon in some future point in time. Second, this study has included only one behavioral bias, future studies can include other relevant biases. Third, a pre and post Covid analysis can be done to compare these market factors. Interesting results can be drawn from this. Forth, this study included volatility, liquidity and information asymmetry; more relevant market related factors can be taken into account to see their impact.

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