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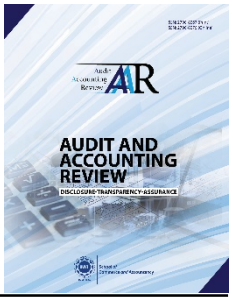

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Moderating Role of COVID-19 Crisis on Firm Leverage Speed of Adjustments: Evidence from Pakistan

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Abstract

This study evaluates the impact of firm-specific, industry-specific, and macroeconomic determinants on the speed of capital structure adjustment and to see if COVID-19 impacted these relationships. Using quarterly data of all listed non-financial firms in Pakistan for the period 2016-2021, a dynamic panel data model using the generalized method of moment (GMM) was used for estimation. It was found that firm size, growth potential, non-debt tax shield, and GDP growth positively impact firm leverage, while profitability and tangibility negatively impact leverage. The study found evidence of convergence to target leverage by Pakistani firms. These firms' capital structure adjustment speed was estimated as 16.7% per quarter. Moreover, COVID-19 was not found to affect the adjustment speed of firms, directly. Furthermore, greater distance from target leverage, growth potential, and GDP growth rate resulted in a lower speed of adjustment, whereas higher profitability and liquidity were found to increase the speed of adjustment.

***Keywords*:** capital structure, COVID-19, non-financial firms, Pakistan Stock Exchange (PSX), speed of adjustment

JEL Classification: G30, G32, G34, O53

Introduction

The COVID-19 pandemic has impacted almost all aspects of human lives, especially the world of business and commerce. A lot of businesses all over the world are on the brink of bankruptcy. The negative impacts of the pandemic are more visible in developing economies, where lack of resources and restrictions cause a lot of obstacles in generating economic activities that bring prosperity (Donthu & Gustafsson, 2020). Extant research about the impacts of such crises on cultural, economic, and social aspects is limited, even though the world has faced many such pandemics in the past, especially when it comes to capital structure decision studies.

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More importantly, the COVID-19 crisis has been suggested in recent literature to be different from the previous crises due to its scale and nature (Mohammad, 2021; Mohammad & Khan, 2021).

Capital structure is defined as the amount of finance or capital that supports the activities of a firm by financing its assets and funding its operations. It also shows company acquisitions and capital expenditures that influence a business's bottom line (Ahsan & Monzur, 2019). Some of the pioneering theories involving capital structure decision-making are the static trade-off theory and the pecking order theory. The underlying idea of static trade-off states that a target level of leverage (usually associated with debt ratio) is required to distinguish between the existing capital structure of a firm and its valuation (Kraus & Litzenberger, 1973). The pecking order theory expresses the notion that there is a hierarchical structure in all firms regarding financial decision-making (Myers, 1984). Using these particular structures, firms strive to establish methods through which their internal financing is given special preference over their external source of financing. A lot of competitive theories are available on capital structure and there seems to be a competition to prove a one best theory (Black, 1996).

Within the scope of capital structure decision-making, a strand of studies focus on the structural speed of adjustment (SOA). It refers to the extent a firm can shift its capital structure to fulfill its desired target within a particular period (Ahsan & Monzur, 2019). Every firm requires a varying amount of time for that shift. There is contradictory evidence in literature with some studies suggesting that this adjustment does not happen (Burgess & Dolado, 1989), while others classify it as merely automatic mean reversion (Taylor et al., 2001). In the case of financial institutions, there is extensive literature available that supports the existence of convergence towards target leverage.

There is evidence that the convergence speed of banking firms was positively influenced during the COVID-19 period (Mohammad, 2021; Mohammad & Khan, 2021). Additionally, empirical evidence for developing economies is limited. Do nonfinancial firms exhibit target level leverage adjustments? What factors impact the speed of adjustment? Did the COVID-19 crisis impact the adjustment speed of these companies? This study focuses on answering these questions.

Pakistan comprises a good case study to answer these questions because reports suggest corporate ventures experiencing losses in Pakistan due to huge differences in their capital structure frameworks (Abbas & Ahmad, 2012; Ijaz et al., 2013). Additionally, limited research has been conducted previously in this domain. A study suggested that Pakistani firms usually adjust almost 60% on a per-year basis towards their optimal capital structure. Moreover, a firm needs at least a period of two years or more to fully adjust its capital structure (Memon et al., 2015). However, the above study did not answer vital questions about what factors impact the speed of adjustment and how economic conditions moderate their mutual relationship. Understanding corporate financing decision dynamism has policy implications for the firms.

The current study estimates the adjustment speed of Pakistani firms and the impact of firm and macroeconomic capital structure determinants on the speed of adjustment of all listed firms, which has not been tested before in the literature. Using quarterly data of all 359 listed non-financial firms in Pakistan Stock Exchange (PSX) for the period 2016-2021, generalized method of moment (GMM) estimation was carried out. This study contributes to the existing literature regarding convergence behaviour and provides insight on how firms in developing economies responded to the COVID-19 crisis. It also adds to the contemporary literature regarding how the speed of adjustment is moderated by typical determinants of capital structure, as well as other factors such as distance from target leverage and growth potential.

Literature Review

Capital structure theories have been extensively studied in the literature. Some such theories have been used in empirical literature to explain capital structure decisions including the pecking order theory (Myers, 1984; Yıldırım & Çelik, 2021), static trade-off theory (Miller & Modigliani, 1963), dynamic trade-off theory (Fischer et al., 1989; Ripamonti, 2020), and market-timing theory (Baker & Wurgler, 2002; Sulaiman et al., 2019).

The main assumption of the static trade-off theory (Miller & Modigliani, 1963) is the minimization of the cost of capital by allocating an appropriate level of equity and debt financing. The point is that all firms strive to maintain a mixed type of funding that can balance out the advantages and limitations of both sorts of external financing (debt and

equity funding). In this way, they avail tax benefit from debt funding and mitigate the debt costs. However, there are several studies available that criticize the static trade-off theory. Fama and French (2002) criticized the theory by stating that corporate interest payment deductions generally lead the firms towards high target leverage.

The pecking order theory is the pioneering work of Myers (1984), who developed this theory based on his criticism of the trade-off theory. This theoretical framework is crucial regarding the study of capital structure because it carries the assumption that the information provided to new stakeholders is quite asymmetrical in nature and choosing the funding source is also a complicated process. However, this theory also has its fair share of limitations. One of them is the inability to factor in any sort of causal association with taxes, problems related to agency, financial distress related to the opportunities involved with investment, and the cost of issuance of new securities (Frank & Goyal, 2009; Chakrabarti & Chakrabarti, 2019).

Fischer et al. (1989) worked on the earliest versions of this theory. This framework also emphasizes the fact that there is no ideal situation regarding capital structure. A major reason is the presence of time-bound determinants. The fluctuations in these variables cause the leverage adjustment to shift away from the optimum level. Other contemporary studies also expressed the notion that the dynamic trade-off framework is, in actuality, a compromise between the assumptions of both the pecking order theory and the static trade-off theory (Hovakimian et al., 2002; Bajaj et al., 2020).

Baker and Wurgler (2002) stated that market timing is an essential component in shaping up the decision-making aspects of any corporate structure. Trejo-Pech et al. (2021) reported that in Mexican firms the adjustment speed is 10.3% per year. On the other hand, a study reported a faster speed of adjustment for UK firms, that is, around 28.8%, annually (Fitzgerald & Ryan, 2019). Furthermore, another study conducted on Malaysian firms observed their speed of adjustment as 18.2% (Chua et al., 2022) .

Empirical literature suggests that profitability, firm size, growth potential, short-term debts, ratio of target capital structure, maturity of assets, non-debt tax shield, industry median leverage, market concentration,

liquidity, market capitalization, GDP growth rate, and COVID-19 are some of the factors that impact the capital structure of firms. However, there is conflicting empirical evidence available regarding their impact on leverage.

Growth potential is one of the determinants that reported mixed results depending on the nature of the theoretical framework used. Studies based on the assumptions of the trade-off theory reported its negative association with the firm's leverage (Aybar-Arias et al., 2012; Li & Islam, 2019). A lot of studies based on the pecking order theory reported that firms that generate higher levels of profitability have the easy option of switching to their retained earnings regarding the formulation of capital structure strategies, hence showing a positive interaction (Hankins et al., 2008; Lemma & Negash, 2014).

Earlier studies expressed the notion that firm size exhibits a positive influence over the leverage ratio of the firm. Some studies stated that firms that are quite large in their operations and size have the advantage of getting an easier access to high levels of long-term debts (Alnori & Alqahtani, 2019; Huang & Song, 2006). The association between taxation and the rate of target leverage has different interpretations, depending on the nature of the framework being used to conduct the research. The studies that used the trade-off theory to study the said association reported a negative interaction of non-debt tax shield with the rate of target leverage adjustment (Bradley et al., 1984; Memon et al., 2015). According to these studies, liquidity exhibits a significant positive interaction with a firm's leverage ratio. A major reason for this association is that firms with higher levels of liquidity or liquid assets can easily meet their short-term obligations due to the presence of high cash flow (Handoo & Sharma, 2014; Khaki & Akin, 2020).

Studies also emphasized that firms that have higher levels of short-term debt have the capability to change their rate of leverage adjustment more rapidly than the firms with lower levels of short-term debt, thus indicating a positive interaction (Aybar-Arias et al., 2012). Several studies reported a positive influence of the distance of the rate of target leverage adjustment on the overall leverage ratios (Drobetz & Wanzenried, 2006; Elsas & Florysiak, 2011). Moreover, there was found a significant negative association of the maturity of assets with the rate of target leverage adjustment (Guney et al., 2011; Lemma & Negash, 2014). Empirical research targeting the association between the median leverage of the entire industry and the rate of target leverage adjustment reported a positive

significance association between the industry-specific determinants of the median leverage of industry and the rate of target leverage adjustment (Drobetz et al., 2015; Getzmann et al., 2014). Researchers also reported that there is a non-linear and positive relationship between market concentration and the leverage levels of a firm. This finding is consistent with the findings of other studies conducted on developing nations (Guney et al., 2011).The determinants of market capitalization show a positive influence over the adjustment speed of a firm's leverage (de Jong et al., 2008). The rate of adjustment speed is more rapid when macroeconomic determinants, especially the GDP growth rate, is high. The macroeconomic event of COVID-19 caused a huge financial shock to operating profits, revenues, and the overall level of net income. Some economies were significantly affected by this variable, while others did not show any significant impact on the overall market.

Methodology

The research model used in this study is an extension of the dynamic partial adjustment model which lead to the econometric specification of the model (Nehrebecka & Dzik-Walczak, 2018). Determinant leverage is used as a function of industry-specific, macroeconomic, and firm-specific determinants within a specification that permits the determination of adjustment costs and adjustment speed (Antoniou et al., 2008; Drobetz & Wanzenried, 2006; Flannery & Rangan, 2006). The econometric research model is given below in equation (1).

$$LEV_{it} = \alpha LEV_{it-1} + \beta X_{it} + \gamma_i + \lambda_i + \mu_{it} \quad (1)$$

In the above equation, *LEV* is the ratio of leverage, α is the parameter for adjustment, *X* represents the vectors regarding the explanatory variables, υ refers to a term of error, β is a K*1 constant vector as observed in firm-specific events and effects that are assumed constant over a time period *t*, λ_i represents the time-specific events and effects that remain unobserved and assumed constant over individual firms *i*. The coefficient given below regarding the lagged leverage indicates the existence of target leverage behaviour. So, it can be inferred that α is referred to as a proxy for the costs of adjustment and exhibits an indirect association with the rate of target leverage adjustment (speed of adjustment), denoted in the research model by 1−α (Flannery & Rangan, 2006).

The econometric model for this study is stated in equation (2) below.

$$LEV_{it} = \beta_0 + \beta_1 LEV_{i,t-1} + \beta_2 ROA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GROWTH_{i,t} + \beta_5 STDL_{i,t} + \beta_6 DIST_{i,t} - \beta_7 AM_{i,t} + \beta_8 IML_{i,t} + \beta_9 NDTS_{i,t} + \beta_{10} HHI_t + \beta_{11} LIQ_{i,t} + \beta_{12} MRC_t + \beta_{13} GDPG_t + \beta_{14} COVID_{i,t} + \mu_{i,t} \quad (2)$$

The definitions and formulas of these determinants are given in Appendix 1.

$$LEV_{it} = \beta_0 + \beta_1 LEV_{i,t-1} + \beta_2 ROA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 GROWTH_{i,t} + \beta_5 STDL_{i,t} + \beta_6 DIST_{i,t} - \beta_7 AM_{i,t} + \beta_8 IML_{i,t} + \beta_9 NDTS_{i,t} + \beta_{10} HHI_t + \beta_{11} LIQ_{i,t} + \beta_{12} MRC_t + \beta_{13} GDPG_t + \beta_{14} COVID_{i,t} + \beta_{15}[interaction\ terms] + \mu_{i,t} \quad (3)$$

For the value of DIST, fixed effects regression method is used to predict the value of distance of the rate of target leverage adjustment. The interaction term in equation (3) is defined as multiplication of lagged leverage with the individual determinants aimed to capture the effect of these independent variables on the speed of adjustment.

Data

For this study, secondary data was collected from Thomson Reuter DataStream and from the annual reports available in the listings of the PSX website. The study selected all non-financial firms listed in the stock exchange. Quarterly data was taken for a sample period of 6 years, that is, from 2016 to 2021.

Result

Table 1 reports the main results of the current study. Thirty (30) models were estimated, each containing a unique interaction of determinants with the rate of target lagged leverage. Based on the partial adjustment model, the value of the coefficient of the adjustment speed of capital structure was obtained by identifying and estimating the regression coefficient of lagged leverage towards target leverage. Based on the results obtained in Table 4, the speed of adjustment (SOA) in Pakistani non-financial firms was found to be 16.7% per quarter (1-0.833). It indicates that the non-financial firms adjust their rate of target leverage with a rate of 16.7% per quarter. The above findings postulate a rate less than the 60% SOA reported in a study without the effects of COVID-19 (Memon et al., 2015). This is still higher than the 4% SOA reported in recent studies that incorporated the effects of COVID-19.

Table 1

Main Results (GMM Estimation)

Variables	(1) leverage	(2) leverage	(3) leverage	(4) leverage	(5) leverage	(6) Leverage	(7) leverage	(8) leverage	(9) leverage	(10) leverage	(11) leverage	(12) leverage	(13) leverage
L.LEV	0.833***	0.939***	0.889***	0.867***	0.925***	0.947***	0.976***	0.950***	0.899***	0.952***	0.939***	0.926***	0.942***
	(0.040)	(0.018)	(0.030)	(0.086)	(0.022)	(0.016)	(0.022)	(0.019)	(0.040)	(0.026)	(0.018)	(0.020)	(0.018)
ROA	-0.198***	-0.158***		-0.159***	-0.158***	-0.164***	-0.159***	-0.160***	-0.157***	-0.153***	-0.158***	-0.158***	-0.158***
	(0.028)	(0.025)		(0.027)	(0.024)	(0.025)	(0.025)	(0.025)	(0.025)	(0.027)	(0.024)	(0.024)	(0.025)
HHI	-0.036	0.006	0.000	0.021	0.002	0.062	0.016	0.012	-0.013		-0.021	-0.009	0.005
	(0.085)	(0.045)	(0.058)	(0.044)	(0.045)	(0.057)	(0.047)	(0.045)	(0.051)		(0.064)	(0.045)	(0.044)
Liquidity	-0.011	-0.003	-0.011	-0.004	-0.004		0.000	-0.000	-0.004	-0.001	-0.001	-0.002	-0.003
	(0.017)	(0.010)	(0.014)	(0.011)	(0.010)		(0.008)	(0.009)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)
COVID	-0.005	-0.003		-0.003	-0.003	-0.003	-0.003	-0.003	-0.004	-0.004	-0.004	-0.007*	
	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	
Size	0.005**	0.002	0.002		0.002	0.002	0.002	0.002	0.003*	0.003*	0.003	0.002	0.002
	(0.002)	(0.002)	(0.002)		(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
IMDL	0.089	0.068	0.090*	0.071*	0.069	0.095*	0.060	0.071*		0.061	0.060	0.056	0.066*
	(0.065)	(0.042)	(0.053)	(0.039)	(0.044)	(0.052)	(0.037)	(0.042)		(0.044)	(0.045)	(0.042)	(0.040)
MRC	-0.008	-0.001	-0.003	0.001	-0.001	0.003	-0.001	-0.000	-0.003	-0.002		-0.001	-0.001
	(0.007)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)		(0.004)	(0.004)
Tangibility	-0.038*	-0.024**	-0.029*	-0.023*	-0.025**	-0.025**		-0.019*	-0.021	-0.026**	-0.024**	-0.022**	-0.023**
	(0.022)	(0.011)	(0.016)	(0.012)	(0.011)	(0.010)		(0.010)	(0.014)	(0.011)	(0.012)	(0.011)	(0.011)
growth	0.000***		0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000**	0.000***	0.000***	0.000***
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STDL	-0.015	-0.008	-0.011	-0.008	-0.009	-0.009	-0.006		-0.008	-0.010	-0.008	-0.007	-0.007
	(0.012)	(0.007)	(0.009)	(0.007)	(0.007)	(0.006)	(0.007)		(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
NDTS	0.289**	0.103	0.127	0.094		0.100	0.106	0.107	0.115	0.110	0.115	0.096	0.100
	(0.131)	(0.078)	(0.105)	(0.080)		(0.082)	(0.076)	(0.076)	(0.084)	(0.080)	(0.080)	(0.077)	(0.079)
GDPG	0.233***	0.204***	0.239***	0.205***	0.202***	0.203***	0.204***	0.204***	0.188***	0.204***	0.204***		0.207***
	(0.067)	(0.068)	(0.040)	(0.068)	(0.068)	(0.067)	(0.070)	(0.070)	(0.065)	(0.069)	(0.069)		(0.045)
DIST x L.LEV	0.209***												
	(0.055)												
Growth x L.LEV		0.000***											
		(0.000)											
ROA x L.LEV			-0.351***										
			(0.061)										

Variables	(1) leverage	(2) leverage	(3) leverage	(4) leverage	(5) leverage	(6) Leverage	(7) leverage	(8) leverage	(9) leverage	(10) leverage	(11) leverage	(12) leverage	(13) leverage
Size x L.LEV				0.005									
				(0.006)									
NDTS x L.LEV					0.066								
					(0.047)								
LIQ x L.LEV						-0.038***							
						(0.013)							
AM x L.LEV							-0.050						
							(0.031)						
STD x L.LEV								-0.010					
								(0.019)					
IML x L.LEV									0.110				
									(0.086)				
HHI x L.LEV										-0.114			
										(0.105)			
MRC x L.LEV											-0.014		
											(0.021)		
GDPG x L.LEV												0.398**	
												(0.201)	
COVID x L.LEV													-0.008
													(0.006)
Constant	-0.007	-0.019	-0.005	0.013	-0.013	-0.023	-0.037	-0.034	-0.002	-0.020	-0.030	-0.005	-0.019
	(0.064)	(0.042)	(0.049)	(0.029)	(0.042)	(0.030)	(0.038)	(0.037)	(0.039)	(0.043)	(0.045)	(0.041)	(0.042)
Observations	5,464	5,464	5,464	5,464	5,464	5,464	5,464	5,464	5,464	5,464	5,464	5,464	5,464
CompanyID	309	309	309	309	309	309	309	309	309	309	309	309	309
AR(1)	0	0	0	0	0	0	0	0	0	0	0	0	0
AR(2)	0.892	0.906	0.421	0.810	0.919	0.692	0.885	0.843	0.818	0.844	0.949	0.918	0.689
Hansen	0.406	0.640	0.680	0.702	0.804	0.701	0.370	0.477	0.913	0.152	0.441	0.660	0.0966
Sargen	0	0	0	0	0	0	0	0	0	0	0	0	0
Instruments#	233	233	233	233	233	233	233	233	233	233	233	233	233

Note. Robust standard errors in parentheses. *** $p < 0.001$. ** $p < 0.01$. * $p < 0.05$.

Table 1 manifests that distance exhibits a negative influence on the adjustment speed of capital structure and is statistically significant. This indicates that firms in Pakistan frequently adjust toward their rate of desired leverage, even if their actual debt is not far from their target debt. These results go against the previous literature which reported that fixed cost remains a major part of a firm's overall adjustment cost. Moreover, firms with sub-par leverage make adjustments in their capital structure framework only when it shifts away from the desired target (Heshmati, 2001). Aybar-Ariass et al. (2012) expressed the notion that in the presence of high fixed adjustment cost, firms prefer internal source(s) of financing over external one(s). This result also validates indirectly the positive impact of profitability towards the rate of leverage adjustment.

The significant positive interaction between growth potential and rate of target leverage adjustment indicates that firms in Pakistan turn to debt financing more frequently than equity financing in order to fund new projects due to the country's potential for rapid growth. One of the main reasons is that non-financial firms in Pakistan often require a large influx of cash to grow, which they may not be able to generate internally and must, therefore, seek external sources of debt. This confirms the earlier hypothesis about growth opportunities (Aybar-Ariass et al., 2012).

Profitability exhibits a positive interaction towards the rate of target leverage adjustment and remains statistically significant, suggesting that firms that generate high levels of profitability have an easier access to investment opportunities. Resultantly, these firms prefer to use lower amounts of debt (Thippayana, 2014; Köksal & Orman, 2015). Size exhibits a negative interaction towards the rate of capital structure adjustment. Although, the findings are statistically insignificant. Profitable companies have an internal source of funding. Consequently, they have better financial flexibility and access to external funding sources. As an effect, these companies enjoy a faster capital structure speed of adjustment than less profitable companies. The insignificance in the results may indicate that the determinant of size could be underwhelmed by other determinants used for this study. So, these findings contradict the findings of previous empirical studies that reported a positive interaction among the variables (Doğan, 2013; Devi & Devi, 2014).

NDTS exhibits a negative interaction towards the adjustment rate of capital structure, although it is statistically insignificant. Liquidity exhibits

a positive interaction towards the rate of target leverage adjustment and is statistically significant. Furthermore, the findings express the notion that firms with more liquid assets have the option of easily shifting their rate of leverage by using their retained earnings and their internal source of financing (Nguyen et al., 2012).

Asset maturity in Pakistani firms exhibits a significant positive influence on the rate of target leverage adjustment. The findings of this result are contradictory to research studies brought forward by previous studies that reported that the repayment of the bondholders would be at face value of those bonds or the principal values of bonds held (Almilia & Devi, 2007). So, this hypothesis is rejected. Short-term debt exhibits a positive interaction towards the adjustment speed of capital structure, although it is statistically insignificant. However, due to the insignificance of the results, the interaction remains indecisive. The industry median leverage exhibits a negative interaction towards the rate of target leverage adjustment, although the results are statistically insignificant. These findings contradict the findings of previous studies based on the trade-off theory that reported a positive interaction between the rate of target leverage adjustment and industry median leverage (Getzmann et al., 2014). However, due to the insignificance of the results, the interaction remains indecisive.

Market concentration exhibits a positive interaction towards the rate of target leverage adjustment, although the results are statistically insignificant. This insignificance can be associated with previous studies which found a positive association between macroeconomic variables and the rate of adjustment (MacKay & Phillips, 2005). However, due to the insignificance of the results, the interaction remains indecisive. Market capitalization exhibits a negative interaction coefficient of -0.014 with the leverage lag. Its standard error value is 0.021. This indicates that market capitalization has a positive influence on the adjustment speed of capital structure, although it is statistically insignificant (Schmukler & Vesperoni, 2006).

GDP growth rate exhibits a negative interaction towards the rate of target leverage adjustment and the findings are statistically significant. These findings are contradictory to the findings of the previous empirical studies that reported a positive interaction with the rate of target leverage adjustment (Korajczyk & Levy, 2003). When GDP growth is high, manufacturing companies tend to adjust their capital structure more quickly.

This finding is in line with several other empirical studies (Lemma & Negash, 2014).

COVID-19 exhibits a weak positive influence on the adjustment speed of capital structure, although it is statistically insignificant. This indicates that the effect of COVID-19 on the individual sectors of the Pakistani economy does not translate into an overall effect on the economy. The exemptions secured by key industries due to COVID-19 may also play a role in obtaining the low values of this result (Mohammad & Khan, 2021).

Conclusion

The current study found evidence of convergence to target leverages by Pakistani firms. The findings regarding the capital structure's speed of adjustment (SOA) conform to the dynamic trade-off theory. This theory expresses the notion that the determinants of the leverage speed of firms' adjustment can involve the costs of adjustments and the financial flexibility of the firms. Using quarterly data of all listed non-financial firms in Pakistan for the years 2016-2021 and estimating the dynamic data model through generalized method of moment (GMM), the adjustment speed of Pakistani firms' capital structure was estimated as 16.7% per quarter.

It was found that firm size, growth potential, non-debt tax shield, and GDP growth positively impact firm leverage, while profitability and tangibility negatively impact leverage. COVID-19 was not found to affect the adjustment speed of firms, directly. Further, it was also found that greater distance from target leverage, growth potential, and GDP growth rate result in a lower speed of adjustment, whereas higher profitability and liquidity increase the speed of adjustment.

The effects of COVID-19 itself are a big limitation, as they creates obstacles in examining the adjustment speed of the capital structure of Pakistani firms in a normal setting. So, only after the COVID-19 pandemic is over, more accurate estimations of the actual adjustment speed of firms in normal settings may be obtained.

Policy Implications

The current study suggests that policymakers and financiers should acknowledge the fact that capital structure dynamics are not stable over time and are affected by individual firm-specific factors, such as distance from target leverage, growth potential, and economic conditions. The

management of Pakistani firms should consider increasing the investment levels to maintain the levels of liquid assets, growth, and profitability of their firms. Furthermore, the management of the firms should also pay considerable attention to the GDP growth rate because this macroeconomic determinant could significantly help to facilitate the rate of target leverage adjustment. Investors in the Pakistan Stock Exchange (PSX) should consider investing in firms with characteristics found to be significant in this study. If firms focus on significant determinants, there is a high possibility of achieving an optimum capital structure.

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Appendix 1: Determinant Measurements

Determinants	Abbreviation	Proxies	Empirical Evidence
Dependent variable			
Leverage	LEV	Total Debt/Total Assets	(Thippayana, 2014)
Firm-specific Determinants			
Profitability	ROA	Net profit/Total assets	(Lemma & Negash, 2014)
Size	Size	Natural logarithm of total assets	(Lööf, 2004)
Growth potential	Growth`	Market to book ratio	(Elsas & Florysiak, 2011)
The ratio between capital structure and target	DIST	Difference between estimated target leverage and observed leverage	(Drobetz & Wanzenried, 2006)
Asset Maturity	AM	average maturity values of current assets, fixed assets and inventories	(Jun & Jen, 2003)
Short-term debt	STDL	Short term debt/Total debt	(Kim et al., 2006)
Non-debt tax shield	NDTS	Depreciation Expense/Total Assets	(Bradley et al., 1984b)
Liquidity	LIQ	Current Assets/Current Liabilities	(Abdeljawad et al., 2013)
Industry-specific Determinants			
Market concentration	HHI	Some of the squares of the market shares of firms within a given industry	(Mitani, 2014)
Industry Median Leverage	IML	Measured using DataStream data type INDUSTRY	(Elsas & Florysiak, 2011)
Macroeconomics Determinants			
Market capitalization	MRC	The ratio of Stock market capitalization to annual GDP	(Fitzgerald & Ryan, 2019)
GDP Growth rate	GDPG	The annual growth rate of GDP on the basis of the nation's constant price	(Öztekin & Flannery, 2012)

Appendix 2: Data Summary and Results

Table 2

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LEV	7410	.341	.356	0	3.658
ROA	7410	.032	.148	-.982	3.078
Size	7410	15.659	1.85	9.915	20.678
AM	7406	.557	.235	0	1
Growth	7012	1.89	87.032	0	4645.214
STDL	6574	.66	.292	0	1
NDTS	7113	.128	.099	0	2.366
IML	7410	.294	.148	0	2.215
GDPG	7410	.035	.021	-.004	.055
LIQ	7016	1.659	11.23	0	317.27
MRC	6963	.621	1.85	0	22.88
HHI	7410	.155	.144	.044	1
COVID	7410	.232	.422	0	1

Table 3

Variance Inflation Factor

	VIF	1/VIF
COVID	1.967	.508
GDPG	1.956	.511
AM	1.356	.738
LIQ	1.355	.738
Size	1.346	.743
MRC	1.285	.778
ROA	1.254	.798
STDL	1.25	.8
IML	1.24	.806
HHI	1.207	.829
NDTS	1.055	.948
Growth	1.004	.996
Mean VIF	1.356	.

Table 4

Matrix of Correlations

Variables	(1) LEV	(2) ROA	(3) Size	(4) AM	(5) Growth	(6) STDL	(7) NDTS	(8) IML	(9) GDPG	(10) LIQ	(11) MRC	(12) HHI	(13) COVID
(1) LEV	1.000												
(2) ROA	-0.426	1.000											
(3) Size	-0.096	0.226	1.000										
(4) AM	0.160	-0.274	-0.066	1.000									
(5) Growth	0.043	-0.003	-0.027	0.023	1.000								
(6) STDL	0.022	-0.062	-0.279	-0.248	0.021	1.000							
(7) NDTS	0.181	-0.063	0.006	0.186	-0.001	-0.106	1.000						
(8) IML	0.325	-0.203	-0.222	0.197	0.023	0.034	0.002	1.000					
(9) GDPG	0.024	0.006	-0.069	0.048	-0.034	0.063	0.010	0.023	1.000				
(10) LIQ	-0.403	0.293	0.021	-0.332	-0.017	-0.084	-0.137	-0.263	-0.028	1.000			
(11) MRC	-0.145	0.263	0.408	-0.063	-0.008	-0.173	0.037	-0.208	0.030	0.030	1.000		
(12) HHI	-0.131	0.141	0.095	-0.211	-0.018	-0.057	-0.025	-0.313	-0.039	0.320	0.044	1.000	
(13) COVID	-0.043	0.056	0.068	-0.049	0.025	-0.081	-0.028	-0.066	-0.695	0.056	-0.031	0.046	1.000

Appendix 3: Fixed Effects Regression Results

Table 5

Fixed Effects Regression Results

LEV	Coefficient	Standard Error	t-value	p-value	[95% C I]		Sig
ROA	-.374	.096	-3.90	0	-.563	-.186	***
Size	.028	.03	0.95	.342	-.03	.087	
AM	.037	.1	0.37	.708	-.159	.234	
Growth	0	0	5.09	0	0	0	***
STDL	-.046	.03	-1.54	.124	-.105	.013	
NDTS	-.018	.155	-0.12	.907	-.322	.286	
IML	.557	.134	4.15	0	.293	.822	***
GDPG	.074	.139	0.53	.594	-.199	.347	
LIQ	-.047	.009	-5.10	0	-.066	-.029	***
MRC	-.003	.003	-1.20	.233	-.009	.002	
HHI	-.056	.107	-0.53	.597	-.266	.154	
COVID	.002	.01	0.17	.866	-.019	.022	
Constant	-.195	.442	-0.44	.659	-1.064	.675	
R-squared		0.231	Number of obs			5694	

Note. *** $p < .001$. ** $p < .01$. * $p < .05$.