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# Adjustment speed towards target capital structure and its determinants

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## ABSTRACT

This study examines the existence of the dynamism of capital structure in Pakistan for the period from 2003 to 2012, with specific objectives of estimating the adjustment speed and determining the factors affecting the adjustment speed towards target capital structure. Using difference Generalized Method of Moments (GMM) as the estimation technique, the study confirms the existence of optimal capital structure for Pakistani non-financial listed firms, and concludes that, depending upon the proxy of target debt used, firms make full adjustment towards optimal capital structure in 1.45 years to 2.25 years. Firms' size, profitability, stock market development, and GDP are found to be relatively consistent determinants of the adjustment speed across different proxies of debt. This study contributes in the existing literature of the capital structure by providing evidence regarding the existence of target capital structure, estimating the adjustment speed towards target capital structure, and identifies factors affecting adjustment speed towards target capital structure for Pakistan using four different measures of leverage.

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Dynamic capital structure; partial adjustment model; speed of adjustment; generalized method of moments

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## 1. Introduction

Earlier studies of the capital structure from developing countries mainly focus on determining the factors affecting observed levels of debt. Recent empirical studies in the area of corporate capital structure decisions from developed countries focus on the new important strand, which is the dynamism of capital structure. This new strand is investigated after Jalilvand and Harris (1984), who conclude that firms' financing behavior is better characterized by partial adjustment towards target capital structure. Later, Fischer et al. (1989) study the differences between maximum and minimum leverage ratios and investigate the characteristics of the firms with large deviations in their capital structure. Survey based studies by Graham and Harvey (2001) and Drobetz et al. (2006) also conclude that firms' financial managers pursue a

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target capital structure. All these studies suggest that due to adjustment cost and market imperfections, the firms are not always at their target capital structure, rather strive to move towards target capital structure with certain adjustment speed. Recent studies of capital structure investigate this new strand of dynamism of capital structure with the objectives of estimating adjustment speed towards optimal capital structure, identifying the factors affecting adjustment speed, and factors determining optimal debt. The studies of the capital structure by Flannery and Rangan (2006), Mukherjee and Mahakud (2010), Frank and Shen (2013), and Haron (2014) investigate the dynamism of capital structure and confirm that firms adjust towards optimal capital structure with certain adjustment speed and several firm and country specific factors affect that adjustments speed.

Majority of the empirical studies contributing to the literature of corporate financing decisions of the firms are based on the empirical findings from the developed countries such as US, UK, France, Germany, Switzerland, Canada and others. Small number of studies is available that provides empirical evidences from developing countries, particularly South Asian developing countries such as Pakistan, Sri Lanka, and Bangladesh, and they are inconsistent in their findings. In context of Pakistan few studies (Hasan & Butt, 2009; Shah, 2007; Sheikh & Wang, 2012), using static framework, are available. Existing studies for Pakistan use limited number of firm specific variables to understand only the determinants of capital structure and still enough gap is there that need to be filled to understand the dynamism of financing behavior of Pakistani firms. According to Ahsan and Qureshi (2017), Pakistan is an economy dependent on the banks and Pakistan's capital market remains undersized. One possible reason for such higher leverage levels is the potential usage of corporate political ties to fund loans from banks. Khwaja and Mian (2005), claim that Pakistan's politically linked companies fund 45 percent. We claim, however, that Pakistan's poor governance structure doesn't have the potential to secure the interests of creditors. High levels of corruption, poor structure of government, institutional turmoil, and observable political and economic dynamics differentiate Pakistan and establish a study vacuum. It therefore motivates us to research the adjustment actions of the companies entangled in such socio-economic structure, operating in a bank-based system and dependent on short-term debt as a main funding source.

The need of this study for Pakistan also arises from the fact that Karachi Stock Exchange delisted 69 firms in 2012 which constitute more than 10% of the total listed firms.<sup>1</sup> These companies were delisted either on account of making default on various listing regulations or have been liquidated or in process of liquidation. Furthermore, non-performing loans of the banking sector of Pakistan also are continuously increasing. They had reached to all time high of Rs.635 billion by the end of June 2012 (Ministry of Finance, Government of Pakistan, 2013).<sup>2</sup> Ijaz et al. (2013) report that the number of business failures in Pakistan is increasing, which requires immediate attention of the government. Newton (1985) as cited in Abbas and Ahmad (2011), report that one of the main reasons behind varying corporate failure rates in different countries is the difference in the capital structure of the businesses. Bankruptcy due to use of the high debt may be explained in context of trade-off theory of the capital structure (Matemilola et al., 2013). Given these issues in corporate sector of Pakistan,

unavailability of studies on dynamism of corporate financing decisions, and inconsistent findings of available capital structure studies; it becomes important to understand the dynamism of corporate financing decisions in Pakistan. This study contributes in the literature of dynamic capital structure for developing countries, specifically Pakistan, by analyzing the existence of dynamism of capital structure, estimating the adjustment speed towards target capital structure, and identifying factors affecting adjustment speed in Pakistan.

This study uses a sample of 143 non-financial firms with 1190 firm year observation from 2003–2012, extracting the firm level data from DataStream. Study uses the unbalanced panel data. Arellano and Bond (1991) difference GMM is used as the estimation technique to avoid endogeneity and autocorrelation problems.

Remaining paper is organized as follows. Section 2 discusses the recent literature on the issue of dynamism of capital structure. Section 3 discusses the research methodology that includes the data, model development, estimation technique, hypotheses development and measurement of variables. This is followed by the section 4, which presents and discusses the findings of this study. Section 5 concludes this study.

## **2. Literature review**

### ***2.1. Existence of optimal capital structure and adjustment speed***

Research on the issue of existence of the optimal capital structure started with the findings of Jalilvand and Harris (1984) who report that firms' financing behavior is characterized by the partial adjustment towards long run target capital structure. Thereafter, Fischer et al. (1989) conclude that firms unreceptively build up earnings and losses that move their leverage ratios away from the target. Based on these arguments, several studies such as Ozkan (2001), Banerjee et al. (2004), Mukherjee and Mahakud (2010), Haron et al. (2013) and others, investigate the existence of optimal capital structure and estimate the adjustment speed towards optimal capital structure in different countries. Ozkan (2001) confirms the existence of target capital structure and finds the adjustment speed of 43 percent per year for UK firms. Similarly, existence of optimal capital structure is confirmed by Flannery and Rangan (2006) and report the adjustment speed towards target capital structure of 33 percent and 34 percent for all Compustat firms and US respectively. Elsas and Florysiak (2011) estimate the adjustment speed of 26 percent for all Compustat firms. Matemilola et al. (2013) also confirm that South African firms have optimal capital structure and they make effort to move towards optimal capital structure at the adjustment speed of 40 percent per year. Recently, Zhang et al. (2020), using data from 1054 listed Chinese companies in 2004–2016, stated that Chinese companies have leveraging goals that they adapt to at an average speed of 25.9%. Bajaj et al. (2020), show that Compared to Chinese companies, companies in India are returning to their targeted debt ratios at a faster speed i.e. 30% and 20%, correspondingly. Haron et al. (2013) also find the existence of optimal capital structure for Malaysian firms and due to presence of the adjustment cost they move towards target debt at the speed of 57 percent. A high adjustment speed towards target is considered as a support for the trade-off theories,

while a low speed of adjustment denies the existence of target capital structure (Xu, 2007).

## **2.2. Determinants of adjustment speed**

Other important area of the research in the dynamism of capital structure is the identification of the factors affecting the adjustment speed towards target capital structure. Banerjee et al. (2004) are deemed to be the first ones to estimate the adjustment speed and simultaneously determining the factors affecting the adjustment speed towards target capital structure. Using US and UK data, they report that in UK the distance between actual and optimal leverage has negative impact on adjustment speed. Against their expectation they conclude that in US growth has negative effect on adjustment speed. Later, Drobetz and Wanzenried (2006) found that firms that are at large distance from their target capital structure and having high growth move faster towards their target capital structure. Furthermore, they conclude that the adjustment speed is higher when the term spread is higher and the economic prospects are good. They report the distance between observed and target leverage and growth to be the significant determinants of adjustment speed.

Clark et al. (2009) also examine the dynamism of capital structure for a sample of 40 countries and conclude that the adjustment speed towards target varies across the countries. They conclude that financial market development (stock market and debt market development) and tax rate have positive significant effect on speed of adjustment. They conclude that the higher the benefit of moving towards target the higher is the adjustment speed. Fitzgerald and Ryan (2019), they found considerable evidence of variation in the rates with which UK companies adapt to the desired leverage. Mukherjee and Mahakud (2010) investigate the factors affecting adjustment speed towards target capital structure for Indian firms and find that firms at large distance from target capital structure adjusts quickly to target. This implies that firms consider the deviations from target costly and make quick adjustment towards target capital structure. Aybar-Arias et al. (2012) investigate the dynamism of capital structure in Spanish SMEs. They find distance between target and observed leverage having negative significant effect on adjustment speed and firms' growth and size having positive significant effect on adjustment speed.

Lemma and Negash (2014), using different measure of leverage, examine the dynamism of capital structure for 9 African economies. They find that firms' profitability has consistently positive effect on adjustment speed across all measure of leverage. Baum et al. (2017), find that companies with financial surpluses or above-target debt adapt their debt very easily when there is small firm-specific risk and strong macro-economic uncertainty. Organizations with financial losses and under-target debt are changing their capital structure easier as all forms of risk are small. The projected speed of adjustments suggest that the level over which companies adapt their capital structure against the target is greatly influenced by both firm-specific risk and economic and financial danger (Rashid, 2016). In fact, the study found that when the firm-specific risk is fairly small, companies change their leverage more rapidly against the target. Another study by Rashid and Mehmood (2017), used a firm-level panel

data tracking the time 2000–2013 to empirically analyze the effect of stock market liquidity on leveraging decisions of firms in Pakistan. They consider that liquidity on the stock market is linked to corporations' debt decisions in a major and detrimental way. Gul et al. (2016), using the sample of 200 small, medium, and large corporate firms listed at the Pakistan Stock Exchange, show that corporate governance and capital costs in big, mid and small Cap corporations are adversely associated. The finding supports the agency theory's theoretical hypothesis that creditors readily embrace a lower risk premium if companies have adequate monitoring structures to mitigate management opportunism. However, the impact of other variables on adjustment speed varies across the measures of leverage. They report that marginal tax rate has positive effect on adjustment speed towards target leverage. With regard to the effect of country specific factors on the adjustment speed, they report that countries having common law, strong shareholders rights protection, and rule of law adjust faster. They further add that developed banking sector and stock market negatively affect the adjustment speed.

### 3. Data and research methodology

#### 3.1. Sample and data

Sample of this study comprises of 143 non-financial firms listed at Karachi Stock Exchange of Pakistan. Data of these firms from 2003 to 2012 is obtained from Thomson Reuters Datastream database. Datastream contains the data for 271 companies listed at Karachi Stock Exchange of Pakistan. For some of the firms Datastream contains only the share price information. Excluding these and firms of the financial sector, the final sample comprises of 143 firms with 1190 firm year observations. This constitutes an unbalanced panel data with average of 8.32 years of the data for every firm.

#### 3.2. Model development

The target debt ratio (TD), as shown below, is considered to be the linear function of a set of explanatory factors used in previous studies of capital structure.

$$TD_{it} = \sum_{k=1}^n \beta_k V_{kit} + u_{it} \quad (1)$$

where  $TD_{it}$  is the target debt ratio of firm  $i$  at time  $t$ ,  $V_{kit}$  is the vector of firm and time variant explanatory factors of target debt ratio. In the absence of adjustment cost and other market imperfections firms would quickly respond and adjust completely to target debt due to change in explanatory variables. So firms should always be at target debt and its observed debt ( $OD_{it}$ ) should be equal to target debt ( $TD_{it}$ ), which means that  $TD_{it} = OD_{it}$ . This suggests that the change in observed debt from the last to current period should exactly be equal to the change desired for the firms to be at target at time  $t$ . This is shown below.

$$OD_{it} - OD_{it-1} = TD_{it} - OD_{it-1} \quad (2)$$

Since, firms are not likely to make complete adjustment to their target debts due to adjustment cost, they partially adjust to its target debt and their observed debt will not be equal to target debt. This partial adjustment model can be represented in Equations (3)–(7) below.

$$OD_{it} - OD_{it-1} = \delta_{it}(TD_{it} - OD_{it-1}) \quad (3)$$

$$OD_{it} = OD_{it-1} + \delta_{it}(TD_{it} - OD_{it-1}) \quad (4)$$

$$OD_{it} = OD_{it-1} + \delta_{it}TD_{it} - \delta_{it}OD_{it-1} \quad (5)$$

$$OD_{it} = OD_{it-1} - \delta_{it}OD_{it-1} + \delta_{it}TD_{it} \quad (6)$$

$$OD_{it} = (1 - \delta_{it})OD_{it-1} + \delta_{it} \left( \sum_{k=1}^n \beta_k V_{kit} + u_{it} \right) \quad (7)$$

Since target debt ( $TD_{it}$ ), in this study, is considered to be dependent upon firm specific factors such as profitability (*pro*), tangibility (*tan*), growth (*gro*), size (*siz*), earning volatility (*erv*), cash (*cash*), tax rate (*txr*), and non-debt tax shield (*ndt*), and industry specific factor such as industry median leverage (*iml*), and country specific factors such as GDP growth rate (*gdp*), interest rate (*inr*), and stock market development (*smd*), so Equation (7) can be expanded as:

$$OD_{it} = (1 - \delta_{it})OD_{it-1} + \delta_{it}\beta_1 pro_{it} + \delta_{it}\beta_2 tan_{it} + \delta_{it}\beta_3 gro_{it} + \delta_{it}\beta_4 siz_{it} + \delta_{it}\beta_5 erv_{it} + \delta_{it}\beta_6 cash_{it} + \delta_{it}\beta_7 txr_{it} + \delta_{it}\beta_8 ndt_{it} + \delta_{it}\beta_9 iml_{it} + \delta_{it}\beta_{10} gdp_t + \delta_{it}\beta_{11} inr_t + \delta_{it}\beta_{12} smd_t + u_{it} \quad (8)$$

Replacing  $(1 - \delta_{it})$  with  $\lambda_0$  and  $\delta_{it} \beta_k$  with  $\lambda_k$ , Equation (8) can be re-written as:

$$OD_{it} = \lambda_0 OD_{it-1} + \lambda_1 pro_{it} + \lambda_2 tan_{it} + \lambda_3 gro_{it} + \lambda_4 siz_{it} + \lambda_5 erv_{it} + \lambda_6 cash_{it} + \lambda_7 txr_{it} + \lambda_8 ndt_{it} + \lambda_9 iml_{it} + \lambda_{10} gdp_t + \lambda_{11} inr_t + \lambda_{12} smd_t + u_{it} \quad (9)$$

The coefficient  $\delta_{it}$ , in Equation (8), refers to adjustment coefficient or adjustment speed. It shows the amount of adjustment to its target debt ( $TD_{it}$ ).

Equation (3) suggests the degree of convergence depending on value of the parameter of adjustment. If the value of  $\delta_{it}$  is 1, it means that the complete adjustment is made within 1 period, and firm at time  $t$  is at its optimal debt level. If the value of  $\delta_{it}$  is less than 1, the adjustment from the last period ( $t-1$ ) to this period ( $t$ ) is less than the adjustment required to be at target debt. If the value of  $\delta_{it}$  is greater than 1, firm is said to over adjust and makes more adjustment than required to reach at target debt level and will not be still at target. Since  $\delta_{it}$  shows the amount of adjustment, a higher value of  $\delta_{it}$  reflects the higher adjustment speed towards target debt. In this model the target debt ratio, to which the firms make adjustment, is not determined

externally rather it is considered in the model as the linear function of the factors determining optimal debt as given in Equation (2).

The model is extended and it endogenizes the adjustment speed towards optimal debt. To explain the factors influencing the adjustment speed, it is assumed that  $\delta_{it}$  changes over time and is a linear function of some predetermined explanatory factors and a constant term as given in Equation (10). A determinant variable of the adjustment speed labeled as  $X_{it}$  is a firm related, country or country's macroeconomic variable.

$$\delta_{it} = \alpha_0 + \alpha_k X_{it} \tag{10}$$

$X_{it}$ , in Equation (10), has both cross sectional and time series dimensions when firm related factors of the speed of adjustment are used. But when the macroeconomic and other country related factors are used as the determinants of adjustment speed,  $X_{it}$  is not a firm related factor therefore the subscript  $it$  will be replaced with only  $t$ .

Now replacing the values in Equation (3) from Equations (2) and (10) and rewriting it will result into the following model.

$$OD_{it} = (1 - \delta_{it})OD_{it-1} + \delta_{it}TD_{it} + u_{it}$$

$$OD_{it} = (1 - \alpha_0 - \alpha_k X_{it})OD_{it-1} + (\alpha_0 + \alpha_k X_{it}) \left( \sum_{i=1}^n \beta_k V_{kit} + u_{it} \right) \tag{11}$$

where  $u_{it}$  is statistical error with constant variance and zero mean. Simplifying Equation (11), we get following model that is subject to our estimation.

$$OD_{it} = (1 - \alpha_0)OD_{it-1} - \alpha_k X_{it} OD_{it-1} + \alpha_0 \sum_{i=1}^n B_k V_{kit} + \alpha_k \sum_{i=1}^n X_{it} B_k V_{kit} + u_{it} \tag{12}$$

Following Haron et al. (2013) and Haron (2014), the Equation (12) is partially estimated upto  $\alpha_k$  terms (the interaction terms between lagged leverage and determinants of the adjustment speed) for interpreting the coefficients of the factors affecting the adjustment speed. The similar approach seems to be adopted in the studies of Mukherjee and Mahakud (2010), Chipeta and Mbululu (2013), and Lemma and Negash (2014). Partial estimation of the model is justified by the following two facts. First, the  $\alpha_k \beta_k$  appearing in  $\alpha_k \sum_{i=1}^n X_{it} B_k V_{kit}$  in equation, do not clearly contribute in explaining the variations, and second, they are difficult to interpret (Aybar-Arias et al., 2012).

### 3.3. Estimation technique

To estimate the partial adjustment model given in Equation (9), for estimating adjustment speed and the determinants of optimal debt, and Equation (12), for identifying factors affecting adjustment speed, Arellano and Bond (1991) difference GMM is



used. Due to presence of the lagged dependent variable ( $OD_{it-1}$ ) and fixed effects, the OLS and fixed effect regressions are likely to be biased (Drobtz et al., 2007; Xu, 2007). Given the biases of OLS and fixed effect regression, this study, in line with the suggestions of Arellano and Bond (1991), uses the difference Generalized Method of Moments (GMM) to estimate the dynamic model. Difference GMM estimator is designed for analyzing the panel data models in which the dependent variable is influenced by its past values (Mileva, 2007). The models of this study represented as Equations (9) and (12) also contain the lagged dependent variable ( $OD_{it-1}$ ) as the explanatory variable. Furthermore, Roodman (2009) also supports the use of GMM when the panel data has short time periods (T) and the large number of cross-sections/firms (N). Our panel data comprises of 143 firms and 10 years' data; hence the use of difference GMM is supported. To avoid the problems of endogeneity, an instrumental variable approach is used. Other instrumental variable techniques require the determination of external instruments to be used. However GMM uses the lagged values of the explanatory variables as the instruments. Difference GMM also avoids the problems of entity fixed effects and serial correlation in panel data by taking the differenced form of the model. Many recent studies of the dynamic capital structure such as Drobtz et al. (2007), Mukherjee and Mahakud (2010), Haron et al. (2013), and Haron (2014) use difference GMM as the estimation technique. Flannery and Hankins (2013), report that out of the established estimation techniques of dynamic panel model the GMM appears to perform better.

### **3.4. Hypotheses and measurement of variables**

Based on the findings of the earlier studies on the dynamism of capital structure, this study uses five firm specific variables and three country specific variables as the determinants of adjustment speed towards target leverage. Firm specific variables used as the determinants of adjustment speed are profitability, size, tax rate, distance between actual and observed debt, and growth (Baum et al., 2017; Rashid, 2016). Country specific variables considered as the determinants of adjustment speed are GDP, stock market development, and interest rate.

Firms may move to target debt ratio if there is large gap (distance) between actual and target leverage and the benefits of moving towards target are higher than the cost incurred. Firms avoid making frequent adjustment if transaction cost is high (Haron et al., 2013). Mukherjee and Mahakud (2010) and Haas and Peeters (2006) report the significant positive relationship between the speed of adjustment and absolute distance. Based on these findings and arguments negative relationship of distance with adjustment speed is hypothesized in Pakistan. Distance is measured as the absolute difference between observed debt and optimal debt where optimal debt is the fitted value from the fixed effect regressions of the firms on capital structure determinants. Similarly, it is inexpensive for larger firms to make quick adjustment towards target capital structure as the cost of changing capital structure is high and mainly fixed. Further due to better analysts' coverage, the large firms can have easy access to the capital markets (Drobtz & Wanzenried, 2006). These arguments lead us to hypothesize positive relationship of firms' size with its adjustment speed towards

optimal debt ratio. Natural logarithm of total assets of the firm is used as the measure of size.

Growing firms can frequently raise capital to meet their growth needs. Such firms are expected to use those financing alternatives that bring them closer to optimal debt ratio (Drobetz et al., 2007). Therefore, a positive relationship is hypothesized between firms' growth rate and adjustment speed towards optimal leverage. Drobetz and Wanzenried (2006) and Öztekin and Flannery (2012) conclude the positive relationship between speed of adjustment and growth. Percentage change in total assets is used as the measure of the growth. Profitable firms can find it relatively easier to adjust towards their target ratios due to availability of internal funds (Haron et al., 2013). Availability of internal funds reduces the cost of adjustment towards target, thus establishing the positive association of profitability with the speed of adjustment. Haron et al. (2013) report the positive relationship between the firm's profitability and adjustment speed towards optimal debt. Similarly, we also hypothesize the positive relationship of profitability with adjustment speed. Ratio of operating income to total assets is used as the measure of the profitability. The tax benefit of using debt should increase the value of reaching and maintaining the target debt ratio, hence establishing the positive relationship between the tax rate and speed of adjustment. Oztekin (2015) reports the significant positive relationship between tax and speed of adjustment towards target debt ratio. Same positive relationship of tax rate with adjustment speed is hypothesized. Ratio of taxes paid to total taxable income is used as the measure of the taxes.

Stock market development, GDP, and interest are used as the country specific determinants of adjustment speed. As argued by Demirgüç-Kunt and Maksimovic (1996) the development of financial sector improves the supply of capital in developing countries and leads to the change in composition of capital structure in developed countries. This factor's effect on adjustment speed has not been widely investigated. Clark et al. (2009) report the stock market development as a significant factor which affects the speed of adjustment towards target capital structure. Development of financial market is expected to affect the adjustment speed towards optimal debt because in developed markets the cost of raising external capital is reduced; hence reducing financial restructuring (recapitalization) cost (Lemma & Negash, 2014). Based on this argument, positive relationship is hypothesized between adjustment speed and stock market development. Stock market development is measured as the ratio of stock market capitalization to country's GDP. Regarding the economic conditions, arguments have been made that good economic conditions facilitate the movement towards optimal leverage. The adjustment cost towards target debt is lower in good economic conditions (Korajczyk & Levy, 2003). Haas and Peeters (2006) and Chipeta and Mbululu (2013) report the positive significant relationship between GDP growth rate and speed of adjustment. Using GDP as the indicator of economic growth, we hypothesize the positive its relationship with adjustment speed. Interest rate is also important factor to be considered in financial restructuring. Drobetz et al. (2007) provides the negative relationship between short term interest rates and the adjustment speed. Interest rate is found to be significant and negatively associated in one out of 10 countries' sample by Haas and Peeters (2006). We also hypothesize the

negative relationship of interest rate with adjustment speed for Pakistan. Maximum lending rate in the country is used as the measure of the interest rate from World Bank's World Development Indicators (WDI) report.

### 3.5. Measurement of dependent variable

Bevan and Danbolt (2002) report that the factors affecting debt level vary significantly and are dependent upon the component of debt analyzed. Leverage can be measured in different ways depending upon the purpose of the study (Rajan & Zingales, 1995). Haron (2014), using both static and dynamic models, concludes that inconsistencies in the results of the empirical studies regarding the capital structure arise mainly from the measure of leverage used.

In this study, following Titman and Wessels (1988), Delcours (2007), Mukherjee and Mahakud (2010), and Cho et al. (2014), we use four measures of leverage. The four measures of the leverage used are i) total liabilities to total assets ii) long term leverage measured as long term debt to total assets iii) total debt divided by the sum of the market value of equity (MV) and total debt, and iv) total debt to total assets.

## 4. Empirical findings

### 4.1. Speed of adjustment

Table 1 reports the estimation results of Equation (9) for different proxies of leverage, using Arellano and Bond (1991) difference GMM estimation technique. Equation (9) has been estimated using second lag of all explanatory variables as instruments. Table 1 shows that the p-values of Hansen test for all measures of leverage are greater than 0.05 suggesting that the null hypothesis of the exogeneity of the instruments cannot be rejected and the instruments are valid. Table 1 also reports Arellano-Bond test for second order autocorrelation (AR2) tests. AR (2) examines the null hypothesis that the error terms of differenced equation are not serially correlated at second order. The p-values of AR (2) reported in Table 1 suggests that error terms are not serially correlated at levels so the null hypothesis cannot be rejected. Table 1 also reports the results of third diagnostic test named F-test. The null hypothesis of this test in the model is that all coefficients of the determinants of target leverage are jointly equal to zero. Table shows that the p-value of F- statistics for all measures of leverage are less than 0.05; hence rejecting the null hypothesis. Table 1 also reports the average variance inflating factor (VIF), which is used to check the multicollinearity in data. Regarding the VIF, Gujarati (2004) states a rule of thumb, suggesting that if VIF is more than 10 then the variables are said to be highly collinear. The Table 1 shows that overall mean of VIF for all proxies of debt is lower than 3. Hence multicollinearity is not an issue in our model.

First row of the Table 1 shows the value of the coefficient of the lagged dependent variables. The lower the coefficients of the lagged dependent variables, the higher will be the speed. The coefficients of lagged dependent variables for all measures of leverage are significant at 1%. The significance of the lagged dependent variable confirms the existence of target capital structure among Pakistani firms and they make partial movement to that target. The coefficient of lagged long term debt as the dependent variable is reported to be 0.422 and is less than 1. Given that the adjustment coefficient,  $\lambda_0$ ,

**Table 1.** Adjustment speed and determinants of target debt.

Variable	Long term debt (ODltd)			Total liabilities (ODtl)			Total debt (ODtd)			Total debt market value (ODmvd)		
	Coefficient	t-stat	p-value	Coefficient	t-stat	p-value	Coefficient	t-stat	p-value	Coefficient	t-stat	p-value
OD <sub>t-1</sub>	0.4225	4.46	0***	0.5552	6.66	0***	0.3655	5.26	0***	0.3122	4.56	0***
pro	-0.4071	-2.15	0.033**	0.0345	0.21	0.838	-0.1084	-0.62	0.535	0.1716	0.7	0.485
tan	0.3510	1.95	0.053**	-0.0757	-0.79	0.43	0.2642	1.46	0.145	0.1956	1.27	0.205
gro	0.0032	0.29	7.70E-01	1.33E-02	2	0.048**	0.1246	3.8	0***	0.1088	2.85	0.005***
tax	-0.0040	-0.35	0.729	0.0024	0.19	0.847	-0.0134	-1.22	0.225	-0.0233	-1.63	0.105*
erv	-0.6557	-2.71	0.008***	-0.2272	-1.38	0.171	-0.4076	-2.64	0.009***	-0.175	-0.78	0.44
ndt	-0.8243	-0.93	0.354	0.7429	1.1	0.274	1.3515	1.52	0.13	0.7875	0.8	0.428
csh	0.1049	0.44	0.663	-0.3060	-1.84	0.067*	-0.3849	-1.97	0.05**	-0.5908	-2.24	0.027**
siz	-0.0786	-2.73	0.007***	-0.0239	-0.88	0.378	-0.0168	-0.52	0.603	0.0126	0.3	0.768
iml	0.5935	4.33	0***	0.5294	4.83	0***	0.3059	3.11	0.002***	0.5250	4.39	0***
gdp	0.0032	1.12	0.264	0.0023	0.83	0.408	-0.0003	-0.11	0.916	0.0034	0.86	0.389
inr	0.0001	0.03	0.98	-0.0005	-0.14	0.891	6.7E-05	0.02	0.987	0.0039	0.86	0.392
smd	-0.0005	-1.17	0.244	-0.0008	-2.58	0.011***	0.0003	0.67	0.504	-0.0004	-0.9	0.37
Mean VIF	2.64			2.65			2.63			2.65		
AR(1)	-2.87***			-3.06***			-3.71***			-4.76***		
AR(2)	-0.11			1.27			-1.47			-0.37		
Hansen J-Stat	75.51			61.02			69.22			68.74		
F-Stat	13.43***			15.65***			9.30***			18.98***		
Number of instruments	80			80			80			80		

Note: This table presents the estimation results of Equation (9) to obtain estimates of adjustment speed and the factors affecting the target debt.  $OD_{t-1}$  is the lagged leverage. *pro* is the profitability measured as the ratio of operating income to total assets. *tan* is the tangibility measured as the ratio of net property, plant, and equipment and inventory to total assets. *gro* is the firms' growth measured as the percentage change in total assets from the last year. *tax* is the firms' effective tax rate measured as the ratio of taxes paid to total taxable income (pretax income). *erv* is the earning volatility measured as the ratio of the standard deviation of operating income to total assets. *ndt* is the non debt tax shield measured as the ratio of annual depreciation, depletion, and amortization expense to total assets. *csh* is the cash measured as the ratio of the sum of depreciation and net income to total assets. *siz* is the firm size measured as the natural logarithm of total assets of the firm. *iml* is the industry median leverage. *gdp* is the annual growth in nominal GDP. *inr* is the interest rate, which is the maximum lending rate in the country using world Bank's WDI. *smd* is the stock market development measured as the ratio of Stock Market capitalization to country's GDP. Coefficients marked \*\*\*, \*\*, and \* are significant at the 1%, 5%, and 10% level of significance respectively. Source: Author's own calculation by using the STATA software.

is equal to  $1-\delta_{it}$ , the adjustment speed turns out to be 0.578 or 57.8 percent. This implies that it takes 1.73 years, calculated as  $1/\delta_{it}$ , to firms in Pakistan to be on target or optimal debt level. This partial movement towards target is due to the existence of transaction cost (Ozkan, 2001). The coefficient of the lagged dependent variable using total liabilities to total assets as proxy of leverage is 0.555. The adjustment speed turns out to be 0.445 or 44.5 percent implying that it takes firms 2.25 years in Pakistan to move to the target debt ratio. Considering total debt, measured as the sum of long term debt and short term debt to total assets, as proxy of the leverage, the adjustment speed towards target is 0.6345 or 63.45 percent. In terms of time, it takes 1.58 years to make full adjustment towards optimal debt. Similarly using quasi market value leverage, calculated as total debt divided by the sum of book value of debt and market value of equity as proxy, the adjustment speed is 0.688. In terms of years it takes 1.45 years to make full adjustment towards target. The adjustment speed towards optimal debt in Pakistan ranges from 44 percent to 69 percent using four different measures of debt. Total time to be taken to make full adjustment towards target, is in the range of 1.45 years to 2.25 years. Haron (2014) also concludes that the use of different estimation techniques with same measure of leverage or different measures of the leverage with same estimation technique yield different results. The range of adjustment speed confirms that the adjustment speed is a function of how we measure the leverage (Lemma & Negash, 2014). Lemma and Negash (2014) estimate adjustment speed ranging from 39.4 percent to 59 percent depending upon the measure of leverage used.

The estimated adjustment speed of Pakistani firms is comparable to 57 percent of Malaysia, as estimated by Haron et al. (2013) and it is higher than the range of 27% to 39% reported by Getzmann et al. (2010) for Asian firms, 43% for Indian firms (Mukherjee & Mahakud, 2010), and 40 percent for South African firms (Matemilola et al., 2013). The estimated speed of adjustment is also higher than 33 percent estimated by Flannery and Rangan (2006) for firms included in Compustat database and 34 percent for USA. Ozkan (2001) reports the adjustment speed of 43 percent for UK firms. Elsas and Florysiak (2011) estimate the adjustment speed of 26 percent for all Compustat firms. Table 1 also reports the coefficients of the determinants of optimal leverage. Findings regarding the impact of firm specific factor on target debt, suggest that firms' financing behavior in Pakistan also cannot be explained by any particular single theory rather a combination of theories explain the financing decisions in Pakistan, as stated by (Seetanah et al., 2007). Findings regarding the impact of industry median leverage on firms' leverage reveal that firms in Pakistan follow the industry benchmarks, as their respective leverages are significantly determined by the industries they belong to. The higher the industry median leverage the higher is the firms' leverage. This finding is also consistent with the empirical studies, such as (Cho et al., 2014; Hanousek & Shamshur, 2011; Jøeveer, 2013). In sum, the results regarding the factors affecting optimal leverage are largely consistent with already available empirical findings.

#### **4.2. Determinants of adjustment speed**

Table 2 shows that the findings of this study, regarding the factors affecting adjustment speed, are mostly consistent with the previous studies' findings for developed

**Table 2.** Determinants of adjustment speed.

	Long term debt (ODltd)			Total liabilities (ODtl)			Total debt (ODtd)			Total debt market value (ODmvd)		
	Coefficient	t-stat	p-value	Coefficient	t-stat	p-value	Coefficient	t-stat	p-value	Coefficient	t-stat	p-value
OD <sub>t-1</sub>	5.0300	4.73	0***	0.9301	1.87	0.064**	3.7198	3.4	0.001***	1.4775	1.23	0.22
pro OD <sub>t-1</sub>	-0.9568	-1.48	0.142	-1.0844	-4.15	0***	-0.6014	-2.12	0.036**	-0.9868	-3.09	0.002***
gro OD <sub>t-1</sub>	0.0180	0.31	0.755	0.02907	0.88	0.378	0.1158	1.65	0.1*	0.1257	1.53	0.128
siz OD <sub>t-1</sub>	-0.2666	-3.7	0***	-0.03673	-1.03	0.305	-0.2337	-3.26	0.001***	-0.0881	-1.1	0.274
tax OD <sub>t-1</sub>	0.0548	0.63	0.53	-0.0126	-0.53	0.6	0.0346	1.11	0.271	0.0364	1.43	0.154
ds OD <sub>t-1</sub>	-0.1801	-0.26	0.799	0.1937	1.16	0.247	1.2847	4.17	0***	-0.0728	-0.15	0.878
smd OD <sub>t-1</sub>	0.0019	0.78	0.438	-0.0019	-3.55	0.001***	-0.0009	-0.84	0.405	-0.0050	-3.57	0***
inr OD <sub>t-1</sub>	-0.0094	-0.43	0.67	0.0090	1.23	0.221	0.0089	0.88	0.383	0.0337	2.44	0.016**
gdp OD <sub>t-1</sub>	-0.0181	-0.69	0.494	0.0098	1.67	0.097*	-0.0137	-1.62	0.107*	0.0038	0.46	0.645
AR(1)	-4.78***			-3.52***			-1.85**			-4.37***		
AR(2)	-0.48			0.03			-0.57			-0.52		
Hansen	45.54			43.94			35.47			43.75		
F-Stat	14.96***			7.56***			6.29***			9.07***		
Number of Instruments	50			50			50			50		

Note: This table presents the estimation results of Equation (12) using difference GMM to investigate the determinants of adjustment speed. OD<sub>t-1</sub> is the lagged leverage. proOD<sub>t-1</sub> is the interaction term between profitability and lagged leverage. groOD<sub>t-1</sub> is the interaction term between firms' growth and lagged leverage. sizOD<sub>t-1</sub> is the interaction term between firm size and lagged leverage. taxOD<sub>t-1</sub> is the interaction term between effective tax rate and lagged leverage. dsOD<sub>t-1</sub> is the interaction term between distance of observed debt and target debt with lagged leverage. smdOD<sub>t-1</sub> is the interaction term between stock market development and the lagged leverage. inrOD<sub>t-1</sub> is the interaction term between interest rate and the lagged leverage. gdpOD<sub>t-1</sub> is the interaction term between gdp and the lagged leverage. The coefficients of these interaction terms between variables and lagged leverage are used to investigate the effect of these variables on adjustment speed. Coefficients marked \*\*\*, \*\*, and \* are significant at the 1%, 5%, and 10% level of significance respectively. Source: Author's own calculation by using the STATA software.

and developing countries. Profitability has positive significant relationship with adjustment speed for three out of four measures of leverage. Positive relationship of profitability with adjustment speed in Pakistan is justified by the argument of Myers and Majluf (1984) that the higher the profitability the higher are the internal funds available; hence easier for the firms to make adjustment towards target. Similar results of the positive relationship of profitability with adjustment speed are also reported in other studies such as Lemma and Negash (2014) for 9 African economies and Haron et al. (2013) for Malaysia. Growth has negative significant relationship with adjustment speed for only one measure of leverage. Negative relationship of growth with adjustment speed is supported by the argument of Eriotis et al. (2007) that high growth causes variations in firms' value, which shows the increased risk; hence making it difficult to raise capital at favorable terms. Negative relationship of growth with adjustment speed for Pakistani firms is similar to the findings of the studies of Banerjee et al. (2004) for US and UK, Heshmati (2001) for Swedish firms, and Haron et al. (2013) for Malaysian firms. Positive significant relationship of firm size is found for two measures of leverage. Positive relationship of size with adjustment speed in Pakistan is justified by two arguments. First, the cost of changing capital structures is largely fixed and is relatively small for large firms so such firms may make quicker adjustments towards their target (Mukherjee & Mahakud, 2010). Second, large firms have superior analysts' coverage in market, and information of such firms is readily available to the investors, so consequently they have better access to capital market (Drobetz & Wanzenried, 2006). Similar findings regarding the impact of size on adjustment speed is reported in studies such as Banerjee et al. (2004), Drobetz et al. (2007) for Germany France, Italy, and UK, Mukherjee and Mahakud (2010) for India, and Aybar-Arias et al. (2012) for Spain. Firms' tax rate is found to be insignificant in determining adjustment speed in Pakistan across all measures of leverage with varying signs. Distance between optimal and observed debt has negative significant relationship with only total debt to total assets proxy of debt. Negative relationship of distance from target and adjustment speed towards target is supported by the argument of Banerjee et al. (2004) and Haron et al. (2013) that the firms at small distance from target may choose to make quick adjustment internally without incurring transaction costs. Banerjee et al. (2004) for UK firms, Aybar-Arias et al. (2012) for Spanish SMEs, and Haron et al. (2013) for Malaysian firms also report significant negative effect of distance on adjustment speed.

Stock market development has positive significant impact with adjustment speed using total liabilities to total assets and quasi market value leverage ratios. Positive impact of stock market development on adjustment speed is supported by Demirgüç-Kunt and Maksimovic (1996) who indicate that when there is development of one financial sector in developing countries, the overall capital supply increases. Clark et al. (2009) also reveal that the stock market development is an important factor affecting the adjustment speed and has significant positive impact. Interest rate has negative significant impact on adjustment speed for only one measure of leverage. Negative relationship of interest rate with adjustment speed is supported by the argument that low interest rate in the country stimulates the borrowing by the firms to diverge to optimal debt (Drobetz et al., 2006). The negative relationship of interest



rate with adjustment speed in Pakistan is similar to the findings of Haas and Peeters (2006) for central and eastern European economies and Drobetz et al. (2007) for Germany, France, Italy, and UK. GDP has negative significant relationship with adjustment speed for total liabilities to total assets measure of leverage. Haas and Peeters (2006) state that the firms can easily move towards target when economic conditions are good. Positive relationship of GDP growth with adjustment speed is similar to the findings of Haas and Peeters (2006) for central and eastern European economies, Clark et al. (2009) for developed countries subsample, and Öztekin and Flannery (2012) for group of 37 countries. To sum up, in response to the question of investigating factors affecting the adjustment speed towards target debt, the findings of this study are mostly consistent with the previous studies' findings for developed and developing countries. Firms' profitability has positive significant relationship with adjustment speed for all four measures of leverage. Growth is found to have no effect on adjustment speed across all measures of leverage. Distance between actual and optimal debt and firms' effective tax rate has significant impact on speed of adjustment for two measures of leverage. Stock market development has consistently positive significant impact on adjustment speed towards target leverage. GDP growth rate and prevailing interest rate in the economy have significant impact on speed of adjustment towards target debt in Pakistan. The results regarding the impact of the above factors on the adjustment speed are well justified and explained by the earlier studies including (Banerjee et al., 2004; Chipeta & Mbululu, 2013; Clark et al., 2009; Drobetz & Wanzenried, 2006; Flannery & Rangan, 2006; Lemma & Negash, 2014; Mukherjee & Mahakud, 2010; Öztekin, 2015).

## 5. Conclusion

This study aims at investigating the dynamism of capital structure in Pakistan. The study contributes in the literature for dynamic capital structure of Pakistan by examining the existence of target capital structure, estimating adjustment speed towards target capital structure, and determining factors affecting adjustment speed. Using difference GMM as the estimation technique for a sample of 143 non-financial listed firms of Pakistan, the study confirms the existence of target capital structure in Pakistan. The adjustment speed towards optimal debt in Pakistan ranges from 44 percent to 69 percent depending upon the measures of debt used. Total time to be taken to make full adjustment towards target, is in the range of 1.45 years to 2.25 years. The estimated adjustment speed towards optimal debt is found to be comparable with other developing countries such as Malaysia, India, Thailand and some African countries. Like other developing countries' adjustment speed, the adjustment speed of Pakistani firms is also higher than the developed countries such as US and UK.

Regarding the factors affecting adjustment speed, the study finds firm size as the significant determinant of adjustment speed when long term debt to total assets is used as the measure of leverage. It has positive relationship with adjustment speed in Pakistan. For other measures of leverage size has insignificant impact. Profitability and stock market development are found to have positive significant impact on adjustment speed using total liabilities to total assets as the measure of the leverage.



Using same proxy of the debt, GDP is found to have negative significant impact on adjustment speed. It is further shown that profitability, size, and GDP have positive significant impact on adjustment speed using total debt as the measure of leverage. Using same measure, distance and growth have negative impact on adjustment speed in Pakistan. Finally using quasi market value debt, profitability and stock market development have positive significant impact, and interest rate has negative significant impact on adjustment speed towards target debt in Pakistan.

As a limitation, this study used the data from 2003 to 2012, however updated data may provide the more robust results but the results of the current study is still relevant to the recent times due to the wide range of proxies used to measure leverage. Furthermore, future studies may be conducted that may consider pre and post Covid-19 situation because interest rate has been reduced drastically in Pakistan. Therefore, it will be very interesting to examine whether it affects the speed of adjustment towards optimum level of debt.

### Disclosure statement

No potential conflict of interest was reported by the author(s).

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