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What Determine the Speed of Adjustment towards Target Leverage? An Empirical Study on Egyptian Non-Financial Firms

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Abstract

The purpose of this research is to study the dynamics of capital structure in Egypt to analyze the determinants of the speed at which Egyptian non-financial firms adjust towards target leverage.

The author employs the partial adjustment model using GMM estimation technique, the model that has been extensively used in literature to study capital structure dynamics. This research uses two proxies for firm leverage to provide robust results and further evidence on employed model.

Results provided robust evidence that there is target leverage determined by firm-specific determinants and political uncertainty, where Egyptian non-financial firms do adjust towards that target at a rapid speed (62 per cent). Speed of adjustment is determined by set of firm-specific determinants.

This research is intended to fill literature gap where there is lack of empirical studies analyzing the determinants of speed of adjustment for Egyptian non-financial firms. Too, inclusion of political uncertainty among controlling variables falls outside the conventional use of firm-specific variables; the action that best suits the Egyptian market that was subject to political changes during the past years. Outcome of this study shall contribute to better understanding of implications of the choice of capital structure as one of the important and complex decisions in finance.

Keywords: Speed of Adjustment, Capital Structure, Generalized Method of Moments, Egypt.
JEL Classification Code: G32

1. Introduction

Due to its proven significance and importance on business success and continuity, capital structure has been addressed as one of the key areas in finance. The choice of the source of finance is always the most important and complex decision for financial managers due to its impact on the firm's cost and availability of capital.

Capital structure theories have been evolved to explain the firm's attitude towards choosing the different sources of finance. MM proposition I by Modigliani and Miller (1958) stated that the value of the firm and its weighted average cost of capital is independent of the capital structure under the assumption that markets are perfect and frictionless, however this is not the case in the real world

where firms pay taxes. In 1963 Modigliani and Miller relaxed their assumption and introduced corporate taxes. (MM Proposition II) M & M (1963) argued that the benefits of corporate taxes lie in the tax deductibility on interest payments that favors the choice of debt over equity. They concluded that firm value increases in response to the increase in debt ratio and the optimal debt ratio is 100 per cent. In 1977 The Static trade-off theory is developed by Myers. Myers (1977) argued that firms maximize their value by trading off the benefits and costs of debt. Firms use debt to benefit from the tax deductibility on interest payments until the marginal benefit of debt is offset by the cost of debt represented by the bankruptcy cost as well as the agency cost that appears at high debt ratios where conflicts of interest arise between bondholders and stockholders in financial distress periods. Agency cost theory introduced the agency cost that arises from the existence of debt and outside equity and proposed that optimal capital structure can be achieved by minimizing the agency cost. As proposed by Ross (1977), there is an information asymmetry between investors and managers, Ross employed the incentive-signaling approach that suggests that increasing leverage will increase firm value since increasing leverage sends a positive signal to investors and accordingly increases the market's perception of value. Pecking order theory (information asymmetry theory) by Myers (1984) suggests that there is a hierarchical preference of firms for choosing the sources of finance, firms tend to initially use retained earning where information asymmetry don't exist and then use debts if additional funds are needed and finally issue equity to cover the remaining fund requirements. Finally, market timing theory developed by Baker and Wurgler (2002) stated that firms slowly adjust toward a target leverage ratio and they only choose equity financing when it appears more valued by financial markets. Too, inertia theory developed by Welch (2004) further supported that firms slowly adjust toward a target leverage ratio as they consider stock price movement prior to deciding to choose equity financing.

Literature is full of empirical studies that addressed the effect of leverage on the profitability of the firms and the determinants of capital structure in different aspects including firm-specific characteristics and management behavior. Most of the classical studies in this regard have been criticized due to ignoring adjustment costs that are usually considered by the firms prior to adjusting the debt-equity mix. Literature also analyzed the dynamics of the capital structure and addressed the firms' behavior in adjusting their current debt-equity mix toward a target level in terms of the speed of adjustment of the their debt ratios considering the adjustment cost that managers consider prior to changing the debt-equity mix (see Heshmati, 2001; Emrah & Koray, 2014). Recent empirical efforts (see Haron et al., 2013; Naveed et al., 2015) are directed towards studying the determinants of the speed of adjustment where results showed set of determinants, some of which are firm specific determinants while others are related to macro-economic conditions.

The Egyptian market has been analyzed in different aspects. Mary et al. (2011) examined the determinants of capital structure choice while, Eldomiaty and Azim (2008) analyzed capital structure dynamics. Moreover, the different capital structure theories have been tested and some of which have been found relevant to the Egyptian context (see Eldomiaty & Ismail, 2005). Finally, Tesfaye and Negash (2014) studied Egypt among nine African countries from 1999 to 2008 and concluded that countries adjust towards target leverage at different speeds and that firm-specific factors affect speed of adjustment according to the used proxy for firm leverage.

This study will examine the dynamics of capital structure in Egypt in attempt to provide an evidence about the speed of adjustment towards target leverage, find the determinants of target capital structure, and analyze the determinants of the speed of adjustment to target capital structure. GMM estimation technique is employed for a period that is designed to cover periods of political changes that faced Egypt during the past years. This research attempts to contribute to the literature of emerging markets in the capital structure dynamics topic. Only couple of studies addressed the dynamics of capital structure in Egypt, one of which by Eldomiaty and Azim (2008) where the variables under study were only limited to firm size and growth opportunity on categorization bases and used OLS estimation that is not efficient to overcome endogeneity problem in dynamic models (see Roodman,

2009), while the other study by Tesfaye and Negash (2014) covers only till 2008 where effect of political changes is not captured.

Findings of this research reveal that Egyptian non-financial firms do adjust towards a target leverage at a rapid speed of 62 per cent that is determined by set of firm-specific factors. Pecking order, market timing, and inertia theories are strong theoretical support for the concluded results, while some previous empirical studies reported similar results. On the macro level, investigations revealed that political uncertainty has positive effect on target leverage.

2. Previous Research

Banerjee et al. (2000) made a comparison between US and UK firms where they studied 426 US firms for the period from 1989 to1996 and 122 UK firms for the period from 1990 to 1996 in non-linear model. They concluded a negative impact of distance from target on the speed of adjustment where UK firms adjust slowly to target leverage that substantially deviates from target while in US, distance variable found to be insignificant. They also concluded that expected growth has a negative impact on adjustment speed while growth opportunity has a positive effect on speed of adjustment in both US and UK firms.

An investigation in one of the European markets is carried out by Drobertz and Wanzenried (2006). They analyzed 90 Swiss firms for the period from 1991 to 2001 and applied difference GMM estimation as proposed by Arellano and Bond (1991). They used first differences and instrumented endogenous variables through lagging variables twice. Regarding firm-specific variables, distance and growth are positively impacting speed of adjustment and size is insignificant while on the macro-economic level, term spread (a proxy for economic conditions, high term reflects good prospects) has a positive impact while ishort (short term interest rate) has negative impact on speed of adjustment.

In different market context, Mahakud and Mukherjee (2011) studied 891 Indian manufacturing firms for the period from 1994 to 2008. Results of difference GMM estimation revealed that tangibility and dividends have negative impact on speed of adjustment while size, profitability, distance, growth opportunities, non-debt tax shield, business group affiliation (ownership structure) and macro-economic conditions have positive impact on speed of adjustment.

Haron et al. (2013) analyzed 790 non-financial Malaysian firms for the period from 2000 to 2009. They concluded that Malaysian firms do adjust to a target capital structure at rapid speed (57 per cent). They found that the closer the gap between current and target leverages, the higher the speed of adjustment. They also concluded that firm size and profitability have significant positive impact on the speed of adjustment while growth opportunity is insignificant.

An empirical study by Naveed et al. (2015) focused on textile sector in Pakistan. They studied 147 textile sector listed Pakistanian companies for the period from 2003 to 2011. They employed difference GMM and system GMM where results of the former outperformed the later. Results of difference GMM revealed 51 per cent speed of adjustment, insignificant impact of tangibility on speed of adjustment, positive impact of growth opportunities while size, profitability and liquidity show negative impact. In the crisis period (defined from 2009 to 2011), 73 per cent speed of adjustment is concluded, only profitability significantly determined speed of adjustment while all other studied determinants were insignificant.

In their attempt to study the institutional differences that impact the speed of adjustment, Oztekin and Flannery (2011) analyzed 37 countries for 16 years based on Q4 2005 data of Elkins McSherry. They categorized the sample countries into three main categories. First category is related to the legal origin (English, French, German, Civil, Common, Scandinavian), the second category has to do with the financial system structure (market based, bank based), while the last category is based on the financial system development. Results of the partial adjustment model showed that legal origin and financial institutions significantly impact the adjustment speed through impacting the costs and benefits of adjusting leverage. They also concluded that better institutional features are considered contributing factor to lowering transaction costs and accordingly higher adjustment speed; the

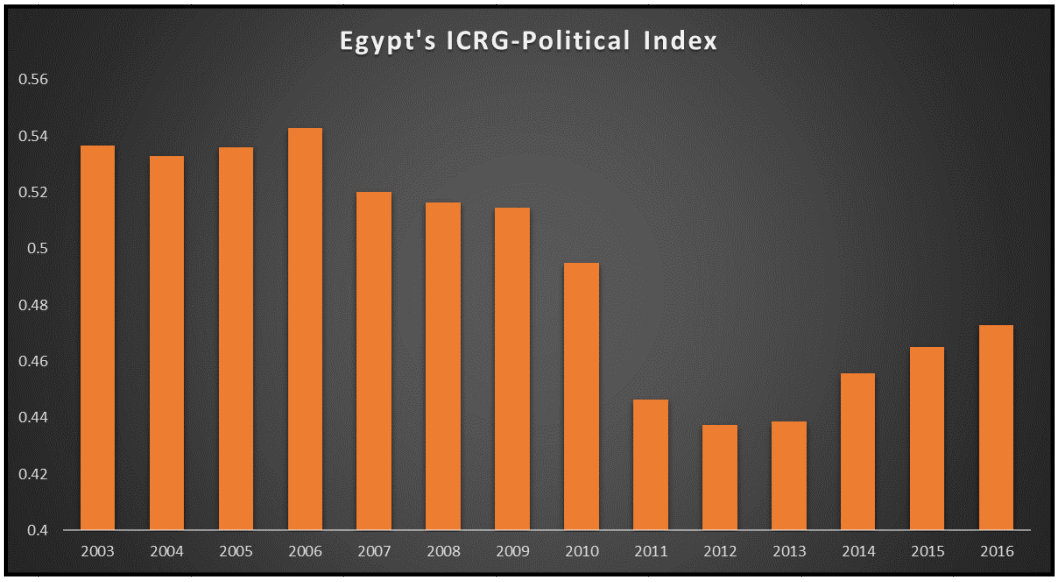
conclusion that is consistent with the dynamic trade off theory. Finally, Tesfaye and Negash (2014) studied different levels of determinants of speed of adjustment (industry, firm-characteristics, macro-economic and institutional). Using system GMM, analysis over 986 firms from nine African countries (including Egypt) for the period from 1999 to 2008 revealed that firms do adjust towards target leverage at speeds that differ across countries, industries, marginal corporate tax and stock market size (Kenya adjusts at fast rate of 65 per cent, Egypt at 47 per cent while Morocco showed the least speed (18 percent)). They further concluded that profitability impacts speed of adjustment positively while effects of firm size and distance from target leverage depend on the used proxy for firm leverage.

3. Data

3.1. Data Collection and Period of Study

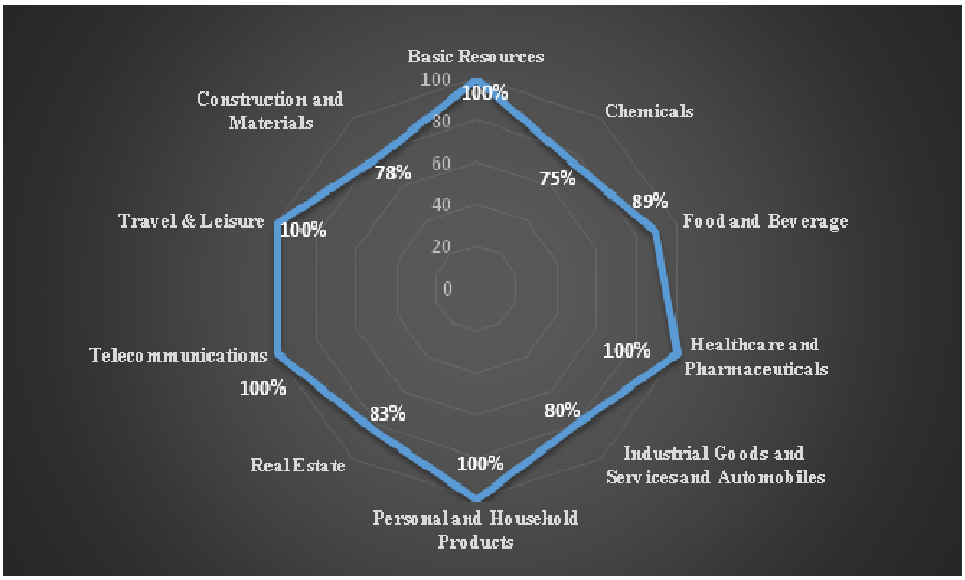
To count for the potential effect of political uncertainty, and to avoid the effect of currency devaluation (that is recommended for future work) that took place early 2016, data collection covers the period from 2003 to 2014. The following figure depicts the trend of Egypt's ICRG political index. Couple of declines in Egypt's ICRG-political index is noticed. One major decline on 2011, that is believed to be due to Jan 25th revolution. Sowers and Toensing (2012) stated that year 2011 witnessed the beginning of political and social major restructuring in Egypt. Another decline is noticed on 2007 in response to labour strikes. Beinin and El-Hamalawy (2007) described the strike as the longest and strongest wave of worker protest in Egypt.

Figure 1: Trend of Egypt's ICRG-political index



171 non-financial companies listed in the Egyptian stock exchange are analyzed for the period from 2003 to 2014 resembling 88 per cent of all listed non-financial companies. Financial ratios are formulated to represent the variables under study based on available financial data from financial statements for non-financial companies for the period from 2003 to 2014. Construct validity is secured through choosing proxies to measure variables that are supported by literature and can be collected easily from available financial disclosed data. The following figure depicts the distribution of the selected 171 non-financial companies in terms of industry coverage as per the last released Sector Index.

Figure 2: Distribution of the 171 companies in terms of sector coverage



3.2. Firm Leverage

Capital structure has been used with various proxies in literature. Too, there are some debates around the use of the book and market values of the debt ratio and the use of the different leverage ratios to proxy for the firm's leverage. Most of the empirical studies have used the book value of debt ratio like the one by Drobertz and Wanzenried (2006) while few studies analyzed the market value of debt (see Murray & Vidhan, 2009; Banerjee et al., 2000). This is due to unavailability of public quotes for bond issues and that most of the corporate debts are traded over the counter (not listed on an exchange) and large number of these debts is traded infrequently. Chen et al. (1998) proved that considering the book and market values gives completely different results. Myers (1977) supported the argument of using the book value of debt as it is related to the value of assets in place while Taggart (1977) found that there is very little to choose between book and market value formulations. Haron (2014) made a study over emerging and developed markets aiming at comparing results of both static and dynamic capital structure models using six different definitions of leverage. He concluded that results are inconsistent when using same model with different leverage definitions and also when using same leverage definition with different models but inconsistencies in the first case were more obvious. Moreover, Tesfaye and Negash (2014) concluded that firm-specific factors affect speed of adjustment according to the used proxy for firm leverage.

In the context of studying the determinants of speed of adjustment, some studies used the book value of total debts over the sum of the book value of total debts plus the market value of equity (see Banerjee et al., 2000; Mahakud & Mukherjee, 2011). The author uses this proxy where the market value of equity takes into account the potential growth of the firms and hence will be relevant to proxy the leverage ratio in studying the dynamics of capital structure. The author conducts the same analysis using the book value of debts over the book value of assets, the proxy that has been widely used in the capital structure literature in order to provide robust results and further evidence on the employed partial adjustment model.

Factors Affecting Target Leverage and Speed of Adjustment

The author studies the most common determinants of target leverage (firm size, assets tangibility, profitability, non-debt tax shield, growth opportunity and industry average) as reviewed from literature. Too, firm-specific and macro-economic factors affecting speed of adjustment are studied (see Mahakud & Mukherjee, 2011; Haron et al., 2013). The following table depicts the used proxy for each variable in the model based on previous empirical studies.

Table 1: Variables, proxies and supporting studies

Explanatory Variable	Proxy	Empirical Support
Firm leverage	1) Book value of total debts/total assets	Flannery and Rangan (2005) and Emrah and Koray (2014)
	2) Book value of total debts/(book value of total debts + market value of equity)	Banerjee et al. (2000) and Mahakud and Mukherjee (2011)
Distance from target leverage	Target leverage - leverage at t	Drobertz and Wanzenried (2006), Mahakud and Mukherjee (2011) and Haron et al. (2013)
Firm size	Natural log of total assets	Eldomiaty and Azim (2008), Mahakud and Mukherjee (2011), Haron,et al. (2013) and Naveed et al. (2015)
Assets tangibility	Fixed assets/total assets	Eldomiaty and Azim (2008), Mahakud and Mukherjee (2011), Haron et al. (2013) and Naveed et al. (2015)
Profitability	Net income/total assets	Heshmati (2001) and Drobertz and Wanzenried (2006)
Non-debt tax shield	Depreciation/total assets	Eldomiaty and Azim (2008) and Mahakud and Mukherjee (2011)
Growth opportunity	Annual percentage change in total assets	Heshmati (2001) and Eldomiaty and Azim (2008)
Macro-economic conditions	Real GDP growth rate (constant price GDP growth rate)	Mahakud and Mukherjee (2011)
Political uncertainty	International country risk guide-political index	Desai et al. (2008)

4. Methodology

4.1. Research Model

In order to study the dynamics of capital structure, the author employs the partial adjustment model as proposed by many empirical studies (see Haron et al., 2013; Emrah & Koray, 2014; Naveed et al., 2015). Internal validity is secured since the partial adjustment model has been widely used and proved that firms do adjust towards target leverage. The model proposes that firms seek to reach a target capital structure but are not able to do that immediately due to the existence of adjustment or transaction costs. The partial adjustment model implies that firms set a target capital structure to achieve irrespective to the initial/current capital structure.

Partial adjustment model can be expressed as follows:

$$(FLit - FLit\text{-}1) = \lambda\,(FL^{*}it - FLit\text{-}1) + \varepsilon it \quad (1)$$

Where,

FLit represents firm leverage for firm i at period t.

FLit-1 represents firm leverage for firm i at period t-1.

λ represents the speed of adjustment towards the target leverage where firms achieve portion λ each year of the remaining difference between leverage at time t-1 and the target leverage.

FL*it represents the target leverage that is determined by set of variables ($FL^{*}it = \beta\, Xit$).

Substituting the previous equation in the partial adjustment model, we get the following equation:

$$FLt = (1 - \lambda)\, FLit\text{-}1 + \lambda\,(\beta\, Xit) + \varepsilon it \quad (2)$$

Where,

Xit represents firm specific variables that determine target leverage for firm i at period t.

β represents coefficient of each determinant of target leverage. Effect of each determinant is discussed in the following section.

For the sake of analyzing the determinants of speed of adjustment, λ is assumed to change over time and the following equation is used following Mahakud and Mukherjee (2011).

$\lambda it = k + \Phi Zit$

Where,

λit represents the speed of adjustment for firm i at period t.

k represents unobservable factors related to the firm.

Zit represents the variables that impact the transaction cost (determinants of speed of adjustment).

Φ represents the coefficient of each determinant of speed of adjustment.

Substituting the previous equation in the partial adjustment model (equation # 2), we get the following equation.

$$FLit = (1-k)\, FLit\text{-}1 - \Phi Zit\, FLit\text{-}1 + (k + \Phi Zit)(\beta Xit) + \varepsilon it \quad (3)$$

4.2. Determinants of Speed of Adjustment and Research Hypotheses

(Z1): Distance from Target Leverage

The distance between the current leverage and the target one has been considered by most empirical studies as one of the key determinants of the speed of adjustment to target leverage; accordingly the author seeks to test the impact of this variable in the Egyptian context. Results of empirical studies are mixed about the impact of the distance variable. Mahakud and Mukherjee (2011) and Drobertz and Wanzenried (2006) argued and concluded in their studies that the speed of adjustment to target leverage is more rapid when the distance from target is far while Haron et al. (2013) and Banerjee et al. (2000) concluded that the distance variable impacts the speed of adjustment negatively in case fixed costs (bank fees and/or legal fees) constitute large part in the cost of changing leverage. The author formulates the below hypothesis following Haron et al. (2013) and Banerjee et al. (2000).

Ha1: There is a negative impact of distance on the speed of adjustment to target leverage.

(Z2): Firm Size

Firm size has been used widely in the capital structure studies as one of the determinants of leverage due to its relation with the information asymmetry (Myers, 1984) that blocks firms from adjusting their debts and equity. Since small firms are more subject to information asymmetry, firm size is expected to positively impact the speed of adjustment. Most of the studies confirmed the positive impact of firm size on the speed of adjustment (see Banerjee et al., 2000; Mahakud & Mukherjee, 2011; Haron et al., 2013), therefore the below hypothesis is formulated to test the applicability of this result on the Egyptian market.

Ha2: There is a positive impact of firm size on the speed of adjustment to target leverage.

(Z3): Assets Tangibility

Assets tangibility is expected to impact the speed of adjustment where the cost of deviation from target leverage increases in firms where collateral is not secured (Harris & Raviv, 1991). In their study on 891 Indian manufacturing firms, Mahakud and Mukherjee (2011) concluded a negative impact of tangibility on the speed of adjustment, then the below hypothesis is considered.

Ha3: There is a negative impact of assets tangibility on the speed of adjustment to target leverage.

(Z4): Profitability

Mahakud and Mukherjee (2011), Haron et al. (2013) and Tesfaye and Negash (2014) concluded a positive effect of profitability on the speed of adjustment, the results that support the implications of the static tradeoff theory, while Naveed et al. (2015) concluded a negative effect of profitability of speed of adjustment supporting the pecking order theory that promotes for a contrary argument where profitable firms enjoy the use of retained earnings that alter them from moving towards the target leverage ratio. The below hypothesis is formulated in accordance to the static tradeoff theory.

Ha4: There is a positive impact of profitability on the speed of adjustment to target leverage.

(Z5): Non-Debt Tax Shield

Tax deductibility on interest payments is one of the motives of choosing debt financing as per static tradeoff theory. Firms are expected to increase their debts in order to benefit from tax deductibility on interest payments when they reach certain level of non-debt tax shields. This argument is confirmed by Mahakud and Mukherjee (2011) where a positive coefficient is examined, accordingly the below hypothesis is tested.

Ha5: There is a positive impact of non-debt tax shield on the speed of adjustment to target leverage.

(Z6): Growth Opportunity

Growth opportunity has been studied by most of the recent studies due to its expected significant impact on adjusting leverage where non-growing firms face difficulties in finding external sources of finance. The positive impact is confirmed by Drobertz and Wanzenried (2006), Mahakud and Mukherjee (2011) and Naveed et al. (2015) however Banerjee et al. (2000) found negative effect for 426 US firms and 122 UK firms. The author tests the below hypothesis based on the results of Drobertz and Wanzenried (2006), Mahakud and Mukherjee (2011) and Naveed et al. (2015).

Ha6: There is a positive impact of growth opportunity on the speed of adjustment to target leverage.

(Z7): Macro-economic Conditions

Hackbarth et al. (2006) argue that speed of adjustment shall be higher in good economic conditions and slower in recessions. The positive impact has been proved by Drobertz and Wanzenried (2006) and Mahakud and Mukherjee (2011), therefore the below hypothesis is tested.

Ha7: There is a positive impact of macro-economic conditions on the speed of adjustment to target leverage.

(Z8): Political Uncertainty

Political uncertainty impact on firms' decision to adjust capital structure has been studied and results are mixed where Desai et al. (2008) concluded that firms decrease their leverage in countries with high political risk. Smales (2014) also concluded that high political uncertainty results in a decline in the issuance of government debts, as well as a decreasing demand on debt issuance. A counter argument is presented by Durnev (2010) who claimed that performance deterioration is associated with election uncertainty due to inefficient capital allocation and reduction in the amount of information contained in the prices of stocks due to election uncertainty. This argument would suggest a general decline in the demand on stock market that might leave firms to the option of increasing debts in such periods of uncertainty. In another context, Francis et al. (2014) concluded that policy uncertainty significantly decreases the speed of adjustment. Accordingly the below hypothesis is formulated.

Ha8: There is a negative impact of political uncertainty on the speed of adjustment to target leverage.

4.3. Estimation of Dynamic Models

One common problem with dynamic models is the dynamic panel bias, that is lagged dependent variable is usually correlated with the fixed effects in the error term, raising the common problem of endogeneity. The conventional pooled OLS and firm fixed effects estimation techniques have been criticized by Hsiao (2003), Baltagi (2005), Lemmon et al. (2008), Huang and Ritter (2009) and Roodman (2009) where the estimated speed of adjustment would be biased. The author uses GMM estimation technique in order to estimate the speed of adjustment and determinants of target leverage as employed by most recent studies. Like conventional two stage least square estimation, GMM employs instrument variables that are orthogonal to errors, but GMM is superior over the later where it try to satisfy all moment conditions by minimizing orthogonality factor. Moreover, GMM estimation is designed to overcome endogeneity problem through modeling the error structure more realistically in order to achieve practical and asymptotically precise estimation results (see Roodman, 2009).

The author employs system GMM to estimate the partial adjustment model using the two defined proxies for firm leverage in order to provide robust results and further evidence on the estimated speed of adjustment and its determinants. System GMM as proposed by Blundell and Bond (1998) designs system estimator that aims at exploiting the moment conditions in levels while keeping the original moment conditions for transformed equation of Arellano and Bond (1991). System GMM involves the use of larger number of instrument variables than in difference GMM.

Following Drobertz and Wanzenried (2006), Mahakud and Mukherjee (2011) and Haron et al. (2013), distance variable (Z1) is calculated as the absolute difference of FL*it – FLit where FL*it is the target leverage that is unobservable and is derived from the fitted (predicted) value of fixed effect regression of FLit = β Xit + const.

4.4. Instrument Specifications

For the difference equation part of the system GMM, second lags of all endogenous and predetermined variables in levels are used to instrument all combinations of variables presented in equation # 4 (including those of interest: determinants of SOA times lagged firm leverage (Z * FLt-1)), while for exogenous variables, year dummies are used as instruments for themselves. For the level equation part of the system GMM, first differences of all endogenous and predetermined variables in the level equation are used as instruments. For exogenous variables, instruments are the same in difference and level equations. For each proxy of firm leverage, FLt-1, Z1 to Z9 and significant determinants of target leverage are used as instruments (in their second lag form in the difference equation and first difference form in the level equation) representing the endogenous and predetermined variables, while year dummies are used representing exogenous variables.

5. Empirical Results

5.1. Descriptive Analysis

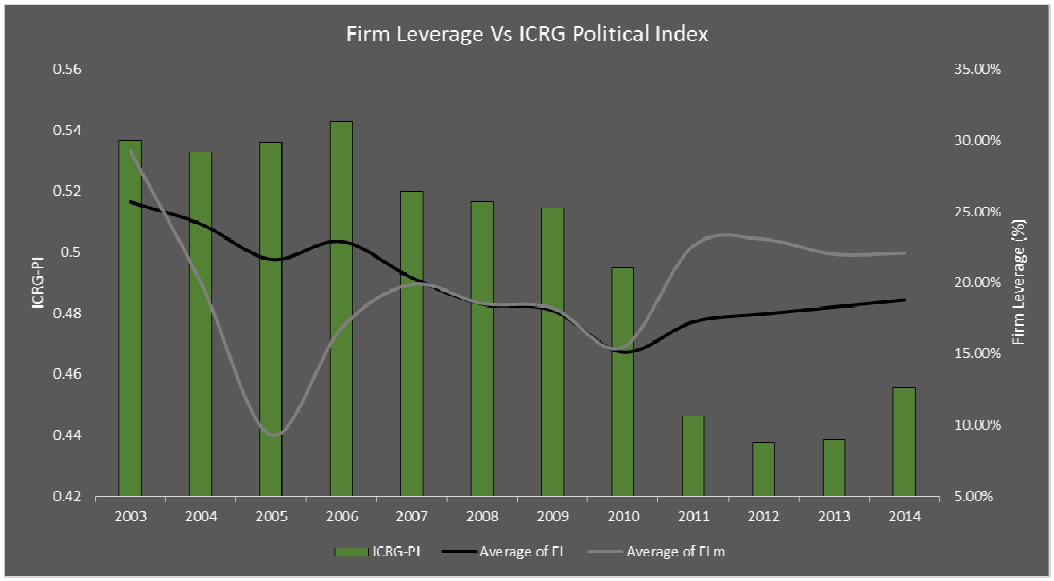
As shown in table 2, the two used proxies for firm leverage are showing same mean values for firm leverage and industry average, while the distance variable is showing different mean values. Mean values of firm leverage based on the two used proxies are showing 20 percent indicating that non-financial firms finance their assets with around 20 per cent of total assets from debts. Mean values of industry average are also showing also 20 per cent for the two used proxies indicating that all industries follow the global pattern of average firm leverage.

Table 2: Summary of descriptive parameters

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm Leverage (First Proxy)	1,463	0.19	0.18	0	1.07
Firm Leverage (Second Proxy)	964	0.2	0.19	0	0.86
Firm Size	1,756	12.90	1.82	8.08	18.37
Assets Tangibility	1,756	0.45	0.25	0.003	1
Profitability	1,754	0.06	0.1	-0.77	0.7
Non-Debt Tax Shield	1,694	-0.02	0.03	-0.26	0
Growth Opportunity	1,668	0.13	0.4	-0.91	5.04
Industry Average (First Proxy)	1,703	0.19	0.12	0	1.07
Industry Average (Second Proxy)	1,395	0.2	0.13	0	0.83
Political Uncertainty	1,756	0.49	0.04	0.44	0.55
Distance (First Proxy)	1,345	0.1	0.08	0	0.54
Distance (Second Proxy)	946	0.17	0.12	0	0.67
Macro-economic Conditions	1,756	4.15	1.94	1.82	7.15

The following chart depicts trend of mean of firm leverage (for both proxies) vs ICRG-political index. Chart is showing a declining trend of both proxies of firm leverage in association with a declining trend in ICRG-political index of Egypt, however both proxies also started to increase in association with a sharp decline in the ICRG-political index of Egypt in response to Jan 25th revolution on 2011.

Figure 3: Firm leverage vs ICRG-political index



5.2. Inferential Analysis for Capital Structure Dynamics

GMM is generally designed for fixed individual effects (Roodman, 2009). The below tables depict the results of Hausman test for equation # 2 and equation # 3 for both proxies of firm leverage. Results reject the null hypothesis that difference in coefficients is not systematic, accordingly fixed effects estimation can be used.

Table 3: Results of Hausman test for equation # 2

Hausman Test	chi2(8)	Prob>chi2
First Proxy of Firm Leverage	414.19	0
Second Proxy of Firm Leverage	2473.55	0

Table 4: Results of Hausman test for equation # 3

First proxy of firm leverage	chi2(39) 334.49	Prob>chi2 0
Second proxy of firm leverage	chi2(35) 379.74	Prob>chi2 0

Implementation of system GMM in partial adjustment model of equation # 2 provided consistent and robust evidence about significant speed of adjustment towards target leverage as shown in the following table. Significant determinants of target leverage differs based on the used proxy for leverage ratio.

Table 5: Estimation results of system GMM for equation # 2

Results	FL = BV of Debts/Assets	FL = BV of Debts / (BV of Debts + MV of Equity)
Number of groups	164	149
Number of instruments	150	150
F statistic for GMM model / Prob > F	34.16 / 0.000	81.27 / 0.000
Estimated speed of adjustment / P > t	0.48 / 0.000	0.62 / 0.000
Arellano-Bond test AR(2)	0.76	0.7
Hansen test of overidentification restriction	0.31	0.98
Significant determinants of target leverage at 5 per cent	X3(profitability) X6 (industry average) X7 (political uncertainty)	X1(firm size) X6 (industry average) X7 (political uncertainty)

F statistic results show significant overall model fit at very low significance levels for both models. All post estimation tests are accepted where results of Hansen J-Statistic test for over identification restriction failed to reject the null hypothesis of 'Instruments as a group are exogenous'. Too, results of Arellano-Bond test AR (2) for autocorrelation in levels failed to reject the null hypotheses of 'No autocorrelation in levels' in both models.

The concluded speed of adjustment (48 per cent using the first proxy and 62 per cent using the second proxy) represents a rapid adjustment process and is supported by recent studies by Naveed et al. (2015), Tesfaye and Negash (2014) and Haron et al. (2013) who concluded 51 per cent, 47 per cent and 57 per cent respectively. Concluded results also have strong theoretical support from market timing theory (Baker & Wurgler, 2002) and inertia theory developed by Welch (2004) that confirm that firms adjust towards a target leverage and only choose equity financing when it appears more valued by financial markets based on stock price movement.

The following table summarizes the estimated regression coefficients of the one step and two step system GMM for the two proxies of firm leverage where speed of adjustment (λ) and coefficients of determinants of target leverage are interpreted according to equation # 2 as follows:

$\lambda = 1$ – reported coefficient of lagged firm leverage.

Coefficients of determinants of target leverage (βs) = displayed coefficients / λ

Table 6: Estimated regression coefficients of system GMM for equation # 2

Determinants of target leverage	FL = BV of Debts/Assets	FL = BV of Debts / (BV of Debts + MV of Equity)
Calculated coefficient of firm size (β1)		0.03
Calculated coefficient of profitability (β3)	-0.62	
Calculated coefficient of industry average (β6)	1.07	1.13
Calculated coefficient of political uncertainty (β7)	-2.05	-3.04

Regarding determinants of target leverage, political uncertainty robust and consistent positive effect on target leverage opposes the concluded negative effect by Desai et al. (2008) and Smales (2014) but is consistent with the argument of Durnev (2010) who studied large number of firms from 79 countries for the period from 1980 to 2006 and explained the reason behind the concluded significant reduction in firm performance is due to the reduction in the amount of information contained in the prices of stocks due to election uncertainty. This argument would suggest a general decline in the demand on stock market that justify the increase in leverage in such periods of uncertainty. The positive effect is also emphasized by the trend of firm leverage vs ICRG-political index presented in figure 2 that is showing increase in debt ratio represented by both proxies in association with a sharp decline in the ICRG-political index of Egypt in response to Jan 25th revolution on 2011. The concluded positive effect of industry average on target leverage is consistent with the results of Eldomiaty and Azim (2008) in the Egyptian context and Emrah and Koray (2014) in Turkey. This indicates that Egyptian non-financial firms consider the industry average of firm leverage rather

than a specified target of their own in the adjustment process. Concluded effect in this regard is robust and consistent across all used models. As discussed earlier, the pecking order theory proposes that profitable firms rely on retained earnings in financing their activities and use debts in case of extra capital are needed in excess to the retained earnings. This argument is consistent with the concluded negative effect of profitability on target leverage and is supported by the results of most previous studies (see Haron et al., 2013; Naveed et al., 2015) in addition to Eldomiaty and Azim (2008) in the Egyptian context who concluded the negative effect on short term debt ratio. As claimed and concluded by most previous studies, large firms enjoy a better access to the debt market due to being more transparent than small firms (see Mahakud & Mukherjee, 2011; Haron et al., 2013) in addition to Eldomiaty and Azim (2008) in the Egyptian context who concluded positive effect on long term debt ratio. This is consistent with the concluded positive effect of size as one of the determinants of target leverage.

5.3. Estimation of the Determinants of Speed of Adjustment

Implementation of system GMM in partial adjustment model of equation # 3 provided evidence about significant determinants of speed of adjustment towards target leverage that differ based on the used proxy for firm leverage. GMM preliminary requirements related to over identification restriction and autocorrelation in levels are satisfied at 5 per cent confidence level for both proxies of firm leverage.

Table 7: Estimation results of one step system GMM for equation # 3

Results	FL = BV of Debts/Assets	FL = BV of Debts / (BV of Debts + MV of Equity)
Number of groups	164	149
Number of instruments	215	202
F statistic for GMM model / Prob > F	170.17 / 0.000	69.55 / 0.000
Arellano-Bond test AR(2)	0.46	0.06
Hansen test of overidentification restriction	0.999	0.998
Significant determinants of SOA at 5 per cent	Z1, Z4 and Z6	Z1m, Z2 and Z4

The following table depicts the estimated regression coefficients of both models where coefficients of determinants of speed of adjustment towards target leverage can be interpreted (following equation # 3) as follows: Coefficients of determinants of SOA (Φs) = - reported coefficient of Z * FLt-1

Table 8: Estimated regression coefficients of one step system GMM for equation # 3

Determinants of speed of adjustment	FL = BV of Debts/Assets	FL = BV of Debts / (BV of Debts + MV of Equity)
Calculated coefficient of distance from target leverage (Φ1)	- 2.74	- 2.71
Calculated coefficient of firm size (Φ2)		0.11
Calculated coefficient of profitability (Φ4)	- 0.95	- 1.64
Calculated coefficient of growth opportunity (Φ6)	0.17	

For the first proxy of firm leverage where FL = BV of debts/assets, significant determinants of speed of adjustment at 5 per cent are distance from target leverage, profitability and growth opportunity while for the second proxy of firm leverage where FL = BV of debts/ (BV of debts + MV of equity), significant determinants of speed of adjustment at 5 per cent are distance from target leverage, firm size and profitability. Overall model significance of first proxy is higher than that of second proxy (Fstatistic is 170.17 for first proxy and 69.55 for second proxy). Too, results of the first proxy related to Arellano-Bond test AR (2) and Hansen test of overidentification restriction can be accepted at higher confidence levels, yet results of the second proxy are accepted at 5 per cent.

6. Discussion of Findings

Distance from target leverage reported negative and robust effect on the speed of adjustment. This result supports the argument of Banerjee et al. (2000) and Haron et al. (2013) that firms bear the large amount of fixed costs of adjustment only if target leverage is not far from the current one (i.e target leverage can be reached in minimum steps). Based on the concluded results, the researcher rejects H2o.

The use of both proxies of firm leverage reported robust negative effect of profitability on the speed of adjustment, the results that are consistent with those concluded by Naveed et al. (2015). These results strongly support the pecking order theory where profitable firms enjoy the use of retained earnings that alter them from moving towards the target leverage ratio. Accordingly, the researcher failed to reject H5o. The concluded negative effect is also consistent with the results of this research regarding the concluded non-existence of optimal capital structure that is opposing the static tradeoff theory.

The concluded positive effect of growth opportunity supports the results of most previous studies (see Drobertz & Wanzenried, 2006; Mahakud & Mukherjee, 2011; Naveed et al., 2015) and confirms the argument that growing firms have better access to external sources of finance. Accordingly, the researcher rejects H7o.

Results of the impact of firm size on the speed of adjustment came consistent with most previous studies where Banerjee et al. (2000), Mahakud and Mukherjee (2011) and Haron et al. (2013) concluded a positive effect claiming that small firms are more subject to information asymmetry that block them from moving towards the target leverage smoothly. Accordingly, the researcher rejects H3o.

Some variables showed insignificant effect on the speed of adjustment. Similar to empirical results by Naveed et al. (2015), asset tangibility has no effect on the adjustment speed towards target leverage. Non-debt tax shield showed no effect on the speed of adjustment, confirming that Egyptian non-financial firms do not enjoy the tax deductibility on interest payment, the results that are consistent with the concluded non-existence of optimal capital structure as proposed by the static tradeoff theory.

Appendix B summarizes the results of hypotheses testing in addition to comparing the concluded results related to the impact of each determinant of speed of adjustment with reference to the hypothesized ones.

7. Summary and Concluding Remarks

This study targets to contribute to the existing literature of emerging markets in the capital structure dynamics topic. Evidence from this research shaped recommendations that shall have practical implications on the management performance in the firms' financing decisions.

Analysis of the dynamics of capital structure in Egypt revealed robust and consistent results about speed of adjustment towards target leverage, accordingly it can be concluded that there is a target leverage where Egyptian non-financial firms do adjust towards the target at a speed represented by closing the gap (between current and target leverages) by 62 per cent each year. Target leverage is determined by political uncertainty and firm-specific determinants.

It has been concluded that speed of adjustment is determined by set of firm-specific determinants that differ according to the use of proxy of firm leverage. Analysis revealed robust and consistent evidence that adjustment speed is higher when distance from target leverage is small. Robust and consistent negative effect of profitability on the speed of adjustment is concluded as explained by pecking order theory. The researcher also concludes that growing and large firms adjust towards target leverage rapidly as they enjoy better access to debt market and are less exposed to information asymmetry.

8. Practical Recommendations and Future Research

Capital structure is one of the complex decisions firm managers can take due to its long term implications on the firms' success. Understanding the dynamics of capital structure choice and its implications on the business profitability are beneficial for managers that shall guide them to the optimum decision regarding the choice of the best source of financing their operations considering all other relevant factors. Inspired from the conclusion of this research, it is highly recommended to watch periodically the concluded significant determinants (firm-specific, political situation and macro-economic conditions) in order to secure the optimum and appropriate capital structure decisions.

Results of this research promoted that pecking order theory is proved to best describe the dynamics of capital structure in Egypt, accordingly implications of the theory would shape the below recommendations:

Firms need to fully utilize retained earnings before issuing debts.

Firms need to adopt cost efficient strategies that overcome/reduce information asymmetry between managers and investors.

Evidence from this research are consistent with the implications of the market timing and inertia theories, accordingly it is recommended for firms to regularly study market conditions to select the right timing of issuing equity.

Some industries might behave differently in terms of capital structure decisions (see Roberts, 2002; Mary et al., 2011; Tesfaye & Negash, 2014). A potential future work might involve similar empirical analysis on the industry level aiming at providing further evidence about concluded results in the Egyptian and broader contexts. One challenge has to do with the applicability of the employed data analysis techniques, especially for the Egyptian case where the distribution of listed non-financial companies is almost even. This can trigger difficulties in satisfying preliminary requirements of GMM. Difference & System GMM are designed for large N and small T and recommends that number of instruments (dependent on the estimated equation) don't exceed the number of groups (companies) to avoid over fitting endogenous variables (see Roodman, 2009).

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9. Appendices

Appendix A

Summary of the results of empirical studies that investigated the determinants of speed of adjustment.

Study	Methodo-logy	Firms under Study	Studied Determinants	Used Proxies	Impact on speed of adjustment
Banerjee et al. (2000)	Non-linear regression	426 US firms and 122 UK firms	Distance from target leverage	Target leverage - leverage at t-1	Negative for UK firms and insignificant for US firms
			Growth opportunities	Annual percentage change in total assets	Negative for both US and UK firms
			Size	Ln of total assets	Positive for both US and UK firms
Drobertz and Wanzenried (2006)	Difference GMM	90 Swiss firms	Size	Ln of Total Assets	Insignificant
			Growth	Book to market ratio of equity	Positive
			Distance from target leverage	Target leverage - leverage at t	Positive
			Term	Yield on bonds - Eurodollar interest rate	Positive
			Ishort	Short term interest rate	Negative
Mahakud and Mukherjee (2011)	Difference GMM	891 Indian manufacturing firms	Dividends	Dividends payment	Negative
			Tangibility	Fixed assets/ total assets	Negative
			Profitability	Net income/total assets	Positive
			Size	Ln of total assets	Positive
			Growth Opportunities	Market to book ratio of equity	Positive
			Non-Debt Tax Shields	Depreciation/total assets	Positive

Study	Methodo-logy	Firms under Study	Studied Determinants	Used Proxies	Impact on speed of adjustment
			Distance from Target Leverage	Target leverage - leverage at t	Positive
			Ownership structure	Business group affiliation	Positive
			Macroeconom-ic conditions	Real GDP growth rate	Positive
Haron et al. (2013)	Difference GMM	790 non-financial Malaysian firms	Distance from target leverage	Target leverage - leverage at t	Negative
			Size	Ln of total assets	Positive
			Growth opportunities	Market to book ratio of equity	Insignificant
			Profitability	Net income/total assets	Positive
Naveed et al. (2015)	Difference and system GMM	147 textile sector Pakista-nian compa-nies	Liquidity	Current assets/ current liabilities	Negative
			Tangibility	Fixed assets/total assets	Insignificant
			Growth opportunities	Market to book ratio of equity	Positive
			Size	Ln of total assets	Negative
			Profitability	EBIT/total assets	Negative

Appendix B

Summary of the results of hypotheses testing.

Determinants of speed of adjustment	Null Hypothesis	Result	Hypothesized	Result
Distance from target leverage	H1o	Reject H1o	Negative	Negative
Firm size	H2o	Reject H2o	Positive	Positive
Assets tangibility	H3o	Insignificant relationship	Negative	Insignificant
Profitability	H4o	Failed to reject H4o	Positive	Negative
Non-debt tax shield	H5o	Insignificant relationship	Positive	Insignificant
Growth opportunities	H6o	Reject H6o	Positive	Positive
Macro-economic conditions	H7o	Insignificant relationship	Positive	Insignificant
Political uncertainty	H8o	Insignificant relationship	Negative	Insignificant