

Fatma Mohamed El-manakhly

Business Administration Researcher

Dr.El-Sayeda Abdel Fattah

Professor of Finance and Investment

Dr. Mohamed El-Hennawi

Professor of Finance and Investment

Faculty of commerce, Alexandria
University

Testing Pecking Order Theory

and Market Timing Theory

in the Egyptian Stock Exchange

اختبار نظرية الترتيب الإنتقائي و نظرية توقيت السوق لهيكل رأس المال على سوق الأوراق المالية المصرى

Abstract

The present study aims at testing the pecking order theory and the market timing theory and how they explain the capital structure decisions of firms listed in the Egyptian stock exchange. The paper examines each theory, independently in separate models and examines both theories, collectively in one model. Both approaches are conducted using panel data analysis for a sample of 43 firms listed on the Egyptian stock exchange in different industrial sectors over the period 2009-2015. The results indicated that the modified pecking order theory is the best theory to explain the capital structure decisions in Egypt, while the market timing has short term effect on capital structure. The study also showed that the most important determinants of capital structure in Egypt are profitability, firm size, growth and financial deficit. The study also confirms the arguments of the capital structure theories are not mutually exclusive and they complete each other in explaining the capital structure decisions in Egypt.

Keywords: Capital structure, Pecking order theory, Market timing theory an Panel data

ملخص البحث

تهدف الدراسة الحالية إلى اختبار نظرية الترتيب الإنتقائي ونظرية توقيت السوق لهيكل رأس المال وكيفية تفسيرها لقرارات هيكل رأس المال للشركات المدرجة في البورصة المصرية. هذه الدراسة تدرس كل نظرية، بشكل مستقل في نماذج منفصلة لكل نظرية وبشكل جماعي يجمع بين النظريتين في نموذج واحد. يتم تنفيذ كلا النهجين باستخدام أسلوب تحليل "Panel Data" لعينة من ٤٣ شركة مدرجة في البورصة المصرية، في مختلف القطاعات الصناعية، خلال الفترة ٢٠٠٩-٢٠١٥. أوضحت النتائج أن نظرية الترتيب الإنتقائي المعدلة هي أفضل نظرية لشرح قرارات هيكل رأس المال في مصر، في حين أن توقيت السوق له تأثير قصير المدى على هيكل رأس المال. كما أظهرت الدراسة أن أهم محددات هيكل رأس المال في مصر هي: الربحية وحجم الشركة والنمو والعجز المالي. كما تؤكد الدراسة أيضاً أن نظريات هيكل رأس المال ليست حصرية، وأنها تكمل بعضها البعض في شرح قرارات هيكل رأس المال في مصر.

1. Introduction

How do firms choose their capital structures? The financial literature in this field was marked by the contributions of the Modigliani and Miller (1958). M&M predicted, in a perfect capital market, the value of a firm is independent of its capital structure, and hence debt and equity are perfect substitutes for each other. However, once the assumptions of perfect capital markets were relaxed, the choice of capital structure became an important value-determining factor. By considering market imperfections, two research orientations have appeared. The first orientation is supported by Kraus and Litzenberg (1973), Scott (1976) and Myers (1977) which considered the imperfections of the market, such as the taxation and the costs of bankruptcy. The second orientation by Myers (1984), Myers and Majluf (1984) considered the imperfections of the market, such as the agency problems and asymmetries of information. Accordingly, the capital structure theories have emerged to explain the capital structure decisions. However, no consensus has been reached yet as the empirical evidence is mixed and difficult to interpret.

Although the capital structure is not a new field of research, it remains one of the most conflicting and puzzling topics. Myers (2001) in his great work of "Capital Structure Puzzle" stated that researchers still do not know much about how firms choose to issue debt, equity or hybrid securities. Also, they added that researchers still have inadequate understanding of corporate financing behavior.

The aim of this paper is to analyze whether two important capital structure Theories; pecking order theory and market timing theory can accurately explain the financing decisions of firms listed in the Egyptian stock exchange during the period 2009-2015. The paper depends on cross-sectional time-series data called "Panel Data" because it provides more informative data, less collinearity among the variables, more degrees of freedom and more efficiency (Baltagi, 2005).

How are the capital structure decisions in developing countries different from those in developed countries? In fact, our major knowledge of capital structures in developing markets has been mostly derived from data in developed markets. However, there are relatively few studies that have tested the capital structure theories and their explanations using data from developing markets. Recently, studies on developing countries are increasing because the stock markets in developing countries, according to Eldomiaty (2008), are relatively less efficient and incomplete than in developed markets causing financing decisions to be incomplete and subject to irregularities

The financial infrastructure and the institutional financing arrangements in Egypt, as an emerging market, are quite different from those in developed markets. Such differences would be relevant to agents involved in the Egyptian capital market, such as regulators, investors and firms. This would require an examination of whether the capital structure decisions are made according to the well-known capital structure theories. In fact, the political

and economic circumstances that Egypt has faced during the last seven years have affected the performance of the Egyptian stock exchange. The Egyptian stock exchange became very sensitive to any political or unstable conditions; consequently this would affect negatively the economic growth and stock market development.

In preview of the paper results, what is the theory/theories and the factors that best describe the capital structure decisions in the Egyptian market? The results show no support to the pecking order theory. The financial deficit was found to have insignificant effect on debt ratio and significant positive effect on equity ratio. Accordingly we can say that firms listed in Egyptian stock exchange tend to follow the "Modified Pecking Order theory", since they depend on equity more than debt, in case of financial deficit. Moreover, the mark-et timing theory was found to have no persistent effect on capital structure. Additionally, examining both the pecking order and market timing theories comprehensively, resulted in better results than those from testing both theories individually. The results also support the effect of the firm size, profitability, the market to book ratio and financial deficit on debt financing.

The implication of these results is the ability of the firm to exploit an appropriate capital structure which would result in a sustainable competitive advantage (Barton and Gordon, 1998). In other words, any decision taken by management will impact the firm's performance as well as how the investors will estimate and perceive the firm's value. Moreover, financial development has ongoing effect on growth and

this requires development of both the securities market and banking system.

The rest of the paper is organized as follows. **Section 2** provides brief to the theoretical background and empirical evidence of each theory. **Section 3** describes data and descriptive statistics of the paper. **Section 4** discusses the models and variables of each theory. **Section 5** presents the empirical results. Finally, **Section 6** gives the conclusion.

2. Theoretical Background and Empirical Evidence

2.1 Pecking Order Theory

Donaldson (1961) suggested that when a firm tries to finance its long-term investments, it has to follow a well-defined order of preference to the sources of finance. It states that a firm's first preference should be the utilization of internal funds, followed by debt and then external equity as the last preference. Donaldson argued that the more profitable the firms are, the lower they borrow because they would have sufficient internal finance to undertake their investment projects. Myers (1984) agreed with Donaldson about there is no well-defined target debt-equity combination and firms prefer internal finance as the first financing source.

Researchers found association between information asymmetry, adverse selection and pecking order. The information asymmetry exists when one group has superior information about the firm's growth opportunities over the others. Managers must know more about their firm's prospects than do typical investors. Asymmetric information introduced the concept of **adverse selection**. Myers and Majluf (1984) in their model showed that the adverse

selection by a firm is done by refusing to issue stock. They suggested that management's objective under asymmetric information is to act in the old shareholders' interest rather than the firm's interest. They argued that firms whose investment opportunities exceed operating cash flows, and which have used up their ability to issue low-risk debt, may leave off good investments rather than issue risky securities to finance them. Halov and Heider (2005) stated that the simple pecking order is a special case of adverse selection as firms prefer to issue debt over external equity.

Shyam-Sunder and Myers (1999) found evidence consistent with Myers and Majluf's results by examining the response of debt to short term investment and earnings in a model by using the financial deficit. One reason for using this variable in pecking order model: is that firms do not aim at any target debt ratio, instead firms that face a financial deficit will first resort to debt. Equity is never issued, except possibly when costs of financial distress are high. Therefore, the pecking order theory predicts a positive relation between financial deficit and debt ratio especially the long term debt ratio.

Researchers found mixed evidence regarding the pecking order theory. Many studies supported the pecking order theory and its predictions. These studies found that companies tend to depend first on the internal financing then using external financing by resorting first to financial debts, consistent with the pecking order theory (Amihud et al., 1990; Chaplinsky and Niehaus, 1993; Fama and French, 2000; Sánchez-Vidal and Martín-Ugedo, 2005; Kayhan and Titman, 2006; Ben-Nor-

vaisiene and Stankeviciene, 2015). Accordingly, **the simple pecking order hypothesis can be written as follows; H.1: The financial deficit has positive effect on debt ratio.**

On the other hand, other researchers criticised the pecking order theory by arguing there is no association between financial deficit and debt (Helwege and Liang, 1996; Chirinko and Singha, 2000, Adedeji (2002); Frank and Goyal, 2003). Chirinko and Singha (2000) stated that the simple pecking order is very restrictive because of its condition of financial deficit is financed only by debt. This test will not be very useful in evaluating pecking order model, if firm uses equity also in covering the financial deficit. Therefore, it is more likely to indicate rejection if the firm goes to the equity market for new capital.

Other studies supported "Modified Pecking Order theory" by allowing the simple pecking order model to accommodate some equity and not considering it a last resort in financing decisions. These studies explained why most of the developing countries tend to follow the modified pecking order theory and tend to rely on equity more than debt. Chen (2004) noticed that Chinese firms are attracted to equity financing due to substantial capital gains in the secondary markets and to the corporate governance problems. Huang and Song (2005) confirmed Chen's findings of higher equity financing compared to debt among the Chinese firms and they proposed two explanations for such finding. First, firms prefer to have access to equity financing when they become public firms to enjoy higher stock price. Second, bond market is still in an infant stage of develop-

ment and banks are the major or even the only source of firm's debt. Similarly, Delcoure (2007) found that managers prefer equity to debt financing because equity appears to be a "free" source of financing relative to debt. Fama and French (2005) justified the tendency to depend on equity not as a last resort in the financing hierarchy by finding ways to issue equity with low transaction costs and least asymmetric information problems, such as issues to employees, rights issues and direct purchase plans. Moreover, Bolbol, Fatheldin, A. and Omran, M. M.(2005) argued that equity financing in developing countries is not subject to adverse selection. Equity provides important channel to access international capital and it promotes risky entrepreneurial investments through their risk-sharing functions. Therefore, **the modified pecking order hypothesis can be written as follows;**

H.2: The financial deficit has positive effect on equity ratio.

2.2 Market Timing Theory

Market timing theory is relatively an old idea. Grant (1978) defined market timing, in the context of portfolio management, as the practice of predicting whether some broadly based index of market prices will rise or fall and thus investing, appropriately. Similarly, many researchers initiated the market timing theory by finding evidence that the decisions to issue equity depend on market performance (Korajczyk, Lucas, and McDonald, 1992). Graham and Harvey (2001) showed that managers admitted that the market timing of issuing or repurchasing the firm's stocks, is an important consideration in capital structure decisions. Myers (1984) argued that the timing of

security issues is one of the factors that affect the corporate financing behavior. Firms try to time issuing of stocks when security prices are high and they are more likely to issue stock rather than debt when prices are rising.

The market timing theory was initially formulated by Baker and Wurgler (2002). It argues that there is no optimal capital structure and it is best understood as the cumulative effect of past attempts to time the market. The market timing theory has two assumptions. First, high market valuations, measured by market-to-book ratio, reduce leverage in the short-run. Second, high external finance weighted average market to book ratio (EFWAMTB) are associated with lower leverage in the long run. The connection between these two results must be that the market-to-book ratio effect, as a proxy to market timing theory, is very persistent in determining the capital structure decision. Baker and Wurgler added that such results cannot be interpreted by the traditional theories of capital structure. Since the market to book ratio in the trade-off theory is an indicator to investment opportunities. Also, the simple pecking order theory suggests that managers tend to avoid issuing equity entirely. Therefore, this persistent effect of market valuation on capital structure can be explained only by the market timing theory.

However, many studies criticised Baker and Wurglers work by finding no evidence to the persistent impact of market timing on capital structure decisions. Several studies in developed countries found no persistent effect of market timing on capital structure decisions, such as Atli (2006), Hovakimian(2006),Kayhan andTitman (2007),

De Bie and De Haan (2007), Mahajam and Tartaroglu (2008). Although studies in developing countries which tested the market timing theory are few, most of them revealed the same evidence, such as Brendea (2012) and Assran (2012). They all found that the importance of historical average market to book ratios in leverage regressions is not due to past equity market timing

On the other hand, other studies supported the market timing theory in U.S. by finding evidence to the persistent effect of market mispricing on capital structure. Huang and Ritter (2005) found that the effects of equity and debt issues are strong and last for over ten years, even after controlling for firm characteristics that have identified as the most important determinants of capital structure. Elliot, Koëter-Kant and Warr (2008) concluded that equity market mispricing plays a significant, if not dominant, role in the security choice decision. Lewis and Tan (2016) found that managers issue more equity relative to debt when analysts are relatively optimistic about firm's long-term growth prospects. They also, noted that managerial market timing, in the form of debt-equity time, plays a role in driving the financing anomalies.

Many studies in the developing countries found similar results supporting the market timing theory. Bougatef and Chichti (2010) and Abdeljawad and Mat-Nor (2012) found that Malaysian firms consider timing of the market conditions as an important factor when making financial decisions. Moreover, Jahanzeb, Saif-Ur-Rehman, Bajuri, Karami and Aiyoub (2013) argued that the recent theoretical and empirical

studies proved that market timing theory has challenged the other capital structure theories because of the manager's tendency to take advantage of market timing. Therefore, **the market timing hypothesis, according to Baker and Wurgler model can be written as follows;**

H.3: The market to book ratio has a negative effect on book leverage.

H.4: The market to book ratio has a negative effect on market leverage.

H.5: The external finance weighted average market to book ratio has a negative effect on book leverage.

H.6: The external finance weighted average market to book ratio has a negative effect on market leverage.

2.3 Pecking Order and Market Timing Theories are not Mutually Exclusive

There is a need to review the literatures that studied the capital structure theories, collectively by developing a model that combines the determinants of each theory in one model. Myers (2001) stated that searching for an optimal capital structure is not one-way to go. Each capital structure theory works under its own assumptions and does not give a complete explanation of financial decisions. Eldomiaty (2008) tested the capital structure theories in the Egyptian context and stated that the capital structure theories are conditional. When the business conditions change, the financing decisions and strategies may change, moving from one theory to another. Al-Najjar and Hussainey (2011) stated that studying the multiple determinants of capital structure in one model aims at providing the

optimal set of factors that affect the capital structure. Also, it indicates the effect of different definitions of capital structure suggested by different studies.

Moreover, some studies criticised studying the capital structure theories, independently. Beattie, Goodacre and Thomson (2006) asserted that no independent capital structure theory is able to explain such complexities. Combining more than a theory in one model can be beneficial in describing the complexities of the capital structure decisions. Liang and Miglo (2014) criticised the traditional pecking order theory as it could not explain why many firms do not prefer debt over equity. They stated that although the market timing provided a good explanation to the timing of firms' IPOs, it could not explain the firm's capital structure other than the IPO decision. Therefore, multiple theories can be used to explain the capital structure decisions to provide the complete interpretation to the capital structure decisions.

Accordingly, the present paper will combine the factors that determine both the pecking order and market timing theories in one model. The hypothesis of this model tests if both theories contribute, simultaneously to understanding the capital structure decision and they are not mutually exclusive.

H.7: The pecking order theory and market timing theory are not mutually exclusive.

3. Research Methodology

3.1 Data and Sample

The population represents all the Egyptian firms listed on the Egyptian stock exchange. The sample data consists of firms that we could determine its IPO at any point of time between

1998 and 2008. According to Baker and Wurgler (2002), the IPO year is defined as the first year in which a market value data is reported. This IPO period was determined, specifically due to the unavailability of data before 1998 and the need to analyze the financing behavior starting in 2009 till 2015. The determination of the IPO in the sample is important to calculate the external finance weighted average market to book ratio, in studying the market timing theory. Then, the following firms were excluded from the sample;

1. Bank sector and financial service sector due to the special financial nature of its capital structure.
2. Firms that have IPO before 1998 and firms that have IPO after 2008, in order to facilitate testing the four capital structure theories for seven successive years from 2009 till 2015.
3. Firms with missing data over the period of its IPO till 2015.
4. Firms that are listed in the Egyptian stock exchange but not actively traded.

The previous exclusions are needed in order to obtain a sample data in which we could test the two capital structure theories without difficulties. This would result in 43 firms from different industrial sectors presented in Appendix (1). Table (1) presents the number of firms included in the sample in each industry sector. This sample is analysed over the period 2009-2015 to test the pecking order model and the market timing model and if both theories are not mutually exclusive.

The data needed for testing the capital structure theories in this study were obtained from different sources:

1. The firms' income statements and balance sheets founded in the firms' annual reports, *Kompass Egypt Financial year Book* and from *Mubasher Misr* website (www.mubasher.info).
2. The firms' missing data and data since the IPO of each firm were obtained from *Egypt for Information Dissemination* (www.egidegypt.com).
3. The listing date for firms were obtained from the Egyptian stock exchange website (www.egx.com.eg).
4. The closing prices used in calculating the market value to firms sample were obtained from *MetaStock Professional 11(Market Analysis Charting & Data for Trader of All Levels)* (www.metastock.com).

Table (1). The number of firms included in the sample according to industry sectors

Industry sector	Number of firms
Basic Resources	2
Chemicals	2
Construction and Materials	7
Foods and Beverage	6
Healthcare and Pharmaceuticals	2
Industrial Goods and Services and Automobiles	4
Oil and Gas	2
Personal and Household Products	1
Real Estate	6
Retail	1
Media	1
Technology	3
Telecommunications	3
Travel and Leisure	3
Total	43

3.2 Models and Variables

3.2.1 Pecking Order Model

In this paper, the simple pecking order model originally developed by Shyam-Sunder and Myers (1999) will be used to test the pecking order theory. There is a hierarchy in firm's financing activities; which is a preference of internal financing over external financing and when external financing is considered, debt is preferred over equity. In other words, this strict form of pecking order model ignores financial distress. It suggests that firms issue the

safest security first which is debt because it is not affected by managers'

inside information. Equity is issued lastly when firms have high financial distress costs. The simple pecking order model states that all the financial deficit is financed only by debt as shown in equation (1);

$$\Delta D_{it} = \alpha + \beta_{po} \cdot DEF_{it} + e_{it} \quad \text{Eq. (1)}$$

Where; ΔD_{it} is the amount of long term debt issued, β_{po} is the pecking order coefficient and DEF_{it} is financing deficit. The strict form of Shyam-

Sunder and Myers model expects $\alpha = 0$ and the $\beta_{po} = 1$ and all financing deficit is financed by issuing debt. The financial deficit is calculated according to Shyam-Suner and Myers as follows in equation (2);

$$DEF_{it} = DIV_{it} + X_{it} + \Delta W_{it} - C_{it} \quad \text{Eq. (2)}$$

Where; DIV_{it} is the dividends payment which is cash dividends in year t , X_{it} is the Capital expenditure, ΔW_{it} is the change in working capital and C_{it} is the operating cash flow after interest and taxes.

The strict form of Shyam-Sunder and Myers model expects $\alpha = 0$ and the $\beta_{po} = 1$ which means all financial deficit is financed by issuing debt. However, they stated that if costs of financial distress are serious, the firm will issue equity to finance real investment or to pay down debt. In fact, Shyam-Sunder and Myer model resulted in the constant (α) was close to zero, and the slope parameter (β_{po}) ranged from 0.75 to 0.85 and was precisely estimated with a standard error of 0.01. Therefore, the broader or semi strong form will expect $\beta_{po} < 1$ and α close to 0. The broader pecking order hypothesis would accommodate some equity issues, in contrary to the simple pecking order.

The broader or the new form of pecking order called "Modified pecking order" was found to be followed in most of the developing countries. The new pecking order theory predicts that equity will be the preferred source of external financing. Then, the previous model as presented in Eq.(1) should be revised to reflect the relation between net equity issuance and the financing deficit. Accordingly, to test the modified pecking order theory, the model developed by Chen and Huang (2013)

and Allini, Rakha, McMillan and Caldarelli (2017) is adopted in equation (3) as follows;

$$\Delta Q_{it} = \alpha + \beta_{po} \cdot DEF_{it} + e_{it} \quad \text{Eq. (3)}$$

Where; ΔQ_{it} is the amount of equity issued, β_{po} is the pecking order coefficient and DEF_{it} is financing deficit. The model predicts $\beta_{po} < 1$ and α close to 0 in contrary to the simple pecking order model.

3.2.2 Market Timing Model

The present paper will test the market timing theory based on the model of Baker and Wurgler (2002). The leverage is regressed by Rajan and Zingales (1995) control variables and a variable that summarizes the relevant historical variation in market valuations. This variable is called External Finance Weighted Average Market-to-Rook (EFWAMTB) ratio which is included in the model alongside the firm size, asset tangibility, profitability and market to book ratio.

The EFWAMTB reflects the influence of past, within-firm variation in market valuation while, the current MTB is included as a proxy to the investment opportunities. Baker and Wurgler explained the inclusion of MTB alongside the EFWAMTB in the model as the latter do a better job in testing whether there is a persistent effect of market timing on capital structure, which may not be well perceived by the MTB. Baker and Wurgler defined the motivation behind this weighting in the EFWAMTB as: "external financing events represent practical opportunities to change leverage. Therefore, it gives more weight to valuations that prevailed when significant external financing decisions were being made, wheth-

er those decisions move toward debt or equity." The Baker and Wur-gler model can be shown in equation (4) as follows;

$$L_{it} = \alpha + \beta_1 FS_{it} + \beta_2 AT_{it} + \beta_3 PROF_{it} + \beta_4 MTB_{i,t-1} + \beta_5 EFWAMTB_{i,t-1} + u_{it}$$

Eq.(4)

Where; L_{it} is the leverage ratio which is measured in book value and market value, FS_{it} is the firm size, AT_{it} is the asset tangibility, $PROF_{it}$ is the asset profitability, $MTB_{i,t-1}$ is the market to book ratio in t-1 and $EFWAMTB_{i,t-1}$ is the external finance weighted average market to book ratio. The leverage, the Rajan and Zingales (1995) control variables and the Baker and Wurgler variable are defined and measured as follows;

- **Book leverage (BL):** The ratio of debt to book value of total assets. $BL = (\text{Current liabilities} + \text{Long-term debt}) / \text{Total assets}$. Following Fama and French (2000).
- **Market leverage (ML):** The ratio of debt to market value of assets. $ML = (\text{Current liabilities} + \text{Long-term debt}) / (\text{Total assets} - \text{Book equity} + \text{market equity})$. Following Fama and French (2000).
- **Firm size:** The natural log of assets. Following Lee et al. (2010), Yang (2010) and Lee and Suh (2011)
- **Asset tangibility:** The ratio of net property, plant and equipment (tangible or fixed assets) to total assets (Titman and Wessels, 1988).
- **Profitability:** The ratio of earnings before interest, taxes and depreciation (EBITDA) to total assets (Frank and Goyal, 2009).
- **Market to book:** The ratio of market value of total assets to the book value of total assets. The market to book ratio is the most common used proxy

for growth. Adam and Goyal (2008) referred to it as the most reliable proxy for firm's investments opportunities.

- **External finance weighted average market to book (EFEAMTB):** Weighted average of a firm's past market-to-book ratios from the IPO till t-1. The weight in the EFWAMTB is the ratio of the sum of external finance (debt + equity) raised in year (s) to the sum of external finance over the period from the IPO till t-1 which referred to (r). The EFWAMTB can be calculated according to equation (5) as follows;

$$EFWAMTB_{i,t-1} = \frac{\sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} \cdot \left(\frac{M}{B}\right)_s}{\sum_{r=0}^{t-1} e_r + d_r} \cdot \left(\frac{M}{B}\right)_s$$

Eq. (5)

Where; e denotes to net equity = $(\Delta \text{book equity} - \Delta \text{retained earnings})$, d denotes to net debt issued = Δ total debt, s denotes to the year, r denotes to the period from IPO to t-1, $\left(\frac{M}{B}\right)_s$ is the

market to book ratio at year (s). For the purposes of computing EFWAMTB, some requirements are needed to be considered. The minimum weight will be set to zero in order to ensure a weighted average is formed. In any event, a zero weight just means that the variable contains no information about the market valuation in that year. Also, the firm-year observations where the resulting EFWAMTB exceeds 10 are dropped off.

3.2.3 Pecking order and market timing are not mutually exclusive model

In fact, there is another point of view that the capital structure theories are not mutually exclusive and one theory cannot describe the capital stru-

ecture decision. Accordingly, the present paper develops a model that combines the factors that determine the pecking order theory and market timing theory, simultaneously. This model examines the effect of the determinants of capital structure, such as firm size, asset tangibility, market to book, profitability, financial deficit, and external finance weighted average market to book on book and market leverage, as shown in equation (6).

$$L_{it} = \alpha + \beta_1 FS_{it} + \beta_2 AT_{it} + \beta_3 PROF_{it} + \beta_4 MTB_{i,t} + \beta_5 EFWAMTB_{i,t-1} + DEF_{it} + u_{it} \quad \text{Eq.(6)}$$

Where; the leverage is in this model is measured in both the market leverage and book leverage. The variables are defined and measured before in the previous models in subsections 3.2.2 and 3.3.3.

3.3 Statistical Methods

Before interpreting the models' results, we have to illustrate the statistical methods used in this paper. In order to estimate the parameters of the three models, a cross-section time series data called "panel data" is utilized using the statistical package "STATA /SE 12". Panel data has two types of regression models: the Fixed Effects (FE) and the Random Effects (RE) (Greene, 2002; yaffee, 2003; Baltagi, 2005; Park, 2005). In order to determine which model to be followed, the following steps must be conducted;

1. Both FE and RE regression models must be conducted first.
2. Then, a "Hausman" test is conducted to choose between FE and RE regression model (Baltagi, 1995; Wooldridge, 2002; Greene, 2003; and Park, 2005). This test uses the

Chi² distribution to test the null hypothesis the coefficients estimated by random effect model are not significantly different from those estimated by the fixed effects model.

3. If the null hypothesis is rejected then, the FE model is applied.
4. If the null hypothesis is not rejected then, the RE model is applied by using the Feasible Generalized Least Squares (FGLS) to overcome autocorrelation problem.

4. Empirical Results

4.1 Descriptive Statistics

Table (2) presents the descriptive statistics for the variables used in the four estimated models. It is clearly shown that the percentage of debt is lower than equity. The firms in the sample depend on debt with a mean value of 43% of book debt ratio and market debt ratio of 42%. On the other hand, the equity has a percentage of 57% which refers to the preference of the Egyptian firms to equity more than debt. Additionally, ΔD refers to the change in long term debt ratio which has a mean of 10% only, while the rest of debt percentage is allocated to short term debt which has the larger percentage. This means that the Egyptian firms prefer short term debt to long term debt ratios due to the high bankruptcy costs associated with debt. Moreover, the MTB has a mean value of 1.15 and minimum value of 0.05 and maximum value of 5.05. Similarly, the EFWA-MTB has a mean value of 0.297 and minimum value of 0 and maximum value of 6.38. The high values of MTB ratio implies that there are windows of opportunities in Egyptian equity market (Allini et al., 2017)

Table (2). Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
<i>ΔD</i>	301	0.101	0.150	0	1.00
<i>ΔQ</i>	301	0.573	0.550	-0.60	1.00
<i>DEF</i>	301	0.005	0.551	-3.51	7.78
<i>BL</i>	301	0.432	0.268	0	1
<i>ML</i>	301	0.415	0.265	0	1
<i>FS</i>	301	20.68	1.916	16.9	24.8
<i>AT</i>	301	0.291	0.223	0	0.98
<i>Prof</i>	301	0.089	0.139	-0.27	0.73
<i>MTB</i>	301	1.152	0.621	0.05	5.05
<i>EFWAMTB</i>	296	0.297	0.797	0	7.38

4.2 Pecking Order Empirical Results

Table (3) shows the estimation of the parameters of both the simple pecking order model and the modified pecking order model. Panel (A) shows the results of the simple pecking order model. According to the Hausman test results, the null hypothesis is rejected and the FE model is followed in testing the simple pecking order theory. It is shown that $\alpha = 0.102$ and $b_{po} = -.007$, where the results are far different from Shyam-Sunder and Myers model predictions. The pecking order coefficient (β_{po}) is far below one with negative sign thus, it predicts a negative effect of financial deficit on debt ratio. This result can be justified by the dependence on equity more than debt to cover the financial deficit, unlike the Shyam-Sunder and Myers model's predictions that suggests the dependence on debt first then equity as a last resort.

The modified pecking order results in Panel (B) assured the preference of equity over debt to cover financial deficit. The Hausman test also supports the FE model in estimating the modified pecking order model. Interestingly, the financial deficit was found to have significant positive effect on equity ratio at 10% significance level. Moreover, the pecking order coefficient $\beta_{po} = 0.021$, which is higher than the coefficient value in the simple pecking order model. However, the R^2 have very low explanatory power that cannot explain the variations in the equity ratio. A probable justification for such result is due to the small sample size.

Table (3). Pecking order and Modified Pecking Order Model

	Panel A: Simple Pecking Order		Panel B: Modified Pecking Order	
	Fixed effects	Random effects	Fixed effects	Random effects
Constant	0.102 *** (21.30)	0.102 *** ((5.78))	0.573 *** (91.64)	0.573 *** ((16.51))
DEF	0.007 (-0.77)	-0.004 ((-0.38))	0.021* (1.76)	0.019 ((1.57))
No. of Obs.	301	301	301	301
R²	0.0023		0.0119	
F	0.59			3.09 *
Wald Chi²		0.14		2.45
Hausman Chi²	15.07 ***		7.69 ***	

Note: *, **, *** represent significance at 0.1, 0.05 and 0.01 level, respectively. The resulting t-statistics of the fixed effects and z-statistics of the random effects are reported below each variable coefficient in parentheses.

The results presented in both panel (A) and panel (B) shows that the Egyptian firms do not follow the simple pecking order theory in making their financial decisions. In fact, Many studies found that firms in developing countries do not follow the standard pecking order theory and they tend to cover their financial deficit with equity rather than debt (Booth *et al.*, 2001; Al-Qaisi and Shubita, 2013; Chen *et al.*, 2013). Although, the predictions of the simple pecking order model were not achieved, the model is useful in indicating rejection if firms goes to the equity market for new capital (Chirinko and Singha, 2000).

To conclude, the Egyptian firms tend to cover its financial deficit using equity rather than debt. Allini *et al.* (2017) mentioned that the equity financing appears to be more attractive and cheaper than debt in the Egyptian market. They explained such result by the lack or even the absence of the Egyptian

bond market, and insufficient corporate profits to meet debt obligations. Additionally, Eldomiaty (2008) described the Egyptian market as an emerging market by being relatively less efficient and this causes the financial decisions to be incomplete and subject to irregularities and information asymmetry thus equity is more preferred under such circumstances.

3.3 Market Timing Results

Table (4) shows that Hausman test results are in favor to the FE model in both panel (C) and Panel (D). First, Panel (C) shows that firm size has significant positive effect on book leverage while, profitability has significant negative effect on book leverage. On the other hand, the MTB and EFWA-MTB have no significant effect on book leverage. Second, Panel (D) shows that only profitability and MTB have significant negative effect on market leverage.

Table (4). Market Timing Models

	Panel C: Market Timing Model-BL		Panel D: Market Timing Model-ML	
	Fixed effects	Random effects	Fixed effects	Random effects
Constant	-1.049 * (-1.84)	-0.731 *** ((-2.22))	1.423 **** (2.17)	0.046 ((0.15))
FS	0.075 *** (2.78)	0.056 *** (3.64)	-0.027 (-0.90)	0.031 *** (2.09)
AT	0.039 (0.57)	0.002 ((0.03))	-0.037 (-0.47)	-0.028 ((-0.41))
PROF	-1.474 *** (-2.93)	-0.384 * ((-1.80))	-2.192 *** (-4.88)	-0.552 *** ((-2.71))
MTB	0.029 (1.59)	0.032 * (1.91)	-0.203 *** (-9.85)	-0.0185 *** ((-9.70))
EFWAMTB	0.000 (0.01)	0.001 ((0.15))	0.001 (0.06)	0.003 ((0.30))
No. of Obs.	296	296	296	296
R²	0.076		0.360	
F	3.58 ***		27.93 ***	
Wald Chi²		17.77 ***		28.29 ***
Hausman Chi²	24.09 ***		22.70 ***	

Note: *, **, *** represent significance at 0.1, 0.05 and 0.01 level, respectively. The resulting t-statistics of the fixed effects and z-statistics of the random effects are reported below each variable coefficient in parentheses.

The positive firm size on leverage is supported in many studies for different reasons. First, large firms are expected to borrow more since they are better diversified and less likely to suffer from financial distress and bankruptcy costs (Titman and Wessels, 1988; Ozkan, 1996; Deesomsak, Paudya and Pescetto, 2004). Second, large firms have a bigger debt capacity because they can easily get access to credit markets and can borrow under better conditions comparing to smaller firms (Sayilgan et al., 2006). Omran and Pointman (2009) justified the positive effect of size on leverage in the Egyptian stock market to the ability of larger firms to have more access to capital market and to have a better negotiation position with banks.

Similarly, the negative effect of profitability on leverage ratio is supported by many researchers, such as Titman and Wessels (1988); Jensen et al. (1992); Rajan and Zingales (1995); Booth *et al.* (2001); Ozkan (2001); Kayhan and Titman (2007). Myers and Majluf (1984) justified this negative relationship as profitable firms prefer to finance their investments with internal funds rather than by debt issuance. Regarding the Egyptian market, El-domiaty and Ismail (2004; 2009) justified such results as the Egyptian market is characterised by: poor bond market and semi bank-oriented financial system. They suggested that the profitability has a vital role either on the short run to meet dividends and current needs or on the long run as retained

earnings to finance potential investments.

The negative effect of MTB on leverage is supported in many studies. Myers (1977); Titman and Wessels (1988) found that high growth firms have higher agency costs since they have more flexibility in taking future investments and risky projects. Therefore, they have incentives to use less risky debt, especially long term debt, to lower such agency costs. Deesom-sak *et al.* (2004) argued that growth firms tend to use internal resources or equity capital rather than debt to lower such costs.

Lastly, according to Baker and Wurgler (2002), the historical within-firm variation in market to book ratio (EFWAMTB), not current cross-firm variation (MTB), is important in explaining the persistent effect of market timing on capital structure. Therefore, the capital structure of Egyptian firms is short term driven by current market valuation. The insignificant effect of EFWAMTB and leverage contradicts with the findings of Baker and Wurgler (2002); Hovakimian (2006); Huang and Ritter (2006); De Bie and De Han (2007) who argued a negative effect of EFWAMTB on leverage. In fact, many studies criticised the role of the EFWAMTB as a proxy to market timing.

For example, Welch (2004) argued that stock returns are the first order determinants of debt ratio rather than EFWAMTB, as the stock price changes affect the choice of financing. Similarly, Huang and Ritter (2009) found that the Equity Risk Premium (ERP) have the long lasting effects on leverage, even after controlling for firm characteristics.

Combining the results of EFWAMTB and MTB, it is revealed that there is evidence to market timing behavior but it has no persistent effect on capital structure as found by Leary and Roberts (2005), Alti (2006), Flannery and Rangan (2006), Hovakimian (2006) and Kayhan and Titman (2007), Assran (2012).

4.3 Market Timing and Pecking Order are not Mutually Exclusive Model Results

Table (5) reports the estimates of the four Rajan and Zingales (1995) control variables, the Baker and Wurgler (2002) market timing variable and Shyam-Sunder and Myers (1999) pecking order variable. It is shown that Hausman test's Chi^2 coefficient is significant and its null hypothesis is rejected. Therefore, the FE model is applied in testing both theories, simultaneously.

Table (5). Pecking order and Market Timing Model

	Panel F: PO & MT with BL		Panel G: PO & MT with ML	
	Fixed effects	Random effects	Fixed effects	Random effects
Constant	0.681 (-1.18)	-0.644 ((-1.97))	1.480 *** (2.21)	0.045 ((0.14))
FS	0.056 *** (2.09)	0.051 *** ((3.33))	-0.030 (-0.96)	0.031 *** ((2.09))
AT	0.007 (0.10)	-0.019 ((-0.31))	-0.042 (-0.599)	-0.028 ((-0.40))
PROF	-1.177 *** (-3.05)	-0.391 * ((-1.85))	-2.196 *** (-4.88)	-0.551 *** ((-2.7))
MTB	0.045 (2.43)	0.052 ((2.93))	-0.200 *** (-9.26)	-0.186 *** ((-9.03))
EFWAMTB	-0.000 (-0.04)	0.001 ((0.12))	0.001 (0.05)	0.003 ((0.30))
DEF	-0.039 *** (-2.99)	-0.041 *** ((-3.16))	-0.006 (-0.40)	0.001 ((0.06))
No. of Obs.	296	296	296	296
R²	0.100	0.084	0.361	0.319
F	4.57 ***		23.22 ***	
Wald Chi²		28.28 ***		127.84 ***
Hausman Chi²	17.66 ***		22.36 ***	

Note: *, **, *** represent significance at 0.1, 0.05 and 0.01 level, respectively. The resulting t-statistics of the fixed effects and z-statistics of the random effects are reported below each variable coefficient in parentheses.

By comparing these model results with the previous models' results, it is found that there are many similarities. Consistent with the market timing results, the firm size has significant positive effect on book leverage, the profitability has significant negative effect on book leverage and EFWAMTB has no significant effect on book leverage. Moreover, the financial deficit was found to have significant negative effect on book leverage, consistent with the modified pecking order results. Regarding the market leverage, only profitability and MTB have significant negative effect on market leverage. The previous results supported the role of modified pecking order rather than the simple pecking order in explaining the financing decisions in the Egyptian market. The model also, supported the

short term effect of market timing on capital structure. In general, we can say that modified pecking order theory and market timing theory are not mutually exclusive.

4. Conclusion

The present paper tested the pecking order theory and market timing theory using panel data analysis on a sample of 43 non-financial firms listed in the Egyptian stock market during the period from 2009 till 2015. The results show that the pecking order coefficient is very far below one and the financial deficit was found to have insignificant positive effect on equity, which is inconsistent with simple pecking order theory. On the other hand, the financial deficit was found to have significant negative effect on leverage and with higher value of the estimated

coefficient in modified pecking order theory. This supports the predictions of modified pecking order theory in the Egyptian context.

Considering the market timing theory, it was found that the Baker and Wurgler variable (EFWAMTB), which is a proxy to market timing, has insignificant effect on book and market leverage. The current market to book ratio, which is a proxy to investment opportunities, has significant negative effect on market leverage. This suggests that the market timing theory has no persistent effect on capital structure and it can only explain the capital structure decisions in the short run.

When examining the pecking order and market timing as not mutually exclusive models, the estimated results were better than those from testing both theories, individually. Both theories contributed to better understanding of capital structure in Egypt. This model suggests that the capital structure decision in the Egyptian market was found to be affected by important factors, such as the firm size, profitability, the market to book ratio and financial deficit. Also, both theories contributed to understanding the importance of equity over debt in the Egyptian market. In other words, Egyptian firms tend to issue equity to finance their financial deficit and to finance their growth opportunities.

5. Recommendations and Future Research

The present paper recommends studying the capital structure theories, comprehensively. The comprehensive capital structure model provided useful insights in explaining the capital structure decisions. First, it helped in the

determination of the factors that affect the capital structure. Second, it proved that the capital structure theories are not mutually exclusive and they complete each other in studying the capital structure. Third, it helped to some extent in solving the issue of "Capital structure inconclusiveness".

Further studies are required to enrich the research on capital structure theories. These future researches would contribute to finding answers to the "Capital structure puzzle" since Myers (1984). They can be summarised in the following points;

- The modified pecking order model should include a proxy to information asymmetry. Fama and French (2005) observed that the pecking order theory assumes that information asymmetry is an important determinant of firms' capital structure.
- The pecking order theory must be tested under different levels of financial deficits and surpluses by developing models that estimates the effect of the financial deficit/surplus level on debt ratio.
- More future researches should give attention to the market timing theory, due to shortages in market timing theory studies, especially in developing countries.
- Studying simultaneously the debt market timing and the equity market timing.
- Doing further tests in testing the effect of EFWAMB on capital structure, by using alternative weighing schemes. For example the differentiation of EFWAMB into two components, such as yearly timing and long-term timing (Kayhan and Titman 2007).

• New theories of capital structure are suggested for future research on capital structure decisions. These new theories emerged since 1980s and they all link findings of applied economics with financing theories. In fact, Weigl and Wittenberg (2011) summarised new capital structure theories in three groups. First, Capital structure based on product/market interaction which includes capital structure and firm's competitive strategy, capital structure and stakeholder theory, and capital structure and market structure. Second, capital structure based on corporate control which includes capital structure and the threat of a takeover, and corporate control model of Haris and Raviv (1988).

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Appendix (1)

List of the firms included in the sample

TMG Holding	Misr Beni Suef Cement
Gulf Canadian Real Estate Investment Co.	Modern Company for Water Proofing (Bitumode)
Egyptian Real Estate Group	Misr Cement (Qena)
Palm Hills Development Company	Arab Valves Company
Six of October Development & Investment (SODIC)	Cairo Oils & Soap
El Obour Real Estate Investment	International Agricultural Products
Cairo Educational Services	The Arab Dairy Products Co. ARAB DAIRY
Egyptian Media Production City	National company for maize product
Raya Holding For Financial Investments	Egypt for Poultry
Egyptian Satellites (Nile Sat)	El Nasr For Manufacturing Agricultural-Crops
Sues Canal Company For Technology- Settling	Alexandria New Medical Center
Orange Egypt For Telecommunications	Minapharm Pharmaceuticals
Global Telecom Holding	GB AUTO
Telecom Egypt	Middle East Glass Manufacturing
Sharm Dreams Co. for Tourism Investment	El Ahram Co. For Printing And Packaging
Remco for touristic Villages Construction	ELSWEDY ELECTRIC
Rowad Misr Tourism Investment	GMC group for Industrial Commercial and Financial Investment
Ezz Steel	Alexandria Mineral Oils Company
Asek Company for Mining - Ascom	ARAB POLYVARA SPINNING & WEAVING CO.
Sidi Kerir Petrochemicals	South Valley Cement
Samad Misr-EGYFERT	
Sinai Cement	
El Ezz Pocolain (Gemma)	

