

# TIMING OR TARGETING: THE ASYMMETRIC MOTIVES OF CAPITAL STRUCTURE DECISIONS

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## **Abstract**

This study investigates how the timing behavior and the adjustment towards the target of capital structure interact in the capital structure decisions. Past literature finds that both timing and targeting are significant in determining the leverage ratio which is inconsistent with any standalone framework. This study argues that the coexistence of both timing and targeting is possible. The preference of the firm for timing behavior or targeting behavior depends on the cost of deviation from the target. Since the cost of deviation from the target is likely to be asymmetric between overleveraged and underleveraged firms, the direction of the deviation from the target leverage is expected to alter the preference toward timing or targeting in the capital structure decision. Using GMM-system estimators with the Malaysian data for the period of 1992-2009, this study finds that Malaysian firms, on average, adjust their leverage at a slow speed of 12.7% annually increased to 14.2% when the timing variable is accounted for. Moreover, the speed of adjustment is found to be significantly higher and the timing role is lower for overleveraged firms compared with underleveraged firms. Overleveraged firms seem to find less flexibility to time the market as more pressure is exerted on them to return to the target regardless the timing opportunities because of the higher costs of deviation from the target leverage. Underleveraged firms place lower priority to rebalance toward the target compared with overleveraged firms as the costs of being underleveraged is lower and hence, they have more flexibility to time the market. The findings of this study support that tradeoff theory and timing theory are not mutually exclusive. Firms consider both targeting and timing in their financing decisions but the preference of one motive over the other is conditional on the cost of the deviation from the target.

**KEYWORDS:** Market timing theory, Tradeoff theory, Dynamic capital structure, Speed of adjustment, GMM system

## **1. INTRODUCTION**

Equity market timing and tradeoff theories get an increasing interest in the capital structure literature for the entire last decade. Market timing theory (Baker and Wurgler, 2002) suggests that firms can recognize times of mispricing of their own stock and time their issuing (repurchasing) activity accordingly. In this theory, firms are indifferent toward any target leverage and no steady adjustment toward any target should be noticed. Instead, changes in leverage are largely dominated by successive timing activities. On the other hand, the trade-off theory include a family of models, both static and dynamic, in

which firms attempt to balance the advantages against the costs associated with borrowing by keeping the leverage ratio at a certain target level (Baxter, 1967; Jensen and Meckling, 1976; Leary and Roberts 2005). In the dynamic version of trade-off theory, any deviation from the target leverage is costly and requires a quick action to adjust to the target.

One important aspect that can differentiate between the timing and trade-off theories is by the estimation of the speed of adjustment (SOA) toward the target (Huang and Ritter, 2009). While tradeoff theory expects high SOA, timing theory expects, basically, no adjustment. The other aspect for differentiating between the two theories is that trade-off theory is built on rational expectation assumption; mispricing is not expected to play a role as a capital structure determinant while it is the main determinant in timing theory. However, literature find that both timing and targeting motives actually exist at the same time which depart from the prediction of any standalone theory (Graham and Harvey, 2001; Huang and Ritter, 2009; Kayhan and Titman, 2007). How the two motives interact in the decision making process remains largely unknown. Moreover, recent literature indicates that adjustment behavior is not homogenous across firms i.e. no single SOA can fit all firms. A more reasonable approach to investigate the adjustment behavior is to use multiple SOA's (Clark et al., 2009; Flannery and Hankins, 2007; Lemmon et al., 2008). Whether the firm is overleveraged or underleveraged is one of the aspects that are found to affect the SOA (Clark et al., 2009; Lemmon et al., 2008). Overleveraged firms are found to have high SOA compared with underleveraged firms. The asymmetry in the SOA is interpreted as a result of the asymmetry in the costs of deviation from the target (Flannery and Hankins, 2007).

This study will investigate the adjustment behavior of Malaysian firms and how the accounting for timing behavior affects this adjustment behavior. Moreover, this study will investigate if targeting and timing behaviors are mutually exclusive as theoretically expected or they can coexist. Given that the adjustment behavior depends on the difference between the cost of deviation and the cost of adjustment and that the cost of deviation is higher for overleveraged firms than underleveraged firms, the benefits of timing are more likely to outweigh the net cost of deviation for underleveraged firms more than that of overleveraged firms. Firms that are above the target will put higher priority to adjust than to exploit timing opportunities. For firms that are underleveraged, adjusting may not be a priority and firms are more likely to exploit the timing opportunities as they appear. This timing asymmetry is likely to continue in the long run since the firm is less active rebalance the short run timing effect once it is underleveraged compared with being overleveraged. The findings of Baker and Wurgler (2002) that timing activities drive the leverage ratio may be specific to underleveraged firms if this hypothesis holds.

The findings of this research will add more insight to the capital structure dynamics. The suggested interaction between timing behavior and targeting behavior in determining the capital structure of the firm is new. This study contributes to the literature by shedding light on one possible interpretation for the otherwise apparent as contradicted results in the past literature. The new interpretation proposes that the two motives of timing and targeting are likely to coexist, but with different weights for firms above and below the

target. While overleveraged firms are more likely to adjust faster, the underleveraged firms are expected to be better timers. This asymmetric behavior of timing is a result of the asymmetry of the costs and benefits associated with both motives. Moreover, this study will address the estimation problems highlighted in previous literature by using GMM system approach of Blundell and Bond (1998) which is found to be less biased than other estimators in the case of weak instruments, short time dimension and large number of cross-sections as typically the case of capital structure research. This estimator is recent to the Malaysian capital structure research and the results may improve the understanding of the way firms make financing decisions.

## **2. BACKGROUND**

Adjustment towards the target leverage is a behavior expected by a set of capital structure theories that assume the existence of a target leverage and that the deviation from the target is costly. Examples of these theories include tradeoff theory (Baxter, 1967; Kraus and Litzenberger, 1973), agency theory (Jensen and Meckling, 1976) and free cash flow theory (Jensen, 1986). Extant literature generally supports the existence of long-run target leverage and agrees on the notion that a typical firm adjust to that target gradually at a certain SOA but the magnitude of this SOA is not a settled issue (Frank and Goyal, 2007). Extreme finding of high SOA of about 80% yearly is found by de Miguel and Pindado (2001) while no adjustment is found by Baker and Wurgler (2002). Alti (2006) and Flannery and Rangan (2006) both documented a relatively rapid SOA which they interpreted in favor of tradeoff theory. In contrast, Fama and French (2002) and Kayhan and Titman (2007) find only slow SOA which indicates that tradeoff factors may be only secondary aspects in the capital structure decisions.

In timing theory, leverage ratio is driven solely by the mispricing of the firm's equity, whether real or just perceived by the managers of the firm. Timing theory assumes that the firm is indifferent toward any level of leverage since no target is assumed. Obviously, this theory departs from the rational expectation assumption to allow the mispricing of equity to consistently affect the leverage ratio. The prediction of timing theory of capital structure is supported internationally (Baker and Wurgler, 2002; Mahajan and Tartaroglu, 2008) and for Malaysia (Abdeljawad and Mat Nor, 2011).

If one motive drives the dynamism of capital structure, the effect of the other motives will vanish once the right motive is accounted for properly (Flannery and Rangan, 2006). However, current literature supports that both targeting and timing motives may coexist. Survey evidence of Graham and Harvey (2001) find that both targeting and timing are taken into consideration in the financing decisions. Managers consider the amount of overvaluation or undervaluation as a key determinant in the decision to issue common stock. Moreover, the increase in the price of common stock is found to be among the top reasons for issuing common stock. At the same time, about 81% of the managers agreed that they have some kind of target leverage. However, the target is strictly defined for only 10% while 34% have a targeted range and another 37% have flexible target. The survey findings of Graham and Harvey (2001) have been supported later by firm level studies. Huang and Ritter (2009) find that firms finance larger amount of the financing

deficit using external equity when the cost of equity is lower. At the same time, they find that firms adjust to the target at a rate of 17%. Kayhan and Titman (2007) find that stock price history affects the debt ratio for about 10 years consistent with the timing theory. However, part of this effect is gradually reversed since debt ratios tend to adjust toward target debt ratio but at a slow rate.

The findings of these studies are hardly reconciled with one capital structure theory as both timing and targeting are supported. This study proposes that timing and targeting are not mutually exclusive. Timing benefits are opportunities to reduce the cost of equity by an amount equal to the difference between the intrinsic value and the market value of the stock. Each 1% of overvaluation of the stock issued leads to 1% reduction in the cost of equity. The benefit of market timing can be considered as an additional factor in a broad dynamic tradeoff framework. In the dynamic tradeoff framework, adjustment behavior depends on the cost of deviation from the target and the costs of adjustments toward the target. Adjustments take place only if the cost of deviation is larger than the cost of adjustment so the net of these two costs drive the capital structure decisions (Leary and Roberts, 2005). In the proposed framework, the benefits of timing are taken into account in the capital structure decision as an additional factor that is offset with the net cost of deviation. Assuming that the net cost of deviation is positive, if the benefit of timing is higher than the net cost of deviation, the firm will exploit the timing opportunity. If the net cost of deviation is larger than the timing benefit, the firm will adjust whatever the market valuation of the firm is.

The adjustment behavior is not homogenous across all firms. The SOA varies across firms directly with the variation in the costs and benefits of being at the target, for instance the higher probability of distress leads to faster adjustments since it implies that the cost of deviation is high (Flannery and Hankins, 2007; Clark et al. 2009). Past literature finds that overleveraged firms face higher costs of deviation and should adjust faster compared with underleveraged firms. The heterogeneity between firms that are overleveraged and those are underleveraged is documented by (Clark et al., 2009; Lemmon et al., 2008). This asymmetry in the SOA is interpreted as a result of the asymmetry in the costs of deviation from the target where the costs of deviation are likely to be higher for overleveraged firms than underleveraged firms.

The costs of deviation above the target include the increased probability of financial distress which lead to higher borrowing rates and more restraints on new debt for overleveraged firms. In addition, agency problems between debt-holders and shareholders may be deepening for these firms (Jensen and Meckling, 1976; Myers, 1977). As a result, the total cost of deviation is expected to be high and to intensify rapidly as the deviation above the target increases more.

Of course, there are costs to be underleveraged as well. The underleveraged firm may lose the tax advantage of debt financing and it may lack the role of debt as a manager disciplining device (Jensen, 1986). However, there is evidence that these costs are lesser for underleveraged firms than overleveraged firms. The zero leverage phenomenon studied by (Strebulaev and Yang, 2007) indicates that being underleveraged is not costly

to many firms. About 9% of all US firms over the period from 1962 to 2002 have zero debt and almost one quarter of the firms have less than 5% debt. Moreover, the tax shield substitutes may reduce the tax advantages of debt for many firms (DeAngelo and Masulis, 1980). The costs of deviation below the target are then lower and increase slowly as the deviation below the target increase compared to the rapid increase of the costs associated with being overleveraged.

If the costs of deviation for overleveraged firms are higher than the costs for underleveraged firms and the net cost of deviation is competing with the benefits of timing in the decision making, then underleveraged firms are likely to exploit more timing opportunities than overleveraged firms. Timing opportunities for underleveraged firms can outweigh the net cost of deviation more often compared with overleveraged firms. In sum, the firm will exploit more timing opportunities once it is underleveraged and it will not rush to adjust toward the target after that since the cost of deviation from the target is low. If the firm is overleveraged, it is more likely to have net cost of deviation that is larger than the timing benefits; hence the firm will not exploit many timing opportunities and will prefer to adjust even if favorable market conditions exist.

Based on this conjecture, this research suggests that the direction of the deviation from the target, i.e. whether the firm is overleveraged or underleveraged, is one of the determinants that are likely to moderate the behavior of timing versus targeting of the firm. The SOA is expected to be higher for overleveraged firms and the timing will be lower. Overleveraged firms will place higher priority on reducing their level of leverage than on waiting for market timing opportunities. On the other hand, underleveraged firms may find that the benefits of timing are higher than the cost of deviation from the target. These firms will place lower priority to rebalance toward the target compared with overleveraged firms and they are expected to have more flexibility to time the market, hence the SOA is expected to be lower and market timing is expected to be more pronounced.

The starting point for this research is to estimate the SOA for the full sample using GMM system approach which is found to be less biased than other estimators of dynamic models. Estimating the SOA is an investigation for whether the target considerations are a first priority factors in capital structure decisions or they are just secondary factors. Next, the research will investigate the effect of market valuation on the adjustment behavior of the firm. Following Flannery and Rangan (2006), if timing behavior dominates targeting behavior, it should wipe out the effect of targeting once it is accounted for in the model. The factors associated with the dominant theory will appear to be more important once both groups of factors are competing together. Lastly, this research will investigate when the role of timing is likely to show up and when it will be cool-off compared with tradeoff motives. Specifically, this research hypothesize that the tradeoff versus timing motives are moderated by the direction of the deviation from the target.

In the remaining of this paper, the methodology and models will be explained in Section 3. The data will be described in Section 4 and the descriptive statistics in Section 5. Estimation results and discussion in Section 6 and finally, Section 7 will conclude.

### **3. METHODOLOGY**

#### **3.1. Variables**

The dependent variable of this research is the leverage ratio of the firm. According to Rajan and Zingales (1995), the most relevant definition of leverage depends on the objective of the analysis. Measures like total liabilities to total assets can proxy for what is left for shareholders in case of liquidation but not a good indication of the risk of default that the firm faces since items that are used for transaction purposes rather than for financing, like accounts payable, can overstate the amount of leverage. A more relevant definition of leverage to this research is the total debt to total assets ratio which reflects only the debt financing policy of the firm (Hovakimian, 2006).

Another issue is whether to use book values or market values in the definition of leverage. Book leverage reflects the financing history of the firm while market leverage is largely future oriented reflecting the market valuation of leverage ratio. Fama and French (2002) argue that most predictions of tradeoff and pecking order models apply directly to book leverage and some carry over to market leverage. Investigating the timing ability of the firm is also more related to past financing activities since timing is an active reaction to market opportunities. Shocks to market leverage can result either from active financing decisions or simply from passive fluctuations resulted from stock price movements (Welch, 2004). For timing behavior, only active financing transactions are relevant, hence book leverage is likely to better capture these transactions.

Market timing variable should capture the relationship between market valuation of the firm and leverage. The market valuation of the firm can be linked to mispricing through the representativeness heuristic (Tversky and Kahneman, 1974). People tend to use the last observation in a sequence as an anchor to make predictions (Bolger&Harvey 1993). The proxy for timing is the stock price performance (SPP) defined as the difference in the logarithm of price between two successive periods which is basically the stock return (De Bie and De Haan, 2007; Deesomsak et al., 2004; Homaifar et al., 1994).

In addition to the timing variable, a set of control variables that are found to be significant in past literature have been used. The control variables utilized in this research are the ones that are found to be significant in Rajan and Zingales (1995) and subsequently used by Baker and Wurgler (2002). These variables are also identified to be the significant capital structure determinants in Malaysia (Booth et al., 2001). These control variables are size, profitability, tangibility and growth options.

In a tradeoff context, the company size affects the capital structure because larger firms tend to be more diversified and less prone to bankruptcy (Rajan and Zingales, 1995; Titman and Wessels, 1988). Add to this, since part of the bankruptcy costs are fixed, it is

expected to find economies of scale in the bankruptcy costs. So, larger firms face lower unit cost of bankruptcy which may encourage the use of more leverage. In addition, agency costs of debt will be less with larger firms since bondholders are more likely to be repaid for their money, and hence, the firm is likely to use more leverage. The proxy for size in this research is the logarithm of sales, where sales are adjusted for inflation using constant prices of 2005.

For profitability, Myers and Majluf (1984) argued that as a result of asymmetric information, companies prefer internal sources of finance. In other words, higher profitability companies tend to have lower debt levels. Relative to this theory Titman and Wessels (1988) and Rajan and Zingales (1995) find leverage to be negatively related to the level of profitability. Fama and French (2002) and Myers (1984) use this negative relationship as evidence against the trade-off model. The proxy for profitability in this research is the earnings before interest, taxes and depreciation to total assets.

Tradeoff theory suggests that tangibility affects the capital structure as the more tangible the assets of a firm are, the greater the assets that can be used as collateral. Tangible assets add more security to the debt and reduce losses associated with information asymmetry. Consequently, a positive relationship is expected with the level of debt finance (Rajan and Zingales, 1995). The proxy for tangibility is the property, plant and equipment net of depreciation to total assets.

Growth opportunities are defined as “capital assets that add value to a firm but cannot be collateralized and do not generate current taxable income” (Titman and Wessels, 1988). Myers (1977) argued that due to information asymmetries, companies with high leverage ratios might have the tendency to undertake activities that transfer wealth a way from bondholders toward shareholders (under-invest in economically profitable projects and asset substitution) and this will increase the agency costs of debt. Therefore, it can be argued that companies with growth opportunities tend to use greater amount of equity finance because they have stronger incentives to avoid underinvestment and asset substitution that arise from stockholder-bondholder conflicts. Moreover, in the free cash flow theory of Jensen (1986), growth firms have less free cash flow and less debt is needed to be used as a control mechanism. In addition, growth options cannot be collateralized, and hence, financial distress will be higher for firms with higher growth leading these firms to use more equity. On the other hand, simple pecking order theory posits a positive association between leverage and growth opportunities. In this framework, a firm’s leverage should increase as investments opportunities exceed retained earnings and vice versa. Thus, maintaining profitability level constant, funds needed in excess of retained earnings, will be obtained from debt expecting higher leverage for those firms with better growth opportunities. Empirical results are mixed. For example, Bradley et al. (1984), Rajan and Zingales (1995) and Fama and French (2002) find a negative relationship between leverage and growth opportunities while Titman and Wessels (1988) did not find support to the effect of growth on leverage. Booth et al. (2001) find a significant positive relationship for many developing countries including Malaysia, Thailand, India and Turkey. The main proxy for growth is the market to book ratio defined as total assets minus book equity plus market equity all divided by

total assets where market equity is the result of the product of the number of common shares and the end of the year share price.

### 3.2. Models

In a dynamic adjustment model, if the costs of adjusting to the target leverage are zero, the firm will always keep its leverage at the target by instantly counteract shocks. However, in the presence of adjustment costs the firm will adjust only if the adjustment costs are less than the costs of deviation from the target. A standard partial adjustment model is usually used to capture this dynamism. The setup of the partial adjustment model is

$$Lev_{i,t} - Lev_{i,t-1} = \delta(Lev_{i,t}^* - Lev_{i,t-1}) + \varepsilon_{i,t} \quad \text{Eq. (1)}$$

where  $\delta$  is the average SOA and  $Lev_{i,t}^*$  is the target leverage.

The model assumes that the firm has a target leverage that minimizes the cost of capital. Nevertheless, shocks can make the firm deviates from the target. Once the firm is deviated from the target, it should adjust as long as the cost of deviation is higher than the cost of adjustment. According to the partial adjustment model, the actual adjustment in leverage is some fraction of the desired adjustment for each period which is called the SOA ( $\delta$ ). If  $\delta=1$ , it means that full adjustment occur each period, while if  $\delta=0$ , no adjustment takes place. The SOA should be a fraction between 0 and 1 if an adjustment behavior is followed by the firm.

The target leverage  $Lev_{i,t}^*$  is unobservable and hence proxied by the fitted value from a regression of observed leverage on a set of firm characteristics identified in the previous literature as important determinants of the target (Fama and French, 2002; Flannery and Rangan, 2006; Hovakimian et al., 2001; Kayhan and Titman, 2007). The target in this case changes from firm to firm and from year to year for the same firm as it is a function of the firm characteristics. The fit value of Eq. (2) will be used as the target leverage.

$$Lev_{i,t}^* = \beta_1 + \beta_2 Growth_{i,t-1} + \beta_3 Profit_{i,t-1} + \beta_4 Tang_{i,t-1} + \beta_5 Size_{i,t-1} + \gamma_t + \eta_i \quad \text{Eq. (2)}$$

where  $\gamma_t$  and  $\eta_i$  are firm and time fixed effects and other variables are self explanatory. However, estimation of the partial adjustment model can be done by incorporating the target leverage (Eq. (2)) into the partial adjustment model (Eq. (1)) and rearranging the terms. Then, the estimation can be done in a single step using Eq. (3)

$$Lev_{i,t} = \delta\beta X_{i,t} + (1 - \delta)Lev_{i,t-1} + \gamma_t + \eta_i + \varepsilon_{i,t} \quad \text{Eq. (3)}$$

where the SOA ( $\delta$ ) equals one minus the coefficient of the lagged leverage.  $X_{i,t}$  is the set of control variables all used as concurrent regressors, except for the lagged leverage, to allow for more observations to be used. The firm and time fixed effects are accounted for in the model following (Flannery and Rangan, 2006; Lemmon et al., 2008).

To investigate the effect of market timing on the adjustment process, a regression that includes the timing variable as well as the other variables that's supposed to determine the target leverage will be used. Flannery and Rangan (2006) argue that if timing behavior can dominate the targeting behavior, the timing variable should be able to wipe out the influence of targeting behavior once it is added to the model. Following Flannery and Rangan (2006), the following model will be used to investigate the effect of timing behavior on the targeting behavior:

$$Lev_{i,t} = \delta\beta X_{i,t} + (1 - \delta)Lev_{i,t-1} + \gamma_1 Timing_{i,t} + \gamma_t + \eta_i + \varepsilon_{i,t} \quad \text{Eq. (4)}$$

Eq. (4) is similar to Eq. (3) except that a timing variable is added to the model. The benchmark that will be used for comparison is Eq. (3). If adding the timing variable reduces the estimated coefficients of  $X_{i,t}$  and the SOA significantly, that mean that timing variable has dominated the tradeoff forces.

Lastly, this research has controlled for the direction of the deviation from the target by dividing the sample based on whether the firm is over or underleveraged and re-estimate Eq. (3) and Eq. (4) for the two sub-samples then compare the results. Since instrumental variables are used in the estimation, separating the two groups aims to insure that the instruments used for estimation are from the same group not the other group. To create the subsamples, the deviation from the target is calculated first based on the following relationship

$$Deviation = Observed\ leverage - target\ leverage$$

If the deviation is positive (negative), the firm is overleveraged (underleveraged). The target leverage is a function of firm characteristics hence; it varies across firm and time. Since leverage value is, by definition, bounded by minimum 0 and maximum 1, any fit value for the target leverage that is out of the sample observations is replaced by its actual value to be consistent with the defined boundaries.

### 3.3. Econometrics approach

The estimation of Eq. (3) and Eq. (4) raises many econometric issues. Mainly, the lagged leverage regressor is likely to be endogenous because it arises within a system that influences the error term. To obtain consistent estimators for this model, instrumental variables should be used to account for endogeneity problem. The instruments should satisfy the two requirements

- i. Exogeneity requirement which mean no correlation between the instrument and the error is exists. This requirement leads to instrument validity.
- ii. Relevance requirement which mean a high correlation of the instrument and the endogenous regressor should be satisfied.

The instrumental variable estimators are consistent once the instruments are valid. If the instruments are only marginally relevant, they are called weak instruments. In case of weak instruments, estimators are still consistent but may provide poor approximation to actual sampling distribution. The challenge is then to find the appropriate instruments.

An increasingly popular approach for estimation of dynamic models is the difference generalized methods of moments (difference GMM) of Arellano and Bond (1991). The difference GMM is able to account for the unobservable time invariant variables by using the first difference of the variables. Moreover, GMM is able to mitigate the endogeneity problem by using the instrumental variable approach where the lags in level of the endogenous variable are used as instruments.

The main drawback of GMM difference is that it has poor finite sample properties in case that the instruments are weak. If the time series are persistent, the number of periods are short and the number of cross sections are large the lagged levels are likely to be only weak instruments for subsequent first differences (Blundell and Bond, 1998). Unfortunately, these features typically exist in the case of capital structure studies (Lemmon et al., 2008). Therefore, GMM difference may result in imprecise or even biased estimators in this case.

An alternative to GMM difference is the GMM system of Arellano and Bover (1995) and Blundell and Bond (1998) where two simultaneous equations are estimated; one in the level and the other in the first difference. The lagged level of the endogenous variable is used to instrument the first difference equation and the differenced variable is used to instrument the level equation. The GMM system estimator is found to be more efficient and has less finite sample bias due to the exploitation of more moment conditions especially when the instruments are weak. Recently, many papers have utilized the system GMM in estimating the dynamic capital structure models (Antoniou et al., 2008; Clark et al., 2009; Lemmon et al., 2008). Lemmon et al. (2008) argue that system GMM is expected to produce large efficiency gains over other approaches that use difference GMM or two-stage least square methods. This research will employ the GMM system in estimation.

This study uses orthogonal deviation to get rid of the firm fixed effects (Arellano and Bover, 1995). In this method, the average of all future available observations of the variable is subtracted from each observation. This type of deviation is able to remove the fixed effect and is computable for all the observations except the last one for each firm (Roodman, 2006). Since the lagged observation is not included in the orthogonal deviation, the resulted deviations are available as valid instruments as well. The use of orthogonal deviations is preferable in the case that many gaps exist in the unbalanced panel data which is likely to occur once the two subsamples are created while the first differencing transformation is likely to magnify the number of gaps and may affect the estimated coefficients. Time fixed effects are captured by including year dummies to remove the effect of general time-related shocks (e.g. macroeconomic shocks common to all firms) from the error term as recommended by Roodman (2006) and Ozkan (2001).

The instruments used for the leverage endogenous variable, in all models, are the lagged, level and difference, two periods and earlier, up to the end of the available time series of the firm. Other variables are assumed to be exogenous and hence they instrument

themselves. All GMM models are estimated using robust two-step estimation method and standard errors are corrected using Windmeijer (2005) finite sample correction.

### **3.4. Model Diagnostics**

It is expected for GMM estimators to have first order autocorrelation, but the crucial requirement for GMM estimators to be consistent is the absence of second order autocorrelation. If second order autocorrelation exists, some lags are invalid instruments and should be removed from the instrument set. Both first order autocorrelation and second order autocorrelation developed by Arellano and Bond (1991) are reported in this research. In addition, instruments must be exogenous to be valid. Otherwise, the moment conditions will not be satisfied. A test for the validity of the over-identifying restrictions called “Hansen test” is used in this research. The null hypothesis for this test is that “all instruments are valid”. This is a null that should not be rejected in order to proceed with GMM estimation. The rejection of the null indicates that at least one of the instruments is not valid.

Lastly, Wald test indicates that the model well fit the data. The null hypothesis of this test is that the set of coefficients of the model are simultaneously equal to zero. If the null cannot be rejected, the variables of the model are not doing good job in predicting the dependent variable.

## **4. DATA**

The data of this research include all firms available in Thomson Financial Worldscope Database<sup>1</sup> for the Malaysian market during the period of 1992-2009. Data before 1992 is often missing and hence, returning earlier than that year is not feasible. Financial firms are excluded since their capital structure reflects special regulations more than independent policy. Moreover, to reduce the effect of outliers, this research will further restrict the sample by excluding the firm-year observations where:

1. The book value of assets is missing,
2. The book leverage is larger than one, and
3. The MB ratio is larger than 10 (Baker and Wurgler, 2002; Hovakimian, 2006).

In addition, observations without at least 2 lags of data available fall out of the sample. The final sample will be an unbalanced panel data where different number of firm-year observations may be available for each firm. The total number of firm-year observations used in the analysis is 7978 observations.

## **5. DESCRIPTIVE STATISTICS**

The descriptive indicators for the variables used in this research are presented in Table 1. The mean, median, maximum, minimum, standard deviation and the number of observations for each variable are reported. Moreover, Figure 1 presents the evolution of

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<sup>1</sup> Part of THOMSON DATASTREAM database

the mean of the variables from year to year with the solid line. A one standard deviation interval is also presented with the dotted lines.

**Table 1: Descriptive statistics**

	<i>Mean</i>	<i>Median</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Std. Dev.</i>	<i>Observations</i>
<i>LEV_TB</i>	0.251	0.233	0.997	0.000	0.196	7978
<i>MB</i>	1.116	0.918	9.297	0.000	0.737	7978
<i>TANGIBLE</i>	0.403	0.394	0.999	0.000	0.222	7978
<i>SIZE</i>	19.104	19.026	23.969	9.250	1.545	7955
<i>PROFIT</i>	0.067	0.075	11.096	-2.434	0.188	7978
<i>SPP</i>	-0.074	-0.048	2.238	-3.258	0.565	7829

Notably, book leverage has peaked between 1997 and 1998 just before or concurrent with the financial crisis. The leverage ratio continues to decrease since that time. Remarkably also, the sharp decrease in profitability and SPP (return) during the crisis year, however, the profitability ratio get better after that.

## 6. ESTIMATION RESULTS AND DISCUSSION

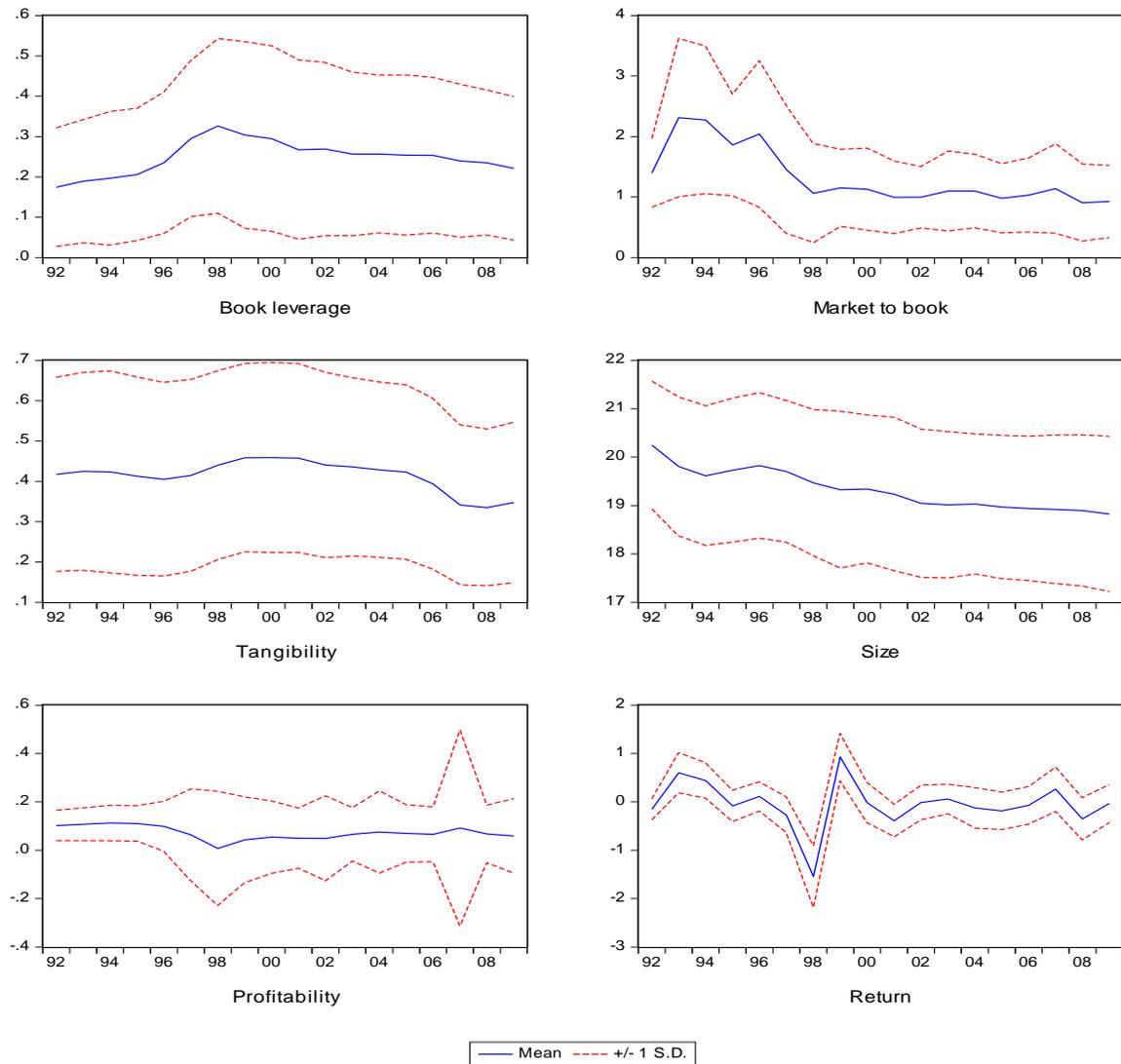
### 6.1. Tradeoff versus timing motives

Results of estimation of Eq. (3) and Eq. (4) appear in column (a) and column (b) of Table 2, respectively. For diagnostics, the table report the significance levels for both AR(1) and AR(2). AR(2) is insignificant thus the absence of second order autocorrelation required for GMM is satisfied. The validity of instruments is satisfied under the Hansen test also. Wald test of the joint significance of the estimated coefficients indicates that the regressors are jointly significant in explaining the dependent variable. The number of instruments is also reported in Table 2 following the recommendation of Roodman (2006).

In Column (a), the lagged leverage is found to be the most important determinant of current leverage. Holding all other regressors constant, about 87.4% change in the mean of current leverage is resulted from a 100% change in the lagged leverage. This is an evidence for the high persistence of the leverage variable. The lagged dependent variable is of special importance in the partial adjustment model. If the firm follows an adjustment policy, the coefficient of this variable must lie between 0 and 1. The speed of adjustment  $\delta$  equal unity minus this coefficient as will be discussed in Section 6-2.

The growth options as proxied by market-to-book ratio are found to be positively related to book leverage ratio. The coefficient of this variable is about 1.1%. The positive relationship is usually interpreted as supporting simple pecking order where funds needed for growth in excess of retained earnings are obtained using debt. This result is consistent with the findings of Booth et al. (2001). Profitability has high significant negative effect. The coefficient of profitability is -21.5% which makes it the second most important firm characteristic in determining the leverage ratio in the short run next to the lagged leverage. The negative result is consistent with most empirical works and can be

interpreted in light of pecking order theory as firms tend to prefer internal finance over external finance in the presence of information asymmetry as a result of adverse selection costs (Myers and Majluf, 1984; Rajan and Zingales, 1995). Size is found to be positively significant but the coefficient is economically small (about 0.48%). The positive relationship of leverage with size can be interpreted as a result of the less probability of incurring bankruptcy costs as large firms are more diversified and less prone to fail (Rajan and Zingales, 1995). Tangibility is found to have positive and significant effect on leverage. The coefficient of this variable is 3.6%. This result is consistent with the prediction that firms with more tangible assets use more debts since tangible assets can be used as collateral.



**Figure 1: The evolution of the mean and the standard deviation of the variables over the period 1992 to 2009**

Column (b) presents the results for Eq. (4). Interpretation of the results is similar to that of column (a). However, an additional variable, that is SPP, is added to capture the association between capital structure changes and the market conditions. This variable is

found to be negatively and significantly related to leverage as expected. A 10% increase in SPP is associated with 1.7% decrease in leverage. The SOA for both models is discussed next.

## 6.2. The speed of adjustments

The speed of adjustment ( $\delta$ ) in Column (a) of Table (2) is 12.7%. This result means that only 12.7% of the difference between desired and actual level of leverage is closed each year. The low SOA found in this research is consistent with many recent papers in developed markets (Baker and Wurgler, 2002; Fama and French, 2002; Huang and Ritter, 2009; Iliev and Welch, 2010; Lemmon et al., 2008; Shyam-Sunder and C. Myers, 1999; Welch, 2004). However, this result is different from Flannery and Rangan (2006) who document a relatively high SOA of 34.4%. The difference can be traced to the estimation approach used. Flannery and Rangan (2006) use a within-estimator to remove the fixed effects. Within estimator is found to be severely biased in estimating dynamic models (Lemmon et al., 2008).

**Table 2: Estimation results for the short-run determinants of book leverage using Eq. (3) and Eq. (4).**

<i>Independent variables</i>	<i>Eq. (3)</i> (a)	<i>Eq. (4)</i> (b)
<i>LEV_TB(-1)</i>	0.8743 <b>(36.91)***</b>	0.8579 <b>(38.12)***</b>
<i>MB</i>	0.0117 <b>(3.59)***</b>	0.0136 <b>(4.42)***</b>
<i>PROFIT</i>	-0.2156 <b>(-8.61)***</b>	-0.213 <b>(-8.11)***</b>
<i>SIZE</i>	0.0049 <b>(4.23)***</b>	0.0058 <b>(4.76)***</b>
<i>TANGIBLE</i>	0.0365 <b>(5.04)***</b>	0.0356 <b>(4.86)***</b>
<i>SPP</i>	--	-0.0176 <b>(-5.28)***</b>
Speed of adjustments	<b>12.7%</b>	<b>14.2%</b>
Number of observations	6931	6842
Number of instruments	156	157
Sig. of AR(1)	0.000	0.000
Sig. of AR(2)	0.989	0.710
Sig. of Hansen test	0.668	0.589
Wald Chi <sup>2</sup>	(2579.78)***	(3129.19)***

*Notes: constant coefficient and time dummies are included but not reported. Standard errors are robust and corrected using (Windmeijer, 2005) finite sample correction. The significance of Arellano-Bond test for AR(1) and AR(2) are reported. T-statistics are shown in parentheses. \*\*\*, \*\* and \* indicate the coefficient is significant at 1%, 5% and 10% levels, respectively.*

The slow SOA found in this paper is not conclusive in supporting or rejecting the tradeoff theory. The adjustment behavior is significant but it is too small to be the first priority of the firm. Fama and French (2002) find similar slow SOA ranging between 7% and 17% and they find it difficult to interpret their results in favor of tradeoff theory. Though the SOA they find is statistically reliable, it is too slow to draw conclusions in favor or against tradeoff theory. This result implies that the door is open for other interpretations that do not have targeting as a distinct behavior.

In Column (b), the SOA becomes 14.2% after introducing the timing variable. Based on the proposition of Flannery and Rangan (2006), if the firm's first priority is timing, the SOA should be less once a variable that capture the timing behavior is included in the regression. On the other hand, if the priority of the firm is to rebalance toward the target, the SOA should be high and the timing variable should not be able to reduce the targeting behavior.

The result of adding the timing variable appears to slightly increase, not decrease, the SOA. This result counters the intuition of Flannery and Rangan (2006). The question becomes what is the interpretation of the increase in the SOA noticed in Column (b). To answer this question, recall that the adjustment behavior of the firm is impeded by the adjustment costs (i.e. the costs of issuing new securities). Adjustment costs are usually thought of as the reason why the firm does not adjust instantly to any shock to leverage. The perceived timing is an opportunity for the firm to offset the cost of adjustment by issuing overvalued shares. Reducing the cost of adjustment of the firm is likely to encourage the firm to adjust faster. The timing variable seems to capture this reduction in the cost of adjustment. The overall results are more consistent with the proposition that both targeting and timing motives are co-existing.

### **6.3. Controlling for the direction of the deviation from the target**

Lastly, this research hypothesize that timing versus targeting behaviors are moderated by the direction of the deviation from the target. The switch in the preference between the two motives is a result of the difference in the behavior of the costs and benefits associated with both tradeoff and timing motives between over and under-leveraged firms. Costs of being overleveraged are higher and increasing sharply as the firm deviates more above the target, while costs of being more underleveraged are lower and do not encounter such sharp increase in costs. Firms that are overleveraged face more pressure to adjust and less flexibility to time the market as their priority is to get back to the target whatever the market conditions are. Firms that are underleveraged face relatively lower pressure to adjust and more flexibility to exploit timing opportunities.

Based on the above conjecture, it is expected that the SOA is higher for overleveraged firms whereas the timing variable is expected to be more important for underleveraged firms compared with the other group of firms. To investigate this hypothesis, the full sample has been split into two subsamples; one contains overleveraged firms and the other contains underleveraged firms. Both Eq. (3) and Eq. (4) have been re-estimated separately for each subsample. Table 4 presents the results of estimation. Column (a) and column (c) present the results of Eq. (3) for the overleveraged and underleveraged firms,

respectively. These two columns are presented for comparison purposes. Column (b) and column (d) present the estimation results of Eq. (4) for the overleveraged and underleveraged firms, respectively. Adding the timing variable slightly increases the SOA for overleveraged firms by 1.3% while it increases the SOA for underleveraged firms by 2.2%. It is likely that timing affects the targeting behavior by reducing the cost of adjustments more for underleveraged firms. Discussion of the results for each sub-sample separately is largely similar to the previous discussion of the full sample. More interesting is the comparison between the two samples. Comparison between column (b) and column (d) appears in column (e) (see the appendix for computation method of (e)).

**Table 4: Estimation results of Eq. (3) and Eq. (4) for both overleveraged and underleveraged firms**

	<i>Overleveraged firms</i>		<i>Underleveraged firms</i>		<i>Difference</i>
	<i>(a)</i>	<i>(b)</i>	<i>(c)</i>	<i>(d)</i>	<i>(e) =</i>
	<i>Eq. (3)</i>	<i>Eq. (4)</i>	<i>Eq. (3)</i>	<i>Eq. (4)</i>	<i>(d)-(b)</i>
<i>LEV_TB(-1)</i>	0.706 <b>(9.41)***</b> [0.075]	0.693 <b>(10.13)***</b> [0.068]	0.869 <b>(21.08)***</b> [0.041]	0.847 <b>(19.66)***</b> [0.043]	0.154 <b>(1.9477)**</b>
<i>MB</i>	0.020 <b>(4.62)***</b> [0.004]	0.022 <b>(5.12)***</b> [0.004]	0.0029 (1.09) [0.0026]	0.004 (1.49) [0.0028]	-0.018 <b>(-3.56)***</b>
<i>PROFIT</i>	-0.261 <b>(-8.04)***</b> [0.032]	-0.278 <b>(-8.86)***</b> [0.031]	-0.126 <b>(-3.93)***</b> [0.032]	-0.116 <b>(-4.27)***</b> [0.027]	-0.162 <b>(-3.9)***</b>
<i>SIZE</i>	0.0045 <b>(2.35)**</b> [0.0019]	0.0054 <b>(2.71)***</b> [0.002]	0.0026 <b>(2.14)**</b> [0.0012]	0.0033 <b>(2.88)***</b> [0.0012]	-0.0021 (-0.94)
<i>TANGIBLE</i>	0.0477 <b>(3.26)***</b> [0.0146]	0.0426 <b>(3.45)***</b> [0.0123]	0.015 <b>(2.35)**</b> [0.0064]	0.0183 <b>(2.68)***</b> [0.0069]	-0.024 <b>(-1.76)**</b>
<i>SPP</i>		-0.010 <b>(-1.84)*</b> [0.0056]		-0.022 <b>(-7.01)***</b> [0.0031]	0.012 <b>(1.86)**</b>
Speed of adjustments	<b>29.4%</b>	<b>30.7%</b>	<b>13.1%</b>	<b>15.3%</b>	
Number of observations	2384	2357	2644	2614	
Number of instruments	156	157	154	155	
AR(1) Sig. +	0.000	0.000	0.000	0.000	
AR(2) Sig.+	0.679	0.724	0.942	0.946	
Hansen test	0.352	0.425	0.454	0.408	
Wald	<b>(888.94)***</b>	<b>(962.86)***</b>	<b>(1169.21)***</b>	<b>(1208.24)***</b>	

*Notes: constant coefficient and time dummies are included with all models but not reported. Standard errors in brackets are robust and corrected using Windmeijer (2005) finite sample correction. The significance level of Arellano-Bond test for AR(1) and*

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*AR(2) are reported. T-statistics are shown in parentheses. \*\*\*, \*\* and \* indicate the coefficient is significant at 1%, 5% and 10% levels, respectively.*

In general, firms are found to be much more sensitive to be overleveraged than to be underleveraged. The SOA for overleveraged firms is much higher (about 30.7%) than underleveraged firms (15.3%). The timing coefficient for underleveraged firms is more than doubled than that of overleveraged firms. For overleveraged firms the coefficient of timing is 1% and it is significant only at p=10% level while for underleveraged firms the coefficient is 2.2% and it is significant at p=1% level. It is apparent that underleveraged firms are more affected by market valuation and less hurry to adjust to the target.

The higher coefficient of SPP for underleveraged firms is not likely to be a result of growth options. The variable that is supposed to capture growth, market-to-book ratio, is actually much higher for overleveraged firms than for underleveraged firms in which it is insignificant. Profitability may signal growth but it is higher for overleveraged firms also. The tangibility variable is higher for overleveraged firms as it is more important to reduce the costs of distress for these firms (Harris and Raviv, 1990). All the variables that are thought to relate with the tradeoff dynamism are higher for the overleveraged firms. SPP is the only factor that is higher for underleveraged firms.

#### **6.4. New insight to the role of historical timing of Baker and Wurgler (2002) as a capital structure determinant**

In their seminal paper, (Baker and Wurgler, 2002) propose a timing variable that captures the history of timing activities of the firm and they called it the temporal “external finance weighted-average market-to-book” ratio (EFWAMB). For a given firm-year, this variable is defined as

$$EFWAMB = \left(\frac{M}{B}\right)_{efwa,t-1} = \sum_{s=0}^{t-1} \frac{e_s + d_s}{\sum_{r=0}^{t-1} e_r + d_r} \cdot \left(\frac{M}{B}\right)_s \quad \text{Eq. (5)}$$

where  $e$  and  $d$  denote net equity and net debt issues, respectively. The sum of  $e+d$  is the external financing raised each year.  $\left(\frac{M}{B}\right)_s$  is market-to-book ratio. The weight for  $\left(\frac{M}{B}\right)_s$  each year is the ratio of external financing raised by the firm in that year to the total external financing raised by the firm in years (0) through (t-1). Negative weights are reset to zero. This variable takes high values for firms that raise external finance when the MB ratio is high and low values for firms that raise external finance while the MB ratio is low. This paper defines ( $e$ ) as " $\Delta(\text{Common stock} + \text{Capital surplus})$ " while ( $d$ ) is defined as " $\Delta \text{Total debt}$ ".

Abdeljawad and Mat Nor (2011) find that this variable is significant in determining the capital structure for Malaysian firms. If firms time the mispricing periods and they do not rebalance the effect of this timing, timing effect may accumulate over time and hence the history of timing will continue affecting the current leverage. If the hypothesis about the asymmetric effect of timing is valid in the short run, it should continue to hold in the long run. To investigate this possibility, this research will re-run a model similar to that used by (Abdeljawad and Mat Nor, 2011; Baker and Wurgler, 2002) but with a dummy variable that captures whether the firm is overleveraged or underleveraged and an

interaction term between the EFWAMB and the dummy variable. Using the dummy variable to differentiate the two possibly different behaviors is more reliable here to capture the moderating effect (Whisman and McClelland, 2005) since no concern about the instruments. The model includes the same control variables used previously in this research but in a static framework. OLS with both firm and year fixed effects are used. Standards errors are corrected using “panel corrected standard errors”. The setup of the equation to be estimated is

$$Leverage_{i,t} = \alpha + \beta_1 EFWAMB_{i,t-1} + \beta_2 Growth_{i,t-1} + \beta_3 Profit_{i,t-1} + \beta_4 Tang_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 D + \beta_7 D * EFWAMB_{i,t-1} + \gamma_t + \eta_i + \varepsilon_{i,t} \quad Eq.(6)$$

**Table 5: The moderating effect of the direction of the deviation on the role of EFWAMB as a determinant of leverage ratio**

	<i>Original model</i>	<i>D=0 for overleveraged firms</i>	<i>D=0 for underleveraged firms</i>
	<i>(a)</i>	<i>(b)</i>	<i>(c)</i>
<i>EFWAMB</i>	-0.039 <b>(-5.86)***</b>	-0.008 (-1.4)	-0.023 <b>(-4.27)***</b>
<i>MB(-1)</i>	0.0197 <b>(4.81)***</b>	0.010 <b>(3.00)***</b>	0.010 <b>(3.00)***</b>
<i>PROFIT(-1)</i>	-0.178 <b>(-13.38)***</b>	-0.112 <b>(-9.33)***</b>	-0.112 <b>(-9.33)***</b>
<i>SIZE(-1)</i>	0.011 <b>(3.65)***</b>	0.009 <b>(3.60)***</b>	0.009 <b>(3.60)***</b>
<i>TANGIBLE(-1)</i>	0.114 <b>(7.22)***</b>	0.099 <b>(7.85)***</b>	0.099 <b>(7.85)***</b>
<i>DEVIATDUM(-1)</i>		-0.074 <b>(-14.01)***</b>	0.074 <b>(14.01)***</b>
<i>EFWAMB*DEVIATDUM(-1)</i>		-0.015 <b>(-4.051)***</b>	0.015 <b>(4.051)***</b>
Number of observations	6932	6932	6932
Adj. R2	0.7088	0.766	0.766
F-statistic	(17.83)***	(23.55)***	(23.55)***

*Notes: In (b), the “deviationdum” variable equal 1 for underleveraged firms and 0 otherwise while in (c) the coding is switched. All other regressors remain the same as described for Eq. (3). All regressions are estimated using OLS with firm and period fixed effects. The constant and all the fixed effects coefficients are suppressed. The numbers in parenthesis are t-statistic calculated based on robust standard errors (PCSE). \*\*\*, \*\*, \* indicate significant at 1%, 5%, and 10% respectively.*

Table 5 presents the results of Eq.(6). Column (a) replicates Abdeljawad and Mat Nor (2011) and Baker and Wurgler (2002) model using the current data. The historical timing is highly negatively significant. Column (b) presents the results for the model with the interaction term. The deviation dummy is set to 1 if the firm is underleveraged and 0

otherwise. The interaction term is significant indicating that the direction of the deviation from the target is able to moderate the relationship between EFWAMB and leverage. A simple way to find the direct effect of EFWAMB in each subsample is to switch the coding of the dummy variable and noting the coefficient of EFWAMB (Whisman and McClelland, 2005). The direct effect of EFWAMB when firms are overleveraged is not significant in column (b) while it is highly significant for the underleveraged firms as appear in column (c). It can be concluded that underleveraged firms are more inclined to exploit mispricing opportunities and the effect of this timing behavior takes longer time to be rebalanced. This result may add doubt to the generalizability of the timing theory since the results of Baker and Wurgler (2002) may be driven by underleveraged firms as the period of their study, the late 1980's and the 1990's, are characterized by the low leverage used by firms (Huang and Ritter, 2009).

## 7. CONCLUSIONS

Using an estimator that is found to be more efficient for estimating dynamic panel data with short time dimension, that is system GMM; this study reveals that Malaysian firms are adjusting their capital structure to the target but at a slow rate. At the same time, firms consider timing of the market conditions as an important factor when making financial decisions. This study finds evidence for asymmetric timing behavior as well as targeting behavior between firms over- and underleveraged. Specifically, overleveraged firms adjust to the target faster and they are less concern with timing. On the other side, underleveraged firms adjust slower but they consider timing more seriously. This behavior is likely to result from taking into account all the costs and benefits of being at the target, adjustment toward the target and timing opportunities. Deviating from the target to the upper side is likely to be more costly than deviating below the target because bankruptcy costs and agency costs of debt will intensify quickly as the firm deviates more above the target. Hence, overleveraged firms need to adjust faster to reduce these costs despite the market conditions. Underleveraged firms are less urged to adjust and hence it is feasible for them to consider market conditions more in their financing decisions. These results are confirmed in the short run as well as long run modeling.

The finding of this study supports that firms consider both targeting and timing in their financing decisions. No standalone theory can interpret the full spectrum of empirical results. This result is consistent with the view of Myers (2003) that capital structure “theories are conditional not general”.

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## APPENDICES

### Appendix A: Comparing the regression coefficients across sub-samples

The difference between the coefficients of two subsamples can be tested as a t-test where the numerator is the difference between the two coefficients and the denominator is the estimated standard error of the difference. Several suggestions are available on how to estimate the standard error for the difference (for detailed discussion see for instant (Cohen, 1983; Paternoster et al., 1998)). Fortunately, when the number of observations is large, the variation in the results between different approaches decreases (Cohen, 1983). This research has tested the difference using the following formula for finding the t-statistics under the null hypothesis that the coefficients are the same for the two subsamples or  $b_1=b_2$ :

$$t = \frac{b_1 - b_2}{\sqrt{\left[ \frac{(m-1)^2}{(m+n-2)} \text{Var}(b_1) + \frac{(n-1)^2}{(m+n-2)} \text{Var}(b_2) \right] * \left[ \sqrt{\frac{1}{m} + \frac{1}{n}} \right]}}$$

where  $n$  and  $m$  are the number of observations for each of the two samples and  $\text{Var}(b_1)$ ,  $\text{Var}(b_2)$  are the square of the standard errors for each of the two samples. Actually, if the number of observations is large enough, estimating t-statistic by the simpler formula

$$t = \frac{b_1 - b_2}{\sqrt{\text{Var}(b_1) + \text{Var}(b_2)}}$$

qualitatively makes no difference in the results (Clogg et al., 1995; Paternoster et al., 1998).