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Capital Structure Theories and Speed of Capital Adjustment towards Target Capital Structure along Life Cycle Stages of Asian Manufacturing Firms

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ARTICLE DETAILS	ABSTRACT
<p>History Revised format: February 2020 Available Online: March 2020</p>	<p>Firms have different costs and benefits and asymmetric information across their life cycle stages and hence each stage has different financial pattern and speed of adjustment towards target capital. We use System GMM to test the hypotheses. We use market leverages proxies for the capital structure, life cycle proxies: introduction, growth, mature, shakeout and decline and the control determinants of capital structure such as profitability, tangibility, firm size and growth opportunities. We estimate the financial pattern and speed of adjustment along life cycle stages of manufacturing firms from eleven Asian economies over the period of 2010-2018. The results show that firms in earlier stages have more long term debt than mature stage. The speed of adjustment towards target capital structure is highest in mature stage than the other stages. The control determinants significantly affect market leverages. The findings suggest that management has to consider life cycle stages of their firms in order to adjust capital structure. Stockholders should consider stage of firm with relation to profitability and capital structure for long term prospects.</p>
<p>Keywords Capital Structure Theories, Life Cycle Stages, Speed Of Adjustment, Market Leverages</p>	
<p>JEL Classification: G32, G39, D91</p>	



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1. Introduction

There are well documented studies that firms in different industry behave differently. Even, the firms from same industry have different financial constraints (Flannery and Hankins (2007) and Dickinson (2011)). These financial constraints may be the cause and effects of firm and country institutions. The

firms formulate financial policies particular for equity/debts or by combination of both within these constraints. Being an emerging concept in literature of capital structure, firm life cycle stages (LCS, hereafter LCS) has variant impacts on the speed of adjustment (SOA, hereafter SOA) towards target capital because firm's resources are quite different during its LCS. The literature provides very fewer evidences in this context like cost of equity variations along LCS (Hasan, Hossain, and Habib (2015), formulations of corporate policies with predefined pattern of life cycle (Faff, Kwok, Podolski, and Wong (2016)) and organizational capital along LCS by Hasan and Cheung (2018).

Life cycle has important role in determining firm's capital structure. Each stage of life cycle has different financial costs, benefits and asymmetric information, therefore, it is expected that stages have different SOA. Financial policies of Asian firms differ from western firms'. Firms from developing economies have more short term debts than long term debts as compared to advanced economies' (Booth et al. (2001)). Therefore, we use total market debt ratio in exploring financial pattern and SOA for Asian manufacturing firms along LCS.

As per our best knowledge, it is the first empirical study that captures the financial pattern and SOA along LCS. We have two major objectives in Asian setting: First, empirically investigate pattern of financial leverage along LCS. Second, empirically estimate and compare SOA towards target capital structure along LCS.

2. Literature Review and Hypotheses

Static trade off theory (TOT, hereafter TOT) argues that firms adjust capital structure towards target in absence of costs. Pecking order theory (POT, hereafter POT) argues that firms have no specific target capital but firms track on predefined preferences of financing. The dynamic trade off model takes practical implications to adjust capital structure like adjustment costs. Modified POT supports soft target capital structure views and argues that firms adjust it by considering adjustment and disequilibrium costs.

Static TOT framework demands firms should seek tradeoff between debt tax shields against financial distress and bankruptcy costs. Modigliani and Miller are pioneers of this theory. They put two contradict views related to capital structure and firms' value. First, Modigliani and Miller (1958) argue that market worth of any firm is not related to its capital structure. Second, Modigliani and Miller (1963) theoretically argue that capital structure impacts the firms' value. Hirshleifer (1966) and Kraus and Litzenberger (1973) criticize Modigliani and Miller(1958, 1968) postulates on certain earnings' assumptions and argue that optimal financial structure seeks trade-off debt tax shields against bankruptcy costs. Therefore, the growing literature on dynamics of capital structure criticizes traditional capital structure models which do not give considerations to capital structure dynamics. The partial adjustment model is dynamic. Partial adjustment model implies that capital structure for each period is determined with comparison of observed capital structure to target one. Fischer, Heinkel, and Zechner (1989) find that transaction costs direct firms' financing policies regularly. Goldstein, Ju, and Leland 's (2001) study concludes retiring debt costs have a tendency for the firms to adjust leverage. Hennessy and Whitted's (2005) study of dynamic trade off model concludes that proportional floatation costs cause to increase equity issuance costs.

Myers (1984) criticizes Donaldson (1961) on the absence of target capital in his pecking order model. He proposes another version of POT by incorporating asymmetric information effects, floating costs and costs of financial distress. He identifies that asymmetric information produces different costs and firm may or may not issue new securities. He suggests that firm issues (purchases) new (outstanding) equities when its existing securities are overvalued (undervalued) and known as market timing theory. The investor perceives positive (negative) signal when firm launches new debt (stock). They perceive debt issuing firm has ability to repay its debt obligations in future and equity issuing firm going to catch opportunity of overvalued stock (known as signaling effect). Adverse selection depends on nature of asymmetric information related to firm's value or related to firm's risks. Managers prefer retained

earnings to avoid adverse selection related to firms' value and they prefer to issue equity in case of risks. Byoun (2008) observes adverse selection in his capital structure model.

Few empirics classify firms into categories like small and large, dividend paying and non paying Byoun (2008) and Faulkender et al. (2012)) and young and fast growing firms (Flannery and Rangan (2006)) to estimate and compare SOA. Kieschnick and Moussawi (2018) find that debt is inversely related with LCS. Berger and Udell's (1998) study growth of firms and identify the availability of financing and its costs depend on LCS. Dickinson (2011)¹ defines firm as a portfolio of multi-products in multi-industries. Each product has distinct stage of life cycle. Therefore, it is hard to capture LCS at firm level. She argues financing, investing and operating cash flow patterns associate with LCS as a non-sequential approach. She classifies firms' life cycle into introduction, growth, mature, shake out and decline stages.

Benefits and costs of debt vary along LCS and TOT addresses this nexus. Such as growing/mature firms have more profits, more tangible assets and larger diversified size to avoid financial and bankruptcy costs (Castro et al. (2016) and Fan et al. (2012)). The information asymmetric varies across LCS and POT discusses this nexus. It is higher at introduction and growth than maturity stage. Mostly, the firms opt for equity financing during introduction stage, growing and mature stages retain more earnings from profits to finance growth prospects. Firms use less debt with higher profits and larger size. Myers (1984) finds that adjustment costs create lags between target capital and actual debt ratio. Fischer et al. (1989) identify that fixed costs let firm to rebalance capital structure only when it deviates from a specified lower/upper limit. Shyam-Sunder and Myers (1999) find validation of POT in adjusting target capital. Byoun (2008) and Hovakimian and Li (2009) find that asymmetric adjustment costs relate to target capital structure.

By summing up the above discussion, TOT seeks balancing of benefits against costs of debt in adjusting capital structure. Therefore, benefits and costs of debt financing are likely change across life cycle and TOT addresses this nexus. POT argues that information asymmetric varies across firms and over time. We expect that asymmetric information is higher at introduction and growth stages than maturity stage.

Introduction stage has deficit knowledge of potential costs and revenues, investment in projects are high and need more debt to grow. Growth and maturity stages have less deficit knowledge of potential costs and revenues, potential increase in investment and efficiency, investment in projects are higher in both stages. Growth stage needs more funds to finance projects while mature stage engages in repay debts and/or repurchase equity. Decline stage is characterized with declining in prices and growth rates, liquidate assets to pay debt obligations and keeps focus on renegotiate debt. In order to shed light on financial leverage and its associated prospects, we investigate Asian firms' capital structure behavior across different LCS. We develop following hypothesis.

H1: Firms have comparatively higher debt ratio in earlier stages than maturity as they move from introduction to mature stage

Hovakimian et al. (2001) finds firms have different SOA from each other and over the period. Faulkender et al. (2012) identify firms adjust capital structure in two ways. First, when benefits are leftover costs and secondly when adjustment costs are relatively low. Small firms are exposed to problem of information asymmetry and have to bear higher cost of financing (debt or equity). Moreover, empirics highlight that firms with higher profitability, less financial leverage and mature in nature are likely to issue debt because they have more incentives in issuing debt (Huang and Ritter (2009)). Firms having growth prospects are always in need to finance their growth prospects; hence, they issue equity financing because it is less constraint. Moreover, TOT explains that high leveraged firms always prefer equity funding to avoid

¹ See for detail: Dickinson, V. (2011). Cash flow patterns as a proxy for firm life cycle. *The Accounting Review*, 86(6), 1969-1994

constraints of collateral attached to debts. Firms in mature stage have growth prospects and mostly have a significant portion of retained earnings. The growth prospects and based on the above views, we construct following hypothesis:

H2: The firms in mature stage have higher SOA than earlier stages introduction and growth and later stage decline.

We use determinants of capital structure like profitability, size, asset tangibility and growth prospects as control variables to justify POT and TOT. Firms are exposed with higher profitability are more likely to finance through retain earning and less reliance on debts. Firms with greater market capitalization enjoy easy access of equity financing. Tangibility floats good signal into market for issuing equities and ensures that firms' have enough collateral values. High market to book ratio is signal of superior performance of assets in place. Based on these views, we expect the negative relationship between financial leverage and firm's tangibility, profitability, size and positive relationship with growth opportunities under the POT. Dynamic TOT implies that more profitable firms have fewer probabilities of financial distress and bankruptcy. These are capable to serve the financial obligations. Firms with greater market capitalization enjoy easy access of debt finance because larger firms are stable and are less likely to be bankrupt. This theory deems that growth opportunities are intangible assets and have no collateral value. Firms with higher tangible fixed assets have more collateral value and simple approach to debt. Based on these views, we expect the negative relationship between financial leverage and growth opportunities and positive relationship with profitability, tangibility and size under the TOT.

3. Methodology

3.1 Sample

We use firm specific data of eleven Asian countries obtained from OSIRIS over period of 2010-2018. We focus on manufacturing firms drawn from Japan, Pakistan, Sri Lanka, Indonesia, India, South Korea, Singapore, Malaysia, Turkey, Thai Land and Philippine. We follow Dickinson (2011) for data generating process.

3.2 Variables Definition

The table 1 presents variables measurement. Market leverages reduce countries differences and manipulations (Booth et al. (2001)). Further Dickinson (2011) argues that her classification of life cycle proxies better explain the rates of return and stock returns. Therefore, this study prefers market leverage proxies.

3.3 Model Specification

We have short panel data set. Therefore, we expect variations between groups dominates the variations within the groups. In addition to, we use lagged dependent variable as independent variable. Therefore, partial adjustment model is suitable. The model specification is as follow:

$$Mlev_{i,t} = (1 - \delta)Mlev_{i,t-1} + (\delta\alpha_j)Z_{i,t} + bi \sum_{k=1}^m LC_k + ci \sum_{k=1}^m LC_k * Mlev_{i,t-1} + \sum_{k=1}^m ID_k + \sum_{k=1}^m CD_k + \sum_{t=2010}^{2018} TM_t + \epsilon_{i,t} \quad \text{Equation I}$$

$Mlev_{i,t}$ represents market debt ratios in terms of long term debts and total debts. $(1 - \delta)Mlev_{i,t-1}$ represents lagged value of market leverages and $(\delta\alpha_j)Z_{i,t}$ is a vector of control determinants. $\sum_{k=1}^m LC_k$, $\sum_{k=1}^m ID_k$ and $\sum_{t=2010}^{2018} TM_t$ are set of dummies for LCS, industries and years respectively. $\sum_{k=1}^m LC_k * Mlev_{i,t-1}$ represents a vector of interaction terms between $Mlev_{i,t-1}$ and the dummy of LCS. The coefficients of dummies bi capture the differences in means of LCS and $1 - \delta - ci$ captures the SOA; where δ is coefficient of $Mlev_{i,t-1}$ and ci is the coefficient of interaction terms.

The sys-GMM performs better to estimate the equation I (Deesomsak et al. (2004) and Antoniou et al. (2008)). We apply pre-diagnostic tests such as Wooldridge, White /Koenker and Wu-Hausman to check autocorrelation, heteroskedasticity and endogeneity for suitability of GMM. We also apply post diagnostic tests such as AR(1) and AR(2) to check autocorrelation, Hanen's J-test to check instruments validity and Wald test to check the goodness of model.

Table 1: Capital Structure and its Determinants

Independent Variables	Proxy/ Measurement	Empirics
Total market leverage	Total book debt / (Total debt plus market value of equity (share price x number of outstanding shares))	Hovakimian et al. (2001), Antoniou et al. (2008), Byoun (2008), Huang and Ritter (2009), Fan et al. (2012) and Matemilola et al. (2018)
Long term market leverage	Long term book debt / (Long term book debt plus market value of equity (share price x number of outstanding shares))	Booth et al. (2001), Byoun (2008), Fan et al. (2012) and Matemilola et al. (2018)
Profitability	Earnings before interest and taxes (EBIT) / Total assets	Matemilola et al. (2018), Byoun (2008), Antoniou et al. (2008) and Flannery and Rangan (2006)
Growth opportunities	Market value of share / Book value of share (MB)	Matemilola et al. (2018), Huang and Ritter (2009), Flannery and Rangan (2006), Myers (1984) and Hasan and Cheung (2018)
Tangibility	Net property, plants and equipment (PPE) / Total assets	Matemilola et al. (2018), Fan et al. (2012), Byoun (2008) and Booth et al. (2001)
Size	Natural logarithm of market capitalization	Dickinson (2011) and Hasan and Cheung (2018)

Source: Author's Compilations

4. Results and Discussion

4.1 Descriptive Statistics

Firms in mature stage are stable and in decline stage are transitory (Dickinson (2011)). Therefore, we expect highest (lowest) rate of recurrence of observations in mature (decline) stage. Table 2 confirms this prediction and finds 58.04 (4.15) percent of firm-observations lie in mature (decline) stage. The mature firms have lower debt as compared to earlier stages.

Table 2: Life Cycle Stages Wise Data Distribution and Means of Debt Ratios

Sr. no	Stages	Number of observations	Percent (%)	Total market debt ratio (%)	Long term market debt ratio (%)
1	Introduction	1,876	7.34	45.28	23.67
2	Growth	4,886	19.12	38.40	23.71
3	Mature	14,831	58.04	26.05	14.68
4	Shake-out	2,897	11.34	26.08	13.42
5	Decline	1,061	4.15	32.80	15.99
Total/Pooled			100.00	30.11	16.98

4.2 Regression Results

The results of leverage pattern along LCS are presented in table 3 and SOA in table 4. The significance of Wooldridge test, White /Koenker test and Wu- Hausman test indicate that GMM estimator is suitable for the study.

As per findings of the study (refer to table 3), the findings are consistent with hypothesis 1 that predicts firms' financial leverage is on higher side in other stages when compare to maturity stage. The mature stage is positively associated with firm's leverage ($\beta=0.0295$ and $p < 0.05$). The growth and introduction stages are positively associated with $\beta=0.0476$ and $\beta=0.047$ respectively at $p < 1\%$, the shakeout stage is negatively associated ($\beta=0.0065$ and $p < 1\%$) and decline stage is 1.6×10^{-5} and negatively insignificant. Mature firms repay debts and growing firms acquire more debt to finance their projects. This is consistent with hypothesis 1; firms are more leveraged as they move from introduction stage to mature stage and less leveraged in shakeout and decline stage. We do not find non monotonic association between LCS and total market leverage (refer to table 3). The findings are contradict with hypothesis 1 which predicts that firms in mature stage have lower financial leverage as compared to earlier stages. The reasons of the contradiction may be that firms in mature stage need more short term debt for working capital. Further, mature firms are more dividend paying and retain lower out of earnings than firms in other stages.

Table 3: Results of System GMM's: Pattern of Financial Leverage along LCS

	Long term market leverage		Total market leverage	
	Coefficients	z-statistics	Coefficients	z-statistics
Leverage(t-1)	.7775***	(14.80)	.8287***	(31.47)
Introduction	.047***	(12.83)	.0803***	(23.90)
Growth	.0476***	(23.50)	.0602***	(34.11)
shake out	-.0065***	(-2.92)	-.0106***	(-5.02)
Decline	-.000016	(-0.000)	.0022	(0.50)
Profitability	-.1945***	(-7.24)	-.2535***	(-10.86)
Size	.00021	(0.35)	-.003***	(-3.40)
Tangibility	.070***	(3.39)	.0415***	(3.91)
Growth opportunities	-.0036***	(-3.47)	-.0052***	(-6.45)
Constant	.0295**	(2.26)	.0974**	(5.38)
Year/industry/Country effects	Yes		Yes	
No. of groups	2835		2835	
No. of instruments	46		46	
AR(1) p value	0.00	(-12.44)	0.00	(-17.81)
AR(2) p value	0.502	(0.67)	0.172	(1.37)
Hansen test p value	0.439	(0.60)	0.933	(0.01)
Wald chi square	0.00	(17006.61)	0.00	(49322.70)
Wooldridge test P-value	0.00	(1013.47)	0.00	(1214.331)
Wu-Hausman test P-value	0.00	(26.4657)	0.00	(71.1933)
White/Koenker test P-value	0.00	(2020.430)	0.00	(1185.359)
Note: ***, ** and * indicate coefficients are significant at 1, 5 and 10 percent levels, respectively.				

The table 4 presents results of SOA along LCS. The coefficients of Leverage (t-1) and interaction variables explain the costs of adjustment towards target capital. Higher costs of adjustment slower down adjustment speed towards target capital. The reference category among LCS is mature stage. The incremental adjustment costs for introduction, growth and decline stages are 0.1462, 0.1538 and 0.128 respectively as compared with mature stage. The interaction variables are positively significant and reflect that these stages have lower adjustment towards target capital structure as compared to mature stage. The

SOA of mature stage is 32.55% (1-0.6745) per year and for introduction, growth and decline stages are 17.93%, 17.17% and 19.75% per year respectively.

As concerned with total market leverage, the introduction, growth and decline stages have 0.0448, 0.0843 and 0.1238 higher adjustment costs respectively than mature stage and hence slower SOA towards target as compared to mature stage. The mature stage has SOA 25.13% (1-0.7487) that is greater than introduction 20.65%, growth 16.70% and decline 12.75% stages. Both results support the hypothesis 2 that firms in mature stage have higher SOA than other the stages of life cycle. The empirics on TOT and POT find that adjustment costs and asymmetric information do matter for the firms in determining how they quickly adjust their capital structure (Myers (1984), Hovakimian et al. (2001), Faulkender et al. (2012), Leary and Roberts (2005) and Flannery and Rangan (2006) support TOT hypothesis and Byoun (2008) and Huang and Ritter (2009) support Pecking order hypothesis).

The results show that growth opportunity and profitability have negative significant impacts on capital structure and are similar to the findings of Byoun (2008) and Flannery and Rangan (2006). Tangibility has positive significant impact and findings are in line with Matemilola et al. (2018), Byoun (2008) and Fan et al. (2012).

Table 4: Results of the System GMM's: SOA along the LCS

	Long term market leverage		Total market leverage	
	Coefficients	z- statistics	Coefficients	z- statistics
Leverage(t-1)	.6745***	(20.96)	.7487***	(35.42)
Introduction	.017 **	(2.51)	.0667***	(7.66)
Growth	.0163***	(2.84)	.0326***	(5.25)
Shakeout	-.0238 ***	(-4.74)	-.0398 ***	(-7.15)
Decline	-.0256 **	(-3.62)	-.0416***	(-5.01)
Leverage(t-1)x (introduction)	.1462 **	(4.80)	.0448**	(2.10)
Leverage(t-1)x (growth)	.1538 ***	(5.47)	.0843***	(4.58)
Leverage(t-1) x (shake out)	.0961***	(3.24)	.0921***	(5.29)
Leverage(t-1) x (decline)	.128 **	(3.62)	.1238***	(5.47)
Profitability	-.2276***	(-11.41)	-.2934***	(-14.76)
Size	-.00036	(-0.62)	-.004***	(-6.13)
Tangibility	0.0886 ***	(8.64)	.0577***	(7.28)
Growth opportunities	-.0041***	(-7.53)	-.006***	(-9.42)
Constant	.0533 ***	(4.76)	.1382***	(9.72)
Year/industry/Country effects	Yes		Yes	
No. of groups	2835		2835	
No. of instruments	51		51	
AR(1) p value	0.00	(-16.73)	0.00	(-20.61)
AR(2) p value	0.550	(0.60)	0.173	(1.36)
Hansen test p value (chi statistics)	0.735	(0.62)	0.545	(1.21)
Wald p value	0.00	(29641.74)	0.00	(81464.77)
Wooldridge t P-value	0.00	(862.689)	0.00	(1160.955)
Wu-Hausman P-value	0.00	(22.828)	0.00	(76.6671)
White/Koenker P-value	0.00	(1040.787)	0.00	(1251.963)
Notes: ***, ** and * indicate coefficient are significant at 1, 5 and 10 percent levels, respectively.				

5. Conclusion

Our findings show that firms in earlier stages of life cycle have comparatively more debt than the firms in mature stage. Moreover, the study also depicts that firm in the mature stage of their life cycle have fastest speed of adjustment followed by introduction and growth stages respectively. The results of total market leverage depict that firms in mature stage have comparatively more debt than other stage, implying that firms in emerging economies heavily rely on debt even in the mature stage which contradict the earlier finding based on long term market leverage. However, the findings in respect of SOA are quite similar as depicted in first proxy of the capital structure.

Our study adds knowledge in context of changing pattern of capital structure along LCS. Secondly, we fill research gap by determining SOA along LCS particularly in Asian context. The Asian manufacturing firms follow pecking order hypothesis that they mainly finance their projects from their profitability and trade off hypothesis for growth prospects, size and tangible assets.

The findings suggest that management has to consider LCS of their firms in order to adjust capital structure. The findings of current study may help stockholders to consider stage of firm with relation to profitability and capital structure for long term prospects. The policy maker may design policy rates that may be supportive for introduction and decline stages. Further, they should develop capital structure bench mark for adjusting capital structure along LCS.

The results of the study cannot be applicable to other industries like services. Future research may be conducted by using larger sample from other industries such as services and economies from regions other than Asia. Speed of adjustment may be estimated across life cycle by using the country specific macro and institutional determinants like GDP growth, interest rates, taxation and etc.

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