Degree of Internationalization, Financial Structure and Cost of Capital: Evidence from Emerging Taiwan

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Abstract

The debt structure of companies in Developing and Emerging Economies (DEEs) is significantly different from that of companies in the developed countries. This study examines the effect of degree of internationalization (DOI) on leverage ratio (LEV) and cost of capital (COC) in DEE setting by using a sample of Taiwan listed companies. Our results show that DOI has a significant positive impact on short-term debt as well as a significant negative impact on long-term debt. Therefore, it appears that DOI has a substitution effect in DEE companies. In summary, our results indicate that DEE firms do not have the advantage of participating in the international financial market.

Keywords: degree of Internationalization, financial structure, cost of capital, debt structure, developing and emerging economies

1. Introduction

Firms in developing and emerging economies (DEEs) play a critical role in globe supply chain system. According to WTO (International Trade Statistics, 2019) data (Note 1), 45% of globe export volume comes from DEE firms while 52% of globe export volume comes from developed countries. Hence internationalization is of interest to DEE firms. Financing and cost of capital are of important issues to DEEs firms considering that the DEEs financial markets are not mature and DEE firm sizes trend to be smaller than those of developed countries. Based on Booth et al. (2001, Table 1) and Fan, Titman and Twite (2012, Figure 2), short-term debt is two times as great as long-term debt in DEE firms' debt structure. This is the opposite of what is seen in the firms of developed countries.

We believe that the main reasons for the differences in debt structure between DEE companies and developed country companies are as follows: First, because the bond markets of DEEs are usually not mature, it is not easy for DEE companies to issue long-term corporate bond financing. Second, the internal credit rating systems of DEE banking industries are underdeveloped. To reduce credit risk, banks usually prefer short-term financing in order to be able to review the company's credit risk year by year and determine the amount of credit granted every other year. Third, in the operation of DEE enterprises, trade credits are often used, and therefore the ratio of accounts payable to short-term liabilities is generally seen to be high (Booth et al. 2001; Huang and Song 2006).

Trade credit transactions can be regarded as interactive credit between enterprises. Love, Preve and Sarria-Allende (2007) document that there is a credit redistribution effect when a financial crisis occurs, and bank credit is tightened. That is, a company with good operating performance will use credit transactions to finance a company with poor operating performance. McGuinness, Hogan, and Powell (2018) also find that companies will rely more on credit transactions when a company has difficulty in obtaining bank financing due to poor operating performance or when it is in a country with a high banking concentration. In addition, they found that during the financial crisis of 2007- 2008, in terms of European SMEs, a one standard deviation increase in trade credit resulted in a 21% decrease in the likelihood of distress.

Proceeding from this prior research, we posit that the long-term debt ratio (LTD), short-term debt ratio (STD) and total debt ratio (TDR) are important factors to be considered in the examination of the association between DEEs firms and their leverage ratios (LEV), particularly STD which accounts for about two-thirds of the debt structure of DEEs enterprises. Also, creditors will evaluate not only the amount of a firm's long-term debt, but also how the amounts of the firm's current debt and total liabilities when DEEs enterprises obtain financing (Huang and Song (2006)). In

addition, current liabilities are a stable part of total assets whether in DEEs or developed countries (Gibson, 2001). In sum, in addition to LTD, one cannot overlook the importance of STD and TRD in examining the LEV of DEE companies.

In the stream of empirical research of LEV of DEE firms, prior research generally examines TDR (the combination of STD and LTD) resulting from the difference in the debt structure of DEE firms from that of companies in developed countries. Booth et al. (2001) examine the influencing factors of LTD and TDR in 10 DEE companies and found that companies with high profitability will have lower LTD and TDR, supporting the Pecking Order Theory of Meyers (1984). Booth et al. (2001) also point out that (1) tangible assets are positively associated with LTD and negatively associated with TDR, mainly due to the bank financing collateral characteristics of tangible assets and (2) there is a substitution relationship between LTD and STD. In addition, Chen and Strange (2005) examine the determinants of TDR of listed companies in China, Huang and Song (2006) use TDR and LTD to explore the LEV influencing factors of China listed companies, Vo (2016) studies the determinants of STD and LTD of firms in Vietnam and each of these studies obtained similar results with Booth et al. (2001). Results from these studies show that the determinant of LEV in DEE firms is similar to that found in firms in developed countries. However, none of these studies considered the impact of the degree of internationalization (DOI) of DEE companies on the leverage ratio (LEV). Kwok and Reeb (2000) study the association between DOI and LTD using a sample of 145 manufacturers from 12 DEEs and their results indicate that there is a positive association between DOI and LTD in DEE firms; however, the association was seen to be negative in firms in developed countries (Note 2). One notable issue in the Kwok and Reeb (2000) study is that they did not examine STD or TRD as well as the debt structure of DEE companies.

The impact of DOI on the LEV and cost of capital (COC) of an enterprise has always been a very important issue in finance literature. Theoretically, companies with a higher DOI can stabilize their profits and effectively reduce their operating risks through geographic diversification (GD), including diversification of operating locations and sources of sales revenue. High DOI firms also have easier access to international financial markets and can therefore diversify the sources of borrowing. High DOI firms, therefore, have higher LEV or lower COC (Jang, 2017; Mittoo & Zhang, 2008). On the other hand, high DOI implies higher political risk, exchange rate risk, cultural misunderstandings, and agency costs. This, in turn, leads to a lower level of LEV or a higher level of COC to firms (Burgman, 1996; Fatemi, 1988; Frijns, Tourani-Rad & Zhang, 2018; Lee & Kwok, 1988; Reeb, Mansi & Allee, 2001). Thus, empirical evidence on the association between DOI and LEV/COC is mixed. Prior DOI study primary focused on firms in developed countries (i.e., the United States) and DOI studies focusing on the content of emerging market are rare.

There is no uniform design for a DOI index in the prior literature. Most prior studies adopt a single index. In our opinion, errors may occur if only a single indicator is used to measure DOI. In addition, Sullivan (1994) and Reeb, Mansi and Allee (2001) suggest using a comprehensive index measurement for DOI. Therefore, we use five DOI indexes: foreign sales as a percentage of total sales (FSTS), geographic diversification (GD), culture distance (CD), degree of international diversification (DOID) and degree of cultural distance (DOCD). Among them, FSTS, GD and CD are single indicators, while DOID and DOCD are comprehensive indicators. By using a comprehensive indicators approach, we can have a more precise DOI index.

Singh and Nejadmalayeri (2004) and Aoun and Heshmati (2008) all suggest that there are endogeneity and joint determination issues between LEV and COC. Hence, we examine the association between LEV and COC through the use of a simultaneous equations model. We believe the current study is the first study to examine the association between DOI and LTD, STD, TDR and COC in the content of DEE firms. Prior studies have generally examined the association between DOI and LTD (e.g., Kwok & Reeb 2000). Our study fulfils the resulting gap in DOI literature by examining the association between DOI and LTD, STD, TDR and COC in the content of DEE firms (Note 3) using a simultaneous equations model estimated with three-stage least squares (3SLS) estimation methods and with five different DOI indicators.

It is worth mentioning that by examining TDR, LTD and STD simultaneously, our paper also explores the debt substitution effect and debt capacity effect on the LEV of the enterprise. Booth et al., (2001) point out that there is a debt substitution effect of short-term and long-term debt if a variable is associated with both LTD and STD, but the direction is the opposite of our expectations in this study. Melnik and Pollatschek (1973) argue that a variable has a debt capacity effect if a variable has a significant impact on TDR. Prior research into financial leverage of developed country firms tends to focus on LTD, hence not exploring the debt substitution effect. The research on DEE financial leverage includes: Booth et al. (2001) and Huang and Song (2006) who only analyses company's LTD and TDR, and Chen and Strange (2005) who only discuss a company's TDR, which can't be applied to the debt substitution effect; while Vo (2017) only studies the STD and LTD of enterprises, therefore it is impossible to analyse the debt capacity

effect. At the same time, the above discussions of DEEs financial leverage did not consider the effect of DOI on corporate financial leverage.

The contributions of this paper are as follows: (1) due to the different debt structures of DEEs and developed countries, we examine the effects of DOI on the debt substitution effect and debt capacity effect of DEE firms in Taiwan based on three LEVs (TDR, LTD and STD) and COC, (2) the paper adopts five DOI indexes (three single index and two comprehensive indexes) as proxy of DOI hoping to more accurately serve as the proxy variable of DOI, and explore the impact of DOI on LEV and COC, (3) the empirical results suggest that there is a negative association between DOI and LTD and a positive association between DOI and STD which suggests that DOI has the debt substitution effect of short-term liabilities and long-term liabilities, (4) the positive association between DOI and TDR indicates that DOI has a debt capacity enhancement effect, mainly because the STD of DEE companies is higher than LTD, (5) there is a positive association between DOI and COC, indicating that DEE companies will bear higher capital costs during the process of internationalization. To our knowledge, this is the first paper to examine the effects of DOI on the company's short-term liabilities (STD), long-term liabilities (LTD), and total liabilities (TDR) in the DEEs setting.

The remainder of the paper is organized as follows. The second section contains a review of relevant DOI research and indexes. The third section presents a description of the research model, the sample, and the empirical results. The fourth and final section provides a summary of the major findings and a discussion of their implications for practice and future research.

2. Literature Review

2.1 DOI and Financial Leverage

In terms of LTD, Doukas and Pantzalis (2003) and Akhtar (2005) believe that in the process of internationalization, enterprises will face political risk and exchange rate risk, and the political stability of host countries and fluctuation of foreign currencies will lead to the instability of the cash flow of the multinational corporations (MNCs), which in turn lowers the expected LTD. Meanwhile, due to more complicated international operation structure, firms will occur higher Agency costs (Lee and Kwok (1988)) in monitoring and bonding activities, which will further reduce firms' leverage ratios (Akhtar, 2005; Doukas & Pantzalis, 2003; Singh & Nejadmalayeri, 2004). In addition, Burgman (1996), Mittoo and Zhang (2008) and Aoun and Heshmati (2008) all point out that MNCs face culture differences in host countries, including higher auditing costs, language differences, sovereignty uncertainties, and varying legal and accounting systems. Results from Frijns, Tourani-Rad and Zhang (2018) suggest that MNCs have a higher level of operation opaqueness due to culture differences. Hence, MNCs are more likely to face significantly higher agency costs than domestic corporations (DCs). This in turn will lower the LTD of MNCs.

From the perspective of international diversification (ID), however, Lewellen (1971), Shapiro (1978), Fatemi (1984) and Singh, and Nejadmalayeri (2004) suggest that firms can reduce the risk of bankruptcy by providing a coinsurance effect using product diversification or geographic diversification (GD) and total earning variability reduction. This in turn will enhance corporate debt capacity. In sum, prior DOI research shows mixed results regarding the association between DOI and LTD. Therefore, Lee and Kwok (1988) and Doukas and Pantzalis (2003) suggest one should consider the net effect of debt-increasing factors (i.e., diversification effect and coinsurance effect) and debt-decreasing factors (i.e., agency costs, political risk, and exchange rate risk) when examining the impact of DOI on capital structure.

In terms of the association between DOI and STD. First, Burgman (1996), Singh and Nejadmalayeri (2004) and Park, Suh and Yeung (2013) suggest MNCs can increase their STD through hedging foreign currency risk by owning foreign currency short-term liabilities via money market instruments when facing exchange rate exposure and political exposure. Second, during the process of internationalization, enterprises use international trade credit to extend the payment time of goods, increase accounts payable, and then improve STD. Third, Doukas and Pantzalis (2003) suggest that, during internationalization, MNCs will finance their funding needs through internal capital market frameworks (i.e., borrowings from group companies, intra-company cross-sector financial finance and borrowing from related parties) due to various barriers that exist in international capital markets and the informational asymmetries in external capital markets (Note 4). This will boost STD of MNCs.

2.2 DOI and Cost of Capital

Reeb, Mansi and Allee (2001) point out that there are negative and positive associations between DOI and COC. From the negative association perspective: (1) based on a capital market arbitrage argument, MNCs can either create or benefit from barriers due to entry barriers that exist in imperfectly integrated international capital markets. Therefore,

the capital market arbitrage argument suggests a negative relation between the COC and the DOI. (2) Based on the international diversification argument, MNCs diversify their assets and sources of income resulting in lower earnings volatility and reduced risk of bankruptcy. A lower probability of bankruptcy for MNCs compared to DCs in turn leads to a lower cost of capital, suggesting a negative relation between the COC and the DOI.

We consider two arguments for a positive association between the COC and the DOI. (1) Based on cross-border and differential bankruptcy arguments, MNCs face greater political risk and currency exchange risk as well as greater stakeholder heterogeneity and information asymmetry compared to DCs. These factors suggest that international firms will have a higher probability of financial distress. A higher financial distress cost suggests a positive association between the COC and the DOI. (2) Based on an agency cost argument, Burgman (1996) points out that monitoring costs increase with firm's international activity due to geographical constraints, cultural misunderstandings, language, and legal system differences. Lee and Kwok (1988) note MNCs have more "real options," in this case, the advantages enjoyed by multinational companies operating in distinct environments across country borders, than purely domestic firms, and Myers (1977) observes that firms with more real options, here referring to certain assets, particularly growth opportunities, have a greater potential underinvestment problem. The agency cost argument implies a higher COC in firms with more extensive international operations.

2.3 DOI Index

There is no uniform DOI indicator in the existing literature. Lee and Kwok (1988) state that there is no generally accepted single DOI indicator and some DOI indexes emphasize structural characteristics: i.e., the number of countries in which the firm has subsidiaries (Burgman, 1996), or the number of its foreign subsidiaries (Akhtar, 2005; Jouida & Hellara, 2018; Park, Suh & Yenug, 2013), while some DOI indexes focus on performance characteristics, i.e., the ratio of foreign sales to total sales (FSTS) (Aoun & Heshmati, 2008; Reeb, Kwok & Baek, 1998; Singh & Nejadmalayeri, 2004), or the ratio of foreign assets to total assets (Reeb, Kwok & Baek, 1998). In terms of international diversity indicators, Jouida and Hellara (2018) apply one minus the Herfindahl Hirschman Index (HHI) of foreign assets to total assets concentration as DOI index and Jamg (2017) uses one minus the HHI foreign sales to total sales concentration as a proxy of DOI, or geographic diversification (GD) index. Frijns, Tourani-Rad and Zhang (2018) explore the impact of cultural differences on corporate leverage ratios during the internationalization process by calculating cultural diversity based on cultural dimensions proposed by Hofstede (1980).

However, as Burgman (1996) and Reeb, Mansi and Allee (2001) point out, there is no commonly accepted measure or criterion for the degree of internationalization (DOI). We posit that errors could occur if we measure DOI using a single index. Taking the most used DOI index - FSTS as example, Kwok and Reeb (2000) point out that there is a problem of mixing international trade and international investment. Results from Sullivan (1994) and Reeb, Mansi and Allee (2001) all suggest that a comprehensive index should be applied when one wants to measure the degree of internationalization (Note 5). Therefore we adopt five DOI indexes in the help to find a more precise DOI measurement: foreign sales as a percentage of total sales (FSTS), geographic diversification (GD), culture distance (CD), degree of international diversification (DOID = FSTS × GD) and degree of cultural distance (DOCD = FSTS × CD). FSTS, GD and CD are single indexes while DOID and DOCD are comprehensive indexes.

3. Sample Selection and Methodology

3.1 Sample Selection

Table 1 depicts the sample selection process. Our initial sample consists of 936 listed companies from the Taiwan Economic Journal database for the years 2014 through 2018. We deleted 233 firms due to their unique characteristics (i.e., firms in the finance, bank, insurance, and construction sectors) and firms with insufficient financial data. Application of these criteria resulted in a final sample of 703 companies.

Table 1. Sample selection and Composition

Panel A : Sample selection process	No. of Companies
Listed companies from Taiwan Economic Journal database	936
Exclude : Financial firms	52
Construction firms	49
Missing financial data	132
Final Sample	703

Panel B : Composition by Sample, By Industry		
Industry	Sample	Cumulative number of firms
Wholesale and Retail	13	13
Service	13	26
Telecommunications	47	73
Transportation	18	91
Electricity and Gas Supply	8	99
Manufacturing	562	661
Other	42	703

3.2. Definition of Variables

3.2.1 Dependent Variables

There are two dependent variables in our models - LEV and COC. Based on Booth et al. (2001), Chen and Strange (2005), Huang and Song (2006) and Vo (2016), we use three different debt ratios as proxy variables of LEV: total debt ratio (TDR = total liabilities / total assets), short-term debt ratio (STD = short-term liabilities / total assets), and long-term debt ratio (LTD = long-term liabilities / total assets). Total assets equal the book value of total liabilities plus the market value of common equity. The market value of common equity is the fiscal year-end stock price multiplied by the number of shares outstanding, (Akhtar & Oliver, 2009; Burgman, 1996; Doukas & Pantzalis, 2003; Lee & Kwok, 1988).

As for COC calculation, following Aoun and Heshmati (2008), we use the weighted average

cost of capital (WACC):

$$\text{WACC} = (1 - tax) \times w_D \times k_D + w_E \times k_E \quad (1)$$

where k_D is the cost of debt, k_E is the cost of equity, w_D is the weight of interest bearing debt to total capital, w_E is the weight of equity to total capital, and tax is the average corporate tax rate and k_D equals interest expense divide by interest bearing debt. We estimate k_E by using CAPM (capital asset pricing model) from Aoun and Heshmati (2008).

$$k_E = r_f + \beta \times (r_m - r_f) \quad (2)$$

Where r_f is risk-free rate, the interest rate of one year certificate of deposit from Bank of Taiwan. r_m is the return of market portfolio, calculated using the Taiwan weighted index. β is beta coefficient of the individual firm. All data are from the TEJ database.

3.2.2. Explanatory Variables: Degree of Internationalization (DOI)

As for DOI - our variable of interest, we adopt five DOI indexes to find the association between DOI and LEV (and COC). The first DOI index is FSTS (the foreign sales as a percentage of total sales) - the most common index of DOI. Reeb, Kwok and Baek (1998), Singh, and Nejadmalayeri (2004) and Aoun and Heshmati (2008) point out that the higher the FSTS is, the higher the degree of DOI. Our second DOI proxy is geographic diversification (GD), which is used to understand the effect of international diversification on LEV and COC. Following Jouida and Hellara (2018), we use one minus the Herfindahl Hirschman index of foreign assets to the total assets concentration to calculate GD.

$$\text{GD} = 1 - \sum_{i=1}^{n} \left(\frac{A_i}{\sum_{i=1}^{n} A_i} \right)^2 \quad (3)$$

Where A_i represents long-term investment amount of company in country i (including Taiwan). A higher number means a higher degree of diversification (Note 6).

Our third DOI index is the degree of international diversification (DOID), a comprehensive index of FSTS and GD.

$$\mathrm{DOID} = \mathrm{FTST} \times \mathrm{GD} \tag{4}$$

The fourth index is cultural differences (CD) as suggested by Reeb, Mansi and Allee (2001) and Frijns, Tourani-Rad and Zhang (2018). We calculate CD using the four culture indexes proposed by Hofstede, Hofstede and Minkov (2010): Power Distance Index (PDI), Individualism (IDV), Masculinity (MAS) and Uncertainty Avoidance Index (UAI) along with the approach from Tong and Reuer (2007).

$$\mathrm{CD}_i = \frac{1}{4}\sum_{\mathrm{m}=1}^{4}\frac{\left(I_{m,i} - I_{m,TW}\right)^2}{v_m} \tag{5}$$

Where CD_i represents culture distance between country i and Taiwan. $I_{m,i}$ is culture index score on scale m of country i proposed by Hofstede, Hofstede and Minkov (2010) (m = 1, 2, 3, 4). v_m is the sample variance in scale m. We calculate following CD by taking long-term investment of company in country i into consideration:

$$\mathrm{CD} = \sum_{i=1}^{n}\left(\frac{A_i}{\sum_{i=1}^{n} A_i} \times \mathrm{CD}_i\right) \tag{6}$$

The fifth DOI index is the degree of culture distance (DOCD) - a comprehensive index.

$$\mathrm{DOID} = \mathrm{FTST} \times \mathrm{CD} \tag{7}$$

3.2.3 Control Variables

Size (SIZE):

We use natural logarithm of the total assets as the proxy for firm size. We define total assets as the book value of total debt plus the market value of common equity. Results from prior study (Chen & Strange, 2005; Titman & Wessels, 1988; Vo, 2016) show different associations between SIZE and LEV. On one hand, larger firms tend to have higher LEV due to their low bankruptcy risk, resulting in a positive association between size and LEV. On the other hand, smaller firms tend to have higher LEV due to an inability to access capital markets, higher issue costs of equity and debt and financing through banks. Therefore, there is a negative association between SIZE and LEV for these firms.

Growth (GRO)

Myers (1977), Titman and Wessels (1988) and Reeb, Mansi and Allee (2001) argue that firms with higher growth opportunities are likely to enjoy real options and firms with more real options have potential underinvestment problems. This underinvestment problem occurs when debt matures after the expiration of a real option, and the shareholders reject positive net present value projects because the benefits from these projects would mainly accrue to the debt holders. This implies firms with higher growth opportunities will have a higher agency cost of debt. Therefore, higher growth opportunities firms tend to have lower LTD and higher STD. Following Singh and Nejadmalayeri (2004) and Aoun and Heshmati (2008), we measure GRO by using average five-year sales growth rate.

Profitability (ROA)

We use return on asset (ROA), calculated as the ratio of earnings before interest and taxes to total assets as a firm's profitability index. Based on Pecking Order Theory from Meyers (1984), firms prefer raising capital when taking security issue cost into consideration. They first raise capital from retained earnings, then from debt, and finally from issuing new equity. Therefore, a negative relation between profitability and leverage is expected from the view of Pecking Order Theory (Akhtar & Oliver, 2009; Titman & Wessels, 1988) since firms with high profit in prior years tend to have more retained earnings. On the contrary, Jensen (1986) and Aoun and Heshmati (2008) point out that profitable firms may signal quality by leveraging up, resulting in a positive relationship between leverage and profitability. In sum, there are mixed results in studies of the relationship of profitability and LEV.

Asset Tangibility (TANG)

Titman and Wessels (1988), Singh and Nejadmalayeri (2004) and Akhtar and Oliver (2009) state that firms will have more collateral in borrowing if they have more tangible assets on hand. This leads to increased firms' leverage capacity. Our study posits that tangible assets are positively associated with LTD but not STD since no collateral is needed for STD financing. Following Titman and Wessels (1988) and Vo (2016), we define tangible assets as fixed assets plus inventory scaled by total assets.

Non-Debt Tax Shields (NDTS)

Titman and Wessels (1988) and Akhtar and Oliver (2009) state that non-debt tax shields (i.e., depreciation or investment tax credits) compete with interest as tax deductions. Hence, firms will have lower LEV if they have

higher non-debt tax shields. Considering that tangible assets (TANG) is correlated with Non-Debt Tax Shields (NDTS), we use depreciation and amortization expenses scaled by total assets a as proxy for non-debt tax shields (Huang & Song, 2006).

Asset turnover ratio (ATO)

Singh and Nejadmalayeri (2004) and Aoun and Heshmati (2008) suggest that one can use the asset turnover ratio as a proxy for managerial agency costs. Low ATO means high managerial agency costs and COC. In other words, there exists a negative association between ATO and COC. We define ATO as the ratio of sales to total assets.

3.3 Methodology

Following Aoun and Heshmati (2008), this paper uses a simultaneous equation framework to examine the relationship between LEV and COC for a sample of Taiwan companies. Three- stage least squares (3SLS) regression is used to examine the association between DOI and LEV and COC. The estimated model is shown below:

$$\mathrm{LEV}_{it} = \alpha_0 + \alpha_1 \times \mathrm{COC}_{it} + \alpha_2 \times \mathrm{DOI}_{\mathrm{it}} + \alpha_3 \times \mathrm{SIZE}_{\mathrm{it}} + \alpha_4 \times \mathrm{GRO}_{\mathrm{it}} + \alpha_5 \times \mathrm{ROA}_{\mathrm{it}} + \alpha_6 \times \mathrm{TANG}_{\mathrm{it}} + \alpha_7 \times \mathrm{NDTS}_{\mathrm{it}} + \mathrm{e}_{it} \quad (8)$$

$$\mathrm{COC}_{it} = \beta_0 + \beta_1 \times \mathrm{LEV}_{it} + \beta_2 \times \mathrm{DOI}_{it} + \beta_3 \times \mathrm{SIZE}_{it} + \beta_4 \times \mathrm{ATO}_{it} + \varepsilon_{it} \quad (9)$$

Where LEV is one of three debt ratios: total debt ratio (TDR), short-term debt ratio (STD), or long-term debt ratio (LTD). COC is the cost of capital. DOI is one of five degree of internationalization indicators - foreign sales as a percentage of total sales (FSTS), geographic diversification (GD), culture distance (CD), degree of international diversification (DOID) and degree of cultural distance (DOCD). SIZE is the natural logarithm of the total assets, GRO is five- year average sales growth rate, ROA is the ratio of earnings before interest and taxes to the total assets, and TANG is the ratio of fixed assets plus inventory to total assets. NDTS is depreciation and amortization expenses scaled by total asset. ATO is the ratio of sales to total assets. The subscripts i and t represent different companies and times, respectively and e and ϵ are disturbance terms.

4. Empirical Results

4.1 Descriptive Statistics

Table 2 presents descriptive statistics of our sample firms (3,515 firm year observations; five years data from 703 companies). Average STD is 0.281 and average LTD is 0.112 in our sample firms, suggesting that STD counts for about 72% of total debt for Taiwanese companies. This is similar to the results from DEEs firms (Booth et al., 2001; Huang & Song, 2006; Vo, 2016). In addition, mean COC is 8.7% for Taiwan firms which is lower than that of U.S. firms (15.6%; Aoun & Heshmati, 2008). Also, the 25% percentile tail of FSTS (Q1) is 0.179, suggesting that over 75% Taiwanese companies are engaged in export sales. In the meantime, the median GD is 0.020 and the median CD is 0.014 which suggests that over 50% Taiwan listed companies invest in foreign countries.

Table 2. Summary Statistics

Variable	Mean	Q1	Median	Q3	Std.	N
TDR	0.392	0.229	0.385	0.540	0.206	3,515
STD	0.281	0.147	0.253	0.389	0.170	3,515
LTD	0.112	0.022	0.070	0.165	0.121	3,515
COC	0.087	0.064	0.083	0.116	0.117	3,515
SIZE	16.038	15.054	15.828	16.765	1.440	3,515
GRO	0.048	-0.034	0.025	0.086	0.230	3,515
ROA	0.049	0.016	0.049	0.089	0.088	3,515
TANG	0.287	0.150	0.262	0.400	0.177	3,515
NDTS	0.031	0.014	0.026	0.041	0.026	3,515
ATO	0.834	0.502	0.730	1.035	0.573	3,515
FSTS	0.573	0.179	0.691	0.922	0.370	3,515
GD	0.128	0.000	0.020	0.212	0.180	3,515
CD	0.160	0.000	0.014	0.172	0.292	3,515
DOID	0.088	0.000	0.004	0.113	0.147	3,515
DOCD	0.113	0.000	0.003	0.100	0.237	3,515

* Variables are defined as follows: TDR is total debt ratio, STD is short-term debt ratio, LTD is long-term debt ratio, COC is cost of capital, SIZE = log(total assets), total assets equal book value of total debt plus market value of common equity. GRO equals average five-year sales growth rate, ROA is the ratio of earnings before interest and taxes to the total assets. TANG is the ratio of fixed assets plus inventory divided by total assets. NTDS is depreciation and amortization scaled by total asset. ATO is measured by the ratio of sales to total assets. FSTS is the foreign sales as a percentage of total sales, GD is geographic diversification, CD is culture distance, DOID is degree of international diversification (FTST × GD) and DOCD is degree of culture distance (FTST × CD).

Table 3. Correlation Matrix

	TDR	STD	LTD	COC	SIZE	GRO	ROA	FTA	NDTS	ATO	FSTS	GD	CD	DOID
STD	0.808													
LTD	0.566	-0.029												
COC	-0.513	-0.413	-0.293											
SIZE	0.383	0.252	0.297	-0.008										
GRO	-0.069	-0.065	-0.026	0.088	0.019									
ROA	-0.284	-0.223	-0.170	0.197	0.185	0.190								
FTA	0.103	-0.141	0.372	-0.016	0.060	-0.003	-0.125							
NDTS	0.043	-0.044	0.135	0.151	0.152	-0.001	-0.140	0.493						
ATO	0.142	0.351	-0.251	-0.071	0.087	0.044	0.154	-0.250	-0.121					
FSTS	0.081	0.185	-0.123	0.197	0.080	-0.062	0.012	-0.132	0.045	0.128				
GD	-0.035	0.023	-0.091	0.040	-0.042	-0.030	0.041	-0.075	-0.030	0.072	0.218			
CD	-0.051	-0.012	-0.070	0.061	-0.070	-0.031	0.035	-0.072	-0.022	0.036	0.202	0.822		
DOID	-0.023	0.050	-0.109	0.073	-0.024	-0.036	0.041	-0.107	-0.035	0.094	0.450	0.861	0.735	
DOCD	-0.035	0.013	-0.077	0.071	-0.053	-0.041	0.032	-0.094	-0.042	0.049	0.370	0.729	0.890	0.851

* See Table 2 for variable definition.

Table 3 presents correlation matrix results. There are no variables with coefficient greater than 0.7 other than three debt ratios (TDR, STD and LTD) and five DOI indexes (FSTS, GD, CD, DOID and DOCD). In addition, there is no multicollinearity issue between these debt ratios and DOI indexes since they don't appear in the same regression models. Table 3 also shows that most independent variables are not highly correlated with each other suggesting that multicollinearity is unlikely to be an issue.

4.2 Simultaneous Regression Results

Following Aoun and Heshmati (2008), we use three-stage least squares (3SLS) for simultaneous-equations model estimates. Our endogenous variables are LEV (TDR, LTD and STD – three debt ratios) and COC. We estimate instrumental variables by using exogenous variables from our regression model. We have total 15 regression models - five DOI indexes multiple by three LEV variables. Table 4 to 6 shows regression results.

In terms of DOI indexes, results from Table 4 ~ Table 6 suggest that there is a consistent and significant positive association between five DOI indexes (FSTS, GD, DOID, CD and DOCD) and TDR (Table 4)/STD (Table 6). The association between DOI and LTD (Table 5), however, is negative and significant. With regard to LTD, the negative association between DOI and LTD suggests that DEEs firms have difficulty to obtain long term capital during the internationalization process due to increasing risk. Therefore, LTD decreases as DOI increases. This is consistent with the results from Doukas and Pantzalis (2003), Singh and Nejadmalayeri (2004), Akhtar (2005) and Frijns, Tourani-Rad and Zhang (2018). Our results, however, are different from Kwok and Reed (2000). Possible explanations are as follows: Kwok and Reed (2000) suggest DEE firms tend to reduce total risk and increase LTD in the process of internationalization due to their focus on industrialized countries. Taiwan firms, however, have targeted more on Mainland China and Southeast Asian countries during their internationalization process in the past ten years. Therefore, for Taiwanese companies, total risk is increased and LTD is decreased during the process of internationalization.

As for STD, we posit that in the short term, Taiwanese enterprises face exchange rate risks during the internationalization process and it is easy to use currency markets and financial instruments to conduct natural hedges of exchange rates (Aoun & Heshmati, 2008; Fatemi, 1988). At the same time, considering international language and cultural differences, companies will tend to use the internal capital market model to finance their short-term funding needs (Doukas & Pantzalis, 2003). In addition, companies with higher DOI are engaged in international trade. Meanwhile, through trade credit, STD can be effectively improved by increasing the payment period and increasing the accounts payable. Above arguments suggest that there is a positive association between DOI and STD. The association between DOI and LTD and STD is consistent with the results from Aoun and Heshmati (2008).

In addition, our results suggest that there is a significant positive association between DOI and TDR. In general, the benefit of DOI to DEE firms (i.e., international diversification and coinsurance effect) outscores its cost (i.e., political risk, exchange rate risk, culturally different and agency costs) via DOI. Our results are therefore different from Aoun and Heshmati (2008). The discrepancy could be due to the fact that debt structure of DEE companies is mainly STD. Hence TDR is more likely to be dominated by STD. In contrast, the focus of Aoun and Heshmati (2008) is on a developed country's (the U.S.) Nasdaq firms whose debt structure is dominated by LTD. Therefore TDR would more

likely be dominated by LTD. In sum, the association between DOI and total debt is depending on relative size of STD and LTD.

Based on the above discussion, DOI indexes have the substitution effect of short-term and long-term debt due to their significant negative (positive) association with LTD (STD). DOI, however, is significant and positively associated with TDR. This suggests a debt capacity enhancement effect of DOI indexes on DEE firms.

Most of our empirical results show a significant positive association between DOI and COC which suggests that DEEs companies do not have the advantage of participating in international financial markets in the process of internationalization, DEEs firms need to obtain sufficient funds by using higher cost of capital, which in turn leads to higher COC as well as higher DOI. From another perspective, there is no diversified coinsurance effect in the internationalization process of Taiwanese companies. This finding is different from results seen on developed countries in Singh and Nejadmalayeri (2004) and Aoun and Heshmati (2008).

Table 4. Simultaneous Regression Results of TDR and COC

	Model 1		Model 2		Model 3		Model 4		Model 5	
Variable	TDR	COC	TDR	COC	TDR	COC	TDR	COC	TDR	COC
Intercept	-0.002	0.009***	0.184	0.010***	0.151	0.010***	0.178	0.010***	0.166	0.010***
	(0.09)	(0.003)	(0.126)	(0.003)	(0.1192)	(0.003)	(0.126)	(0.003)	(0.124)	(0.003)
LEV(TDR)		-0.055***		-0.057***		-0.056***		-0.056***		-0.056***
		(0.003)		(0.003)		(0.000)		(0.003)		(0.003)
COC	-14.570***		-17.716***		-17.192***		-17.773***		-17.574***	
	(0.003)		(2.352)		(2.237)		(2.377)		(2.337)	
SIZE	0.053***	0.003***	0.053***	0.003***	0.054***	0.003***	0.054***	0.003***	0.054***	0.003***
	(0.009)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)	(0.004)	(0.000)
GRO	-0.007		-0.002		-0.003		-0.002		-0.003	
	(0.009)		(0.01)		(0.01)		(0.01)		(0.01)	
ROA	-0.16**		0.005		-0.029		0.004		-0.008	
	(0.084)		(0.112)		(0.107)		(0.113)		(0.111)	
TANG	0.045*		0.004		0.012		0.005		0.008	
	(0.024)		(0.041)		(0.038)		(0.041)		(0.04)	
NDTS	-0.397		-0.082		-0.140		-0.091		-0.113	
	(0.294)		(0.452)		(0.427)		(0.455)		(0.448)	
ATO		-0.001**		0.000		0.000		0.000		0.000
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
FSTS	0.167***	0.011***								
	(0.018)	(0.001)								
GD			0.046*	0.003*						
			(0.026)	(0.001)						
DOID					0.130***	0.008***				
					(0.034)	(0.002)				
CD							0.047***	0.003***		
							(0.017)	(0.001)		
DOCD									0.079***	0.005***
									(0.022)	(0.001)
N	3515	3515	3515	3515	3515	3515	3515	3515	3515	3515
R-squared	0.706		0.617		0.622		0.619		0.623	

Notes: The numbers in the parentheses are standard errors. *, **, and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

Table 5. Simultaneous Regression Results of LTD and COC

	Model 6		Model 7		Model 8		Model 9		Model 10	
Variable	LTD	COC	LTD	COC	LTD	COC	LTD	COC	LTD	COC
Intercept	-0.742***	0.017***	-0.818***	0.016***	-0.803***	0.016***	-0.823***	0.016***	-0.818***	0.016***
	(0.081)	(0.003)	(0.106)	(0.000)	(0.1)	(0.004)	(0.106)	(0.004)	(0.105)	(0.004)
LEV(LTD)		-0.077***		-0.084***		-0.083***		-0.082***		-0.082***
		(0.006)		(0.006)		(0.006)		(0.006)		(0.006)
COC	8.327***		9.518***		9.271***		9.654***		9.578***	
	(1.551)		(1.987)		(1.897)		(2.022)		(1.992)	
SIZE	0.035***	0.002***	0.033	0.002***	0.033***	0.002***	0.033***	0.002***	0.033***	0.002***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)	(0.003)	(0.000)
GRO	-0.003		0.001		0.000		0.002		0.001	
	(0.015)		(0.016)		(0.016)		(0.016)		(0.016)	
ROA	-0.477***		-0.516***		-0.508***		-0.517***		-0.514***	
	(0.077)		(0.096)		(0.092)		(0.097)		(0.096)	
TANG	0.428***		0.487***		0.476***		0.490***		0.486***	
	(0.028)		(0.039)		(0.037)		(0.039)		(0.038)	
NDTS	-1.703***		-1.984***		-1.945***		-1.981***		-1.973***	
	(0.299)		(0.41)		(0.39)		(0.414)		(0.409)	
ATO		-0.007***		-0.007***		-0.007***		-0.007***		-0.007***
		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)
FSTS	-0.094***	0.007***								
	(0.016)	(0.001)								
GD			-0.049**	0.001						
			(0.022)	(0.002)						
DOID					-0.100***	0.004**				
					(0.029)	(0.002)				
CD							-0.030**	0.002***		
							(0.014)	(0.001)		
DOCD									-0.048***	0.004***
									(0.019)	(0.001)
N	3515	3515	3515	3515	3515	3515	3515	3515	3515	3515
R-squared	0.450		0.415		0.416		0.414		0.415	

Notes: The numbers in the parentheses are standard errors. *, **, and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

Table 6. Simultaneous Regression Results of STD and COC

	Model 11		Model 12		Model 13		Model 14		Model 15	
Variable	STD	COC	STD	COC	STD	COC	STD	COC	STD	COC
Intercept	0.926***	0.020***	1.335***	0.023***	1.249***	0.023***	1.337***	0.023***	1.308***	0.023***
	(0.149)	(0.003)	(0.209)	(0.003)	(0.197)	(0.003)	(0.21)	(0.003)	(0.206)	(0.003)
LEV(STD)		-0.073***		-0.066***		-0.066***		-0.066***		-0.066***
		(0.004)		(0.005)		(0.005)		(0.005)		(0.005)
COC	-28.383***		-36.249***		-34.704***		-36.663***		-36.090***	
	(0.006)		(3.87)		(3.668)		(3.928)		(3.859)	
SIZE	0.009	0.002***	0.011*	0.002***	0.013**	0.002***	0.012*	0.002***	0.012*	0.002***
	(0.006)	(0.000)	(0.007)	(0.000)	(0.006)	(0.000)	(0.007)	(0.000)	(0.007)	(0.000)
GRO	0.034**		0.049**		0.046**		0.051**		0.050**	
	(0.017)		(0.02)		(0.019)		(0.002)		(0.02)	
ROA	0.700***		0.953***		0.886***		0.965***		0.945***	
	(0.145)		(0.195)		(0.185)		(0.197)		(0.194)	
TANG	-0.041		-0.112		-0.096		-0.111		-0.105	
	(0.042)		(0.071)		(0.066)		(0.072)		(0.069)	
NDTS	1.267**		2.129***		1.935***		2.149***		2.086***	
	(0.496)		(0.763)		(0.718)		(0.772)		(0.759)	
ATO		0.004***		0.004***		0.004***		0.004***		0.004***
		(0.001)		(0.001)		(0.000)		(0.001)		(0.001)
FSTS	0.337***	0.014***								
	(0.029)	(0.001)								
GD			0.148***	0.005***						
			(0.043)	(0.001)						
DOID					0.340***	0.011***				
					(0.056)	(0.002)				
CD							0.120***	0.003***		
							(0.028)	(0.001)		
DOCD									0.195***	0.006***
									(0.036)	(0.001)
N	3515	3515	3515	3515	3515	3515	3515	3515	3515	3515
R-squared	0.467		0.346		0.355		0.347		0.351	

Notes: The numbers in the parentheses are standard errors. *, **, and *** indicate two-tailed significance at the 10%, 5% and 1% levels, respectively.

In terms of the interactive effect of COC and LEV, the positive association between COC and LTD shows that, in general, the cost of debt is lower than the cost of equity. Because, the market interest rate in DEEs has been at a low level in recent years and the yield curve has been close to flat, these results are different from those of Aoun and Heshmati (2008) and higher COC DEEs firms would tend to finance via long-term debt. With regard to substitution effect of short-term and long-term debt, firms increase their holdings of LTD due to increased COC, which in turn leads to decreased STD and suggests the negative association between COC and STD. In addition, the significant negative association between COC and TDR suggests that, for DEEs firms, changes in total debt are dominated by changes in short-term debt.

As for the effect of LEV on COC, our results show that the COC level will drop significantly with increases in each of STD, LTD and TDR (Table 4 ~ Table 6). Higher LEV comes with lower COC as the cost of debt is lower than the cost of equity. Our findings are consistent with Singh and Nejadmalayeri (2004) and Aoun and Heshmati (2008).

With regard to control variables, the positive association between size (natural logarithm of the total assets) and LEV suggests that large companies tend to have higher LEV due to their low level of risk of bankruptcy. This is consistent with the results from Chen and Strange (2005), Huang and Song (2006), and Vo (2016). Regarding the positive association between size and COC, a possible explanation could be that SME (small and medium-sized enterprises) of DEEs countries tend to have difficulty in financing through capital markets. On the other hand, collateral is required when financing through banks. Therefore, the cost of debt for larger companies (no collateral requirement) is higher than that of a SME (with a collateral requirement), which leads to a positive association between size and COC.

As for the growth (GRO) index - five-year average sales growth, our results show an insignificant association between GRO and TDR (and LTD). The results are consistent of those from Chen and Strange (2005), who used China listed companies as their sample. However, in that study there was a positive association between GRO and STD. The above results suggest that there is no evidence of an underinvestment problem in Taiwan firms. This is consistent with results from Singh and Nejadmalayeri (2004) but inconsistent with results from Aoun and Heshmati (2008).

Regarding ROA - our firm profitability measurement, the empirical results suggest a significant negative association between ROA and LTD. This is consistent with results from Kwok and Reeb (2000), Booth et al. (2001) and Huang and Song (2006). The results also in line with the Pecking Order Theory proposed by Meyers (1984) which suggests that companies prioritize their sources of financing, they first preferring internal financing, and then debt, lastly issuing new equity. On the other hand, the significant positive association between ROA and STD is different from results of Vo (2016), who studied firms in Vietnam. This suggests that profitability indexes have a substitution effect on short-term and long-term debt due to alternative characteristics of LTD and STD – even though Pecking Order Theory suggests that high profitability companies will reduce LTD usage. Results also show that profitability indexes do not have debt capacity effect on DEE firms due to insignificant associations between ROA and TDR.

Regarding the association between tangible assets (TANG) and LEV, due to immature credit rating markets, DEEs firms' long-term debt usually requires the provision of collateral. Therefore, DEEs firms with more tangible assets could provide more debt collateral which in turn increases their LEV. Our results suggest that there is a positive association between TANG (fixed asset plus inventory scaled by total assets) and LTD. At the same time the association between TANG and STD/TDR is not significant. The results are quite intuitive since companies are not required to provide collateral for short-term debt and short-term debt counts for majority portion of total debt in DEEs firms. The coefficient sign of TDR, hence, is not significant.

With regard to the relationship between NDTS (non-debt tax shields, depreciation and amortization expenses scaled by total assets) and LEV, results suggest that there is a negative (positive) association between NDTS and LTD (STD). These results are expected since the interest burden of long-term debt is higher than that of short-term debt, hence the tax deduction effect of long-term debt will be higher than that of short-term debt. On the other hand, the tax shields effect of debt interest will be lower when the NDTS is higher. Therefore, the incentive for companies to use long-term debt financing will be reduced, and the LTD will be lower. Taking the substitution effect of short-term and long-term debt into consideration, our results show a positive association between NDTS and STD. Consequently, there is no association between NDTS and TDR. Moreover, the debt capacity effect does not exist between NDTS and TDR.

5. Conclusions

Due to the increasing internalization of DEEs and considering the debt structure of DDEs companies is significantly different from that of the developed countries, this study examined the association between DOI and LEV (COC) in a DEE setting using a sample of Taiwan listed companies from 2014-2018. Our DOI measurement consists of five

proxies (foreign sales as a percentage of total sales (FSTS), geographic diversification (GD), culture distance (CD), degree of international diversification (DOID = FSTS × GD) and degree of cultural distance (DOCD = FSTS × CD), and LEV measurement consist of three proxies (TDR, LTD and STD). This study also discussed the substitution effect of short-term and long-term debt and debt capacity effect between DOI and total debt ratio.

Based on simultaneous equation estimation, our empirical results found that DOI has a significant negative impact on LTD, suggesting that during the process of internationalization, as the risk increases, the difficulty for DEEs companies to obtain long-term funds will increase, therefore LTD decreases with DOI increases. In addition, DOI has a significant positive impact on STD, showing that DEE companies tend to use short-term debt financing (i.e., short-term borrowing, internal capital market financing, and raising accounts payable) to conduct financial operations during the process of internationalization. Due to the significant negative impact of DOI on LTD and the significant positive impact on STD, the DOI index has a substitution effect on the short-term and long-term debt on DEE companies. In addition, DOI has a significant positive impact on TDR, indicating that overall, the benefits (e.g. international diversification and coinsurance effect) of DOI on DEE enterprises are higher than costs (i.e., political risk, exchange rate risk, culturally different and agency costs, etc.). In addition, the higher the DOI is, the higher the COC will be. This indicates that DEE firms do not have the advantage of participating in international financial markets, resulting in COC increasing along with increases in DOI.

In addition, the empirical results in this study also indicate that, in addition to DOI and COC, Profitability (Profitability Index) and Non-Debt Tax Shields and other indicators have a substitution effect on short-term and long-term debt. Both DOI and size have a debt capacity enhancement effect. To our knowledge, this is the first paper to examine the effects of DOI on the company's short-term liabilities (STD), long-term liabilities (LTD), and total liabilities (TDR) by using DEEs setting. Our study is subject to several limitations that are inherent in this type of research. For example, there may be omitted variables in the statistical model. Our database is the Taiwan Economic Journal database and the results may be specific to this dataset which tends to include larger firms. Further studies can examine the interaction between the degree of internationalization and cost of capital in other developing and emerging economies.

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Notes

Note 1. Source: http://www.intracen.org/itc/market-info-tools/statistics-export-product-country/

Note 2. Kwok and Reeb (2000) point out that in the process of internationalization DEE companies enjoy the benefits of "upstream" investment when they internationalize their investments into developed countries. This can reduce the overall risk of the company and thus increase the company's debt capacity. In contrast, when an enterprise of a developed nation internationalizes investment into DEEs, a "downstream" disadvantage occurs, which increases the overall risk of the company and reduces its debt capacity.

Note 3. Doukas and Pantzalis (2003), Singh and Nejadmalayeri (2004) and Aoun and Heshmati (2008) discuss the association among DOI and STD, LTD and TDR using a sample of developed country firms, not DEEs firms.

Note 4. Alchian (1969) defines the internal capital market as a phenomenon of competing funds among enterprises; Peyer and Shivdasani (2001) describe the internal capital market as a mechanism for allocating funds among departments within an enterprise.

Note 5. Sullivan (1994) used the factor analysis statistical method based on nine indicators, including: Foreign Sales as a Percentage of Total Sales (FSTS), Research of Development Intensity (RDI), Advertising Intensity (AI), Export Sales as a Percentage of Total Sales (ESTS), Foreign Profits as a Percentage of Total Profit (FPTP), Foreign Assets as a Percentage of Total Assets (FATA), Overseas Subsidiaries as a Percentage of Total Subsidiaries (OSTS), Top Managers' International Experience (TMIE), and Psychic Dispersion of International Operation (PDIO). Five indicators were finally selected: FSTS, FATA, OSTS, TMIE and PDIO as a linear combination as comprehensive indicators of the degree of internationalization (DOI).

Note 6. Taiwanese firms include 68 countries as their original long-term overseas investment targets. This paper excludes tax haven countries listed on Wikipedia (i.e., British Virgin Islands and Cayman Islands). Our final investment portfolio consists of 54 countries.

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