Analyze the Determinants of Capital Structure for Vietnamese Real Estate Listed Companies

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ABSTRACT

This study adopts a two-step system general method of moments approach towards investigating the determinants of capital structure for the listed real estate firms on Ho Chi Minh stock exchange in Vietnam from 2010 to 2015. The determinants of capital structure are mixed and different for short-term and long-term indicators. The real estate firms tend to use more debts to finance their investment. Vietnamese real estate firms should focus on balance structure debt due to complicated impacts of the determinants to their capital structure. There are some implications for the real estate companies and policy of the government that are based on the empirical results.

Keywords: Determinants of Capital Structure, Real Estate Company, General Method of Moments
JEL Classifications: G32, R3

1. INTRODUCTION

Until now, capital structure always plays an vital role in any kinds of firm. Capital structure is the way a firm can use many sources of fund to finance its operation and growth. Determination the proportion of mixture source such as debt and equity in company's performance is considerably. Debts have the origin of bond issues, long-terms notes payable or short-term debt (e.g., working capital requirement) while equity includes common stock, preferred stock or retained earnings. Additionally, the increasing of number of publications refers to capital structure is originated from the two prominent theories: Trade-off theory and pecking order theory, studying the determinants affect to capital structure behavior and investigating between the firm's performance and capital choice. However, the evidence for proofing these theories is quite mixed. Many empirical studies measures the capital structure in either developed countries and developing countries therefore there is a big gap between two markets, especially developing countries where it is hard to access information. In addition, measures the capital structure through difference in firm specific uniqueness and industry characteristic have become the interesting topics in empirical research however the evidence is still debatable and complicated to interpret.

As we known, the real estate market all over the world before 2007 had an interesting consideration, this issue brought high value for real estate firms by pushing the price for housing market. Nevertheless, with the overprice of assets, this issue led to the collapse for the rest markets all over the world since financial crisis in The United States of America happened 2008, and Vietnam setting is not exceptional. Furthermore, due to the burning of real estate bubble in America, Vietnamese real estate market is an emerging market, got the highest growth of sale at the beginning of the year of 2009 and until at the end of this year, Vietnamese real estate market could be affected under this crisis. Until now, the market has recovered remarkably. However, we do not know clearly that how does firm's manager prefer to determine their capital structure in Vietnamese real estate market.

The paper aimed to focus on three main points to understand more about the capital structure of the real estate firms to answer three questions as follows:
1. How do Vietnamese real estate firms define the proportion of short-term debt to total assets?
2. How do Vietnamese real estate firms define the proportion of long-term debt to total assets?

3. How do Vietnamese real estate firms define the proportion of total debt to total assets?

With three main fold above, the study findings are expected to support the financial managers in determinating appropriate capital structure choice and are also essential for firm's performance.

This reminded paper is organized into five sections. In Section 1, the paper will introduce the real estate listed companies in Vietnam setting. In Section 2, we aim to summarize relevant literature review, not only academic theories but also empirical evidences. In Section 3, the paper will describe the data, measurement and variables. In Section 4, the research presents empirical results. In the last section, the paper concludes the major findings and the related implication.

2. REAL ESTATE LISTED COMPANIES IN VIETNAM

The movements of real estate industry in Vietnam the past 20 years is witnessed 3 times booming and freezing, however the real estate market in Vietnam is considered the favorable destination in East Asian. This fact is supported by a number of reasons in which a majority of laws have conducted to support this sector, and in addition, Vietnam has a young and abundant workforce. For instance, Circular 36 of Vietnamese Government, effective from February 2nd, 2015 reduced the risk factor suitable for lending for real estate investments from 250% to 150%. This points that the more rooms for credit growth in the real estate industry is the necessary issue from State Bank of Vietnam.

The global economy was heading for recession. So, the real estate industry was affected in Vietnam. The growth of asset is unchangeable during the period 2010-2015. The other ratios move together at low level. The estate was frozen at that period because the interest rate was high and the buyers felt it was hard to buy the property with high price. Meanwhile, the other investors tried to make money from other markets.

Vietnam has a number of real estate companies from the north region to south region. Hanoi and Ho Chi Minh cities are still contributed as active and potential market. In respect of registration as of December 31, 2014, there are approximately 4.480 firms are listed as their business. During the year 2014, real estate sector was seen an impressive aspect by a majority mergers and acquisitions and liquidity. After that, there are about 65 listed firms that operate in real estate industry in both Hanoi Stock Exchange (HNX) and Ho Chi Minh City Stock Exchange (HSX), which account for 11% of total capitalization. The real estate companies have specialized in industrial property, affordable housing, real estate business and toll collection, high-end to luxury commercial and residential property, middle to high-end housing, brokerage and second distribution…

3. THEORETICAL BACKGROUND AND LITERATURE REVIEW

3.1. Theoretical Background
The paper uses some theories to instruct for the direction including theories of capital structure, trade-off theory, and pecking order theory as follows:

3.1.1. Theories of capital structure
Capital plays an vital and critical role for company performance. Debt and equity are two main categories of capital resources. Equity arises when firms sell some of its ownership right to investors to gain more funds support for operation. Meanwhile debt is contractual obligation between companies and credits, and lessors who will receive not only capital but also interest for a stipulated time frame.

Notably, there are many definitions arises with capital structure of companies. Brealey et al. (2011) defined capital structure as a composition of debt, equity and hybrid securities issued by the firms. According to Ross et al. (2001) capital structure is the mixture between long-term debt and equity the firm uses to finance its operations. From the given definition above, a capital structure is referred as the relationship between amount of debt and equity used to finance firm performance. Theoretical of capital structure from Modigliani and Miller is considered the first framework in this field and contributed high value for a number of latter researches. On the theoretical aspects there are two popular fundamental literatures: Trade-off theory and pecking order theory.

3.1.2. Trade-off theory
The trade-off theory is originated from the discussion of Modigliani and Miller (1958) and Modigliani and Miller (1963). The idea of the trade-off theory is that firm should balance how much debt finance and how much equity finance to use by balancing the cost and benefits. In other words, the assumption of this theory is that the cost of debt can protect firm earnings from corporate income tax therefore 100% capital from debt can bring high benefit for firm, however this issue is also extremely risky because there are no firms dare to take advantage from debt for operation. According to Modigliani and Miller (1958), when corporate income tax was added on the original irrelevance proposition, this issue will create benefit for debt in that it creates tax shield. Firms in trade off theory set the target debt to value ratio and slowly acquire the target (Myers, 1984).

3.1.3. Pecking order theory
On the pecking order theory aspect, internal source of firm is more preferable or in case external sources are required for financing firm' performance, debt is chosen before equity therefore the order of financial sources is ranked as retained earnings, debt and equity (Myers, 1984; 2001). This is explained by Myers and Majluf (1983) in which managers who want to maximize the market value for firm will avoid external equity financing if they have better information as opposed to shareholders and the outside investors are rational.

3.2. Literature Review
There were many studies, which shed some lights on this topic since 2000s on over the world, especially in Asia and Vietnam. Frank and Goyal (2008) mentioned that capital structure which included a large of variables relating to the debt. 3 year later, Gill et al. (2011) said that capital structure were blend of debt and equity, which support firms to operate their business activities. Martin and Hoffmann (2017) indicated that the researchers try to answer the question "How do firms decide their capital

structure?" Furthermore, based on pecking order theory, Myers (1984) emphasized that firms' managers prefer the internal funds and always try to reduce the external funds in order to balance tax benefit with cost of debt. In this decade, a numerous arguments that shed light on firm's capital structure. However, almost researchers can not define exactly the way how does firm choice his capital structure. The literature on capital structure are emerging two major theories such as trade-off theory and pecking order theory that argued firm prefers borrowing toward his target (de Jong et al., 2011).

In Asia, there are also a lot of many researches focused on the developed securities markets such as Taiwan, China… Fauzilah et al. (2009) used the structural equation modeling, factor analysis and path analysis to figure out the link among capital structure, operation risk, and profitability. Capital structure has the negative and significant effect on operational risk. There is one-way effect between capital structure and operational risk. The operational risk has a negative and significant effect on profitability. Insurance companies should diversify their investment and reduce risk. The implications for the governments are that they should loosen investment restrictions and use instruments to assist risk-based capital in checking insurance company. Shyu (2013) researched on Taiwanese group-affiliated firms by using panel data and two-stage least square regression. Then he figured out that capital structure has a significant positive effect on performance. Besides, firms with higher leverage are associated with improved operational efficiency. However, profitability has a positive effect to performance. However, size has a significant negative effect on performance. Size has a negative effect on ownership, insider ownership does not reach a significant level and the performance doesn't have a significant relationship with ownership. Dan et al. (2015) used the structural equation modeling approach, which determined the capital choice for listed companies that have constraint of debt financing is rather restrictive. The research suggested the equity more frequently than debt in long-term investment. Most influential attributes are growth opportunities, profitability and liquidity.

In terms of Vietnam capital structure view, there are few results fruited from this field, however existing studies will provide valuable evidence. Tran and Ramachandran (2006) applied regression analysis by using 558 SMEs that is separated 176 state owned and 382 private firms, meanwhile the paper was conducted by direct interviews with SMEs managers from the period year 1998 to 2001. This paper indicates that Vietnamese firms prefer using short-term loan instead of using equity for supporting performance, agreed by Vo (2016), Chang et al. (2014) and Nha et al. (2016), this issue is explained by difficulty in accessing long-term debt.

Regarding to determinants of capital structure, commonly factors in international empirical literature such as size, profitability are appropriate for Vietnam market. However, some factors bring opposite view such as growth and tangibility. With respect to growth determinant, Tran and Ramachandran (2006) and Nha et al. (2016) confirmed that growth had a positive relationship with all measures of capital structure. Nguyen et al. (2012) indicated

that growth was more relevant to long-term debt and less in short-term debt. While, Vo (2016) argued that high growth Vietnamese firms enabled to finance their projects with bank loans, but unable to take advantage of new equity issue in stock markets.

The most common determinant of capital structure is tangibility. Most capital structure hypotheses confirm that there is a positive relation between tangibility and capital structure. Vo (2016), Nha et al. (2016) and Nguyen et al. (2012) agreed that firms could borrow more long-term debts if they are capable more tangible assets for collaterals, this result implies that tangible assets have more value than intangible assets in comparison. In addition, the more tangible assets firms have, the more ability in acquiring credit term loans from bank in Vietnam. However, Nguyen et al. (2012) indicated that firms with high tangibility less depended on capital structure due to most firms in Vietnam context operates in the trade and service sector therefore firms acquire more working capital.

Liquidity is another determinant affect to capital structure. According to Nguyen et al. (2012) stated that liquidity has a downside with capital structure, it is explained that liquid firms prefer to support operation by using internal source instead of external sources. Vo (2016) emphasized that if liquidity of firm had problem, it would limit the firm from borrowing long-term whilst liquidity management is a critical concern for succeed of Vietnamese firm.

In light of profitability determinant, there are two strands are confirmed. On the one hand, Vo (2016) and Nha et al. (2016) stated that there is a negative relation between profitability and capital structure, which is consistent with the pecking order theory. On the other hand, Nguyen et al. (2012) and Tran and Ramachandran (2006) indicated that profitability is considered the significant factor have impact to capital structure due to this determinant is unrealistic accordance with Vietnamese firms.

It is commonly stated that firm size has a strong effect on capital structure. All findings show that the more size firm have, the more leverage firm achieve (Chang et al., 2014; Tran and Ramachandran, 2006; Vo, 2016). Specifically, Vo (2016) and Nguyen et al. (2012) reported that firm size had a positive and significant in regression of long-term debt and in contrast with short-term debt.

4. DATA, LINE TRENDS, MEASUREMENT OF VARIABLES AND RESEARCH METHODOLOGY

4.1. Data and Line Trends

This study obtained a strongly balanced panel data from annual financial statement data of 34 real estate listed companies on Ho Chi Minh stock exchange (HSX) website for period 2010-2015 due to the limitation in gathering data for the year 2016 (the 2016 financial report will be published since April 2017).

Before our main analysis, we first proceed with a discussion on the line trends of the variables under consideration for 34 listed real state companies on HSX. As it is evident from Figure 1, there is
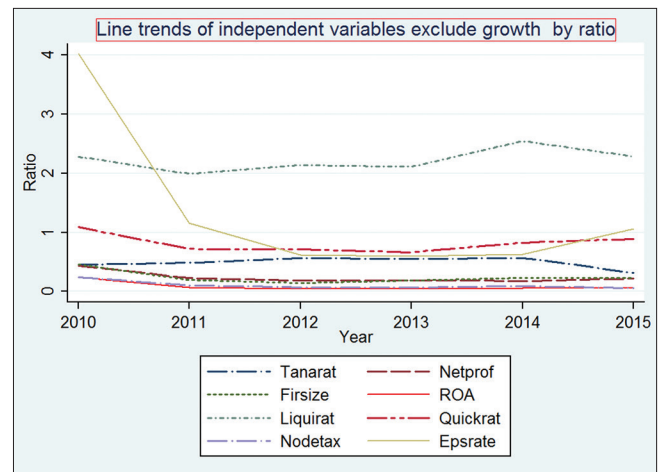
Figure 1: Line trends of capital structure and growth for 34 listed real estate companies on Ho Chi Minh City Stock Exchange in the period 2010-2015
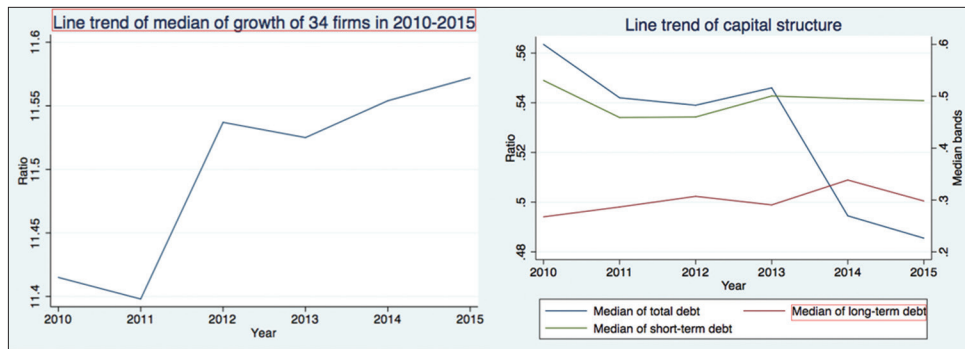
clearly a strong upward trend in the growth of 34 listed real estate companies from 2011 to 2015. The detail of full name and address of 34 listed real estate companies will be found in the appendix Table 1.The firms tend to use more short-term debt for funding their activities compared with their long-term debts. Beside, total debt ratio goes down considerably from 2013 to 2015 compared with the previous periods. These graphs reveal that there has been a closely linear relationship among determinants of capital structures.

Notably, the Figure 2 gives information on the line trends of independent variables. There is a similar trend among the determinants such as net profits margin on sale, firm size, return on asset (ROA), non-debt tax shields, quick ratio, tangible assets rate except liquidity ratio and earnings per share (EPS) rate. Generally, there is an improvement for liquidity of the firms to use their current assents to guarantee for their short-term debt. According to the Figure 2, EPS rate declines notably from 2010 to 2014. Then there is an upward trend slightly in 2015.

4.2. Measurement of Variables

Based on the uniqueness of real estate setting in Vietnam and extent literatures (Harris and Raviv, 1991), we will focus on following attributes: Three debt ratios as explained variables: Total debt, long-term debt ratio and short-term debt ratio at year end, in addition, number of independent variables such as: Growth, asset structure, liquidity, profitability, size, tax shield, inventory, interest payment income. The proxies which represent the attributes from various aspects will be explained accordingly.

4.2.1. Capital structure

Capital structure choice is still controversial. The objective in using attributes will depend on the aim of the writers. Some authors use total debt, long-term debt, short-term debt are explained variables (Dan et al., 2015; Vo, 2016). While Nha et al. (2016) also measured capital structure by using three main variables above, the writer also added LTATM (long term debt/long-term debt + market value of equity). In this paper we also obtain there main dependent variables, named consecutively: Total debt, long-term debt, short-term debt, we also add further variable named long-term debt to short-term debt ratio. Total debt ratio is calculated by using total debt divide total assets of firm for a period year. This is the broadest definition of leverage due to total debt refers to both short-term and long-term debt. While the second measure is long-term debt ratio over total assets, the third indicator is defined as the short-term debt divide total assets. In fact, real estate companies in Vietnam setting prefer

Figure 2: Line trends of determinants of the capital structure of 34 listed real estate companies on Ho Chi Minh City Stock Exchange in the period 2010-2015

long-term debt over short-term debt for corporate financing due to the high value from tangible assets as well as inventory firm retains.

Furthermore, accordance with Graham and Harvey (2001) book value is more considerable than market value when computing leverage due to book value is preferable for financial managers in making decisions. This is confirmed by Fama and French (2000) that is most theoretical literature adopt book values.

Almost firms have to make decision on debt ratio. In Vietnam, for long-term investment, firms borrow the financial capital in long time period to get the low cost of capital. However, to invest the short-term real estate, Vietnamese firm prefer to make a loan in short time period for easier administration procedures as well as solving their short-term demands. That is a reason why we chose the long-term debt to total assets and short-term debt to total assets. Furthermore, we try to estimate the total debt to total assets it is simple that is there any different when both long-term and short-term debt to total assets together.

4.2.2. Growth

Growth is also a controversial determinant from two main theories trade-off theory and pecking order theory. There is less flexible for firms to pursue investment decisions under trade-off theory due to the number of financial covenants and restrictions

imposed by creditors, therefore growth firm tend to avoid debt. The pecking order theory is disparity as compared with trade-off theory, accordingly, corporations are exhausted in internal funds so they prefer to finance their operations via debt. On the empirical literature aspects, there are number of studies found a positive relationship between growth attribute and capital structure, in developing countries view such as Nha et al. (2016) and Nguyen et al. (2012). Nonetheless, it is shown a negative relationship between growth opportunity and capital structure in developed countries (Jensen and Meckling, 1976). Growth ratio is calculated by using the difference between total assets previous year and current year over the total asset in the previous year.

There are numerous literature that debate the vast and ambiguous relationship between firm's growth and capital structure. Pecking order theory, which posed that firm's growth negatively affects firm's leverage. Deesomsak et al. (2004) determined the capital structure for a data of four Asian and Pacific countries (Thailand, Malaysia, Singapore, and Australia) and show the evidence to support this argument. While, Tran and Ramachandra (2006) utilized the SMEs Vietnamese data and found that firm's growth has a significantly positive impact on all variables that can be estimate the capital structure.

4.2.3. Asset structure
Some studies measured relationship between asset structures with leverage, specifically focusing on two factors are tangible assets and intangible assets. Titman and Wessels (1988), Fama and French (2000), Vo (2016) and Nguyen et al. (2012) have showed the positive relationship between tangible assets with leverage, in which the more collateral assets firm have, the more chance to access credits from loans. In contrast, it is also a negative side between tangible assets and leverage (Tran and Ramachandran, 2006). This paper particular concentrates on tangible ratio, which is defined as sum of fixed assets with inventories over total assets. This is explained by the fact that most real estate firms have a dramatic value on both fixed assets and inventories, while it is intangible assets is generous and hardly to define in Vietnam setting.

4.2.3.1. Firm's tangibility
Two major financial theories such as trade-off theory and agency theory that confirmed that tangibility plays an important role for determinant of capital structure. This variable also increases the firm's debt ratio based on the below strong debates. On the one hand, tangibility can support firm easily to borrow money from the banks because of their investment in assets. On the other hand, to improve the asset, firm should loan more money from banks. However, investigate this impact for SMEs Vietnamese data, Tran and Ramachandra (2006) determined that tangibility negatively affected all components of capital structure. While Vo (2016) applied general method of moments (GMM) to analysis 300 Vietnamese firms' data and noted that tangibility were positively related to long-term debt, while on short-term debt it changed to negative level of effect.

4.2.4. Liquidity
Liquidity is another factors have impact on capital structure, liquidity ratio and quick ratio are two attributes selected in this paper. Liquidity ratio is the result from current assets over short-term debts for current year, while quick ratio is measured by using the net value from currents assets exclude inventory then divide short-term debts for current year. Intuitively, the more liquidity firm have, the more convenient for accessing bank credits. In spite of pecking order theory, if firm has a large amount on liquid assets, it will prefer finance operations by using internal source (Prowse, 1990; Nguyen et al., 2012).

Agency theory and pecking order theory state that liquidity has a negative effect on firm leverage because of debates that when a firm obtains the high cost of liquidity, it tends to reduce financial debt (Myers and Rajan, 1998; Sbeti and Moosa, 2012). Meanwhile, Vo (2016) noted that liquidity links with firm's leverage which result is mixed.

4.2.5. Profitability
Following Modigliani and Miller (1958) there is a relationship between profitability and capital structure, numerous studies have followed the trace of this study. On the one hand, Titman and Wessels (1988) and Quang and Xin (2014) discussed the opposite side between profitability and leverage due to profitable firms tend to maintain internal sources for performance than external sources under pecking order theory. On the other hand, Dan et al. (2015) represented that profitability has an averse as compared with capital structure.

Regarding to profitability ratios, this paper conducts four themes as named ROA, net profit margin on sale and earning per share. ROA is the result from earnings after tax divide total assets. Next ratio is net profit margin on sale, it is conducted by gathering earnings after tax over net revenue. Finally, EPS is equaled to earnings after tax divide the number of shares outstanding.

The arguments about the relationship between firm's profit and leverage are mixed. The pecking order theory and trade-off theory state that the firm prefers using profit for their investment to debt fund. Moreover, taxes theory argues that in case of high profit earning, firm will borrow more to reduce their capital cost. However, both studies by Tran and Ramachandra (2006) and Vo (2016) show that profit does not significantly impact of Vietnamese firms on long-term debt ratio, it negatively and significantly affects short-term debt ration only.

4.2.6. Firm's size
Intuitively, capital structure is forecasted that large firms will have more leverage than small firms. It is confirmed by the majority studies both in developed countries and developing countries (Myers and Majluf, 1983; Frank and Goyal, 2009; Vo, 2016; Tran and Ramachandran, 2006). On the other hand, there is also a negative relationship between leverage and firm size (Dan et al. (2015, this paper pointed out that large Chinese firm easily capture more finance through issue stocks because they have high reputation. In this study, firm size is logarithm of total assets at year-end on assets "ROA" and earning per share "*epsrate*".

Myers and Majluf (1984), Tran and Ramachandra (2006) stated that firm size positively affect firm leverage, while Vo (2016) posed that firm size has duplicated impact on firm leverage.

4.2.7. Inventory

This study measures proxy inventory because as we known that real estate firms store a majority value of inventory, such as housing inventory, construction in process, land inventory, etc. This is a new point as compared with previous studies, simply concentrate on two manifold tangible assets and intangible assets belong to asset structure. Inventory refers to logarithm of inventory of firms in a period of year.

4.2.8. Non-debt tax shields

Last attribute related to capital structure is non-debt tax shield, while most Vietnames studies has not brought out any relationship between non-debt tax shields and capital structure, foreign studies not only discuss both positive and negative relation. Dan et al. (2015) discussed the positive relationship between non-debt tax shield and capital structure, there is a significant impact between non-debt tax shield with state firms and insignificant effect between

Table 1: Measurement of attributes (firms' specific factors and accounting indicators)

Firms' specific factors	Accounting indicator	Measurement	Source
Capital structure	Total debt ratio (*todebrate*) Long-term debt ratio (*ltdebrat*) Short-term debt ratio (*stdebrat*)	Total debt/Total assets Long-term debt/Total assets Short-term debt/Total assets	The data total debt, long-term debt, short-term debt and total assets from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement
Growth	Percentage change in total assets (*Growth*)	(Ending total assets in current year – Ending total assets in previous year)/Ending total assets in previous year	The data total assets from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement
Asset structure	Tangible asset (*tanarat*)	(Fixed assets+Inventory)/Total assets	The data fixed assets, inventory and total assets from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement
Liquidity	Liquidity ratio (*liquirat*) Quick ratio (*Quickrat*)	Current assets (CRAS)/Short-term debt (STDeb) at year end (Current assets [CRAS] – Inventory)/short-term debt (STDeb) at year end	The data current assets, short-term debt and inventory from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement
Profitability	*roa*	Earnings after tax/Total assets	The data earnings after tax and total assets from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement
	Net profits margin on sale (*netprof*)	Earnings after tax/Net revenue	The data earnings after tax and net revenue from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement
	EPS (*eps*)	Earnings after tax/The number of shares outstanding	The earnings after tax is extract from annual reports while the number of shares outstanding is extract from the profile of firm which was listed on the Ho Chi Minh Stock Exchange: www.hsx.vn. All the data are retrieved from 1st January till 31st December every year from 2010 to 2015
Size	Firm size (*firsize*)	Total assets at year end	We extract the total assets from annual reports of each 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015
Inventory	Inventory (*inven*)	Value of inventory	New proxy is generated from the real estate data
Non-debt tax shields	Non-debt tax shields (*nodetax*)	(Prime operating revenue – Interest payments – Income tax)/Total assets	The data prime operating revenue, interest payments, income tax and total assets from annual reports of 34 firms, which was reported from 1st January till 31st December every year from 2010 to 2015, then we compute the results by adopting the measurement

EPS: Earning per share, ROA: Return on asset

private firms with non-debt tax shields. Sogorb-Mira (2005) and Delcoure (2007) shed light on relationship among non-debt tax shield with total debt, long-term debt and short-term debt in emerging economies that firms prefer to earn benefit from reducing debt ratio by maintaining the larger non-debt tax shield.

Table 1 illustrate the firms specific factors, accounting indicator as well as measurement of those variables.

4.3. Research Methodology

Based on theoretical frameworks of three below theories: Capital structure theory, trade-off theory, and picking order theory and summary of literature, we design the analytical framework. Based on theoretical background of three below theories: Capital structure theory, trade-off theory, and pecking order theory and summary of literature, we design the analytical framework:

$$Capstruct_{i,t} = \beta_0 + \beta_{jk}Capstruct_{i,t-1} + \beta_{jk}X'_{i,t} + u_i + \varepsilon_{i,t} \quad (1)$$

Where, $Capstruct_{i,t}$ indicates the capital structure of firm i, at time t, $X'_{i,j}$ denotes the control variables, u_i is un-observation error term of specific firm, $\varepsilon_{i,t}$ is observation error term of the model. This research should try to verify the null hypothesis is $\beta_{jk} = 0$ where j Represents the number of model with $j = 1...,3$ and k says about the number of control variables with $k = 1...11$. Consequently, the null hypothesis in each Equations (1a-1c), is tested by examining the significance of the Z-statistic for the coefficients in the Table 5.

In this study, we can interpret the above model into three specific models as seen as below:

$$Stdebrat_{i,t} = \beta_0 + \beta_{1.1}Stdebrat_{i,t-1} + \beta_{1.2}Growth_{it} + \beta_{1.3}Tanrat_{it} + \beta_{1.4}Netrof_{it} + \beta_{1.5}Firsize_{it} + \beta_{1.6}ROA_{it} + \beta_{1.7}Liquirat_{it} + \beta_{1.8}Quickrat_{it} + \beta_{1.9}Nodetax_{it} + \beta_{1.10}Inven_{it} + \beta_{1.11}Eps_{it} + u_{1i} + \varepsilon_{1it} \quad (1a)$$

$$Ltdebrat_{i,t} = \beta_0 + \beta_{2.1}Ltdebrat_{i,t-1} + \beta_{2.2}Growth_{it} + \beta_{2.3}Tanrat_{it} + \beta_{2.4}Netrof_{it} + \beta_{2.5}Firsize_{it} + \beta_{2.6}ROA_{it} + \beta_{2.7}Liquirat_{it} + \beta_{2.8}Quickrat_{it} + \beta_{2.9}Nodetax_{it} + \beta_{2.10}Inven_{it} + \beta_{2.11}Eps_{it} + u_{1i} + \varepsilon_{1it} \quad (1b)$$

$$Todebrate_{i,t} = \beta_0 + \beta_{3.1}Todebrate_{i,t-1} + \beta_{3.2}Growth_{it} + \beta_{3.3}Tanrat_{it} + \beta_{3.4}Netrof_{it} + \beta_{3.5}Firsize_{it} + \beta_{3.6}ROA_{it} + \beta_{3.7}Liquirat_{it} + \beta_{3.8}Quickrat_{it} + \beta_{3.9}Nodetax_{it} + \beta_{3.10}Inven_{it} + \beta_{3.11}Eps_{it} + u_{1i} + \varepsilon_{1it} \quad (1c)$$

Notably, the paper uses three-step procedure. First, to ensure the robust and validity of regression results, we apply the Harris–Tzavalis (1999) test (HT) to have the null hypothesis that all the panels contain a unit root. This test is similar to Levin-Lin-Chu (2002) test that requires balanced data and assumes that all panels have the same autoregressive parameter and hypothesis is simply rho <1. However HT test assumes time period is fixed.

In the case of dynamic panel data models, the recognition of parameter heterogeneity is important to avoid potential biases. Secondly, we also run the correlated matrix to estimate the correlation coefficient to ensure the linkage among estimation variables. Finally,

to avoid the bias from endogenous model, we employ the two-step system GMM for a dynamic panel data for 34 real estate firms in 6-year period (Hsiao, 2003; Baltagi, 2005; Vo, 2016).

4.3.2. Empirical analysis result

First, Table 2 reports summary statistics for capital structure and independent variables over the entire sample period. As shown, mean of capital structure including short-term debt ratio, long-term debt ration and total debt ratio measures range from 0.312 to 0.520. Beside, there is a big variation of growth ratio, firm size, liquidity ratio, inventory and earning per share (*epsrate*) among the real estate firms in Vietnam. This table indicates that the real estate firms gain the growth with the large gap of inventory. The status of inventory can make firms' managers to guest the leverage rate of these firms in the market. The value of debt structure in this table also emphasizes that Vietnamese real estate firms prefer pecking theory as well as trade-off theory.

Second, to ensure the robust and reality of regression, we apply HT unit root test to identify the stationary variables, which should be used in the model and results as shown in Table 3. Table 3 shows that almost variables are stationary except only firm size. However, when we take the first different, all variables are stationary. It means that in long run, almost variables keep the same walk steps and it could be supported the reality results from regression estimation in the empirical result.

Third, to help us determine the capital structure, we should examine the correlation of relationship among analytical variables. We conduct and show the correlation matrix as shown in Table 4.

Table 4 shows the correlation matrix among the determinants. There is a negative correlation between short-term and long-term leverage and between short-term and total debt ratio. However, the below variables have a fully significant correlation with capital structure including quick ratio, liquidity ratio, and firm size. Some others correlate to total debt ratio and short-term debt ratio significantly such as inventory, non-debt tax shield, ROAs, and tangibility ratio. Overall, the results are quite mixed for short-term, long-term and total debt ratio.

Table 2: Description statistic

Variable	Obs.	Mean±standard deviation	Minimum	Maximum
todebrate	204	0.520±0.170	0.046	0.948
ltdebrat	204	0.312±0.215	0.000	0.992
stdebrat	204	0.499±0.259	0.008	1.035
growth	204	12.487±81.249	−0.223	1,164.211
tanarat	204	0.481±0.284	0.000	2.010
netprof	204	0.220±0.517	−5.988	1.230
firsize	204	5.566±6.196	−1.709	14.163
roa	204	0.134±0.321	−1.730	1.803
liquirat	204	3.588±5.984	0.180	64.002
quickrat	204	1.867±5.247	0.144	63.260
nodetax	204	0.243±0.881	−0.373	11.445
inven	204	1.634±3.218	0.000	28.027
epsrate	204	1.733±2.725	−4.550	17.518

EPS: Earning per share, ROA: Return on asset

Table 3: Result of stationary variables

Variables	Normal variables			Variables	First different variables		
	Statistic	Z	P value		Statistic	Z	P value
todebrate	0.353***	−3.019	0.001	*d.todebrate*	−0.075***	−6.879	0.000
ltdebrat	0.174***	−5.487	0.000	*d.ltdebrat*	−0.547***	−12.526	0.000
stdebrat	0.329***	−3.350	0.000	*d.stdebrat*	−0.507***	−12.046	0.000
growth	0.000***	−7.894	0.000	*d.growth*	0.000***	−5.983	0.000
tanarat	0.280***	−4.031	0.000	*d.tanarat*	−0.383***	−10.562	0.000
netprof	−0.168***	−10.219	0.000	*d.netprof*	−0.422***	−11.029	0.000
firsize	0.647	1.037	0.850	*d.firsize*	−0.076***	−6.885	0.000
roa	0.001***	−7.878	0.000	*d.roa*	−0.391***	−10.658	0.000
liquirat	0.194***	−5.221	0.000	*d.liquirat*	−0.568***	−12.780	0.000
quickrat	0.295***	−3.820	0.000	*d.quickrat*	0.114***	−4.620	0.000
nodetax	−0.111***	−9.431	0.000	*d.nodetax*	−0.418***	−10.982	0.000
inven	0.608	0.505	0.693	*d.inven*	−0.329***	−9.922	0.000
epsrate	0.0114***	−7.739	0.000	*d.epsrate*	−0.223***	−8.6508	0.000

***, *and ** denote that the coefficients are the level of significance at 1%, 10%, and 5% respectively. EPS: Earning per share, ROA: Return on asset

Fourth, based on dynamic panel data characteristic, this study applies two-step system GMMs to analysis the determinants of capital structure and analytical results are shown in Table 5.

Through Table 5, we can define the capital structure for real estate firms in HSX as seen as below: First, on short-term debt ratio as well as on total debt ratio, the structure of assets such as percentage change of assets, total assets, or proportion of current assets to short-term debt have strongly significantly negative impact. For instance, increasing 1% of percentage change of assets (*growth*), short-term debt ratio and total debt ratio should be reduced more than 0.05%. This finding also supports the confirmation of Deesomsak et al. (2004).

Like other firms in HSX, which defined by Tran and Ramachandra (2006), the results in this table show the significantly positive effect of assets-structure. For example, increase 1% of *growth*, firm size (*firsize*), or liquidity with both liquidity ratio (*liquirat*) and quick ratio (*quickrat*) can enhance from 0.007% to 0.139% of long-term debt rate. Nevertheless, this result enriches and differs the pecking order theory and suggests to the firms' managers that focusing on percentage change of total assets is important issue, due to its mixed effects on structure of debt in both long-term and short-term. Furthermore, estimation results in this table also support the findings of Vo (2016) that Vietnamese firms increase their fixed assets and inventory value could rise their short-term and total debt ratio. Especially, the regression is similar to conclusion of Tran and Ramachandra (2006) that fixed assets can reduce long-term deb ratio of Vietnamese firms. The remarkable point in this table is that net profit has a significantly negative impact on capital structure in both long-term and short-term period. This result highly supports trade-off theory and indicates that Vietnamese firms' managers always try to reduce financial cost by making less debt whenever they can. Based on the trade-off theory, this finding suggests the message of those more profitable firms could have a lower probability of bankruptcy (Fama and French 2002). Likes findings of Vo (2016) this study shows that firm's size, liquidity ratio and quick ratio have duplicated effect on capital structure, it make firms' debt increase in the long-term and reduce in the short-term. The non-debt tax shield can help Vietnamese real estate firms to reduce their long-term debt ratio as well as total debt ratio. This finding also confirms the argument of Sogorb-Mira (2005) and Delcoure (2007). Moreover, earning per share rate makes Vietnamese real estate firms develop their structure of debt in both long-term and short-term as well as in generally leverage of capital structure. The finding suggests to firms' managers and investors about the harm of this variable in defining capital structure.

5. CONCLUSION REMARKS AND IMPLICATION

Consequently, the paper runs the unit root test, and shows the free of unit root for all panels that are used to determine the capital structure for 34 real estate firms on HSX in the period 2010-2015. This finding helps us to ensure the robustness and validation of the regression in the empirical result. Next, by conducting the two-step system generalized method of moments, this study defines the capital structure for Vietnamese real estate firms as seen as follows:

First, capital structure, which was estimated through the short-term debt ratio is positively affected by structure of assets. The tangibility rate, ROAs, inventory and earning per share positively affect short-term debt. The growth of assets, net profit, liquidity ratio, and quick ratio have significantly negative effects on this variable. Non-debt tax rate does not have any meaning for defining short-term debt ratio.

Second, through long-term debt rate, this study showed the net profit, and earning per share have the same level effect on long-term debt rate as well as on short-term debt rate. However, non-debt tax rate helps firms to reduce long-term debt rate. The other variables have different level effects on long-term debt ratio when we compare the level effect with short-term debt ratio.

Third, the total debt ratio was defined as same as short-term debt rate excepts ROAs, and quick ratio, which have an opposite level effect on total debt rate and like an effect in the long-term. All above effects have strongly significance at 1% or 5% respectively except net profit in the long-term model that has significance at 10% only.

Furthermore, real estate firms prefer to borrow capital in long-term for their developing assets (see effect of growth, firm size

Table 4: Correlation matrix among the variables

	todebrate	ltdebrat	stdebrat	Growth	Tanarat	netprof	firsize	roa	Liquirat	quickrat	nodetax	inven	epsrate
todebrate	1												
ltdebrat	0.075 0.289	1											
stdebrat	−0.062 0.378	−0.513*** 0.000	1										
growth	0.040 0.575	−0.036 0.608	0.048 0.496	1									
tanarat	0.289*** 0.000	−0.016 0.821	−0.233*** 0.001	0.030 0.672	1								
netprof	−0.096 0.172	0.034 0.626	0.076 0.281	0.001 0.988	−0.127* 0.070	1							
firsize	0.254*** 0.000	−0.326*** 0.000	−0.546*** 0.000	0.003 0.969	0.329*** 0.000	−0.159** 0.023	1						
roa	−0.252*** 0.000	−0.042 0.553	0.217*** 0.002	−0.009 0.903	−0.252*** 0.000	0.227*** 0.001	−0.248*** 0.000	1					
liquirat	−0.276*** 0.000	0.439*** 0.000	−0.372*** 0.000	−0.021 0.770	−0.075 0.285	0.029 0.682	−0.062 0.379	0.024 0.735	1				
quickrat	−0.265*** 0.000	0.376*** 0.000	−0.245** 0.000	−0.014 0.841	−0.287*** 0.000	0.061 0.386	−0.116*** 0.099	0.108 0.123	0.881*** 0.000	1			
nodetax	−0.226*** 0.001	−0.093 0.184	0.184*** 0.009	−0.009 0.897	−0.217*** 0.002	0.044 0.531	−0.100 0.157	0.075 0.289	0.128* 0.000	0.198*** 0.005	1		
inven	0.303*** 0.000	0.051 0.467	−0.156** 0.026	−0.033 0.639	0.193*** 0.006	−0.030 0.672	0.328*** 0.000	−0.110 0.116	−0.071 0.312	−0.113 0.109	−0.075 0.284	1	
epsrate	0.024 0.731	−0.075 0.289	0.045 0.526	−0.036 0.612	−0.171** 0.015	0.326*** 0.000	0.031 0.664	0.419*** 0.000	−0.099 0.159	−0.039 0.578	0.036 0.607	−0.016 0.821	1

***, ** and * denote that the coefficients are the level of significance at 1%, 5%, 10% respectively. EPS: Earning per share, ROA: Return on asset

Table 5: Results of dynamic panel-data estimation through two-step system GMM

Dependent variable	Short-term debt ratio (*stdebrat*) (1a)			Long-term debt ratio (*ltdebrat*) (1b)			Total debt ratio (*todebrate*) (1c)		
	Coefficient	Z	P>z	Coefficient	Z	P>z	Coefficient	Z	P>z
L1	0.656***	15.560	0.000	0.566***	23.750	0.000	0.584***	18.200	0.000
growth	−0.099***	−3.870	0.000	0.139***	3.710	0.000	−0.052**	−2.140	0.032
tanarat	0.104**	2.320	0.020	−0.066**	−2.050	0.041	0.080***	2.800	0.005
netprof	−0.063***	−5.080	0.000	−0.013*	−1.910	0.057	−0.032***	−7.480	0.000
firsize	−0.106***	−4.200	0.000	0.130***	3.480	0.000	−0.054**	−2.330	0.020
roa	0.230***	6.420	0.000	−0.226***	−15.120	0.000	−0.134***	−9.550	0.000
liquirat	−0.010***	−5.170	0.000	0.010***	9.150	0.000	−0.006***	−4.880	0.000
quickrat	−0.006**	−2.010	0.044	0.007***	5.900	0.000	0.008***	5.240	0.000
nodetax	0.018	0.980	0.328	−0.011***	−2.680	0.007	−0.028***	−4.290	0.000
inven	0.00000001***	4.680	0.000	−0.00000002***	−2.930	0.003	0.00000001***	6.360	0.000
epsrate	0.024***	2.760	0.006	0.014***	2.830	0.005	0.032***	5.620	0.000
Number of obs.	135			169			169		
Number of group	34			34			34		
Number of instruments	28			33			32		
AR (2)	0.895			0.724			0.714		
Sargan test	0.225			0.453			0.609		
Wald Chi-square (9)	4719.37			8424.77			21913.15		
P>Chi-square	0.000			0.000			0.000		

***,**, and * denote that the coefficients are the level of significance at 1%, 5%, 10% respectively; (L1.) represents for the variables such as $stdebrat_{i,t-1}$, $ltdebrat_{i,t-1}$, $todebrate_{i,t-1}$ respectively. GMM: General method of moments

and liquidity on long-term debt rate) because they hope they can earn more and they think the non-debt tax rate can help them to reduce financial cost and indirectly reduce long-term debt ratio. Constraint of debt financing is rather restrictive. Real estates companies should diversify their investment and reduce risk. The implication for the government is that they should loosen investment restrictions and use instruments to assist risk-based capital in checking real estate companies. The firms differ in the choice of funding sources and highlighting the role of shareholders on stock market to attract more investments. They should try to control the liquidity by management of estate projects efficiently and effectively. Simultaneously, they should use Marketing tools to reduce inventory. Most influential attributes are growth opportunities, profitability and liquidity to their capital structure. The listed estate companies should use equity more frequently than debt in long-term investment.

Overall, the determinants of capital structure are mixed and different for short-term and long-term indicators. These findings indicate that Vietnamese real estate firms should focus on balance structure debt, especially the proportion of total debt to total assets due to complicated impacts of determined factors saying about profitability or liquidity of a firm such as ROAs or quick ratio.

Finally, due to the limitation in gathering data, the research has a limitation in collecting data only during 6 years. The paper would like to expand the research for a longer and bigger panel data in near future. Notably, this study is a first step for our research project to examine capital structure not only for real estate firms but also for other industrial firms for both Ho Chi Minh City Stock Exchange and Ha Noi Stock Exchange in Vietnam in Vietnam.

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APPENDIX

Appendix Table 1: List of real estate listed companies on HSX

Order	Firms code	Companies' name	Address
1	ASM	Sao Mai Group Corporation	326 Hung Vuong Street, My Long Ward, Long Xuyen District, An Giang Province
2	BCI	Binh Chanh Construction Investment Joint Stock Company	550 Kinh Duong Vuong Street, An Lac Ward, Binh Tan District, Ho Chi Minh City
3	CCL	Cuu Long Petroleum Urban Development and Investment Joint Stock Company	No. 2, KTM 06 Block, Street 6, Urban Area 5A, Ward 4, Soc Trang City, Soc Trang
4	CIG	COMA18 Group Corporation	Km 10 - Nguyen Trai Street - Thuong Dinh Ward, Thanh Xuan District - Hanoi
5	CLG	Cotect Investment and urban industrial development Joint Stock Corporation	Floor 6, H2 Building, 196 Hoang Dieu Street, Ward 8, District 4, HCMC
6	D2D	Urban Industrial Development Joint Stock Company No. 2	H22, Vo Thi Sau Street, Thong Nhat Ward, Bien Hoa City, Dong Nai Province
7	DRH	Dream House Investment Corporation	Floor 9, Central Park, 117-119-121 Nguyen Du, Ben Thanh Ward, District 1, HCMC
8	DTA	De Tam Joint Stock Corporation	2/6-2/8 Nui Thanh, Ward 13, Tan Binh District, Ho Chi Minh City
9	DXG	Dat Xanh Real Estate Services and Construction Joint Stock Company	27 Dinh Bo Linh, Ward 24, Binh Thanh District, Ho Chi Minh City
10	FDC	Foreign Trade and Investment Development Corporation of Ho Chi Minh City	28 Phung Khac Khoan Street, DaKao Ward, District 1, HCMC
11	FLC	FLC Group Corporation	Floor 5, FLC Landmark Tower, Le Duc Tho Street, Ha Noi Capital
12	HAR	An Duong Thao Dien Real Estate Investment Trading Joint Stock Company	No. 81-83-85 Fideco Tower, Ham Nghi Street, Nguyen Thai Binh Ward, District 1, Ho Chi Minh City
13	NBB	Nam Bay Bay Investment Joint Stock Company	Carina Plaza Building, 1640 Vo Van Kiet, Ward 16, District 8, Ho Chi Minh City
14	NLG	Nam Long Investment Joint Stock Company	No. 6, Nguyen Khac Vien Street, Tan Phu Ward, District 7, HCM
15	NTL	Tu Liem Urban Development Joint Stock Company	Floor 2A, No9B1, Dich Vong new urban area, Cau Giay District, Hanoi
16	NVT	Ninh Van Bay Travel Real Estate Joint Stock Company	3rd Floor, Royal Building, 180 Trieu Viet Vuong St., Bui Thi Xuan Ward, Hai Ba Trung District, Hanoi
17	PDR	Phat Dat Real Estate Development Joint Stock Company	422 Dao Tri Street, Phu Thuan Ward, District 7, Ho Chi Minh City
18	PTL	PVC Petroleum Urban Infrastructure and Investment Joint Stock Company	12 Tan Trao Street, Tan Phu Ward, District 7, Ho Chi Minh City
19	QCG	Quoc Cuong Gia Lai Joint Stock Company	26 Tran Quoc Thao Street, Ward 6, District 3, HCMC
20	SCR	Saigon Thuong Tin Real Estate Joint Stock Company	278 Nam Ky Khoi Nghia Street - Ward 8 - District 3 HCM
21	SJS	Song Da Urban & Industrial Zone Investment and Development JSC	SUDICO Building, Me Tri Street, My Dinh 1 Ward, Nam Tu Liem District, Hanoi.
22	SZL	Sonadezi Long Thanh Joint Stock Company	Long Thanh Industrial Zone, Tam An commune, Long Thanh district, Dong Nai province
23	TDC	Binh Duong Trading and Development Joint Stock Company	No. 26-27, Lot I, Dong Khoi Street, Hoa Phu Ward, Dau Mot Town, Binh Duong Province
24	TDH	Thu Duc Housing Development Corporation	3-5 Pasteur, Nguyen Thai Binh Ward, District 1, HCMC. HCM.
25	TIX	Tan Binh Investment, Production and Import-Export Trading Joint Stock Company	89 Ly Thuong Kiet Street, Ward 9, Tan Binh District, HCMC
26	VIC	Vingroup Corporation - Joint Stock Company	No. 7, Bang Lang Street, Vinhomes Riverside Urban Area, Viet Hung Ward, Long Bien District, Hanoi
27	VPH	Van Phat Hung Corporation	89 Hoang Quoc Viet Street, Phu Thuan Ward, District 7, Ho Chi Minh City
28	HDC	Ba Ria-Vung Tau House Development Joint Stock Company	3rd Floor HODECO Plaza Building, 36 Nguyen Thai Hoc, Ward 7, Vung Tau City
29	HQC	Hoang Quan Consulting - Trading - Real Estate Services	286-288 Huynh Van Bach, Ward 11, Phu Nhuan Dist. Ho Chi Minh

(Contd...)

Appendix Table 1: (*Contined*)

Order	Firms code	Companies' name	Address
30	ITC	Investment - Trading House Joint Stock Company	18 Nguyen Binh Khiem St., Dakao Ward, Dist. Ho Chi Minh
31	KAC	Khang an Real Estate Investment Joint Stock Company	Ground floor (G-BLK-3) The Manor building, 91 Nguyen Huu Canh, Ward 22, Binh Thanh Dist. HCM
32	KBC	Kinh Bac City Development Share-Holding Corporation	Lot 7B, Que Vo Industrial Park, Bac Ninh province
33	KHA	Khanh Hoi Investment and Service Joint Stock Company	6th Floor - Khahomex Building, 360A Ben Van Don, Ward 1, District 4, Ho Chi Minh
34	LHG	Long Hau Corporation	Hamlet 3, Long Hau Commune, Can Giuoc District, Long An

HSX: Ho Chi Minh City Stock Exchange