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Tax Shields and Capital Structure of Real Estate Firms in Emerging Markets: Evidence from Vietnam

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This study examines the impacts of tax shields on the capital structure of real estate companies in an emerging country – the case of Vietnam. The research data includes 58 real estate enterprises listed on the Ho Chi Minh Stock Exchange (HOSE) from 2019 to 2023. The impact is estimated by using the feasible generalized least squares model. The results show that a non-debt tax shield is negatively correlated with capital structure, while the debt tax shield has no significant impact. In other words, the non-debt tax shield dominates the debt tax shield in shaping capital structure decisions for real estate companies. Additionally, we find the intensifying impact of the COVID-19 pandemic on the relationship between non-debt tax shield and capital structure.

Keywords

Tax shield, Capital structure, Real estate firms, COVID-19, Vietnam

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1. Introduction

Real estate is one of the industries that plays a vital role in the economy and closely related to financial markets, such as capital markets, financial institutions, and the money market. However, in recent times, the real estate industry has been going through a complex cycle that is entirely different from previous difficult ones due to two adverse events. First, the complexities of the COVID-19 pandemic have caused the general economy to decline, with real estate being one of the industries that suffered heavy losses. Second, despite the real estate boom right after the pandemic due to fears that arose based on the Russia-Ukraine conflict, the liquidity of the industry is heavily impacted by excess supply in the economy and legal issues (which cause project delays and reduced market confidence). Third, the sector in Vietnam faces challenges in accessing cash flow as the interest rate has remained high (over 10%) despite a general downward trend in interest rates. This makes it difficult for businesses to obtain credit. Investments have been declining as market confidence erodes and supply has become scarce. Therefore, real estate businesses that aim to survive and persevere through this period of time must promote their financial strength. To do that, companies need to build a reasonable capital structure and know how to utilize and optimize this structure, which will provide them with the financial resources to enter a period of prosperity.

As an economy that is currently facing many difficulties and challenges, Vietnam has been using a tightened monetary policy to reduce inflation (World Bank, 2023). The government controls the state budget by increasing taxes or reducing spending. Tax policies are an essential tool to help the state regulate the economy. In addition, real estate investment and business are vital economic sectors, which significantly contribute to the gross domestic product (GDP) growth and account for a relatively large proportion of the state budget revenue. Therefore, the corporate tax cost of the real estate industry is quite significant. The Vietnamese government allows taxable income deductions for businesses through eligible deductions such as interest expenses, depreciation, and staterelated charitable contributions called tax shields. This benefit also helps businesses to reduce their tax burden, especially during the difficult recent years for the real estate industry. At the same time, tax shields can affect state tax revenue if many businesses take advantage of this benefit and misuse tax shields.

Therefore, many factors influence managers when planning the capital structure of a business to maximize corporate value, including tax shields. Previous studies in the literature on this topic mainly focus on the macro level and pay little attention to specific industries, particularly the real estate sectors. Previous empirical results show that debt tax shields positively impact capital structure, whereas non-debt tax shields have the opposite impact (Mackie-Mason, 1990; Doina and Michael, 2010; Heider and Ljungqvist, 2015; Yue and Xiao, 2017; Lei, 2020). In addition, there is limited empirical evidence related to this topic in the Vietnamese context, with few studies confirming the positive impacts of debt tax shields and negative impact of non-debt tax shields on capital structure (Phan, 2017; Luong, 2021), but some reporting positive influences of non-debt tax shields on capital structure (Le et al., 2023). However, as previous studies are done under different national contexts and use samples from various sectors with distinct characteristics, their results might vary.

This paper examines the impact of tax shields on the capital structure of real estate firms in Vietnam. Based on the results, this paper gives recommendations for businesses on combining the use of tax shields and capital structure to increase business efficiency and suggestions for the Vietnamese government on reasonable deduction regulations to avoid loss of state budget revenue, thus helping its tax policy to operate better, thereby regulating economic development.

We use a sample of 58 real estate firms (classified as L3) listed on the Ho Chi Minh Stock Exchange (HOSE) in Vietnam and the feasible generalized least squares (FGLS) method to estimate the relationship between their tax shields and capital structure. The results show that non-debt tax shields negatively impact capital structure, while debt tax shields show no significant impact. In other words, real estate firms that use higher non-debt tax shields will use less debt, and non-debt tax shields have a crowding-out effect on debt tax shields.

The rest of the paper is organized as follows: Section 2 summarizes the theoretical framework and empirical evidence on tax shields and capital structure. Section 3 provides an introduction on the Vietnamese real estate sector. Section 4 describes the data and methods, while Section 5 reports and discusses the results. Finally, Section 6 provides the conclusions and recommendations.

2. Literature Review

2.1 Theoretical Framework

According to Brealey et al. (2014), a tax shield is a reduction in the taxable income of an individual or business achieved by claiming specific eligible deductions such as mortgage interest, medical expenses, charitable contributions, and depreciation. Deductions reduce the taxable income of taxpayers for the fiscal year or offset income taxes the following year. Tax shields vary in different countries, and their benefits will depend on the overall tax rate and cash flow of a taxpayer for the tax year. The introduction of a tax shield reduces the total amount of tax payable by an individual or a business.

A tax shield is a tool or method that can reduce the impact of corporate tax burden, including debt and non-debt tax shields. The former refer to cases when enterprises borrow from bond issuance, and loans from financial institutions and individuals, including financial leasing activities. The loan interest payable to the capital providers can be excluded from taxable income when calculating corporate income tax. The latter are a way to reduce the tax burden of noninterest expenses, such as investment credit, fixed asset depreciation, intangible asset amortization, and research and development (R&D) investment. Non-debt tax shields create financial benefits for businesses by reducing tax payable.

The Modigliani – Miller (M&M) theorem is the first theory that is used to conduct research related to the capital structure of enterprises and the foundation for the development of theories that followed (Modigliani and Miller, 1958). The theorem assumes that the market is perfect, regardless of transaction costs and taxes. It affirms that the market value of a business is independent of its capital structure. If the price of debt is constant and lower than equity costs, financial leverage does not change the capital cost of an enterprise. American economists Modigliani and Miller (1963) then present a follow-up study that eliminates the assumption of corporate income tax. According to Modigliani and Miller (1963), the use of debt will increase the value of the business with corporate income tax. As interest expenses are a reasonable expense that can be deducted when calculating corporate income tax - the benefit from the tax shield, part of the income of a business that uses debt is transferred to the investors, according to

$$V_g = V_u + T.D \tag{1}$$

where D is the total amount of debt used, T is the corporate income tax rate, and T.D is the benefit of using debt. The value of a business that uses debt equals the value of a business that is not using debt plus the benefit from using debt. Thus, according to the M&M theorem, capital structure is related to the value of the enterprise. Higher use of debt increases the business value, to a maximum when the business is funded with 100% debt.

Contrary to the M&M theorem, the trade-off theory of capital structure offers two benefits when using debt: businesses will create a tax shield from interest costs, and debt can help reduce the representative cost of equity that arises from conflicts of interest between shareholders and the board of directors of the enterprise so that the capital structure can be optimized (Kraus and Litzenberger, 1973). More specifically, an optimal matching point exists for firms as they strive toward increased debt use. Using debt will increase the weighted average cost of capital (WACC). According to Wald (1999), the present value of tax savings due to increased debt is canceled out by an increase in the present value of bankruptcy costs. More specifically, there are advantages and disadvantages to using debt. In the early stages, there are benefits from paying lower taxes through tax shields. That means businesses will pay less taxes than they would by taking on more debt. However, when there is too much debt, they will face the risk of future repayment. When businesses are unable to pay, they will go bankrupt. In addition, the theory also shows that bankruptcy costs can directly or indirectly affect a business. Bradley et al. (1984) state that three types of bankruptcy costs exist. First, there are direct administrative costs for third parties if a business is dissolved. Second, there is a shortfall in the event of a loss of liquidity or related expenses necessary to restore the company. Finally, there is also the loss of tax credits.

2.2 Empirical Evidence

Modigliani and Miller (1963) then propose the tax shield of corporate debt in the revision of their theory. After this revision, a number of scholars then conducted empirical studies on the debt tax shield. Mackie-Mason (1990) analyzes listed businesses and finds that tax shields impact capital structure, and non-debt tax shields can overwhelm debt tax shields. The study also indicates a positive correlation between corporate tax rate and asset-to-debt ratio, that is, the debt tax shield effect, and a higher tax rate results in the more benefits from using debt. Doina and Michael (2010) analyze the impact of fundamental tax reforms, particularly the capital gains tax reform in Germany. They report a decrease in corporate debt ratios when reforms cause tax rates to decline. Fischer et al. (1989) and Derashid and Zhang (2003) find little or no impact of debt tax shields on the capital structure choices of enterprises. On the contrary, Heider and Ljungqvist (2015) observe that a 1% increase in the US federal corporate tax rate results in a 0.38% rise in the financing ratio for listed US firms from 1989 to 2011.

Research on the relationship between non-debt tax shields and the choice of corporate capital structure began with DeAngelo and Masulis (1980) who extend the model in Miller (1977). They include a non-debt tax shield in the initial model. An optimal capital structure model is built, and the non-debt tax shield negatively affects the asset/liability ratio. Related to research on the "substitution effect" between debt tax shields and non-debt tax shields, DeAngelo and Masulis (1980) propose the "substitution effect" hypothesis in which non-debt tax shields affect the effectiveness of corporate debt tax shields when credits are tightened in building the corporate capital structure. Hope et al. (2013) also propose a similar view.

Cao and Zou (2010) conduct a multiple regression analysis and find a negative correlation between non-debt tax shields and corporate debt-asset ratio. Wang and Wang (2015) consider R&D investment as a particular form of non-debt tax shield and argue that a non-debt tax shield formed through R&D investment of an enterprise has a significantly negative relationship with the asset/liability ratio. Other scholars have conducted industry analyses of non-debt tax shields. For example, Wu (2011) finds differences in the impact of non-debt tax shields across different industries in China, including utilities, construction, wholesale and retail, real estate, and other industries. The non-debt tax shield has a significantly negative correlation with the asset-to-debt ratio. Yue and Xiao (2017) verify that some industries carry out "business-to-business reform", such

as in transportation, modern services, postal services, etc. Under the tax shield effect, lower taxes and income tax burden mean lower debt levels. Lei (2020) examines 224 listed Chinese companies from 2002 to 2017 and report that debt tax shields are positively correlated while non-debt tax shields are negatively correlated with corporate capital structure, but varying across industries.

Regarding Vietnam, there is little empirical research on the impact of tax shields on the capital structure of Vietnamese enterprises. From the perspective of debt tax shields, which is often studied through the corporate income tax variable, Phan (2017) examines 444 Vietnamese non-financial joint stock companies from 2008 to 2015 and concludes that the ratio of corporate income tax payable always positively impacts financial leverage, which shows that businesses will increase debt when corporate income tax payable increases to enjoy more benefits from the tax shield. In addition, there is research on debt and income tax shields that impact financing decisions and company value. Tran et al. (2022), based on the model of Fama-French (Fama and French, 1998), sample 295 companies listed on the HOSE from 2006 to 2019 and report that high corporate income taxes related to borrowed capital would reduce the value of a company.

From the perspective of non-debt tax shields, Luong (2021) studies the factors that affect the capital structure of transportation companies on the Vietnamese stock market from 2015 to 2019 and finds that non-debt tax shields positively impact capital structure. Le et al. (2023) examine Vietnamese non-financial firms from 2012 to 2022 and report that increased depreciation rates allow businesses to use more internal capital while limiting bond issuance, which indicates an inverse relationship between the depreciation rate and debt ratio of companies in Vietnam.

In summary, previous empirical research has mostly focused on country-level analysis and often ignore the distinct characteristics of individual industries. In this article, we conduct a separate study of the real estate industry in Vietnam listed on the HOSE to more clearly analyze the impact of tax shields on corporate capital structure.

3. Real Estate Sector in Vietnam

The real estate market in Vietnam emerged in 1986, when the Vietnamese government mandated the Doi Moi (open door) policy, which shifted the economy toward a market orientation (Path, 2020). Since 1986, the Vietnamese real estate market has undergone various phases of development, including the expansion (2003-2006; 2009-2010; and 2014-2020), hypersupply (1993-1994; 2001-2002; 2007-2008; and 2021-2022), and recession and recovery (1995-1999; 2003-2006; 2010-2013; and 2023-present) stages. The real estate sector plays a significant role in the Vietnamese economy, accounts for 3-5% of the

national GDP (General Statistics Office, 2023), and ranks second among sectors that attract foreign direct investments (FDIs) with a total investment of USD 4.45 billion, which accounts for 16.1% of the total registered FDIs in 2022 (MOC, 2023).

Along with the emergence and development of the real estate market in Vietnam, real estate companies have been established with growing scale in capital and labor. Table 1 reports a significant increase in Vietnamese real-estate firms, which tripled from 5,400 firms in 2010 to 19,354 in 2022 (General Statistics Office, 2023). Furthermore, while no real-estate company had more than 1,000 employees from 2010 to 2015, the period of 2016 to 2022 witnessed the appearance of 7 to 13 of such companies. Regarding the scale of capital, the number of companies with more than USD 21.2 million in capital in 2022 is 1,851, or seven times higher than that in 2010. This significant growth is further enhanced by the development of the Vietnamese stock market, which creates a major capital mobilization channel for businesses in general and real estate businesses in particular. At the end of 2023, there were nearly 80 listed real estate companies on the HOSE and Hanoi Stock Exchange (HNX) in Vietnam.

Year	Number	Scale	of capital (millions)	USD	Numb	er of emp	loyees
		< 8.5	8.5 - 21.2	> 21.2	<1.000	1.000- 5.000	>5.000
2010	5,400	4,637	471	292	5,398	-	-
2011	6,855	6,010	418	427	6,853	-	-
2012	6,980	5,986	597	397	6,979	-	-
2013	7,271	5,872	828	571	7,269	-	-
2014	7,833	6,338	873	622	7,830	-	-
2015	8,979	6,996	1,394	589	8,975	-	-
2016	11,591	9,753	746	1,091	11,583	8	-
2017	13,044	11,025	960	1,059	13,037	7	-
2018	15,540	13,039	1,026	1,475	15,527	12	1
2019	18,839	15,721	1,192	1,926	18,826	13	-
2020	19,826	16,620	1,210	1,996	19,818	7	1
2021	20,430	17,201	1,318	1,911	20,421	9	-
2022	19,354	16,228	1,283	1,851	19,342	11	1

Table 1Real Estate Companies in Vietnam (2010-2022)

Source: General Statistics Office (2023)

Despite the above achievements, the Vietnamese real estate sector faces numerous drawbacks and difficulties. First, the legal framework with regard to real estate business activities has not been supplemented or amended in a timely manner, which has caused consequences such as specific projects failing to adhere to plans and schedules and misaligning with market demand, or prolonged investment processing time due to overlapping policies and procedures (Giang, 2023). Second, information on the real estate market is often inconsistent, incomplete, and unreliable, and needs more transparency. Particularly, the Vietnam real estate bond market recently revealed numerous risks, which have led to the current economic downturn. In 2021, real estate companies played a leading role in bond issuance, and accounted for approximately 40% of the corporate bond issuance value. Although this ratio was reduced to 17% in 2022 and 23.5% in 2023 (VBMA, 2023), many of these bonds lack collateral or carry high interest rates, which pose a high risk of default. Third, the performance of Vietnamese real estate firms is significantly influenced by macroeconomic conditions, most recently by the COVID-19 pandemic during 2020 to 2021, which slowed down market transactions and stagnated real estate prices. Fourth, to deal with the difficulties of the COVID-19 pandemic and stimulate sector growth, the Vietnamese government promptly introduced a VND 120 trillion (USD 5 billion) credit program in 2023 to allow investors and homebuyers of social housing and worker housing projects to borrow at interest rates of 1.5-2% lower than the average long-term lending rate of state-owned commercial banks (including Agribank, Bank for Investment and Development of Vietnam (BIDV), Vietcombank, and Vietinbank) and qualified non-state commercial banks. This action implies another aspect of the Vietnamese real estate sector, which is the significant intervention by the government.

4. Methods and Data

4.1 Data

The data used in this study include 58 real estate businesses listed on the HOSE from 2019 to 2023 (290 observations). Data are collected from their audited annual consolidated financial statements.

We examine the impact of tax shields on the capital structure of service real estate firms in Vietnam by using traditional panel data regressions, including ordinary least square (OLS), fixed effects model (FEM), random effects model (REM), and the FGLS. Different tests are performed to ensure the reliability of estimation results.

4.2 The Model

Based on the models from previous empirical studies such as Lei (2020) and Phan et al. (2011), we use short-term debt ratio (SDR) as the dependent variable to present the capital structure and debt tax shield (IER) of an enterprise and non-debt tax shield (NDTS) as the primary independent variables. Besides, we use control variables such as scale (SIZE), growth rate (GROW), tangible fixed assets (TANG), profitability or return on average total assets (ROAA), business risk (RISK), corporate income tax (marginal tax rate or MTR), and corporate cash flow (CF).

$$SDR_{it} = c_1 \times NDTS_{it} + c_2 \times IER_{it} + c_3 \times SIZE_{it} + c_4 \times GROW_{it} + c_5 \times TANG_{it} + c_6 \times ROAA_{it} + c_7 \times RISK_{it} (2) + c_8 \times CF_{it} + \varepsilon$$

Dependent Variable: Capital Structure of Enterprise

Capital structure is the way a business allocates capital to production activities through a combination of two types of capital flows: debt capital and equity capital. The use of debt ratio by enterprises is implied through the financial leverage ratio. Therefore, financial leverage is the dependent variable that shows the capital structure of an enterprise. According to Titman and Wessels (1988) and Nguyen et al. (2022), the measurement uses three criteria: total, short-term, and long-term debt. However, real estate businesses in Vietnam mostly use short-term debt during company operations; we choose to use the short-term debt ratio to reflect the debt ratio in this study. This measurement is also used in Chen (2004), Huang and Song (2005), and Lin and Flannery (2012) to represent corporate capital structure.

Main Independent Variables: Debt and Non-debt Tax Shields

There has yet to be consensus in the literature on ways to measure debt and nondebt tax shields. Lei (2020) measures debt tax shields by using the effective tax rate of an enterprise, that is, TANG payable. In previous research papers, the tax variables that are used to represent tax rates are often actual, nominal, and marginal tax rates. It is true that the effective tax rate only indicates the actual tax burden of a business, but cannot reveal the debt tax shield because the debt tax shield is an amount deducted from interest expenses. Thus, in this research paper, we use interest expenses to represent the debt tax shield as in Tran et al. (2022). Non-debt tax shields are amounts deducted from company expenses other than interest, such as depreciation, amortization, etc. Many studies, such as Deesomsak et al. (2004), Huang and Song (2005), Le (2016), and M'ng et al. (2017), point out that non-debt tax shields are measured from depreciation expenses in addition to interest expenses.

Control Variables

Firm Size. According to the pecking order theory, the relationship between size (SIZE) and capital structure is negative. As large-scale companies have been in operation for a long period of time, they tend to use more equity capital to ensure control from the shareholders of a company. On the contrary, some theories, such as the trade-off and agency theories, show a positive correlation between size and debt ratio. In empirical research, for example, Titman and Wessels (1988), Chakraborty (2010), and Temimi et al. (2016), most of the results show that firm size has a positive impact on capital structure (financial leverage).

Firm growth. GROW often reflects the future growth potential of a business. Therefore, fluctuations in GROW also partly reflect the future capital structure of enterprises that would correspond with business operations. Changes in total assets or net sales are often used to measure GROWs. However, we use a measure based on net revenue to better understand the tax shield effect. It is predicted that with high GROWs, businesses will maintain low debt levels when there is an impact from the tax shield. This measure is also used in Huang and Song (2005), Phan (2017), and Tarazi (2013).

Fixed assets. TANG are often considered collateral in the borrowing activities of businesses. Most research results show that TANG are positively correlated with capital structure. According to the pecking order theory, companies with a significant amount of TANG will maintain lower debt levels because they often bear information asymmetry and lower stock issuance costs. In addition, some studies show the opposite result, such as Phan (2017), who points out that industrial enterprises will often invest in TANG with retained profits or increase equity capital rather than prioritizing debt capital. Therefore, depending on the specific industry and type of business, the impact between TANG and capital structure will be different.

Profitability. The profitability level (ROAA) is the rate of return on the average total assets in an enterprise, which indicates the relationship between the profit that the enterprise earns and amount of capital that the enterprise is investing in assets. Previous studies show that profitability hurts financial leverage. According to Phan (2017), using the generalized method of moments (GMM) method yields similar profitability and capital structure results. We adopt this measure as in Booth et al. (2001), Le (2013), and Tarazi (2013).

Risk. RISK, according to Booth et al. (2001), Huang and Song (2005), and Rao and Barakat (2012), is negatively correlated with capital structure. As businesses with higher and more unstable income fluctuations often face financial distress costs and significant risks in the loan repayment process, they will tend to borrow less.

Cash flow. Corporate CF is considered the internal strength of a business, from which companies can choose the appropriate capital structure to distribute CF appropriately and evaluate their investment decisions. The relationship between business CF and debt capital utilization ratio will depend on the financial situation and general characteristics of the industry. Businesses will borrow less when they have solid internal CF and capital to use in investment decisions (Ferri and Ricci, 2021). On the other hand, when CF is on the rise, businesses still use financial leverage to increase profit. Business CF is measured by total net income after taxes and depreciation, which are taken from the balance sheet and income statement.

No.	Description	Abbrev- iation	Measurement	Unit
De	pendent variable			
1	Short-term debt to	CDD	Total short – term debt	0/
1	total asset ratio	SDK	Total asset	/0
Inc	lependent variable			
2	Non-debt tax	NDTS	Depreciation	0/2
2	shield	NDIS	Total asset	/0
3	Debt tax shield	IFR	Interest expense	0/0
5	Debt tax sinera	ILK	Net Revenue	70
Co	ntrol			
4	Company size	SIZE	Log(Total asset)	mil.
	e empany size			VND
5	Growth rate	GROW	$Net Revenue_t - Net Revenue_{t-1}$	%
5	Growth fute	0100 11	Net $Revenue_{t-1}$	70
6	Fixed assets	TANG	Fixed asset	%
Ŭ	1 IACC USSELS	11110	Total asset	70
7	Profitability	ROAA	Profit after tax	0/0
'	Tiontaointy	ROAA	Total average asset	70
0	Ducinoca riale	DICV	EBIT changes	0/
δ	Business risk	KISK	Net Revenue changes	70
			$Profit after tax_{t} + Depreciation_{t}$	
9	Cash flow	CF	Fired agent	%
			Fixed $ussel_{t-1}$	

Table 2Description of Variables in Proposed Model

4.3 Research Hypothesis

According to the equilibrium theory (Arrow and Debreu, 1954), business interest expenses can be deducted from TANG. A higher debt burden that a business faces means greater efficiency of tax deduction from interest expenses, so companies tend to use more debt capital. According to the literature review, most studies believe that debt tax shields are positively correlated with corporate financial leverage. Therefore, we propose the following:

Hypothesis 1 (H1): Debt tax shields have a positive correlation with the capital structure of real estate enterprises.

According to Deangelo and Masulis (1980), non-debt tax shields will reduce the beneficial effects of tax deductions from business interest expenses; that is, non-debt tax shields have the effect of replacing debt tax shields. Businesses that use non-debt tax shields more often tend to borrow less because non-debt tax shields reduce the tax burden from deductible amounts in addition to interest expenses, and businesses want to reduce TANG. They also do not need to incur excessive amounts of debt, which could lead to the risk of default. As such, we believe that non-debt tax shields are negatively correlated with capital structure and propose the following:

H2: Non-debt tax shields have a negative correlation with the capital structure of real estate enterprises.

Table 3 summarizes our two main hypotheses (H1 and H2) along with additional hypotheses derived from an empirical summary for the control variables in Section 4.2.

Hypothesis	Description	Expectation
1	Debt tax shields have a positive correlation with	+
2	Non-debt tax shields have a negative correlation with the capital structure of real estate enterprises	-
3	Company size has a significant correlation with capital structure	+/_
4	Company growth rate is negatively correlated with capital structure	_
5	Tangible assets have a significant correlation with capital structure	+/_
6	Profitability is negatively correlated with capital structure	-
7	Business risk is negatively correlated with capital structure	_
8	Cash flow has a significant correlation with capital structure	+/_

Table 3Hypothesis Summary

Source: Authors' compilation

5. Results and Discussion

5.1 Descriptive Statistics

Table 4 shows that the ratio of short debt to total assets of the 58 real estate companies listed on the HOSE has an average value of 35.85%. Among them, the largest value is about 83.56%, and the lowest recorded level is about 0.38%, which shows a vast difference in the use of short-term loans between businesses. Some businesses use more capital from short-term loans, but there is a small number of companies whose ratio accounts for less than 1%. The NDTS is on average 0.667%, and the minimum and maximum values are - 3.06% and 7.17%, respectively. The tax shield variable is measured from interest expenses, the amount of money that can be tax deducted when paying TANG, and the statistical results show that the average value of the IER is about 11.8%. The difference between the smallest and largest values is also

substantial, which shows that businesses have different levels of debt utilization during the research period.

Figure 1 gives an overview of the changes in the scale of the HOSE-listed real estate companies from 2010 to 2023. During that time, the number of listed real estate firms increased from 41 to 58 companies, with total assets increasing more than 11 times, which reached VND 31.6 trillion (approximately USD 1.32 billion) in 2023, thus accounting for about 0.5% of the total real estate sector in Vietnam. During the sample period (2019 to 2023), the number of HOSE-listed firms remained stable at 58, with total assets significantly increasing by 77%.

Variable	Obs	Mean	Std.Dev	Min	Max
SDR	290	35.849	17.695	0.38	83.56
NDTS	290	0.667	1.022	-3.06	7.17
IER	290	11.729	61.811	-118.49	1018.57
SIZE	290	6.628	.738	3.91	8.83
GROW	290	18.933	123.275	-265.73	1083.77
TANG	290	5.364	9.242	0	62.86
ROAA	290	3.728	5.699	-27.86	29.91
RISK	290	40.858	864.381	-2431.4	10288.84
CF	290	7.085	308.047	-4257.08	2229.24

Table 4Descriptive Statistics



Figure 1 Real Estate Companies listed on HOSE (2010-2023)

Sources: General Statistics Office (2023), Authors' own calculation

Table 5 shows that the variables that are positively correlated with SDR, the dependent variable, include ETR and GROW; when the value of IER and GROW increases, SDR also increases. On the contrary, the remaining six variables, including NDTS, SIZE, TANG, ROAA, RISK, and CF, are negatively correlated with SDR.

	SDR	NDTS	IER	SIZE	GROW	TANG	ROAA	RISK	CF
SDR	1								
NDTS	-0.281	1							
IER	0.114	-0.053	1						
SIZE	-0.006	0.098	0.014	1					
GROW	0.057	-0.045	-0.008	0.011	1				
TANG	-0.038	0.4176	-0.046	0.041	0.023	1			
ROAA	-0.232	0.071	-0.104	0.055	0.042	0.037	1		
RISK	-0.033	0.019	0.037	-0.085	0.024	-0.006	-0.089	1	
CF	-0.029	-0.009	-0.007	0.068	0.109	0.009	0.324	-0.046	1

Table 5Correlation Matrix

Furthermore, we perform the variance inflation factor (VIF) test, which confirms that there is no multicollinearity; see Table 6.

Variable	VIF	1/VIF
NDTS	1.23	0.809
IER	1.02	0.978
SIZE	1.02	0.977
GROW	1.02	0.976
TANG	1.21	0.823
ROAA	1.14	0.874
RISK	1.02	0.881
CF	1.02	0.982
Mean	1.1	

Table 6VIF Test Results

5.2 Results and Discussion

We perform the panel regressions (OLS, FEM, and REM) for the model, and the results are presented in Table 7. The estimation results of the OLS model show that NDTS and ROAA negatively impact SDR with a significance level of 1%, while the remaining variables are not statistically significant.

Next, we perform tests to choose the most appropriate estimation methods. The test results in Table 8 indicate that the REM produces the most reliable estimation results.

		Dependent variable: SDR			
Variable description	Variabla	OLS	FEM	REM	
v ariable description	variable	(1)	(2)	(3)	
Non-debt tax shield	NDTS	-5.191***	-0.786	-2.118*	
		(-4.90)	(-0.61)	(-1.85)	
Debt tax shield	IER	0.0243	-0.00365	-0.000756	
		(1.52)	(-0.42)	(-0.09)	
Company size	SIZE	0.574	5.718	1.733	
		(0.43)	(1.50)	(0.77)	
Growth rate	GROW	0.00779	0.00375	0.00364	
		(0.97)	(0.95)	(0.91)	
Fixed assets	TANG	0.185	-0.18	-0.0937	
		(1.59)	(-1.62)	(-0.90)	
Profitability	ROAA	-0.695***	0.125	-0.0134	
		(-3.80)	(0.99)	(-0.11)	
Business risk	RISK	-0.000979	-0.0000895	-0.000243	
		(-0.86)	(-0.15)	(-0.41)	
Cash flow	CF	0.00188	0.00168	0.00254	
		(0.56)	(0.83)	(1.28)	
Observation		290	290	290	
R-sq		0.1675	0.0091	0.0882	

Table 7Model Estimation using OLS, FEM, and REM

Notes: The variables are defined in Table 1. The t-statistics are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively

Table 8	Selection	of Suitable	Panel	Regression	Methods

Test	Baseline model
FEM: F-test	
Value	19.87
p-value	0.0000
REM: Bruesch and Pagan Lagrangian multiplier test	
Value	0.00
p-value	1.0000
Hausman test	
Value	5.76
p-value	0.6743
Conclusion	REM

To ensure the reliability of the estimation results, we further verify the deficiencies of the selected model with heteroscedasticity and autocorrelation tests. The two tests indicate that heteroscedasticity and autocorrelation issues are found for the REMs; see Table 9.

To fix the defects in the REM, we use the FGLS method, also known as the generalized least squares model, to overcome errors in the model and the results of running the model with the command "xtFGLS" with "panels(h)" is to

overcome heteroscedasticity and "corr(ar1)" overcomes serial autocorrelation. The baseline results are presented in Table 10.

Table 9 Postestimation Test for REM Estimations

Test	Baseline model
Heteroscedasticity	
Value	305.75
p-value	0.0000
Autocorrelation	
Value	58.946
p-value	0.0000

Tuble IV Dusenne Results

Variable description	Variable	Dependent variable: SDR GLS (4)
Non-debt tax shield	NDTS	-4.175***
		(-5.40)
Debt tax shield	IER	0.0053
		(0.52)
Company size	SIZE	2.775**
_		(2.09)
Growth rate	GROW	-0.0016
		(-0.50)
Fixed assets	TANG	0.0415
		(0.62)
Profitability	ROAA	-0.277***
		(-3.13)
Business risk	RISK	-0.000194
		(-0.62)
Cash flow	CF	0.00272**
		(2.08)
Observation		290

Notes: The variables are defined in Table 1. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively

The results in Table 10 show that non-debt tax shields have a negative impact on the ratio of short-term debt use of real estate businesses at the 1% significance level. This supports the capital structure trade-off theory of DeAngelo and Masulis (1980) developed from the model in Miller (1977). In building the corporate capital structure, there is a "substitution effect" between non-debt and debt tax shields because businesses that use the former tend to use less debt, thus reducing their ability to use the latter. The enterprises in the sample reduce their proportion of debt financing, and the depreciation ratio on total assets tends to increase, which mean that most of the enterprises use depreciation to reduce their tax burden during the period of study. The variable IER - debt tax shield is not statistically significant for the ratio of short-term debt usage; even though real estate businesses often have a high proportion of debt, short-term debt accounts for the majority of the debt. This does not support the theory in Modigliani and Miller (1963) and Myers (1977) but is similar to the research results of Fischer et al. (1989). Derashid and Zhang (2003) find that the corporate debt tax shield effect could be stronger or more significant. This can also be explained by the time period of the sample. This means that the actual interest expense in the business results report does not accurately reflect the debt situation of the enterprise due to Vietnam Accounting Standards (VAS) No. 16. Specifically, a part of the loan interest has been capitalized into the value of unfinished assets and inventory, thus creating a significant difference between the interest expense reported in the business results and reality. Besides, as the corporate bond market is still limited in scale, it is difficult for businesses to mobilize medium and long-term loans and they cannot exploit the benefits from a debt tax shield, which means that the debt tax shield in this research sample will not have as significant an impact as a nondebt tax shield. In other words, the non-debt tax shield will likely overwhelm the debt tax shield, which supports the "substitution effect" theory of DeAngelo and Masulis (1980).

The size of the enterprise has a positive correlation with the debt utilization ratio of the enterprise. This result is similar to that in Titman and Wessels (1988), Chakraborty (2010), Temimi et al. (2016), and Phan (2017), who point out that firm size has a positive impact on capital structure and significant influence on the decision of enterprises to choose their debt ratio. It can be seen that real estate businesses are often cyclical and have high risks. An enterprise with a larger scale needs to invest more in large projects, possibly more complex projects; thus, businesses need a vast and flexible source of funding to implement projects. Therefore, financial leverage helps large-scale real estate businesses to take advantage of investment opportunities, optimize capital structure (reduce capital costs), and enhance their financial strength.

The ROAA has a negative impact on the use of leverage of a business, which means that a company tends to borrow debt with higher profitability. It can be explained that a higher return on assets means that the asset management of the enterprise is more influential, and the enterprise optimizes available capital, so the enterprise does not need to use much financial leverage, thus reducing its risks. This result is similar to the conclusions in Booth et al. (2001), Tarazi (2013), and Phan (2017).

In addition, the regression results also show that corporate CF is positively related to the debt usage ratio of real estate businesses in the research sample at the 5% significance level. The sample period was in general, difficult for the entire economy, not only the real estate industry. After the COVID-19 pandemic, the value of the internal CF of businesses has decreased significantly, which is typical of real estate businesses that use significant leverage. When the internal strength of an enterprise decreases, the problematic

situation of calling for capital, especially debt capital, forces the enterprise to reduce the leverage ratio because leverage is an amplifier, and using it during this period is even more critical—causing businesses to become more troubled. Combining contextual factors, the regression model results show that when business CF decreases, businesses also tend to use less debt, which is reasonable during this period.

5.3 Further Analysis: Moderating Role of COVID-19 Pandemic

As our sample period is from 2019 to 2023, which encompasses the COVID-19 pandemic, we suspect that the pandemic would likely impact the relationship between tax shields and the capital structure of listed real estate firms in Vietnam. To test the possible impact of the COVID-19 pandemic, we use three additional variables: (1) COVID-19: a dummy variable, which takes the value of 1 for year 2020 and 2021, and 0 otherwise; (2) COVID-19 x NDTS: the interaction term between COVID-19 and non-debt tax shields; and (3) COVID-19 x IER: the interaction term between COVID-19 and debt tax shields. Table 11 reports the results of this analysis.

The results in Table 11 confirm our baseline findings of the significantly negative impact of NDTS on capital structure and non-significant positive impact of IER, which shows the robustness of our primary conclusion. Additionally, the COVID-19 variable shows significantly positive impacts on SDR, thus indicating that listed Vietnamese real estate firms tend to use more short-term debt during the period of the pandemic from 2020 to 2021 This result confirms the findings of Ngo and Nguyen (2023) and Prakash et al. (2022). During the pandemic, real estate firms faced difficulties in maintaining liquidity and operational continuity and had to adjust their capital structure towards short-term debt (Prakash et al., 2022).

Regarding the interaction terms, we find a significantly negative impact of COVID-19 x NDTS on capital structure and a non-significant impact of COVID-19 x IER. In other words, the COVID-19 pandemic intensified the significantly negative impact of NDTS on the capital structure of real estate firms, but did not significantly change the impact of IER. This significant result suggests that during the pandemic, real estate firms with a higher NDTS were less likely to increase debt, which aligns with the argument of Balemi et al. (2021) that the COVID-19 pandemic led to significant shifts in financial strategies within the real estate sectors, including their capital structure decisions. Moreover, the pandemic period resulted in decreased firm profitability, which reduced the tax benefits associated with non-debt tax shields (Gabrielli, 2023).

		Dependent variable: SDR
Variable description	Variable	GLS
variable description	variable	(5)
Non-debt tax shield	NDTS	-4.146***
		(-5.34)
Debt tax shield	IER	0.0068
		(0.67)
COVID-19	COVID-19	2.022**
		(2.30)
Non-debt tax shield x	NDTS x	-1.271*
COVID-19	COVID-19	(-1.85)
Debt tax shield x	IER x	-0.057
COVID-19	COVID-19	(-0.79)
Company size	SIZE	2.871**
		(2.16)
Growth rate	GROW	-0.0016
		(-0.51)
Fixed assets	TANG	0.059
		(0.87)
Profitability	ROAA	-0.246***
		(-2.75)
Business risk	RISK	-0.0003
		(-0.71)
Cash flow	CF	0.0026**
		(1.99)
Observations		290

Table 11Impact of Tax Shield on Capital Structure: Moderating
Role of Covid-19 Pandemic

Notes: The variables are defined in Table 1. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively

6. Conclusion and Recommendations

This study examines the impact of tax shields on the capital structure of listed real estate firms in the Ho Chi Minh Stock exchange from 2019 to 2023. The relationship is estimated by using the FGLS model. The results report a significantly negative impact of non-debt tax shields on capital structure, thus indicating that firms that use higher non-debt tax shields will use less debt, and non-debt tax shields have a crowding-out effect on debt tax shields. Despite expectations, debt tax shields show no significant impact on the capital structure of businesses, thus indicating that the effect of non-debt tax shields is more beneficial than debt tax shields. For companies in the research sample, non-debt tax shields have become a tool to reduce tax burden. Furthermore, the study finds that the negative impact of non-debt tax shields on capital structure is intensified during the COVID-19 pandemic.

Based on the findings in this study, we suggest the following practical implications and recommendations for listed real estate firms and policymakers.

For real estate firms, credit sources are tightened, and real estate businesses primarily rely on capital from debt under the context where financial institutions no longer have many preferential interest rates; if companies want to adjust their capital structure, they can consider using non-debt tax shields and the quick depreciation method of fixed assets to greatly benefit from reducing their tax burden earlier. Although this shield will gradually become smaller in the coming years, it will also help businesses to optimize operating efficiency and use capital effectively. Additionally, as interest expenses as a tax shield do not significantly affect the choice of capital structure, managers should avoid excessive interest expense capitalization in a stagnant real estate market to prevent future financial burden. Finally, to achieve an optimal capital structure, businesses can consider strategies to expand company size, improve profitability, and enhance internal cash flow.

For policymakers, we propose to supplement the corporate income tax policy by classifying businesses according to their average capital, thereby facilitating eligibility for deductions according to each capital group item (corresponding to each industry) along with the maximum deduction level and necessary conditions for implementation. The tax policy goal is not to collect high tax amounts but help businesses accumulate capital for reinvestment so that their taxable income is higher than the taxes collected by the state and also higher. In addition, governments in emerging economies could consider designing tax incentives or programs to encourage real estate firms to adopt a more balanced financing approach, which could help to mitigate the crowding-out effect of non-debt tax shields on debt tax shields and promote greater financial resilience within the sector. Moreover, Vietnam and other emerging countries must solve problems related to the corporate bond market as the capital market is experiencing uneven development, corporate bonds are still pristine, liquidity is bleak, and investors are not interested in the market. This makes it difficult for businesses to mobilize medium and long-term loans, which is one of the reasons why companies in the research sample have yet to take advantage of the benefits of debt tax shields. Hence, we propose that the government be flexible in its fiscal and monetary policies, focusing on stable growth drivers for the corporate bond market.

Although this study offers valuable insight, it is important to acknowledge its limitations. First, the research scope is confined to real estate companies listed on the Ho Chi Minh Stock Exchange (HOSE), thus potentially overlooking nuances within different industry subsegments. Second, the analysis does not account for the managerial characteristics of the sample companies, which could significantly influence their capital structure decisions. These limitations suggest avenues for future research to provide a more comprehensive understanding of capital structure determinants in the real estate sector in Vietnam and other developing countries.

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