Capital Structure in the Real Estate and Construction Industry

An empirical study of the pecking order theory, the trade-off theory and the maturity-matching principle

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Abstract

The aim of this report is to test if the real estate industry and the construction industry in Sweden are described by the pecking order theory, trade-off theory and/or the maturity-matching principle by investigating determinants of capital structure in the two industries separately. The theoretical framework used in this report is the pecking order theory, the trade-off theory and the maturity-matching principle in order to establish the research topic. A static panel data regression is performed on a decomposed leverage level to test the hypotheses empirically, including the unobserved firm characteristics: growth opportunities, profitability, size, tangibility, volatility in earnings, non-debt tax shields and lastly effective tax rate. The results indicate that the Swedish real estate industry and the Swedish construction industry differ significantly over the period of 2007 to 2015. In general, the report provides support for both the pecking order theory, the trade-off theory and the maturity-matching principle.

Keywords: The pecking order theory, The trade-off theory, The maturity-matching principle, Swedish real estate industry, Swedish construction industry, Static panel data regression

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1. Introduction

This section will highlight the problem discussion and introduce the reader to the subject of the report. This is followed by a literature review of previous studies within the same area to show the economic background of the objectives of the report. This section also includes a definition of the problem, the main purpose and contribution of the study.

Companies face decisions related to capital structure and general financing on a daily basis. Financing generally originates from internal funds, debt or equity. Modigliani & Miller (1958) introduced that the choice of capital structure affected the cost of capital and hence the market value. They also considered that under certain assumptions taken into consideration the value of a firm should be independent of its capital structure, since the net effect of the tax advantage of debt at the firm level and the tax disadvantage of debt at the personal level is down to zero. By relaxing these assumptions, a theoretical framework can be reached that resembles the reality of the firm. Furthermore, two theoretical models have evolved to explain how firms determine their specific capital structure. These models are, the pecking order theory and the trade-off theory, presented by Myers and Majluf (1984) as well as Myers (1984). This thesis investigates the Swedish real estate industry and the Swedish construction industry. These industries are chosen because they currently are expected to grow in the coming years. The real estate industry has a low risk and does not maximize their debt when assets are growing. (Nyman, 2016). The industry is predicted to grow substantially the coming years and without any downside risks due to unbalance between supply and demand. The return on construction projects is expected to be 100% in the next 10 years (Privata Affärer, 2016).

The main research done to empirically test the implications of the pecking order theory and the trade-off theory has almost entirely focused on public large firms. Firms within the same industry should face similar risks, since they produce similar products and face the same costs for material (Ferri & Jones, 1979). Whereas Myers believes that the firm's debt to equity ratio is affected by its financing needs and not by industry standards (Myers, 1984). However, Harris and Raviv has shown that companies within a particular industry is more like-minded than companies in different sectors in terms of gearing (Harris M. & Raviv A.1991).

Industries face different challenges, for example new technologies, environmental regulations and different economic conditions. Moreover, companies active in industries with variable profit tend to have more capital as a buffer against eventual threats. The real estate industry has stable returns and the construction industry has periodic revenues which is given unevenly (Phillips, M, Roberts, J & Watson, S, 2017, Sikich, 2017). Therefore, it can be argued that the construction industry should have more capital as a buffer than the real estate industry. With good knowledge of the factors that affect the capital structure it is possible to get an understanding of how companies and sectors adapt the allocation between equity and debt.

1.1. Problem Discussion

This report's focus is to fill the gap of information about capital structure in the real estate and construction industries. This is completed with an empirical test of the pecking order theory and the trade-off theory on a decomposed level of leverage using short-term and long-term debt measures. To get further insights on a decomposed level, the maturity matching principle is also considered. The report also differs from previous studies with the specialization in the real estate industry and construction industry in a Swedish setting. Therefore, a Swedish nationwide panel data is used and is covering the period of 2007 to 2015. Furthermore, this to complete a static panel data regression comprising the firm characteristics such as growth opportunities, profitability, size, tangibility, non-debt tax shields and lastly effective tax rate. Hence, firms operating in the same industry face similar business environment and are therefore considered to have comparable operating risks (Berk, DeMarzo 2011). Consequently this should lead to intra-industry similarities and inter-industry differences in the firm's capital structure. Therefore firms within sectors such as the real estate industry and the construction industry are expected to have lower operating risk and therefore higher leverage ratio than the firms who operate within areas such as software and biotechnology (Bougheas 2004).

There are few previous studies that have contributed to the knowledge in specific industries. The main research done to empirically test the implications of the pecking order theory, the trade-off theory and maturity-matching principle, has almost entirely focused on public large firms. Moreover, research within this area has also focused on a specific country or region, for example on public American or German firms. Furthermore, this report will contribute to those involved in the Swedish capital market since further research is needed and will be proposed. Hence, the hope is to provide a better foundation for further academic research and practitioners, e.g. investors and managers, when they try to better understand capital structure.

1.2. Aim

The aim of this report is to test if the real estate industry and the construction industry in Sweden are described by the pecking order theory, trade-off theory and/or the maturity-matching principle by investigating determinants of capital structure in the two industries separately.

1.3. Research Question

Which theory, of the pecking order theory, trade-off theory and the maturity-matching principle, does best describe the capital structure of the Swedish real estate and construction industries?

1.4. Contribution

This thesis is inspired by previous studies that contributes to the capital structure debate and specializes in examining if the leverage development among Swedish real estate firms and Swedish construction firms can be explained by the pecking order theory, the trade-off theory and the maturity-matching principle.

This report will contribute to further knowledge within the field of capital structure. In the context of firms financing decisions, following the important contributions by Modigliani and Miller (1958, 1963), various studies has been devoted to investigate what the main factors of firm's capital structure are. In the beginning of the mid-1980s empirical research aimed at comparing and contrasting the predictive powers of the major theories of capital structure, earlier work concentrated mostly on the developing economies.

2. Theory

This section will cover the most relevant theoretical background regarding the subject of the report, the focus is on capital structure. First, the factors of capital structure tested in this report are chosen and presented. Thereafter, Modigliani and Miller's proposistions are stated and lead to the other theories in the section. The hypotheses of the report are presented and formed from the theoretical framework including the pecking order theory, the trade-off theory and the maturity-matching principle.

2.1. Factors of Capital Structure

Previous researchers such as Chittenden *et al*. (1996) and Van der Wijst and Thurik (1993) have proved that influences of the independent variables on the total debt is a net effect of opposite effects on the measures short-term and long-term debt. Therefore, assets structure should be positively correlated with the long term-debt and negatively correlated with the short-term debt which could work to neutralize the net effect on total debt. Hence, to use only the total debt as a measure would disregard the change in a factor on a decomposed level of leverage.

The chosen factors that are investigated in the regression will be presented. The impact of the factor is motivated using previous theories. However, it is difficult to draw conclusions from previous reported studies since the authors use different measures for the different factors of capital structure. The factors of capital structure that constantly reappear in previous reports are growth opportunities, profitability, size, tangibility, non-debt tax shields, depreciation, volatility and effective tax rate. (e.g. Sogorb-Mira, 2005; Bauer 2004; Bradley, Jarrell & Kim 1983; Kester 1986). For this report the chosen factors are the most common ones; growth opportunities, profitability, size, tangibility, non-debt tax shields and effective tax rate.

The measures for each variable presented in the theory, is explained in Table III. For this report the chosen factors are therefore; growth opportunities, profitability, size, tangibility, non-debt tax shields and effective tax rate. The chosen variables will be further discussed in 5. Result and Analysis.

Table I. Factors Measures

Variables	**Measure**
Growth Opportunities	$(Turnover_t / Turnover_{t-1})-1$
Profitability	$EBITDA_t / Turnover_t$
Size	$Log\ (Total\ Assets)_t$
Tangibility	$Tangible\ Assets_t / Total\ Assets_t$
Non-Debt Tax Shields	$Depreciation_t / Turnover_t$
Effective Tax Rate	$Tax_t /$ Earnings before tax_t
Total Debt/ Assets (Leverage)	$Total\ Debt_t / Total\ Assets_t$

2.2. General Capital Structure Theories

There are three models that are considered into the mainstream of corporate finance. There is the trade-off theory, it provides an actual formula to calculate the optimal capital structure. Furthermore, there is the pecking order and the signaling hypothesis, which tries to explain and observe patterns for optimal capital structure (Copeland & Weston, 1992). The signaling hypothesis will be excluded due to irrelevance (Ross 1977).

2.2.1. Modigliani and Miller's Propositions

Modigliani and Miller demonstrated that in a capital market free of taxes, transaction costs and other frictions; the choice of a firm's capital structure could not affect its market valuation. To make this reliable there are several assumptions that must be fulfilled:

- The capital markets are frictionless, which implies that assets can be purchased and sold instantly without any costs.
- That it is possible to lend and borrow at a risk-free rate.
- There are no costs of bankruptcy for the firm.
- Corporations are operating in the same group of risk.
- Personal and corporate income taxes do not exist.
- Cash flow is eternally and there is no growth.
- The information available is the same for corporate insiders and the public.
- Agency costs do not exist and managers always maximize the shareholder's wealth.

These assumptions are not applicable in practice and new theories is needed for explaining this further.

2.2.2. Pecking Order Hypothesis

Donaldson (1961) has discovered a pecking order for how firms establish their long-term financing. The pecking order assumes the information asymmetry exists between managers of the company and the investors, it is where the managers have an information advantage over the investors. This creates adverse selection problems, which means that investors are unable to make accurate investments decisions based on the information received from the company. (Myers, 1984). Due to the adverse selection problem, certain debt is preferred over others.

A firm that maximizes its profit, which firms in general tend to do, operates on the margin, the top of the curve, in order to balance the tax shield and the costs of distress. Initially, firms prefer internal financing to external financing of any sort (debt or equity), when financing positive net present value projects. Further on, when a firm has insufficient cash flows from internal sources, it sells parts of its investments in marketable securities. As a firm is required to receive more external financing, it will work down the pecking order securities. The pecking order is beginning with the safe debt, then continuing through risky debt, convertible securities, preferred stock, and lastly common stock. The pecking order theory explains the observed patterns regarding financing preferences of firms (Myers & Majluf, 1984).

Firms with growth opportunities should generally have a high demand for funds. If retained earnings is not enough to provide the desirable number of funds, firms will most likely search for external financing (Michaelas et al., 1999). Using external financing will increase the leverage of the firm. Therefore, the relation between growth opportunities and total debt over total assets should be positive.

The pecking order theory concludes that firms chooses internal financing before debt and also debt before assets. Profitable firms have greater internal finance which results in less external financing in line with to the pecking order theory, ceteris paribus (Myers & Majluf, 1984). Firms with high profitability is sensitive to takeovers, hence increased leverage. Therefore, profitable firms that has been acquired will have a higher debt-to-asset ratio (Jensen, 1986). Therefore, a negative relation is expected between profitability and total debt over total assets. This is assumed to apply for short-term and long-term debt as well since sensitivity to takeovers should affect as much in the short run as in the long run.

2.2.3. Trade-off Theory

In contrast to the pecking order, in the trade-off model, agency costs, taxes and bankruptcy costs push more profitable firms towards higher book leverage, resulting in a positive relation to profitability. A trade-off between the cost and benefits of debt is often described as the optimal capital structure. In this case, costs are represented by the cost of financial distress and agency costs arising between owners and creditors (Jensen and Meckling, 1976). While the benefits in this case can be measured by the tax shields of debt (Myers, 1984). The optimal capital structure is reached when the cost and benefits of debt are equal, which depending on the characteristics of the firm may vary from firm to firm.

In the theory of the trade-off, the cost of debt is represented by the financial distress costs and finally the probability of bankruptcy. It is commonly presumed that a large firm is less likely to default, since they are more diversified and therefore should have a greater debt capacity (Titman and Wessels, 1988). As the value of the firm increases, the ratio of direct bankruptcy costs to the firm’s value decreases which might have an impact on the firm’s borrowing decisions. Hence, the firm will take more leverage (Warner, 1977).

Transaction costs for large firms are reduced since there might be struggles with asymmetric information issues which could increase larger firms' preferences for equity over debt compared to smaller firms (Fama & Jensen, 1983). Due to the fact that a firm that is larger generally diversifies more, they have a lower probability of bankruptcy. Hence, a positive relation between size and short-term debt and a negative relation between size and long-term debt is predicted.

An implication of leverage is that it increases a firm's probability to default on its debt obligations, which indicates that risky firms should borrow less (Myers, 1984). Tangible assets are debt associated with problems such as moral hazard and adverse selection problems, which encourage lenders to require security on a firm's loans. Moreover, intangible assets will be associated with higher cost of liquidation, there is no secondary market due to asset specificity (Williamson, 1988). Most capital structure theories conclude that the type of assets owned by a firm should be an important factor of capital structure. The value of liquidation for the firm is affected by the extent to which a firm's assets are tangible (Titman & Wessels, 1988). An increase in the proportion of tangible assets will increase the value of liquidation for the firm since the values of the tangible assets can be assessed easier.

The tangible assets are more likely to be accepted as collateral than the intangible assets. Funds provided to the borrower are restricted to a specific project by collateralizing debt. The creditors might require for them more favorable terms if no such guarantee exists for a project, potentially forcing the firm to use equity instead of debt as financing. Using tangible assets as collateral will prevent risk from shifting due to that the firm will have difficulties shifting investments to riskier projects (Myers, 1977). Hence, a greater fraction of tangible assets will increase the incentives to using lender to finance and increasing leverage. (Rajan & Zingales, 1995). Therefore, a positive relation between tangibility and total debt over total assets is expected. A negative relation between the tangibility and short-term debt and a positive relation between tangibility and long-term debt is expected due to that long-term debt enables that more of the assets can be used as collateral.

In the corrected seminal work by Miller and Modigliani with the realization of the tax advantage of debt, they argued that firms should instead employ as much debt as possible to maximize the value of the firm (Modigliani and Miller, 1963). However, there are additional sources of tax shields that can be an alternative to debt. These sources are discretionary expenses, research and development (R&D) and depreciation (DeAngelo and Masulis, 1980). Firms have a strong incentive to increase leverage resulting for tax deductible interest tax shield (Miller and Modigliani, 1963). Furthermore, large amounts of non-debt related corporate tax shields, for example tax credits for R&D and tax deductions for depreciation, indicates that debt is related inversely to non-debt tax shields. Titman & Wessels (1988) cannot find any statistical evidence that non-debt tax shields affect debt ratios. Larger non-debt tax shields implicate increased probability of no taxable income, thus decreasing the expected corporate tax rate and expected payoff from interest tax shields (DeAngelo, Masulis, 1980). The trade-off theory supports these predictions and includes that non-debt tax shields have lower expected tax rates, hence lower book leverage (Fama, French, 2002), which has been empirically supported by De Miguel & Pindado (2001). Therefore, a negative relation between non-debt tax shields and total debt over total assets is predicted. This is assumed to apply for short-term and long-term debt as well since lower book leverage should affect as much in the short run as in the long run.

The main benefit of trade-off theory are the tax benefits of debt (Myers, 1984). These benefits exist due to that interest payments of debt are tax deductible and payments to equity owners, i.e. dividend payments, are not tax deductible. Debt is therefore less expensive than equity and when the effective tax rate increases the advantages of debt increases. Since the main benefit in the trade-off theory is the tax benefit of debt, which is the effective tax rate, it can be argued that effective tax rate should have a positive relation to short-term, long-term and total debt over total assets. This has been supported empirically (Sogorb-Mira, 2005).

2.3. Maturity Capital Structure Theory

2.3.1. The Maturity-Matching Principle

This section will help to determine hypotheses on a short-term and long-term debt basis. The Maturity-Matching Principle states that a firm fund short-term assets with short-term debt and long-term assets with long-term debt. Furthermore, the maturity-matching principle states that intangible assets must be financed with equity. Matching yields benefits that the firm's financial flexibility enhances, that overall financing costs minimizes and that the firm's risk of default is reduced.

According to this theory it would be better to finance inventory with long-term debt if it is rather stable and relatively permanent inventory. By doing this, the firms can avoid frequent finance ability of short-term credit. Short-term debt provides two basic advantages over long-term debt; lower average interest rates and flexibility regarding the amount borrowed over time. The theory mentions disadvantages of issuing short-term debt. First, greater issuance costs over time by rolling over the short-term debt. Second, firms face a risk to be unable to refinance maturing debt. Third, firms face a risk of changing interest rates on its short-term debt, which they would not if they would have issues long-term debt on a fixed rate instead. (Ogden, Jen & O'Connor 2002)

2.4. Hypotheses

2.4.1. Hypotheses

The pecking order and the trade-off theory, have many shared predictions about leverage, though motivated by different forces. However, two major differences where the theories disagree is profitability, where the trade-off theory suggests a negative relation between leverage and profitability. Furthermore, they disagree on the relation for growth opportunities where the pecking order theory highlights the large equity issues of small low-leverage growth firms (Farma & French 2002).

Bond and Scott (2006) concludes in a study that listed real estate firms in the United Kingdom that debt is the most common security issued when external financing is needed. Another finding from the study is that debt issuance is tracking financing deficit closely. Ghosh et al (1999) finds in the American market that a significant negative stock price reacts to equity issues. According to the pecking order theory, this shows that information asymmetry exists. The empirical findings favor that the real estate industry is aligning with the pecking order theory. In contrary, the construction industry which is assumed to not align with the pecking order theory due to limited research on testing the theoretical framework on capital structure.

Therefore, the first hypothesis is formed: *The pecking order theory should be more prominent in the real estate industry relative to the construction industry.*

The real estate industry has unique characteristics i.e. supporting high levels of debt due to high ratio of collateral on the balance sheets which could implicate a reduction in financial distress costs. Allen (1995) finds that American real estate firms raise more leverage compared to other industries due to having lower agency and bankruptcy costs. Riddiough (2003) finds that firms strive towards a designated debt ratio when examining public security offerings. These findings favor the trade-off theory on optimal capital structure.

The construction industry is also assumed to align with these findings and the second hypothesis is formed. *The trade-off theory should align with the real estate industry and the construction industry.*

Agency problems developed from growth opportunities can be according Myers (1977) mitigated by issuing short-term debt instead of long-term debt. According to the maturity-matching principle, short-term assets is funded by short-term debt and long-term assets is funded by long-term debt. The real estate industry mostly has long-term assets in form of buildings which concludes in mostly long-term debt. The real estate industry should thereby have a negative relation between growth opportunities and short-term debt over total assets and a positive relation between growth opportunities and long-term debt over total assets. The construction industry mostly has short-term assets in form of labor, property, plant and equipment which concludes in mostly short-term debt. The construction industry should therefore have a positive relation between growth opportunities and short-term debt over total

assets and a negative relation between growth opportunities and long-term debt over total assets.

A third hypothesis is formed: *The maturity-matching principle should align with the real estate industry and the construction industry.*

2.4.2. Description of Expected Signs

Table I. & table II. describes the expected signs which will be investigated and tested against the Swedish real estate industry and the Swedish construction industry capital structures. Furthermore, each of these signs describes the characteristics of the firm to be observed and investigated, they are linked to either the pecking order theory or the trade-off theory. The expected signs are found and formed from the theory, and the most relevant for this report are selected.

Table II. Expected Signs Real Estate Industry

Table I. shows the expected signs arranged after origin in the theoretical framework. The table describes the expected signs for the real estate industry of the relation to each variable, divided into STD = short-term debt, LTD = long-term debt and TD = total debt over total assets.

VARIABLES	EXPECTED SIGN STD	EXPECTED SIGN LTD	EXPECTED SIGN TD
GROWTH OPPORTUNITIES	-	+	Pecking Order
PROFITABILITY	-	-	Pecking Order
SIZE	+	-	Trade-off Theory
TANGIBILITY	-	+	Trade-off Theory
NON-DEBT TAX SHIELDS	-	-	Trade-off Theory
TAX RATE	+	+	Trade-off Theory

Table III. Expected Signs Construction Industry

Table II shows the expected signs arranged after origin in the theoretical framework. The table describes the expected signs for the construction industry of the relation to each variable, divided into STD = short-term debt, LTD = long-term debt and TD = total debt over total assets.

VARIABLES	EXPECTED SIGN STD	EXPECTED SIGN LTD	EXPECTED SIGN TD
GROWTH OPPORTUNITIES	+	-	Pecking Order
PROFITABILITY	+	+	Pecking Order
SIZE	+	-	Trade-off Theory
TANGIBILITY	-	+	Trade-off Theory
NON-DEBT TAX SHIELDS	-	-	Trade-off Theory
TAX RATE	+	+	Trade-off Theory

3. Method

This section presents the strategy of research for the report. A quantitative method for analyzing data and a literature review will be conducted. The purpose for the literature review was to evaluate the subject and construct a theoretical framework for interpretation of the collected data presented in the quantitative analysis and also to construct proxy variables.

3.1. Data

The data for the regression is collected from Business Retrievers database which provides approximately 10 years of accounting data for Swedish firms. The sample used in this report is selected with limits in turnover in the real estate industry and the construction industry. The 30 largest firms in the real estate and construction industry is selected which generates the turnover limit for the real estate industry to be more than 2000 MSEK and more than 1000 MSEK for the construction industry. These limits are selected to include and show larger firms in the industry, and not take into consideration the smallest firms because the data provided may have abnormal borrowing terms. This could lead to selection bias. However, it could be that companies include issues that we do not wish to investigate such as operative managerial theories. Since the firm selection is made in 2015 and following the same firms back to 2007, this could lead to survivorship bias. Firms not existing anymore, who existed in this period are not taken into consideration. The firms are selected by industry in Business Retriever where the real estate industry is defined as "renting and operating of own or leased real estate". Moreover, the construction industry is defined as "construction and civil engineering activities and related technical consultancy" and also "construction of buildings". The data is collected from 2007 to 2015. The chosen years for the regression is to see the change over time and due to limitations in the database. The sample includes firms with parent companies which could create noise and potential measurement errors due to that external financing is investigated. This is disregarded and assumed to not affect the outcome substantially. The data set includes 30 real estate firms and 30 construction firms after adjustments which concludes in total 60 firms in the unbalanced panel data.

Table V. Number of Firms

Table II. shows the number of firms taken into consideration in this report per year for the real estate industry and the construction industry as well as in total.

Year	Real Estate	Construction
2007	28	26
2008	30	28
2009	30	27
2010	30	28
2011	29	30
2012	30	30
2013	30	30
2014	30	30
2015	30	30

As presented in table V. some years are missing data due to limitations in the database Business Retriever.

3.2. Static Panel OLS Regression

Previous research from 1983 by Buser and Hess deals with time series to investigate capital structure empirically. Later research by e.g. Rajan & Zingales (1995) often practice cross sectional data using average coefficients over selected years. In recent empirical tests and studies the panel data has been practiced. The report is using a simple linear OLS Regression in STATA version 12.1. The quantitative analysis is using panel data sets to empirically test the capital structure. Panel data sets is a combination of time-series and cross-sectional data which concludes in larger amount of data points which increases the degrees of freedom and reduces collinearity in independent variables. The panel data sets also allow for control of fixed effects and random effects. (Hausman & Taylor, 1981). A Hausman test is performed to distinguish whether the fixed effect model or random effect model should be used.

Table IV. Hausman Test

Table IV. describes the outcome of the Hausman te from the selected data. b = consistent under H0 and Ha, obtained from xtreg, B= inconsistent under Ha, efficient under H0, obtained from xtreg, Test: H0: difference in coefficients not systematic, Chi2 (6) = (b-B)'((V_b-V_B)^(-1))(b-B), = 1.78, Prob>chi2 = 0.9391, (V_b-v_B is not positive definite)

	Coefficients			
	(b)	(B)	(b-B)	Sqrt(diag(v_b-v_B))
	FE	RE	Difference	S.E
H1 Growth Opp.	-0.0006663	-0.0008972	0.0002309	0.000658
H2 Profitability	-0.0670396	-0.067778	0.0007384	0.0017731
H3 Size	0.0022048	0.0016349	0.0005699	0.0070253
H4 Tangibility	-0.0397379	-0.0137089	-0.026029	0.0264235
H5 NDTS	-0.1842498	-0.1875114	0.0032615	0.0042618
H6 Tax Rate	0.0149232	0.0148317	0.0000915	0.0003703

The outcome from the Hausman test shows V_b-v_B is not positive definite, which implicates that a fixed effect model is more accurate. Therefore, the regression will be based on a fixed effect model. Hence, using panel data methodology in empirical tests allows control for firm heterogeneity and reduces collinearity among independent variable.

The panel data model is:

$$Y=H1X1+H2X2 +H3X3+H4X4+ H5X5+H6X6 +e$$

Where: Y is the dependent variable Leverage measured as debt-to-equity ratio.

X1 is the independent variable Growth opportunities measured as growth in turnover.

X2 is the independent variable Profitability measured as EBITDA over sales.

X3 is the independent variable Size measured as the natural logarithm of total assets.

X4 is the independent variable Tangibility measured as tangible assets over total assets in book values.

X5 is the independent variable Non-debt tax shield measured as annual depreciation expenses over net sales.

X6 is the independent variable Effective tax rate measured as tax divided by earnings per share.

is the intercept term.

3.3. Discussion of data

This report will follow out a literature review to investigate the aim of the report. The literature review will be based on scholarly papers which includes the current knowledge as well as theoretical contributions from papers including capital structure. The data is collected from scholarly databases such as Google Scholar, Sciencedirect and Business Retriever database. Corporate Finance theory prefers using market values of the measured assets and debt when defining capital structure. Due to limitations in the data set in Retriever Business, book values are used to complete the research. The data is collected from the 30 largest firms from both industries. To broaden the study, smaller firms could also be taken into consideration which would increase the number of observations and could change the result.

The authors cannot assume responsibility for the validity of all data sources. Some of the data sources are continuously updated and since they are collected during the time this paper was written any responsibility for updates of these sources cannot be taken into consideration.

4. Results and Analysis

This section describes the key characteristics of the data set. Both for leverage ratios and the determinants of capital structure, the data is presented separately for the real estate industry and the construction industry, as well as together. This section also provides the result and analysis of the regression. The tables explain the result, and the graphs gives some understanding of the capital structure of real estate and construction firms.

4.1. Characteristics of the Data Set

The leverage levels over time are quite similar. However, on a decomposed leverage level, differences are shown in capital structure between the two industries. It is shown in figure I. that the real estate industry has throughout the years significantly higher level of long-term leverage.

Figure I. Leverage Development Over Time

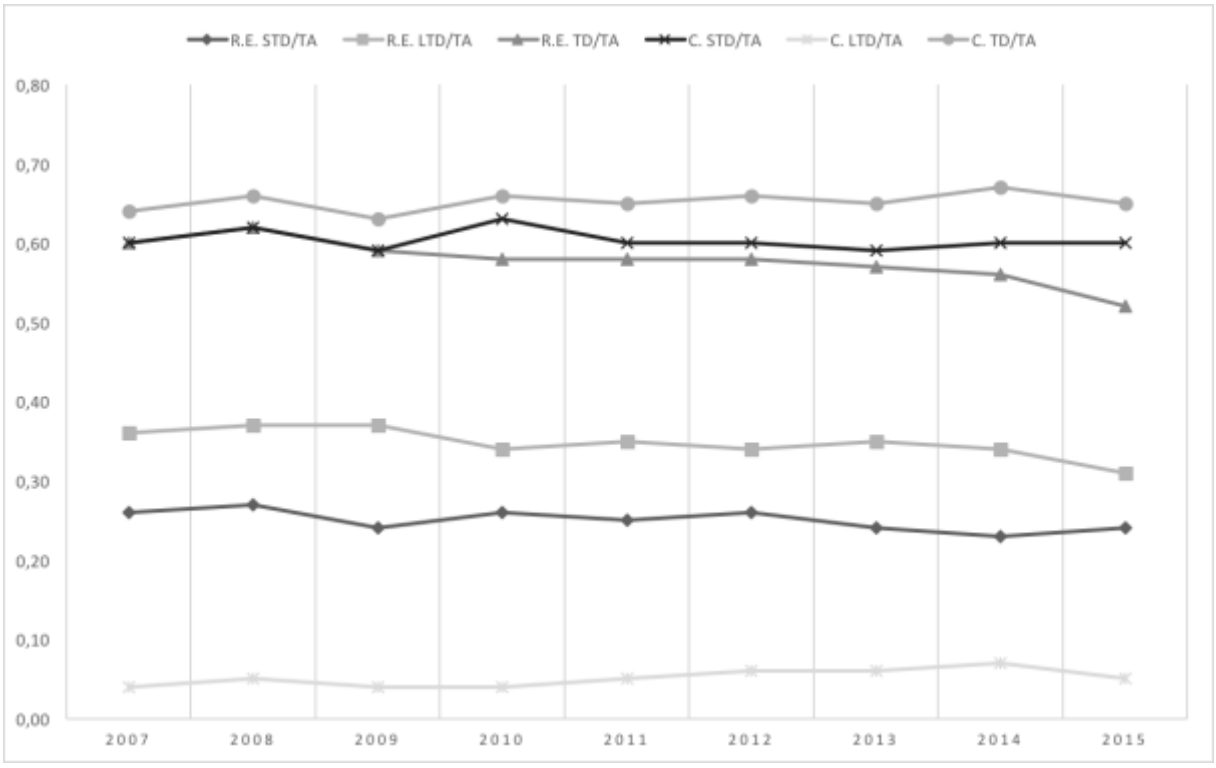

Figure I. illustrates the leverage development for the two selected industries on the Swedish market between 2007 to 2015 in short-term-, long-term- and total- debt over total assets.

The construction industry generally has a considerable amount of property, plant and equipment noted on the balance sheet which is shown as short-term debt, however they have less long-term debt. The real estate firms have on average employed around 25 % short-term debt over total assets and 35% long-term debt over total assets, whereas the construction firms 60 % short-term debt over total assets and 5 % long-term debt over total assets. Overall, the industries show steady debt levels which is recognized from the trade-off theory.

Table VI. Correlation for the Construction Industry and the Real Estate Industry

Table VI. describes the correlation between the variables for the construction industry and the real estate industry.

Construction

	Leverage Short-term	*Leverage Long-term*	*Leverage Total*	*H1 - Growth Opportunities*	*H2 - Profitability*	*H3 - Size*	*H4 - Tangibility*	*H5 - Non-debt tax shields*	*H6 - Effective tax rate*
Leverage Short-term	1								
Leverage Long-term	-0,427	1							
Leverage Total	0,8157	0,1746	1						
H1 - Growth Opportunities	-0,228	0,2849	-0,066	1					
H2 - Profitability	0,2057	-0,021	0,2105	-0,012	1				
H3 - Size	-0,101	0,2735	0,0648	-0,067	0,071	1			
H4 - Tangibility	-0,09	0,2358	0,0526	0,05	-0,166	0,087	1		
H5 - Non-debt tax shields	-0,217	0,0291	-0,218	0,013	-1	-0,064	0,162	1	
H6 - Effective tax rate	0,0484	-0,05	0,0208	-0,069	0,057	-0,062	0,075	-0,055	1

Real Estate

	Leverage Short-term	*Leverage Long-term*	*Leverage Total*	*H1 - Growth Opportunities*	*H2 - Profitability*	*H3 - Size*	*H4 - Tangibility*	*H5 - Non-debt tax shields*	*H6 - Effective tax rate*
Leverage Short-term	1								
Leverage Long-term	-0,535	1							
Leverage Total	0,364	0,5137	1						
H1 - Growth Opportunities	0,0034	0,0242	0,0411	1					
H2 - Profitability	-0,274	0,1533	-0,116	-0,06	1				
H3 - Size	-0,324	0,293	0,0046	0,032	0,434	1			
H4 - Tangibility	-0,264	0,4024	0,1603	-0,023	0,585	0,714	1		
H5 - Non-debt tax shields	-0,094	-0,089	-0,166	0,017	-0,23	0,015	-0,27	1	
H6 - Effective tax rate	-0,009	0,0428	0,0445	-0,014	-0,033	-0,038	-0,106	0,046	1

The correlation between the different variables presented in Table VI. differ in magnitude. Growth opportunities has the lowest correlation to leverage for the real estate industry and effective tax rate has the lowest correlation to leverage for the construction industry. Size and tangibility has the highest correlation to leverage for the real estate industry and growth opportunities has the highest correlation to leverage for the construction industry.

Table VII. Descriptive Statistics of Independent Variables

Table VII. shows characteristics from the data set for the real estate firms and construction firms separatly.

	Variable	*Mean*	*SD*	*Max*	*Min*	*Median*	*Skewness*	*Kurtosis*
Real Estate Firms	**Growth**	0,14	0,515937073	5,38	-0,78	0,04	5,6814825	44,72712606
	Profit.	0.53	0.58149924	2.77	-0.7	0.39	1,2317551	2,027348522
	Size	15.81	2.035305615	18.51	7.6	16.32	-2,1520780	6,15409934
	Tangibility	1.48	0.658899676	2.51	0	1.84	-1,0102189	-0,506214875
	Non-debt Tax Shield	0.01	0.020031035	0.15	0.00	0	4,0886540	20,60517944
	Effective Tax Rate	0.21	0.732008054	9.65	-2.75	0.22	8,6575847	108,7375647
Construction firms	**Growth.**	0,41	2,588977269	36,83	-0,47	0,06	11,71366952	154,6123378
	Profit.	-0.08	1.835254504	0.42	-29.69	0.04	-16,09736331	260,5822301
	Size	13.79	1.676761484	18.4	10.42	13.36	1,080430196	0,59584878
	Tangibility	0.13	0.168353296	0.9	0	0.07	2,09008907	4,52205968
	Non-debt Tax Shield	0.06	0.795648244	12.91	0	0	16,15405094	261,8730263
	Effective Tax Rate	0.23	0.271000372	1.39	-2.49	0.24	-3,114482875	42,67701429

Table VII. describes the key characteristics of the dataset. The leverage ratios and factors of capital structure are presented separately for the real estate and the construction industry. This table helps to explain some of the results later in the paper. This table and Figure I. of the leverage levels, gives some understanding of the capital structure in the real estate and the construction industry. In Table VII. it can be noticed that the variables are overall relatively similar.

4.2. Regression

The variables are generally similar for the Real Estate Industry and the Construction industry. However, the growth opportunities, profitability and non-debt tax shield is larger for the Construction industry. The size, tangibility and effective tax rate is larger for the Real Estate industry.

Table VIII. Regression Results

Table VIII shows the results from the fixed effect panel regression made in STATA. It describes the coefficients for the two industries divided into short-, long- and total-debt. Furthermore, the t-values are given in the parenthesis and *** = p<0.001, ** = p<0.01 and * = p<0.05.

Factor	Short-Term Debt		Long-Term Debt		Total Debt	
	R. E	C	R. E	C	R. E	C
Growth	-0.004 (-0.30)	0.001 (0.29)	0.035* (2.16)	-0.003* (-2.03)	0.027* (2.13)	-0.002 (-0.66)
Profitability	-0.014 (-1.04)	-0.316* (-2.35)	-0.036* (-2.31)	0.142* (2.28)	-0.061*** (-4.99)	-0.174 (-1.32)
Size	0.01 (0.51)	0.023 (1.78)	-0.068* (-2.17)	0.007 (1.20)	-0.021 (-0.83)	0.031** (2.37)
Tangibility	-0.005 (-0.11)	-0.045 (-0.74)	-0.012 (-0.22)	-0.063* (-2.23)	-0.011 (-0.25)	-0.106 (-1.80)
NDTS	-0.136 (-0.33)	-0.728* (-2.33)	1.208* (2.54)	0.298* (2.07)	1.046** (2.80)	-0.43 (-1.40)
Effective tax Rate	-0.015* (-2.03)	0.023 (1.02)	0.031*** (3.60)	0.006 (0.54)	-0.007 (1.80)	0.029 (1.29)
R2 (within)	0.023	0.038	0.17	0.292	0.253	0.103
R2 (overall)	0.039	0.006	0.073	0.000	0.002	0.030
F-statistic	0.91	1.48	6.63	15.29	11.00	4.28
Observations	264	259	264	259	264	259
Year Dummies	YES	YES	YES	YES	YES	YES
	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect

The results from the regression is mostly in line with the theory aswell as previous studies, however some coefficients differ from the hypotheses. The results and the expected signs are presented in the Table IX and Table X. Most estimates are statistically significant and also economically meaningful that capture effects that are determinants of capital structure. Some estimates however, have lower significance levels which might be a result of the low number of observations.

On a decomposed leverage level, the R2 values are generally satisfying in comparison to previous work (Hall 2004). However, the R2 values for total debt are significantly lower, which might be because of neutralizing effects arising from counteractive effects from the variables from short-term and long-term debt.

Table IX. Result Signs Real Estate

Table IX shows the expected sign and the regression result for short-term and long-term debt of the real estate industry, for each sign based on the theory and the actual regression made in the report.

VARIABLES	EXP. SIGN STD	REG. RES REAL ESTATE	EXP. SIGN LTD	REG. RES REAL ESTATE	EXP. SIGN TD	REG. RES REAL ESTATE
GROWTH OPPORTUNITIES	-	-	+	+	+	+
PROFITABILITY	-	-	-	-	-	-
SIZE	+	+	-	-	+	-
TANGIBILITY	-	-	+	-	+	-
NON-DEBT TAX SHIELDS	-	-	-	+	-	+
EFFECTIVE TAX RATE	+	-	+	+	+	-

Table X. Result Signs Construction

Table X shows the expected sign and the regression result for short-term and long-term debt of the construction industry, for each sign based on the theory and the actual regression made in the report.

VARIABLES	EXP. SIGN STD	REG. RES CONSTRUCTION	EXP. SIGN LTD	REG. RES CONSTRUCTION	EXP. SIGN TD	REG. RES CONSTRUCTION
GROWTH OPPORTUNITIES	+	+	-	-	-	-
PROFITABILITY	+	-	+	+	+	-
SIZE	+	+	-	+	+	+
TANGIBILITY	-	-	+	-	+	-
NON-DEBT TAX SHIELDS	-	-	-	+	-	-
EFFECTIVE TAX RATE	+	+	+	+	+	+

4.2.1. Growth Opportunities

As expected growth opportunities for real estate firms are negatively related to short-term debt over total assets and positively related to long-term and total debt over total assets. The real estate industry can therefore be assumed to act according to the pecking order theory and have more safe debt. This could be due to the fact that they have more acquired assets that does not decrease in value and exhibit stable and high sales. Therefore, the real estate can utilize financial leverage more. In the contrary, the construction industry shows as expected a positive relation between growth opportunities and short-term debt over total assets and a negative relation to long-term debt over total assets. An abnormal sign is the relation to total debt which is negative even though a positive relation was expected. Therefore, the construction industry shows signs of less external financing when having growth opportunities and a reason for this is that large investments might not be needed or that they have desirable amount of internal funds when starting new projects.

In contrast, the real estate industry shows signs of more external financing when having growth opportunities which could be due to required major investments for land and construction. In addition, the economical meaningfulness of the results should be carefully considered. All other relation is in line with the hypotheses which strengthens the maturity matching principle which states that firm funds short-term assets with short-term debt and long-term assets with long-term debt. In addition, the long-term debt results and the results from the total debt in the real estate industry are statistically significant. Whereas the results for the long-term debt for the construction industry has a lower coefficient magnitude, which makes it uncertain if the result can be economically meaningful.

4.2.2. Profitability

The real estate industry has as expected a negative relation between profitability and all debt ratios. However, the construction industry shows a different result for long-term debt over total assets. The real estate industry has a negative relation as expected, this shows that generally real estate firms require less external financing when becoming more profitable. When becoming more profitable real estate firms generally have increasing revenues in rents which lower the incentives for external financing. However, the construction industry has the opposite relation which indicates that construction firms require more external financing when becoming more profitable. The results for the construction industry is not in line with the pecking order theory. This was expected and could be reasonable because the construction industry might prefer more ongoing projects when being profitable. The construction industry can be seen as highly volatile due to incomes based on separate projects obtained from procurements. The relation between total debt over total assets and profitability is negatively related as expected for the real estate industry but not for the construction industry. The negative impact on total debt suggests that profitable firms in both industries would prefer to substitute debt with internal funds. Moreover, the long-term debt results, the short-term debt results in the construction industry and the results from the total debt in the real estate industry are statistically significant.

4.2.3. Size

The real estate industry show as expected a positive relation between size and short-term debt over total assets and a negative relation to long-term debt over total assets. Which is in line with the theory that larger firms diversify more and have a lower probability of bankruptcy. However, the relation between size and total debt over total assets differ from the theory with its negative relation which was not expected. This means that larger real estate firms do not employ more debt. The construction industry shows as expected a positive relation between size and short-term and total debt over total assets, which is in line with the theory. The relation between size and long-term debt over total assets is positive which was not predicted, which weakens the arguments that larger firms diversifies more and have a lower probability of bankruptcy. The construction firms do not withhold the same amount of assets as the real estate firms do, which puts them in a different situation when it comes to taking on debt.

The data shows signs that real estate firms employ more long-term debt than the construction firms. This could answer the differences in the regression results in long-term debt. The results may change when considering even smaller firms with different borrowing characteristics. Furthermore, the long-term debt results in the real estate industry is statistically significant.

4.2.4. Tangibility

According to the hypotheses, tangibility is negatively related to short-term debt over total assets for both industries. There is also a negative relation between tangibility and long-term and total debt over total assets for both industries, which is not in line with the theory. The hypotheses claim that acquiring more long-term debt enables that more of the assets can be used as collateral. Which is not applicable for the real estate and the construction industries. This suggests that firms in both industries does not match the maturity of their debt structure with their assets structure. Construction firms typically have higher short-term debt levels than real estate firms, this should suggest that tangible assets are more desirable for construction firms than real estate firms since they are in need for substituting long-term for short-term debt. In addition, the long-term debt results in the construction industry is statistically significant.

4.2.5. Non-Debt Tax Shields

Non-debt tax shield is as expected, negatively related to short-term debt over total assets for both industries. Therefore, both industries employ as much short-term debt as possible to maximize the value of the firm. According to the hypotheses it was expected to be a negative relation between long-term debt over total assets and non-debt tax shield, however both industries show a positive relation to non-debt tax shield instead. This could be because the firm uses other sources of tax shields as an alternative to debt. The real estate industry show a positive relation to total debt over total assets which is not in line with the theory, which was not expected. This argues with the trade-off theory that the non-debt tax shields have lower expected tax rates which also lowers the book leverage. In contrast to this, the construction industry shows a negative relation to total debt over total assets which is in line with the theory. Furthermore, the long-term debt results, the short-term debt results in the construction industry and the results from the total debt in the real estate industry are statistically significant.

4.2.6. Effective Tax Rate

The relation between effective tax rate and short-term and total debt over total assets is negative for real estate industry and positive for the construction industry. The relation between effective tax rate and long-term debt is positive for both industries. In the theory, it is stated that it is beneficial to use debt instead of equity because interest payments of debt are tax deductible. The regression suggests that in the construction industry benefits from less expensive debt compared to equity. For long-term debt, the real estate industry benefits from the same statement. However, it contradicts this statement for short-term and total debt. The real estate industry shows generally that higher taxes should increase leverage and the construction industry shows the opposite. This could be because higher tax rates lower profitability for real estate firms which reduces the firm's lending capacity, and hence the opposite for the construction industry. Moreover, the short-term debt results in the real estate industry and the results from the long-term debt in the real estate industry are statistically significant.

4.3. Discussion and Reliability of the Report

The characteristics explained by the theory of the pecking order and the trade-off theory, affecting capital structure are by nature unobserved, to estimate these proxies must be used. The most difficult problem with the use of proxies in the research for capital structure is the struggle finding proxies that are uncorrelated to other proxies that are relevant, is identified by Titman (1988). Moreover, Fama and French (2002) argues that the use of panel regressions ignores the bias in the standard errors since it is correlated across years. The completed correlation matrix results indicate that the correlation between the independent variables are generally quite small, which means there is a low degree of first order collinearity between the independent variables. The phenomena of reversed causality, i.e. that is if the leverage ratios should affect the factors instead of the other way around, can be minimized by using static panel data methodology where the control of this problem can be included by testing for firm and time specific effects.

To test if the results are robust an additional one lag regression and a two lag regression are performed in Table XII and Table XIII. Increasing the lagged effect reduces the economical meaningfulness and the statistical significant for all variables including the R2 variables. No other tests of robustness were performed. Further suggestions to test robustness of the analysis are to change the measurements for the variables and add other control variables such as age. In addition, the methods used in this report follow previous studies and the results discovered are in line with earlier findings. Also, the Swedish firm setting prevent the generalizability of the reports results in an international context.

5. Conclusion

This section concludes the analysis of the results and discusses the most important parts of the study. This section also connects the analysis of factors of capital structure with the pecking order theory, trade-off theory and maturity-matching principle to answer the aim of the report.

5.1. Conclusion of the report

The report contributes to better understanding of how the Swedish real estate firms and the Swedish construction firms have chosen their capital structure between the years 2007 and 2015 and may be used as base for further research on the subject of optimal capital structure in a Swedish setting. However, the results from the static panel data regression are not definite, they generally support the literature of the pecking order, the trade-off theory and the maturity-matching principle. The investigation of the hypotheses come to the conclusion that on a decomposed level of leverage the two industries differ significantly over the time period of 2007 to 2015 on the Swedish market.

Tangibility affects capital the same for both the real estate and the construction industry, however the magnitude of the coefficient for the construction industry is larger. Which is not expected since the real estate firms have more tangible assets than the construction industry. The firms in both industries do not match their maturity of their debt structure with their asset structure. Further the construction industry is statistically significant and the real estate industry is not, which makes the conclusions uncertain. The industries differ completely for the factor growth opportunities; the construction industry therefore show signs for less external financing when having growth opportunities and the real estate industry show signs for more external financing. This could be related to that they already have desirable amounts of internal funds when starting new projects and the real estate industry require major investments for land and construction. The real estate industry show more results that are statistically significant than the construction industry.

Generally, the results from this report indicates that leverage ratios on a decomposed level are sensitive to the factors of capital structure chosen in the report. With this said, other characteristics that affect firms in the Swedish real estate and construction industry could be captured using another setting. In conclusion, the real estate industry can be better explained using the factors that originates from the pecking order theory, and the construction industry follows the factors from the trade-off theory in higher extent. The maturity-matching principle was tested briefly in the report, the results matched the expectations from the theory perfectly and was applicable for both industries. Therefore, all three hypothesis was correct.

In practice, the results from this report may help practitioners on the market understand why firms have the observed leverage ratios and how firms deviating from sector standards will likely develop in the Swedish real estate and construction industry. The report may also provide an insight in how one single theory perspective lacks comprehensive explanatory power when explaining the leverage development on the Swedish market.

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7. Appendix

Table XI. Level of Leverage

Year	Real Estate			Construction		
	Short-Term Debt	Long-Term Debt	Total Debt	Short-Term Debt	Long-Term Debt	Total Debt
2007	26 %	36 %	60 %	60 %	4 %	64 %
2008	27 %	37 %	62 %	62 %	5 %	66 %
2009	24 %	37 %	59 %	59 %	4 %	63 %
2010	26 %	34 %	58 %	63 %	4 %	66 %
2011	25 %	35 %	58 %	60 %	5 %	65 %
2012	26 %	34 %	58 %	60 %	6 %	66 %
2013	24 %	35 %	57 %	59 %	6 %	65 %
2014	23 %	34 %	56 %	60 %	7 %	67 %
2015	24 %	31 %	52 %	60 %	5 %	65 %

Table XII. Regression with One Lag

Factor	Short-Term Debt		Long-Term Debt		Total Debt	
	R. E	C	R. E	C	R. E	C
Growth	-0.002 (-0.14)	0.001 (0.36)	0.026 (1.63)	-0.003 (-2.04)	0.023 (1.86)	-0.002 (-0.66)
Profitability	-0.005 (-0.37)	-0.215 (-1.65)	-0.018 (-1.08)	0.134 (2.05)	-0.035 (-2.78)	-0.081 (-0.63)
Size	-0.015 (-0.73)	0.0267 (1.81)	-0.069 (-2.90)	0.005 (0.72)	-0.084 (-4.55)	0.032 (2.18)
Tangibility	-0.016 (-0.34)	0.006 (0.11)	0.0136 (0.25)	-0.081 (-2.70)	0.009 (0.23)	-0.074 (-1.25)
NDTS	0.042 (0.09)	-0.496 (-1.64)	0.305 (0.58)	0.281 (1.86)	0.345 (0.85)	-0.215 (-0.72)
Tax Rate	-0.024 (-3.43)	0.013 (0.62)	0.047 (5.77)	0.007 (0.68)	0.022 (3.57)	0.02 (0.96)
R2 (within)	0.058	0.031	0.215	0.327	0.246	0.115
R2 (overall)	0.098	0.001	0.064	0.001	0.000	0.029
F-statistic	2.07	1.05	9.17	15.97	10.94	4.28
Observations	237	233	237	233	237	233
Year Dummies	YES	YES	YES	YES	YES	YES
	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect

Table XIII. Regression with Two Lags

Factor	Short-Term Debt		Long-Term Debt		Total Debt	
	R. E	C	R. E	C	R. E	C
Growth	-0.008 (-0.58)	0.000 (0.09)	0.019 (1.07)	-0.003 (-1.99)	0.009 (0.69)	-0.002 (-0.91)
Profitability	-0.012 (-0.72)	-0.235 (-1.80)	-0.036 (-1.79)	0.147 (2.28)	-0.063 (-4.41)	-0.088 (-0.68)
Size	0.004 (0.17)	0.027 (1.43)	-0.083 (-3.08)	0.005 (0.57)	-0.08 (-4.09)	0.032 (1.74)
Tangibility	-0.024 (-0.45)	-0.01 (-0.16)	0.011 (0.17)	-0.07 (-2.42)	-0.001 (-0.03)	-0.083 (-1.38)
NDTS	0.032 (0.07)	-0.541 (-1.79)	0.028 (0.05)	0.311 (2.08)	0.058 (0.15)	-0.230 (-0.78)
Tax Rate	-0.057 (-2.80)	0.017 (0.81)	0.041 (1.67)	0.005 (0.45)	-0.011 (-0.60)	0.021 (1.05)
R2 (within)	0.048	0.029	0.115	0.383	0.243	0.139
R2 (overall)	0.018	0.000	0.094	0.000	0.000	0.033
F-statistic	1.46	0.85	3.75	17.47	9.23	4.53
Observations	209	205	209	205	209	205
Year Dummies	YES	YES	YES	YES	YES	YES
	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect	Fixed Effect