Why Capital Structure Matters: Evidence from the Banking Sector in Luxembourg

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Abstract

The study explores the main determinants of capital structure in the banking sector in Luxembourg and examines the relationship between them. The hypothesis tested is whether the ratio of total liabilities to total assets, which denotes the capital structure of the bank, depends on its asset structure, size, profitability, and growth rate that we call as its determinants. The research methodology is based on panel data analysis that takes into account both the time series and cross-sectional data. Then regression analysis is carried out on the collected data of the banking sector in Luxembourg. Descriptive statistics is also carried out on the sample. The paper includes 50 banks operating in Luxembourg and data is collected for a period of 7 years (2009-2015). The statistical evidence from Luxembourg showed that profitability, tax, growth, bank's size, and asset structure are very important variables influencing bank's capital structure. However, there was no supporting evidence regarding the effect of risk on the leverage of banks in Luxembourg.

Keywords: Capital Structure, Luxembourg, Profitability, Bank, Debt Ratio, Panel Data

structure significant to the firm's value. However, there still exists a knowledge gap regarding the empirical validity of the various theories. The empirical evidence has brought to light various exemplary facts on capital structure choice, but this evidence is mostly related to the firms operating in the United States, and there is still some ambiguity about how these facts represent other theoretical models. So, there is a need to examine the strength of these findings outside the surroundings in which they were unearthed before determining if these empirical predictions are merely superficial correlation or they support all the theories. This paper will try to reduce the knowledge gap. The main goal will be to find if the capital structure of the firms outside the United States is influenced by the same factors as compared to the firms inside the US. Also, the research done so far were on companies and they excluded the banks, because it was believed that banks behave in a different manner. So, the main focus of this paper is on banks. The reason for choosing Luxembourg was because the economy of this country is largely dependent on banks, and banking is the largest sector there. However, there are not many studies conducted on this topic. So, this research conducted in Luxembourg will bring new insights to the capital structure theories and will help make things clearer.

Introduction

It has been 58 years, and thousands of papers have been published after Modigliani and Miller's ground-breaking findings, and still it is hard for us to make the right decision in terms of capital structure choice. Although, there are more insights on this topic now and more ways to comprehend the most important deviations from the Modigliani and Miller theory, which makes the capital

Literature Review

M & M: The Founders of the Modern Literature on Capital Structure

The relevant modern literature on capital structure began in 1958 with the classic Franco Modigliani and Merton Miller (or "M & M") (Modigliani & Miller, 1958).

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The work, "The Contributions of Stewart Myers to the Theory and Practice of Corporate Finance" (Allen, Bhattacharya & Schoar, 2008), identifies the main points of the theories of M & M. The authors demonstrated that, given certain assumptions known as "perfect market", the way in which companies are financed should notaffect its cost of capital or market value. The most important thing about the M & M propositions was to alert scholars about the importance of understanding the impact of capital structure on the value of the companies.

In 1963, Modigliani and Miller began the process of adapting and/or modifying some of the assumptions of the original theory. The authors demonstrated that the tax shield benefit (tax shield) obtained with the interest payment could be up to 35-40 cents for every dollar of debt financing. Therefore, the theory had identified a potential benefit of debt financing. However, the authors wondered if there was a significant cost associated with debt financing; otherwise, companies could present capital structure with 99% debt.

Trade-Off Theory

Trade-off of financing through debt issuance is among the pioneering studies on cost-benefit (Myers, 1977). According to Myers, the market value of the companies can be separated into "current assets" (assets in place) and "growth options" (growth options). Current assets represents the present value of the benefits generated by operations and existing investments. Growth options represents the expected present value of future investments (not yet realised). The main point of the paper was to demonstrate that for companies, whose market value is primarily in growth options, the financial cost expected by the lack of investment outweighs the benefits of the tax shield on debt issuance. Therefore, these companies tend to have focused structure equity capital. For companies whose market value is mainly in current assets, the expected costs of future investments that are inevitable are probably small, and the benefit of the tax shield is more substantial. In another work, Myers argues that companies must replace debt with equity, to the extent that the value of the company is maximised (Myers, 1983).

Regarding the determinants of debt in capital structure, it was mentioned that profitability is the most important determinant of debt, based on empirical evidence with cross-sectional data, for the USA, the UK, Germany, France, and Japan (Myers, 2001). Myers argues that most studies agree with that most profitable companies tend to borrow less, and therefore, a negative relationship between profitability and debt levels are expected. He concluded that the trade-off theory cannot explain the correlation between high profitability and low debt, but it can explain that companies with more tangible assets (safer assets) tend to borrow more than companies with higher risk (those with more intangible assets), as the financial risk increases the probability of bankruptcy.

Pecking-Order Theory

The more relevant pecking-order theory is a consequence of the work of Stewart Myers and Nicholas Majluf, (Myers & Majluf, 1984). The authors analyse how information asymmetry affects financing and investment decisions, and obtain two important results: in a case where financial stress can be controlled, companies finance their investments through the safest possible financial instrument, therefore, funding through good debt risk rating (investment grade) is preferred to the issue of shares; and in a case in which financial stress is inevitable, companies tend to consider the possibility of issuing shares to finance new investments or pay down debt, therefore, the least optimistic corporate managers are those who tend to issue shares.

From 1999, empirical studies were published to test the pecking-order theory, and one of the first ones was by Lakshmi Shyam-Sunder and Stewart C. Myers. They tested structure models of traditional capital against pecking-order alternative model, which is based on the assumption that the internal financial deficit is financed by external funds raised by issuing debt (Shyam-Sunder & Myers, 1999). After that several important empirical works on the pecking order were carried out, such as "Testing trade-off and pecking order predictions about dividends and debt" (French & Fama, 2002). Using a panel data of companies between 1965 and 1999, the authors obtained results that indicate that the most profitable companies with fewer investments have higher dividend payment volume, and that the short-term variation in the levels of investment and profit is financed by debt issuance. Finally, confirming the pecking order,

but contrary to the trade-off, it was found that the most profitable companies have lower leverage.

However, aspects emerged indicating that many of the assumptions of the pecking order could not be validated empirically. For example, the work of Frank, Goyal and Vidhan analysed data from American companies between 1980 and 1998, and concluded that all quantitative predictions of the pecking order may not be corroborated. Regarding the trade-off, the authors found robust evidence of mean reversion level of indebtedness (Frank, Goyal & Vidhan, 2003).

In 2008, another work by Seifert and Gonenc reached the same conclusion. The data analysed companies from the USA, Germany, the UK, and Japan. This research contained 18,503 firms with at least 5 results published between 1980 and 2004, and the results suggest that there is little empirical evidence to support the pecking order for the countries studied, except for Japan (Seifert & Gonenc, 2008).

Finally, in 2010, two important researches were done: "The pecking order, debt capacity, and information asymmetry" by Leary and Roberts; and "The impact of financing surpluses and large financing deficits on tests of the pecking order theory" by De Jong, Verbeek and Verwijmeren (2010). They analysed data from 1980 to 2005, a total of 34,470 observations, and concluded that the original model of the pecking order is not able to explain more than half of the funding decisions.

Factors Correlated with Debt

The capital structure model built in this paper is based on six of the independent variables presented by Harris and Raviv: profitability, growth, tax, asset structure, size, and risk (Harris & Raviv, 1991). The 6 variables represent some of the determinants of the level of debt used by most other major previous studies. The indebtedness (leverage) in its 2 forms and the 6 independent variables are described as:

Indebtedness (Leverage), the Dependent Variable

Given the differences in the composition of liabilities, the definition of the dependent variable is based on the

investigation: "What do we know about capital structure? Some evidence from international data" (Rajan & Zingales, 1995).

In this paper, values from accounting statements (book value) are considered and 3 of the measures identified by Remmers, Stonehill and Wright in 1974 and Cassar and Holmes in 2003 are chosen:

- Leverage is the relation between the total debts and the total capital, where total debt is the sum of short-term debt and long-term debt.
- Short-term leverage is known as the part of the bank's total debts that is repayable within one year. This comprises current accounts and deposits payable within one year.
- Long-term leverage is the total debt of the bank that is repayable beyond one year.

Profitability

The first independent variable defined in the capital structure model and related indebtedness is profitability. Its relationship with the level of debt has been a matter of great controversy in several studies due to opposite predictions that the pecking order and trade-off theories defined. In 2004, according to a research by Bevan and Danbolt, "Testing for inconsistencies in the estimation of UK Capital structure determinants", the pecking order stated that companies prefer internal capital over external to finance their investments; hence, the greater level of profit tends to be used to finance investment rather than issuing new debt. Bevan and Danbolt constructed a model of capital structure based on four independent variables (profitability, size, asset structure, and market-to-book ratio) and tested hypotheses to profitability variable (defined as the ratio of EBT to total assets) that indicated a negative relationship with the level of indebtedness. All results showed that the relationship was negative and statistically significant, confirming the pecking order and contradicting the tax shield (trade-off) theory.

Size

The second variable defined and related to the level of indebtedness is the size of the bank. The variable is referred to in the vast majority of studies on capital structure, but

its effect is ambiguous. According to Titman and Wessels, larger companies tend to be more diversified and less prone to bankruptcy (Titman & Wessels, 1998). Therefore, the trade-off theory predicts an inverse relationship between size and probability of failure, i.e., a positive relationship between size and level of indebtedness. If greater diversification with a more stable cash flow occurs, this relationship will agree with the theory of free cash flow of Jensen (Jensen, 1986) and Easterbrook (Easterbrook, 1984), indicating that the company's size has a positive impact on the supply of debt.

In 2010, Getzmann, Lang and Spremann, who carried out the research titled "Determinants of the target equity structure and adjustment speed – Evidence from Asian capital markets", added to the dispute between the pecking order and trade-off theories about the effect of size on the company's debt level. In their model of capital structure, they defined the independent variable firm size as the natural logarithm of assets (in (total assets)) and used data from 1,301 companies with greater than $1,000 million in assets listed, gearing values of 14 Asian countries. The authors found, based on GMM estimates (Generalised Method of Moments), robust evidence on the positive relationship between company size and level of indebtedness. The positive relationship between company size and level of indebtedness is also suggested by the theoretical work of Harris and Raviv (1991). According to the authors, the available studies generally agree that the level of debt increases with the size of the company.

Asset Structure

The third variable defined and related to the level of indebtedness is asset structure. The reason for the use of the variable – asset structure comes from the theory by Rajan and Zingales (1995), that tangible assets are more easily used as security (collateral) for the issuance of debt, reducing agency costs. They suggested that if a large part of the company assets is tangible, then they can be used as collateral, reducing the lender's risk. Tangible assets must provide higher value in case of liquidation of the company, therefore, the greater the proportion of tangible assets in the balance, the greater the willingness of lenders to offer loans, increasing the level of debt. The authors also suggest that the need for security tends to decrease in countries with greater banking penetration, because a good relationship between company and creditors could function as a substitute for physical collateral. The paper analysed 4,557 companies in the G7 countries (the USA, Japan, Germany, France, Italy, The UK, and Canada) from 1987 to 1991, and asset structure was defined as the ratio of fixed assets to the total assets. The paper concluded that the asset structure was always positively related to the level of indebtedness in the 7 countries.

The non-significance of asset structure is suggested by "Determinants of capital structure: Evidence from empirical comparison of the use of different estimators" (Serrasqueiro & Nunes, 2008). The authors defined the asset structure variable as the ratio of fixed assets to the total assets, and using data from 39 Portuguese companies from 1998-2004, concluded that both static and dynamic models indicate that asset structure is statistically insignificant.

Finally, the classical theory of Harris and Raviv suggests a positive relationship between fixed assets and indebtedness (Harris & Raviv, 1991).

Risk

The fourth variable defined and related to the level of debt is risk. Many studies have included a measure of risk in the capital structure model proposed by Titman and Wessels (1998), Kremp, Stöss and Gerdesmeier (2001), and Booth et al. (2001). These studies used the volatility of the operational profitability of each company as proxy for operational risk and the likelihood of financial stress. In general, according to the trade-off theory, a negative relationship between risk and debt levels is expected; however, there are studies indicating the opposite, for example, those by Gaud et al. (2005) and Kremp, Stöss and Gerdesmeier (2001).

The positive relationship between risk and debt level is suggested by the paper "The capital structure of Swiss companies: An empirical analysis using dynamic panel data" (Gaud et al., 2005). Operational risk is confirmed as one of the determinants of capital structure and defined as the squared difference in the profitability of the company and the profitability of the other companies for each year. The authors analysed 106 Swiss companies during the period 1991-2000, and using GMM estimators concluded that operational risk is positively related to the level of indebtedness (Arellano & Bond, 1991).

Finally, authors defined financial risk as the standard deviation of returns and found varying conclusions for the ten countries analysed. The relationship between risk and the level of debt is negative for six countries and positive for four (Booth et al., 2001).

Tax

The effect of tax on the decisions of corporate financing in prominent industrial countries has received distinct views from various authors. Some of them have related it directly to the tax policy. Among them, Auerbach and Mackie submitted their work on the tax impact on the decisions of corporate financing. The studies, "Real determinants of corporate leverage" (Auerbach, 1985) and "Do taxes affect corporate financing decisions?" (MacKie-Mason, 1990) provided considerable evidence on the effect of tax on the decision to choose between debt and equity. They confirmed that financing decisions are affected by any marginal changes in the tax rate of a company. A company that has a high tax shield will not opt for debt financing. The explanation is that marginal tax rates on interest deduction is lowered by the tax shields. The studies published by Graham, "Debt and the marginal tax rate" (Graham, 1996), also proved that taxes in general affect decisions of corporate financing, but the degree of this effectiveness is mostly not noteworthy. "Corporate financial policy: American analytics and UK taxation" (Ashton, 1991) concluded that any tax advantage to debt is possibly nominal, and thus the relationship between debt usage and tax burdens of the companies is not so strong. On the other hand, "Optimal capital structure under corporate and personal taxes" (DeAngelo & Masulis, 1980), depicts that investment deduction, R&D expenses, depreciation, and so on, could be alternatives for the fiscal role of debt. The research done by Titman and Wessels (1998), "The determinants of capital structure choice", stated that it is tiresome to find an exact proxy for tax reduction that does not take into consideration the effect of economic depreciation and expenses, and so, measuring the substitution effect with empirical evidence is difficult.

Growth

Growing companies put a higher demand on their funds generated internally if the pecking order arguments are applied. Undoubtedly, companies with a higher growth will resort to external funds to finance their growth. Therefore, companies would not rely on long-term secured debts, but on short-term less secured debt, for their financing needs. The study, "Determinants of capital borrowing" (Myers, 1977), verified this and stated that companies that have the capacity for debt will have a higher proportion of their market value tied up to the growth opportunity. Auerbach argued that leverage is inversely related to growth rate because the tax deductibility of interest payments is less valuable to expeditious growing firms, since they usually have non-debt tax shields (Auerbach, 1985). Some researchers found future growth positively related to leverage and long-term debt (Michaelas, Chittenden & Poutziousris, 1999), while Chittenden, Hall and Hutchinson (1996) and Jordan and Taylor (1998) found mixed evidence.

Trade-Off vs. Pecking Order

Some of the major theoretical controversies between the trade-off and pecking order are regarding the effects of the variable's profitability and company size with respect to debt. As mentioned, the trade-off theory suggests a positive relationship between profitability and debt, while the opposite is suggested by the pecking order. Regarding the size of the company, the trade-off also suggests a positive relationship with debt, while the pecking order, once again, suggests the existence of an opposite relationship. Therefore, the results that are going to be found in this paper can confirm about the real relationships between variables for the Luxembourg market.

The main objective of this work is to create a model of capital structure and apply advanced econometric methodology to identify the effects of six variables relative to the level of debt for banks in Luxembourg, corroborating some of the main findings of other important studies, and also some of the assumptions of the trade-off and pecking order theories.

Research Methods

In this study sample, 50 banks of Luxembourg, as stated by KPMG, in their publication "Luxembourg Banks Insights 2013" (KPMG, 2012), are included. In order to get the best sample of observations, the annual reports are downloaded from the respective bank sites.

Considering the work, "Beekhuizen industry size as debt ratio determinants in manufacturing internationally" (Remmers, Stonehill & Wright, 1974) and "Capital structure and financing of SMEs: Australian evidence" (Cassar & Holmes, 2003), the 3 dependent variables chosen are leverage, short-term leverage, and long-term leverage. Some examples of relevant work used as the data source are: Getzmann, Lang and Spremann (2010), Seifert and H. (2008), Elsas and Florysiak (2008), Drobetz and Wanzenried (2006), Fama and French (2005), Gaud et al. (2005), and Bevan and Danbolt (2004).

The leverage (LEV) is the ratio of total debts to total capital. The short-term debt ratio (SHORT) represents short-term debt to total capital. The long-term debt ratio (LONG) shows the long-term debt to total capital. The independent variables taken into consideration are profitability (PRT), risk (RSK), asset structure (AST), tax (TAX), size (SZE), and sales growth (GROW). As per the work, "The capital structure puzzle" (Myers, 1983), which indicates that book values are proxies for the total asset value in place, all the variables used in this study are taken from the book value. The model for this study is similar to the one provided while conducting the study "The determinants of capital structure: Evidence on UK property companies" (Ooi, 1999), to describe the relationships between capital structure and the determinants. This can be summarised as follows:

$LEV_{i,t} = \beta 0 + \beta 1 PRT_{i,t} + \beta 2 GRW_{i,t} + \beta 3 TAX_{i,t} + \beta 4 AST_{i,t} + \beta 5 RSK_{i,t} + \beta 6 SZE_{i,t} + \mu$ $LONG_{i,t} = \beta 0 + \beta 1 PRT_{i,t} + \beta 2 GRW_{i,t} + \beta 3 TAX_{i,t} + \beta 4 AST_{i,t} + \beta 5 RSK_{i,t} + \beta 6 SZE_{i,t} + \mu$ $SHORT_{i,t} = \beta 0 + \beta 1 PRT_{i,t} + \beta 2 GRW_{i,t} + \beta 3 TAX_{i,t} + \beta 4 AST_{i,t} + \beta 5 RSK_{i,t} + \beta 6 SZE_{i,t} + \mu$

Where, $LEV_{i,t}$ is the ratio of total debt to total capital for company *i* in period *t*; $LONG_{i,t}$ is the ratio of long-term debt to total capital for company *i* in period *t*; $SHORT_{i,t}$ is the ratio of short-term debt to total capital for company *i* in period *t*; $PRT_{i,t}$ is the ratio of EBT to total assets for company *i* in period *t*; $GRW_{i,t}$ is the percentage change in sales for company *i* in period *t*; $TAX_{i,t}$ is the ratio of pre-tax profits for company *i* in period *t*; $AST_{i,t}$ is the ratio of tangible assets to total assets for company *i* in period *t*; $RSK_{i,t}$ is the squared difference between the profitability of the company and the average profitability of the other companies for company *i* in period *t*; $SZE_{i,t}$ is the natural logarithm of total assets for company *i* in period *t*; and μ, the error term.

Hypothesis Analysed

The capital structure model used for this work contains 6 explanatory variables: profitability, size, asset structure, sales growth, tax, and risk. Upon review of the relevant works about the relationship of each of the 4 variables with the level of debt, the hypotheses to analyse empirically are defined as:

- Hypothesis 1: It is expected that performance is inversely related to the level of indebtedness.
- Hypothesis 2: Growth is directly related to leverage and long-term debt.
- Hypothesis 3: A firm with a high tax shield is less likely to finance with debt.
- Hypothesis 4: Size is expected to be directly related to the level of indebtedness.
- Hypothesis 5: It is expected that asset structure is directly related to the level of indebtedness.
- Hypothesis 6: It is expected that risk is inversely related to the level of indebtedness.

Next, Table 1 presents the independent variables of the model, and also the dependent variable in its 2 forms.

Table 1: **Description of the Dependent and Independent Variables**

	Variables	*Proxy*
Dependents	Leverage (LEV)	(Long-term debt + Short-term debt) / Total capital
	Short-term debt ratio (SHORT)	(Short-term debt)/Total capital
	Long-term debt ratio (LONG)	(Long-term debt) / Total capital
Independents	Profitability (PRT)	EBT / Total assets
	Asset structure (AST)	Fixed assets / Total assets
	Size (SZE)	ln (Total assets)
	Risk (RSK)	(Profitability of the bank in year *t* − Average profitability of other banks in year *t*) ^ 2
	Tax (TAX)	Ratio of pre-tax profits
	Growth (GRW)	Percentage change in turn-over

Panel Data Analysis

The research methodology is based on the panel data analysis, taking into account both the time series (2009-2015) and cross-sectional data of the 50 banks. Panel data are better able to identify and measure effects that are simply not detected in time-series data or cross-section studies. Panel data models allow to build and test more complex models of the time-series or pure cross-section behaviour. So that biases resulting from the aggregation of companies or individuals may be reduced or eliminated, after data collection, a regression is run over these two dimensions. Eviews 9 is used for panel data analysis.

Descriptive Statistics

Descriptive statistics methods like arithmetic average (mean), median, and standard deviation are used in this paper to summarise and simplify the data sample, and derive certain useful observations.

Regression Analysis

The linear regression model is the most widely used in predicting the values of a quantitative variable from the values of other explanatory quantitative variables (also known as simple linear regression model).

In particular, according to the simple linear regression model, subjects' scores on 2 of them – 1 variable, considered predictor variable (X) and the other, the response variable (Y) – are represented (modelled) by the equation a straight line:

$$\hat{Y} = \beta_0 + \beta_1 \cdot X_1$$

In case of analysis of the structural equations, 2 stage least squares (2SLS) regression analysis method isused. This method is the extension of the OLS method. It is used to avoid endogeneity problem that arises when the dependent variable's error terms are correlated with the independent variables, as in this paper.

Empirical Results

Result of Descriptive Statistics

A synopsis of the descriptive statistics carried out on the dependent and independent variables can be found in Table 2. These are the average figures arrived upon, using the financial statements of the banks.

Table 2: Descriptive Statistics of Dependent and Independent Variables

	LEV	*SHORT*	*LONG*	*AST*	*GRW*	*PRT*	*RSK*	*SZE*	*TAX*
Mean	0.9279	0.7562	0.1716	0.0044	0.0172	0.0078	0.00009	24.8795	0.2751
Median	0.9617	0.8384	0.1136	0.0035	0.0381	0.0049	−0.00004	24.4750	0.2759
Maximum	1.1499	1.1499	0.8678	0.0139	2.3222	0.0777	0.0047	32.7131	0.7641
Minimum	−1.7841	−0.9926	−0.7915	0.000002	−0.9101	−0.0396	-0.0006	19.6769	0.0000
Std. Dev.	0.2202	0.3156	0.1642	0.0031	0.3138	0.0121	0.0005	2.5714	0.1376

The mean and median leverage of the banks in the sample is 0.9279 and 0.9617, respectively. This clearly depicts that more than 93% of the banks in Luxembourg are debt financed. The mean of the long-term leverage is computed as 17.1%, which denotes the percent of long-term debt as percentage of total capital. The mean and median of the short-term leverage of the banks was 0.7562 and 0.8384, respectively. This is calculated by taking the ratio of short-term debts and total capital of the banks. The entire short-term debt seems to consist of more than 75% of the capital of the banks. This enforces the significance of the short-term debt financing over the

long-term debt financing for the Luxembourg banks. This is fairly in line with the regular procedure implemented in the banks, where the working capital mainly consists of the deposits made by customers. The profitability, which is calculated as the ratio of earning before taxes (EBT) to the total assets, has provided an average value of 0.0078. This means the banks in Luxembourg provide an average ROA of 0.78% or 78 basis points.

Risk is measured as the variability of profit and it is calculated as the squared difference in the profitability of the bank and the profitability of the other banks for each

year. The sign of the difference between the profitability of the bank and the average profitability is added to this squared result. The mean and median values of risk are 0.00009 and −0.00004, respectively. The average corporate tax in Luxembourg was 27.51%. The mean and median growth rate was 0.017 and 0.038, respectively. This means the sales growth in Luxembourg over this 6-year period was 1.7%. The fixed assets employed for the operation had a mean of 0.0044 and median of 0.0035. This depicts that at an average, fixed assets comprised of 0.44% of the total assets of the banks studied in the sample. The size of the bank is calculated as the natural logarithm of their total assets and it has a mean value of 24.8795 and median value of 24.4750.

Result of Regression Analysis

The results of the 2 stage least squares regression between leverage (dependent variable) and the 6 independent variables are shown in Table 3. The results indicate that there is an inverse relationship between profitability and leverage.

Previous studies show that if the company has higher profits, then the level of internal financing increases (Titman & Wessels, 1998). If the banks are profitable, they will accumulate internal reserves, and this will enable them to depend less on external financing. Banks do have access to external funds, but they avoid this, and the need to use debt financing maybe lower if there are investments financed from previous reserves. Pecking order theory is in line with this theory, and many firms prefer internal sources for financing, and not external. The amount of risk associated with 'level of leverage' of banks is very high and there is no support. Another thing to add to this is that the coefficient for risk on leverage is positive and irrelevant; so this raises a question as to whether risk is imperative in the capital structure of banks.

However, the results between tax and leverage are positive. The positive coefficient may be due to the additional tax that is imposed on the banks. The corporate income tax rate comprises a 7% employment fund contribution. Furthermore, a municipal business tax is

imposed. This rate for the city of Luxembourg is 6.75%. The municipal business tax rate differs subject to the location. Banks in Luxembourg thus have an enticement to utilise more debt capital. However, interests charged on these taxes are deductible. Thus, tax increases each time (successive tax increase) would enable increased debt capital. The results have shown a very strong and positive relationship between the two variables - growth and leverage.

Many growing companies demand internal financing, and therefore, banks with a high growth rate are inclined to short-term (less assured) debts first, and later, move on to long-term (more assured) debts. Table 3 shows a negative and strong correlation between operating assets and leverage. Statistically relevant positive relationship exists between size and leverage, so this suggests that bigger the bank, the more external financing used. The main reasons are – the larger the banks, the more diversified their portfolio, presence in the global arena, and lower variance in earnings, enabling them to manage these high debt ratios. The companies that provide the debt capital will lend to larger banks as they are thought to be at less risk, such as Bank of America, and so on. Smaller banks will always go with lower debt ratios as they find it expensive. This result is in agreement with the financial theory the author has put forth.

Table 3: Regression Model Results (Y: Leverage)

Indept. Variable	Coefficient	Std. Error	t-Statistic	Prob.
AST	−11.9564	4.9432	−2.4187	0.0162
GRW	0.0123	0.0268	0.4600	0.6459
PRT	−2.4132	1.1074	−2.1792	0.0301
RSK	20.3213	16.7427	1.2137	0.2258
SZE	0.0477	0.0059	8.0122	0.0000
TAX	0.2424	0.0986	2.4594	0.0145

Notes: R-squared = 0.3755; S.E. of regression = 0.1677; F-statistic = 15.7438; Prob(F-statistic) = 0.0000.

Table 4 shows the outcome of regression, explaining the link between short-term debt and bank's features. An inverse relationship exists between the bank's profit, risk, and asset structure, and short-term debt.

Table 4: **Regression Model Results (Y: Short-Term Debt)**

Indept. Variable	Coefficient	Std. Error	t-Statistic	Prob.
AST	−24.7573	5.0980	−4.8562	0.0000
GRW	0.0131	0.0222	1.5888	0.0504
PRT	−2.9877	0.9799	−3.0490	0.0025
RSK	−20.3677	17.7041	−1.1504	0.2509
SZE	0.0843	0.0065	13.0574	0.0000
TAX	0.1858	0.0908	2.0470	0.0416

Notes: R-squared = 0.6934; S.E. of regression = 0.1244; F-statistic = 59.2027; Prob(F-statistic) = 0.0000.

The correlation analysis between the bank's profit and short-term debts shows that banks use less short-term debts. The coefficient is negative, and the risk (pre-tax profit variability) is statistically irrelevant, thus confirming that risk has no impact on the bank's structure. On the contrary, the relationship (inverse) between assets structure and short-term debts indicates that less short-term debts are involved in the financing of operating assets of the banks.

Again, in Table 4, we see that there is a strong positive relationship between taxation, growth, and size on one side, and short-term debt on the other side. All the variables are shown moving in the same direction (except risk). Short-term debt does have a significant impact on bank's capital.

The relationship between long-term debt, profit of the bank, risk, corporate tax, growth, and asset structure are shown in Table 5. Again, it shows a very positive and strong relationship between the profits and long-term debts of banks. This result is contrary to evidence that suggests more profitable banks use less debt capital. A negative relationship exists between risk and long-term debt, and is statistically insignificant, but it is in agreement with the statements that high-risk banks (firms) use less debt.

Table 5: **Regression Model Results (Y: Long-Term Debt)**

Indept. Variable	Coefficient	Std. Error	t-Statistic	Prob.
AST	12.3866	2.6419	4.6884	0.0000
GRW	−0.0243	0.0114	−2.1318	0.0339
PRT	0.1635	0.5340	1.6061	0.0497
RSK	−4.2628	10.2122	−0.4174	0.6767
SZE	−0.0416	0.0036	−11.5781	0.0000
TAX	−0.0181	0.0466	−2.2840	0.0232

Notes: R-squared = 0.6083; S.E. of regression = 0.0625; F-statistic = 40.6650; Prob(F-statistic) = 0.0000.

The relationship between corporate taxes and long-term leverage is negative, which is totally opposite to the trade-off model. Then, the next set of results between long-term debt and bank's growth are negative, but not significant. The firms that are in the growth phase will use internal funds for their debt capital, and thus, banks with a high growth rate tend to look at their own reserves and then go for short-term debts before long-term debts for financing their growth. Pecking order theory suggests that firms will have a preference for capital to be used to finance their own investments.

There is a direct relationship between operating assets (such as tangible assets) and long-term debt. Banks in Luxembourg with higher operating assets are using financing through long-term debt capital. The valid reason could be that the bank's operating assets mean fewer operating risks for them, so there may not be much risk for banks if they use long-term debt capital. It also depicts an inverse relationship between the bank's size and long-term debt, which means smaller banks rely on long-term debt for their financing needs (limited access to capital). This result is similar to the evidence.

Result Summary

Research Question 1: "It is expected that performance is inversely related to the level of indebtedness."

The empirical evidence confirms that performance is inversely related to the leverage, in the case of banks in Luxembourg.

Research Question 2: "Growth is directly related to leverage and long-term debt."

The empirical evidence confirms that sales growth of the banks in Luxembourg is directly related to the leverage.

Research Question 3: "A firm with a high tax shield is less likely to finance with debt."

The empirical evidence confirms that tax has a direct relationship with the leverage of the banks in Luxembourg.

Research Question 4: "Size is expected to be directly related to the level of indebtedness."

The empirical evidence confirms that size is directly related to the bank's leverage, in Luxembourg.

Research Question 5: "It is expected that asset structure is directly related to the level of indebtedness."

Contrary to the assumption, the empirical evidence confirms an inverse relationship between asset structure and leverage of the banks in Luxembourg.

Research Question 6: "It is expected that risk is inversely related to the level of indebtedness."

In the case of risk, the empirical evidence does show a direct relationship between risk and the leverage of the banks in Luxembourg, but the results are statistically insignificant.

Conclusion

This research is built on studies by Abor and Biekpe (2007), in developing a model for the analysis of financing and capital structure of banks in Luxembourg. In conclusion, the variables that were studied by the authors were similar to the trade-off and pecking order analogy. Risk was definitely an exception, but the assumptions associated with this variable were mostly affected by the choice of proxy employed to represent risk. This research also brings to light the importance of understanding the difference between 2 debts – short term and long term, especially when it is related to capital structure. Since the banks in Luxembourg mostly use short-term debt financing, it is found that the leverage of banks is negatively related to the tangible assets in operations.

Debt was divided into short- and long-term, and it was found that long-term debts are positively related to the assets used in operations. There is a negative relationship between short-term debts of banks and the bank's profit, risk, and asset structure, and a positive relationship with size of the bank, growth rate, and corporate tax. Positive relationship is witnessed with the banks' asset structure and profitability, and negative relationship with bank's risk, growth, corporate tax, and size. Except the risk, all variables show movement in the same direction. All this could be because of short-term debt being a large part of a bank's capital structure. It has been researched that 93% of banks' assets in Luxembourg are debt-financed, especially short-term debt, which is 75% of the capital. Short-term debts are more important than long-term debts in financing the banks of Luxembourg.

So, in conclusion, the statistical evidence from Luxembourg shows that profitability, tax, growth, bank's size, and asset structure are very important variables influencing bank's capital structure. However, there is no supporting evidence regarding the effect of risk on the leverage of banks in Luxembourg.

The study once again confirmed that capital structure matters, and it affects the performance of the firms. The only factor that could not be determined was risk. So, for future research, it would be good to assess the impact of risk on the leverage of the banks, by taking into consideration the risk value theory, and to determine a link between the optimal capital structure and bank credit.

References

Abor, J., & Biekpe, N. (2007). Corporate governance, ownership structure and performance of SMEs in Ghana: Implications for financing opportunities. *Corporate Governance, 7*(3), 288-300.

Allen, F., Bhattacharya, S., & Schoar, A. (2008). The contributions of Stewart Myers to the theory and practice of corporate finance. *Journal of Applied Corporate Finance, 20*(4), 8-19.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies, 58*(2), 277-297.

Ashton, D. (1991). Corporate financial policy: American analytics and UK taxation. *Journal of Business Finance and Accounting, 18,* 465-482.

Auerbach, A. (1985). Real determinants of corporate leverage. In B. M. Freidman (Ed.), *Corporate Capital Structure in US* (pp. 301-324). Chicago, IL: University of Chicago Press.

Bevan, A., & Danbolt, J. (2004). Testing for inconsistencies in the estimation of UK capital structure determinants. *Applied Financial Economics, 14*(1), 55-66.

Booth, L., Aivazian, V., Demirguc-Kunt, V., & Maksimovic. (2001). Capital structures in developing countries. Journal *of Finance, 56*(1), 87-130.

Cassar, G., & Holmes, S. (2003). Capital structure and financing of SMEs: Australian evidence. *Accounting and Finance, 43(*2), 123-147.

Chittenden, F., Hall, G., & Hutchinson, P. (1996). Small firm growth, access to interest on corporate capital structure. *Journal of Finance, 43*, 271-281.

De Jong, A., Verbeek, M., & Verwijmeren, P. (2010). The impact of financing surpluses and large financing deficits on tests of the pecking order theory. *Financial Management, 39*(2), 733-756.

DeAngelo, H., & Masulis, W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics, 8*(1), 3-29.

Drobetz, W., & Wanzenried, G. (2006). What determines the speed of adjustment to the target capital structure? *Applied Financial Economics, 13*(7), 941-958.

Easterbrook, F. (1984). Two-agency cost explanations of dividends. *American Economic Review, 74*(4), 650-659.

Elsas, R., & Florysiak, D. (2008). *Empirical capital structure research: New ideas, recent evidence, and methodological issues*. Munich School of Mgmt. Discussion Papers in Business Admin 2008-10.

Fama, E., & French, K. (2005). Financing decisions: Who issues stock? *Journal of Financial Economics, 76*(3), 549-582.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics, 67*(2), 217-248.

French, K., & Fama, E. (2002). Testing tradeoff and pecking order predictions about dividends and debt. *The Review of Financial Studies,* 15(1), 1-33. Oxford Univ. Press for Society for Fin Studies.

Gaud, P., Jani, E., Hoesli, M., & Bender, A. (2005). The capital structure of Swiss companies: An empirical analysis using dynamic panel data. *European Financial Management, 11*(1), 51-69.

Getzmann, A., Lang, S., & Spremann, K. (2010). *Determinants of the target capital structure and adjustment speed-evidence from Asian capital markets.* European Financial Management. Paper Presented at the European Financial Management Symposium.

Graham, J. (1996). Debt and the marginal tax rate. *Journal of Financial Economics, 41*(1), 41-73.

Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance, 46*(1), 297-355.

Jensen, M. (1986). Agency cost of free cash flows, corporate finance and takeovers. *American Economic Review, 76*(2), 323-339.

Jordan, J. L., & Taylor, P. (1998). Strategy and financial policy in UK small firms. *Journal of Business Finance and Accounting, 25*(1), 1-27.

KPMG. (2012). Luxembourg Banks Insights 2012. Retrieved March 22, 2013, from www.kpmg.com/LU/en/IssuesAndInsights/Articlespublications/Documents/2012-Luxembourg-Banks- Insight.pdf

Kremp, E., Stöss, E., & Gerdesmeier, D. (2001). *Estimation of a debt function: Evidence from French and German firm panel data, corporate finance in Germany and France, joint research project of Deutsche Bundesbank and Banque de France* (pp. 140-194). Frankfurt am Main: Deutsche Bundesbank and Paris: Banque de France.

Leary, M., & Roberts, M. (2010). The pecking order, debt capacity, and information asymmetry. *Journal of Financial Economics, 95*(3), 332-355.

MacKie-Mason, J. (1990). Do taxes affect corporate financing decisions? *The Journal of Finance, 45*(5), 1471-93.

Michaelas, N., Chittenden, F., & Poutziousris, P. (1999). Financial policy and capital structure choice in UK SMEs: Empirical evidence from company panel data. *Small Business Economics, 12*(2), 113-130.

Modigliani, F., & Miller, M. (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review, 53*(3), 433-443.

Modigliani, F., & Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review, 48*(3), 261-297.

Myers, S. (1977). The determinants of corporate borrowing. *Journal of Financial Economics, 5*(2), 145-175.

Myers, S. (1983). The capital structure puzzle. *Journal of Finance, 39*(3), 575-592.

Myers, S. (2001). Capital structure. *Journal of Economic Perspectives, 15*(2), 81-102.

Myers, S. C., & Majluf, N. (1984). Corporate financing and investment decisions when firm have. *Journal of Financial Economics, 13*(2), 187-221.

Ooi, J. (1999). The determinants of capital structure: Evidence on UK property companies. *Journal of Property Investment & Finance, 17(*5), 464-480.

Rajan, G., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance, 50*(5), 1421-1460.

Remmers, L., Stonehill, A., & Wright, R. (1974). Beekhuisen industry size as debt ratio determinants in manufacturing internationally. *Financial Management, 3*(2), 24-32.

Seifert, B., & Gonenc, H. (2008). The international evidence on the pecking order hypothesis. *Journal of Multinational Financial Management, 18*(3), 244-260.

Serrasqueiro, Z., & Nunes, P. (2008). Determinants of capital structure: Comparison of empirical evidence from the use of different estimators. *International Journal of Applied Economics, 5*(1), 14-29.

Shyam-Sunder, L., & Myers, S. C. (1999). Testing static trade-off against pecking order models of capital structure. *Journal of Financial Economics, 51,* 219-244.

Titman, S., & Wessels, R. (1998). The determinants of capital structure choice. *Journal of Finance, 43*(1), 1-19.