

EFFECT OF DEBT-EQUITY TAX BIAS ON THE WACC OF OIL AND GAS COMPANIES IN BRICS COUNTRIES

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—Abstract —

The global financial crisis, highlighted companies' vulnerability to debt that led to an intensive effort to reduce leverage. The debt-equity ratio points towards financial leverage and therefore has a direct impact on a company's long-term sustainability. The literature review highlights the fact that tax systems allow for interest payments to be deductible for income tax purposes, while denying such payments on equity. This tax treatment leads to a tax bias towards debt finance. The purpose of the study is to determine the potential tax bias risk of oil and gas companies in BRICS countries exploring the effect of debt-equity tax bias on weighted-average cost of capital (WACC). The annual financial statements of five oil and gas companies in BRICS countries were analysed to determine the effect of debt-equity tax bias on WACC for the period of 2009 to 2016. Evidence of tax biasness related to debt-equity finance is clearly visible in the annual financial statements. The WACC is directly influenced through this phenomenon. The results indicated a significantly inverse relationship between debt-equity and the WACC of oil and gas companies in BRICS countries. The annual financial statements revealed in all cases a tax bias trend. Which can potentially increase risk for the said companies, due to the over exposure to debt, especially in times of financial hardship. Although many of the companies adjusted the WACC based on the lessons learned from the global financial crisis, this still remains a concern. The study proposes that debt-equity tax bias influences WACC and provides some evidence to suggest that managers, directors and shareholders should consider reducing the debt-equity ratio. The study could potentially help regulating authorities to gain insights into debt-equity decisions and how these decisions could potentially influence long-term sustainability and the wealth earning ability of companies in BRICS countries.

Keywords: Debt-equity ratio, Capital structure, Taxation, BRICS, Weighted-average cost of capital

JEL Clarification: G32

1 INTRODUCTION

In the aftermath of the Global Financial Crisis (GFC), an intensive effort was made to reduce companies' leverage (Bremus, 2016). The debt-equity ratio influences financial leverage and therefore has a direct impact on a company's long-term sustainability as well as the ability to create wealth. Furthermore, De Mooij (2011) highlights the fact that tax systems allow for interest paid to be deductible for corporate income tax while equity is seen as business income. The European Union (EU) Commission (2015) is of opinion that the preferential tax treatment of debt causes equity to not always be considered. Furthermore, the EU Commission (2015) argues that by addressing the tax bias on debt, an increase in equity financing will develop.

Dubay (2015); Fatica, Hemmelgarn and Nicodème (2012); De Mooij (2011); Mitra (2011), all demonstrate that most tax systems support corporate debt over equity, especially with interest payments that are deductible for income tax purposes while equity returns are not, this lead to a tax-induced bias towards debt finance (de Mooij, 2011). Tax bias strongly encourages companies to increase debt relative to equity (Pozen, 2015). The tax bias towards debt is the result of the tax deductibility of interest expenses on loan financing and not on equity financing, which has led to the distortion of financing decisions (Fatica *et al.*, 2012). Interest expenses on debt are deductible for tax purposes in all BRICS (Brazil, Russia, India, China and South Africa) countries (ZAO Mazars, 2011; PKF, 2013; PWC, 2016; Deloitte, 2017 and PWC, 2017).

Previous studies focussed on the tax benefit of debt (Bremus, 2016; Barclay, Heitzman & Smith, 2012 ;) and corporate funding structures (Chowdhury & Chowdhury, 2010). The literature search yielded no study that focus on the tax bias risk oil and gas companies face in BRICS countries and its effect on weighted-average cost of capital (WACC). The purpose of this study was to determine the impending tax bias risk faced by oil and gas companies in BRICS countries by exploring the effect of debt-equity tax bias on WACC. By achieving this, the study contributes to academics, practitioners, and managers' thoughtfulness towards the impact of debt-equity tax bias on the WACC of companies.

1.1. Debt-equity ratio

Kazemian and Sanusi (2015) identify a very strong relationship between financial decisions (debt) and earnings management (equity). McConnel and Servaes (1995) illustrate the importance of debt and equity policies to determine the optimum capital structure. De We and Dhanraj (2007) surmise that the value of a company is directly influenced by the optimum capital structure. Oliveira (2016) argues that if a company increase its debt past the optimal capital structure, the company is more defenceless to risk. This risk can be measured by the debt-equity ratio.

The debt-equity ratio is a long-term solvency ratio that establishes (Maheshwari, Maheshwari & Maheshwari, 2013) and directs (Maheshwari, Maheshwari & Maheshwari, 2012) the accuracy of the company's long-term financial policies. The capital structure of a company that is used to finance a company over a long-term period is a mix between debt and equity (Subbareddy & Reddy, 2017).

Peavler (2017) contests that a higher debt-to-equity ratio indicates a higher use of debt instead of equity and lead to an increased risk. Cordes and Sheffrin (1981) explain that by growing the portion of debt in a company's capital structure the company's taxable income will decrease through extra interest deductions, which will reduce tax payments. Barclay et al. (2012) point out that tax play a noticeable role in the financing decisions of a company.

1.2. Tax bias

Tax benefits of debt financing can potentially influence financing decisions (Fatica et al., 2012). Vernimmen, Quiry, Dallochio, Le Fur and Salvi (2014) argue that by financing a company through debt the tax liability is reduced as repayments (cash outflows) create a tax deduction. GrantThornton (2016) predicts that the leading tax benefit is derived from the tax deduction obtained for interest expenses. Debt bestows a tax benefit on companies when interest payments are deductible from taxable income (Heider & Ljungqvist, 2015).

Taxation has a substantial effect on the choice of financing structure as well as the value of a company (Adelegan, 2003). Lewellen and Lewellen (2005) argue that the link between taxes and financing decisions is more significant than the traditional view suggests. Sinha and Bansal (2014) supported this by concluding that tax effects are one of the important deliberations in companies' financing decisions. Clayman, Fridson, and Troughton (2008) predict that founded on the

MM-theory, if taxes as a deduction on interest expenses are introduced, the value of the company will increase and WACC will decrease as more debt is used.

1.3. Weighted-average cost of capital (WACC)

WACC is an important and useful financial tool for companies (Berry Betterton & Karagiannidis, 2014). Chowdhury and Chowdhury (2010) explain that the WACC is used to outline a company's value by discounting future cash flows. According to Fernandez (2015) the WACC is a weighted-average of two very diverse significances namely a cost (debt) and a required return (equity). It is important to note that WACC usually use market values to express the value of debt and equity (Borad, 2017). Nevertheless, Mitra (2011) is of the opinion that tax deduction based on interest relates to the actual book value and therefore the WACC calculation method needs to report on tax deductions based on book values. Beech and Thayser (2015) explain that WACC is the "blended" cost of capital after taking in to consideration the relative weighted-average of debt and equity in the company's capital structure.

1.4. The influence on the company's risk

Chowdhury and Chowdhury (2010) explain that there is a direct link between the increase in the level of debt, the profit level and the value of the company. Modigliani and Miller (1958) seminal research indicate that a company's value is not based on how the operations are financed but rather on the present value of the company's operational cash flows in a "perfect capital market", known as the trade-off- or MM-theory. Modigliani and Miller (1963) corrected this irrelevance theorem based on the fact that this proposition will not function when a company's income is taxed. Modigliani and Miller have been cited by various authors (Schepens, 2016; King, 1974; Stiglitz, 1973).

The debt-equity ratio influences financial leverage and therefore has a direct impact on a company's long-term sustainability as well as the ability to create wealth. King (1974) and Stiglitz (1973) already assessed that tax deductions do not only have an impact on a company's capital structure but have a direct influence on financial stability. The magnitude of this truth was realised by many over indebted companies during the GFC and its aftermath. However, Das (2016) critiques national governments, financial institutions, businesses and citizens for the increase in borrowing and global debt-to-GDP ratio and argue that it seems that the lessons learned are forgotten. Furthermore, Das (2016) identifies the

significant increase of debt in BRICS countries, with a high proportion of the new debt being used to pay off the old loans. Most economists agree that refinancing loans aggravates risk.

The aim of this study was to determine the potential tax bias risk of oil and gas companies in BRICS countries to determine whether debt-equity tax bias influence the WACC of oil and gas companies.

2 METHODOLOGY

This study used an extensive literature review in the form of a document analysis as a qualitative research approach. This analysis highlighted the need for this study as well as the phenomenon. Stent, Hooks and Bradbury (2010), Bowen (2009), Welman, Kruger and Mitchell (2005); Creswell (2003) argue that the usefulness of document analysis lies in its inconspicuous and non-reactive characteristics. Swart, Swanepoel and Surujlal (2014) contest that document analysis is an iterative process, whereby both researcher(s) and reader(s) can verify the results of the study.

2.1 Instrument and procedures

Before embarking on this research the researchers decided which documents would be most relevant in the framework of this study. The documents that were analysed in this study were the annual financial reports of Petroleo Brasileiro SA Petrobras (Petrobras), Public Joint Stock Company Gazprom (Gazprom), India Oil and Natural Gas Corporation Limited (India Oil), PetroChina Company Limited (PetroChina), and Sasol Limited (Sasol) for the period 2009 to 2016. The annual financial reports contain the audited financial statements, auditors' reports and performance information of the company. Particular prominence was centred on debt, equity, interest expenses and effective tax rate of each of the companies. Researchers (Berry et al., 2014 and Mitra, 2011) argue that debt, equity, interest expenses and effective tax rate are important aspects to determine the optimum capital structure of a company, which will ultimately influence its WACC. The evidence obtained from the annual financial reports was prudently evaluated by the two researchers, both being experts, one a tax practitioner and the other a management accountant.

2.2 Data analysis

The data obtained from the documents analysis were at the outset captured on an Excel spreadsheet and analysed. The financial statements of the five BRICS-based oil and gas companies were analysed too first determine correlation coefficients. Based on the results of the correlation coefficients, the expected WACC, debt-to-equity and interest cover were determined before calculating the coefficient of variance of each company.

3. RESULTS

A factor analysis was conducted on the data based on the results of the literature study. WACC%, Debt%, Equity%, Effective Tax Rate and Interest cover were identified as the principle components that needed to be analysed. This section reports on the sample composition, correlation among variables and expected values. Each of these are reported on separately.

3.1. Sample composition

The study investigated Brazil, Russia, India, China and South Africa (BRICS) oil and gas companies. Esposito, Kapoor and Mathur (2016) indicate that these countries historically have had incredible growth possibility, however, currently these countries find themselves in severe economic and political distresses. Commodity prices, such as the oil price, influence a country's economy (Canuto, Crain & Davig, 2016). The oil and gas industry was chosen as it is believed that it is the industry that keeps the wheels of the economy turning. The Rapier's list of 25 Biggest Oil and Gas Companies in the World, (Rapier, 2016) rank the following BRICS companies.

Brazil – Petrobras:

Petroleo Brasileiro SA Petrobras, a state-owned company that was founded on October 3, 1953. The company operates on an integrated basis and specialises in the oil, natural gas and energy industry (Reuters, 2017a). Petrobras came in at number eight on the Rapier's 25 Biggest Oil and Gas Companies in the World.

Russia – Public Joint Stock Company Gazprom:

Gazprom has taken first place on the Rapier's list. Gazprom is a global energy company that holds the world's largest natural gas reserves and the largest gas transmission system. Gazprom's mission is to ensure reliable, efficient and a

balanced supply of natural gas, other energy resources and their derivatives to consumers (Gazprom: 2017).

India-India Oil and Natural Gas Corporation Limited:

India Oil is filling the ranks at number 17 (Rapier, 2016), the company is engaged in the exploration, development and production of crude oil and natural gas (Reuters, 2017b).

China – PetroChina Company Limited:

PetroChina is the largest oil/gas producer and distributor, playing a dominant role in the oil and gas industry in China (PetroChina, 2015). For this reason, PetroChina is placed fourth on the rankings by Rapier.

South Africa unfortunately did not appear on the Rapier's 25 Biggest Oil and Gas Companies in the World, however, the researchers chose to include Sasol even though it was not on the Rapier's list, but because it is a South African company.

South Africa – Sasol Limited:

Sasol is an international integrated chemicals and energy company working in 33 countries. The company is listed on the Johannesburg Stock Exchange (JSE) in South Africa and the New York Stock Exchange in the United States (Sasol, 2017).

The five companies' financial statements from 2009 to 2016 were content-analysed. A total of 40 (n=40) financial statements were included in the study. Table 1 summarises the results of the mean and the standard deviation of the debt-equity ratio for the eight financial years from 2009 to 2016.

Table 1: Debt-equity ratio for the financial period 2009 to 2016

	<i>WACC %</i>	<i>Debt %</i>	<i>Equity %</i>	<i>Effective tax rate %</i>	<i>Interest cover</i>
Mean	8,373	28,818	71,176	16,821	1943,963
Standard error	0,460	3,427	3,426	2,119	942,600
Median	7,560	26,810	73,190	19,775	16,320
Standard deviation	2,911	21,677	21,668	13,403	5961,523
Kurtosis	0,905	-0,622	-0,622	-0,316	19,721
Skewness	1,207	0,418	-0,420	-0,603	4,221
Range	11,270	72,160	72,150	54,840	32964,250
Minimum	5,300	0,260	27,580	-18,660	-2,250
Maximum	16,570	72,420	99,730	36,180	32962,000
Sum	334,930	1152,710	2847,020	672,850	77758,530
Count	40,000	40,000	40,000	40,000	40,000
Largest(1)	16,570	72,420	99,730	36,180	32962,000
Smallest(1)	5,300	0,260	27,580	-18,660	-2,250
Confidence level (95.0%)	0,931	6,933	6,930	4,286	1906,587

Source: India Oil and Natural Gas Corporation Limited (2016), PetroChina Company Limited (2016), Petroleo Brasileiro SA Petrobras (2016), Public Joint Stock Company Gazprom (2016), Sasol Limited (2016)

3.2. Correlation among variables

Puth, Neuhauser and Ruxton (2015) argue that Pearson and Spearman are frequently used correlation coefficients models. Spearman’s correlation is normally used as a non-parametric measure of the relation between variables and is limited by the assumption of normality. Exploring the relationship among the constructs (WACC%, Debt%, Equity%, Effective tax rate, and interest expenses) the Spearman’s correlation coefficient established the strength of the relationships among the constructs. Levin (1987) illustrates that correlation indicates the nature and strength of the interactions between variables. Field (2009) predicts that variables’ correlation coefficient can indicates a positive, negative or an unconnected relation.

It may be argued that by only considering 40 observations (n=40) influence the statistical significance (Pallant, 2016). However, as the purpose of the study is to determine the potential tax bias risk of oil and gas companies in BRICS countries exploring the effect of debt-equity tax bias on WACC, the sample size deemed appropriate. The appropriateness of the 40 observations is based on the Rapier’s

list of 25 Biggest Oil and Gas Companies in the World, with the exception of Sasol Limited just being a South African company. The study made use of quota sampling similar to what Saunders (2016) used together with non-probability convenience sampling as proposed by Laerd (2015), Farrokhi and Mahmoudi-Hamidabad (2012). The scores for the variables included in the five scales of the BRICS oil and gas companies are conveyed in Table 2.

Table 2: Descriptive and correlation analysis of constructs of the BRICS oil and gas companies

Brazil-Petrobras					
	WACC %	Debt %	Equity %	Effective Tax Rate %	Interest cover
WACC %	1,000				
Debt %	0,240	1,000			
Equity %	-0,240	-1,000	1,000		
Effective tax rate %	-0,440	-0,743	0,743	1,000	
Interest cover	0,117	-0,847	0,847	0,627	1,000
Russia-Gazprom					
WACC %	1,000				
Debt %	0,477	1,000			
Equity %	-0,477	-1,000	1,000		
Effective tax rate %	-0,139	-0,402	0,402	1,000	
Interest cover	0,623	0,471	-0,471	-0,071	1,000
India Oil India					
WACC %	1,000				
Debt %	-0,219	1,000			
Equity %	0,219	-1,000	1,000		
Effective tax rate %	0,337	-0,788	0,788	1,000	
Interest cover	-0,418	-0,588	0,588	0,312	1,000
China-Petro China					
WACC %	1,000				
Debt %	-0,391	1,000			
Equity %	0,391	-1,000	1,000		
Effective tax rate %	0,529	0,487	-0,487	1,000	
Interest cover	0,279	-0,952	0,952	-0,540	1,000
South Africa-Sasol					
WACC %	1,000				
Debt %	0,612	1,000			
Equity %	-0,567	-0,986	1,000		
Effective tax rate %	0,396	-0,296	0,342	1,000	
Interest cover	0,349	0,630	-0,655	-0,445	1,000

Source: India Oil and Natural Gas Corporation Limited (2016), PetroChina Company Limited (2016), Petroleo Brasileiro SA Petrobras (2016), Public Joint Stock Company Gazprom (2016), Sasol Limited (2016)

An interesting observation from Table 2 is that there exist different levels of positive correlation (weak $r < 0,10 > 0,29$); (moderate $r < 0,30 > 0,49$), (strong $r < 0,50 > 1,00$) as well as negative correlation (weak $r < -0,10 > -0,29$); (moderate $r < -0,30 > -0,49$) and (strong $r < -0,50 > -1,00$). The correlation coefficient indicates WACC, debt-to-equity and interest cover as important variables.

3.3. Expected values

In order to determine the risk due to the potential tax bias risk of oil and gas companies in BRICS countries exploring the effect of debt-equity tax bias on WACC was necessary to determine expected values. The expected values are used to determine the coefficient of variance. Based on the results obtained from the Spearman's correlation coefficients it was decided to calculate the expected values for WACC, debt-to-equity and interest cover. Table 3 summarises the findings for the five oil and gas companies based in the BRICS countries.

Table 3: Summary of the expected WACC, debt-to-equity and interest cover values

Company	WACC	Interest cover	Debt/Equity
Petrobras	6.79	7.43	55.12
Gazprom	13.19	11.08	26.52
India Oil	8.31	446.89	37.60
PetroChina	6.79	12.67	24.18
Sasol	6.79	9421.75	0.66

4. DISCUSSION

The literature review and the document analysis resulted in some interesting findings about the potential tax bias risk of oil and gas companies in BRICS countries. It became apparent in the analyses of the results, that debt-equity tax bias influence the WACC of oil and gas companies.

4.1 Coefficient of variance

Based on the expected return (R_e) and the standard deviation (σ) the coefficient of variance (CV) are calculated. The CV expresses the risk per 1% of return. Therefore, the CV relates to the return and risk. It expresses the risk per 1% of return as follows: $CV = \sigma / R_e$. Table 4 reports the results of the coefficient of variance of WACC, debt-to-equity and interest cover, for the five oil and gas companies in BRICS countries.

Table 4 Summary of the coefficient of variance of the five companies

Company	WACC	Interest cover	Debt/Equity
Petrobras	0.44	3.16	4.18
Gazprom	0.41	1.65	2.62
India Oil	0.30	77.40	6.95
PetroChina	0.44	4.69	2.42
Sasol	0.44	246.19	6.05

The document analysis revealed that India Oil and Sasol had the lowest percentage of debt-to-equity between the five companies. Thus relating to lower financial risk results, which would be consistent to a higher interest cover ratio. The coefficient of variance indicates the risk exposure per expected unit of return. Table 4 clearly indicates that if the CV of the five companies is compared based on risk the two companies with the lower debt (India Oil and Sasol) are less risky. India Oil and Sasol expose the shareholder and investor to 6.95 and 6.05 units of risk for each expected unit of return, while Petrobras, Gazprom and PetroChina expose the shareholders and investors to only 4.18, 2.62 and 2.42 units of risk for each unit of return, respectively. Therefore, on a relative basis, India Oil and Sasol seem to offer a better trade-off between expected return and risk than Petrobras, Gazprom and PetroChina. Correia (2015) argues that this approach is not always helpful in decision-making, it was only used as an indicator to assist to conclude on the debt-equity tax bias of BRICS oil and gas companies.

5. CONCLUSION

The purpose of this study was to determine what impact debt-equity tax bias has on the WACC for five oil and gas companies based in the BRICS countries. The results seem to point towards an increase in risk if a company rely on higher debt levels, due to the debt-equity tax bias, as managers, directors and shareholders use more debt in order to obtain tax deductions. The study proposes that debt-equity tax bias influences WACC and provides some evidence to suggest that managers, directors and shareholders should consider reducing the debt-equity ratio. The study could potentially help regulating authorities to gain insights into debt-equity decisions and how these decisions could potentially influence long-term sustainability and the wealth creating ability of companies in BRICS countries. The study only focussed on five oil and gas companies based in the BRICS countries and therefore limits the scope of the study. Further research should be conducted to include all oil and gas companies across the world. Which could lead

to better results and conclusions on how debt-equity tax bias impact the weighted-average cost of capital (WACC) of oil and gas companies.

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