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Debt Finance, Inventory Management and Economic Value of Energy Industry in Saudi Arabia: Empirical Investigation

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ABSTRACT

The purpose of this paper is to identify the relationships of debt finance and inventory management with firm economic value of energy industry in Saudi Arabia, from 2012 to 2019. The sample comprises of 32 firm-year observations throughout the 8 years' time frame until 2019. Pearson's correlation, Pooled OLS Regression are used in this study. The findings of this study indicate to a negative association between debt finance and firm economic value. Furthermore, a positive association is reported between inventory management and firm economic value. The results of this study are important for energy industry in Saudi Arabia in making decisions related to debt financing. In addition, energy industry can use the results of this study in controlling their inventory practices. Further, the results of this study can be used in future research to gain a deeper understanding of the issues of debt finance, inventory management and firm economic value.

Keywords: Debt Finance, Inventory Management, Economic Value, Energy Industry, Saudi Arabia

JEL Classifications: L25, G51, H68, O13, P18, P28, P48

1. INTRODUCTION

Debt is employed by companies as a means of financing their activities (Damadoran, 2001). Choosing to employ debt financing is regarded as a crucial financial decision for all companies. Every company wants to achieve the maximum possible return and choosing to take on debt can negatively affect profit. Companies employ debt for financing what they presume will be successful projects. If the projects succeed as hoped, the firm will get a good return on its investments and therefore be able not only to pay their debt but also to use the funds left over for further investment. However, should projects not succeed, company performance can be adversely impacted for a considerable period (Stiglitz and Weiss, 1981).

By the same way of token, it is widely agreed that the way in which inventory is managed can have a crucial influence on company profits, as good management can reduce the expense of retaining

stock and make sure that production runs smoothly (Cheung et al, 2004; Shin, 2015). Economic value ratios operate as indicators of how well a company is performing financially and how effectively it is generating profits (Brigham and Erhardt, 2013). Bourne and Walter (2005) state that there is a direct correlation between inventory management and company performance. Inadequate management will inevitably result in a significant wastage related to the cost of storing inventory and greater risks of inventory being damaged or lost (Lwiki et al., 2013). For effective performance, companies must create the maximum possible revenue for the minimum possible cost (Mohamad et al., 2016). Managing inventory will directly influence outlay and therefore company profit and performance (return on investment) (Fullerton et al., 2003; Swamidass, 2007; Koumanakos, 2008; Steven and Britto, 2016; Lin et al., 2018). This means that inventory management and ROA are directly linked (Eroglu and Hofer, 2011; Sahari et al., 2012). Keeping the optimal level of inventory will lead to significant improvements in company financial performance (Abd Karim et al., 2018).

This paper aims to offer greater insight into the links between debt financing/inventory management and company performance related to Saudi Arabia's energy businesses. As far as the researchers are aware, there is no empirical research available linking debt financing/inventory management and company performance. The energy industry has been chosen for examination as it is highly influential economically for the nation in which it employs labor and capital for its output. Saudi Arabia's energy sector is crucial in helping to alleviate economic hardship and address social inequality in the country. Development goals mandate that the energy sector must be developed in a manner that ensures that it benefits wider society. In this way, it can alleviate the poverty gap that exists in developing countries (Ruti and Felice, 2013; Yergin and Gross, 2012). Saudi Arabia has taken steps to implement a market economy through regulation and other means. The outcomes of this research should be a useful reference for the nation's politicians and regulators. On a wider level, it should be useful for all those involved in emerging Middle Eastern markets as many countries in the region have similar institutions and economic structures (La Porta and Lopez-de-silanes, 1999). It is likely that this research will raise new questions regarding debt financing and inventory management; numerous stakeholders will have an interest in seeing the influence that debt financing/inventory management has on a company's profits.

The following sections of the paper are organized as follows. The literature is reviewed and the hypotheses are developed in Section 2. The data collection and research design is highlighted in Section 3. Section 4 displays the results and discussions. Conclusions and implications were discussed in the final section, Section 5.

2. LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

Debt represents the monies borrowed by a company from outside agencies. It is recognized that management is frequently concerned about the impact that debt will have on company value (Grossman and Hart, 1982). This may occur if executives do not exercise effective control over a firm's activity. Excessive debt can damage a company's reputation in the marketplace and thereby lead to a loss of custom. Companies take on debt to have sufficient funds for large projects with an assumption of success. Should these projects succeed and provide the desired results, a company will make significant profits and therefore will be able to pay off their debt and employ the remaining funds to reinvest. However, if such projects should fail, company performance may be negatively impacted for significant periods (Stiglitz and Weiss, 1981). Berezinets et al. (2017) noted that if organizations have higher debt levels, this may be an indicator that they are expanding through engagement with new initiatives. This is why the organization will have to borrow some capital to be used in funding these projects, (Berezinets et al., 2017; Black et al., 2006). Kinsman and Newman (1998) reported that high levels of debt are correlated with lower firm performance. Empirically, Fernandez-Temprano and Tejerina-Gaite (2020) Assenga et al. (2018), Mishra and Kapil (2018), Yasser et al. (2017), Plalniappan (2017), Kumar and Singh

(2013), McConnell and Servaes (1995), Short and Keasey (1999), Weir et al. (2002), Haniffa and Hudaib (2006), Majumdar and Chhibber (1999), Gleason (2000), Cheng (2009), Johnny Jermias (2008). In the setting of Saudi Arabia, Aljifri and Moustafa (2007) find a negative association between firm performance and debts. Accordingly, the expected signs for the relationships of debt finance with firm economic value is negative.

H_{1a} : There is a negative relationship between debt finance and firm economic value-ROA.

H_{1b} : There is a negative relationship between debt finance and firm economic value-ROE.

Inventory is an essential part of business and it requires effective management by senior executives, no matter what the company size (Elsayed and Wahba, 2013; Abd Karim et al., 2018). Inventory management covers everything related to the maintenance and management of inventory, including raw materials, products during manufacture, and the finished article. Companies holding inventory must make sure they maintain the correct level of stock, as over or under stocking can lead to wastage during manufacturing (Chase et al., 2006; Heizer and Render, 2014; Ahmad and Zabri, 2018; Kotler, 2002; Abd Karim et al., 2018).

A primary reason for the importance of inventory is that storage and handling of inventory can be a costly and complicated process. This is especially true with modern systems (Dennis and Meredith, 2000). If inventory is not managed efficiently, delays may ensue and the company may not be able to satisfy the requirements of consumers (Baron et al., 2010; Ahmad and Zabri, 2018). It is essential that companies should have rigorous systems established for managing inventory and make sure that such systems are subject to continuous monitoring and management by suitably qualified employees (Coyle et al., 2003; Mohamad et al., 2016).

The chief aim of managing inventory is making sure that the ideal level of stock is maintained to accord with the demands of customers and the manufacturing processes (Mohamad et al., 2016; Toomey, 2000). In any firm producing products, inventory management is essential as problems with inventory can cause loss of sales or additional cost. Managing inventory effectively maintains a robust supply chain and can help a company to take a lead over its rivals. Inventory management may have a crucial effect on company profits, as it can lead to reductions in storage costs and assist in the smooth flow of production (Cheung et al., 2004; Shin et al., 2015). Economic value ratios offer indicators of how a company is performing financially and how effectively it is creating profits (Brigham and Ehrhardt, 2013).

Bourne and Walter (2005) state that inventory management directly influences how a firm performs. Poor management of inventory will cause significant wastage in terms of the costs of storing inventory and greater risks of goods being damaged or lost (Lwika et al., 2013). For effective performance, companies must create the greatest possible level of revenue for the least outlay (Mohamad et al., 2016). Inventory management directly influences cost and therefore the profits and asset returns of a company (Fullerton et al., 2003; Swamidass, 2007;

Koumanakos, 2008; Steven and Britto, 2016; Lin et al., 2018). This creates a direct linkage of inventory management and ROA (Eroglu and Hofer, 2011; Sahari et al., 2012). The maintenance of the ideal level of inventory can lead to significant improvements in a company's financial performance (Abd Karim et al., 2018).

Little clear evidence is available directly supporting the correlation between company performance and inventory management (Vastag and Whybark, 2005; Cannon, 2008; Keramidou et al., 2012; Obermaier and Donhauser, 2012; Folinis and Shen, 2014). A certain amount of empirical research has been undertaken to investigate this correlation, and what there is has found the two elements to be positively related (Jonsson and Mattsson, 2008; Capkun et al., 2009; Gaur and Kesavan, 2009; Pong and Mitchell, 2012; Sahari et al., 2012; Ahmad and Zabri, 2018; Lin et al., 2018). Researchers have demonstrated that the lower a company's inventory ratio is the greater likelihood of their having high levels of sales, improved ROI, and remaining competitive. Overall, based on the above empirical evidences reported by the extant literature, the following hypotheses are suggested:

H_{2a} : There is a positive relationship between inventory management and firm economic value-ROA.

H_{2b} : There is a positive relationship between inventory management and firm economic value-ROE.

3. DATA COLLECTION AND RESEARCH DESIGN

3.1. Sample Selection and Data Collection

The sample of this study consists of energy listed companies on Saudi Stock Exchange (Tadawul) for the years ranging from 2012 to 2019. We conduct a cross-sectional review of financial reports of the sample companies as depicted in Table 1.

3.2. Regression Model and Definition of Variables

Ordinary-Least Square OLS regression is used to estimate the associations of debt finance and inventory management with firm economic value of energy listed companies in Saudi Arabia for the

period ranging from 2012 to 2019. The utilizing of the OLS regression is because the dependent variable in this study is a continuous measure. The functional equation of the OLS model is as follows:

$$FEV-ROA = \beta_0 + \beta_1 DFA + \beta_2 IM + e \quad (1)$$

$$FEV-ROA = \beta_0 + \beta_1 DFO + \beta_2 IM + e \quad (2)$$

$$FEV-ROE = \beta_0 + \beta_1 DFA + \beta_2 IM + e \quad (3)$$

$$FEV-ROE = \beta_0 + \beta_1 DFO + \beta_2 IM + e \quad (4)$$

Where the dependent variable is:

Where the independent variables are:

Test variable

DFA = total debts divided by total assets

DFO = total debts divided by total owner's equity

IM = sales/inventory

e = error

4. RESULTS AND DISCUSSIONS

4.1. Summary Statistics

Table 2 predicts the mean, standard deviation, minimum and maximum of each variable in the sample data set.

Table 2; panel A shows that the mean of the debt finance DFA is 0.486, and the range is between 0.01 and 0.86 and a standard deviation of 0.299. Further, the average of the debt finance DFO is 1.805 and it ranges from 0.01 to 6.37 and a standard deviation 1.961. The mean of the inventory management IM is 38.479 and it ranges from 10.01 to 88.63 and a standard deviation of 32.058. In addition, Table 2; panel B illustrates that the mean of firm economic value FEV-ROA, the dependent variable, is .0417 and it ranges from 0.000 to 0.11 with a standard deviation of 0.0336. As for the firm economic value FEV-ROE, the average is .091 and it ranges from .000 to 0.33 with a standard deviation of 0.082.

4.2. Correlation Matrix

Tables 3 and 4 display the Pearson correlations among the hypothesized variables. The coefficients of correlation are small and the highest correlation was between DFO and IM (-.427), indicating that the sample has no multicollinearity, since none of the correlation is equal or above 0.80 or 0.90. All variables have a correlation of equal or less than -.427 (Myers, 1990).

As for the Variance Inflation Factor (VIF), Tables 5 and 6 report the results as follows:

Table 1: Sample selection from 2012 to 2019

	Totals
Total listed companies	5 firms
Number of years observed	8 years
Total observation	40
Missing data	(8)
Final sample	32

Table 2: Descriptive statistics

Panel A: Independent variables				
Continuous Variables	Mean	Std. Deviation	Minimum	Maximum
DFA	0.486	0.299	0.01	0.86
DFO	1.805	1.961	0.01	6.37
IM	38.479	32.058	10.01	88.63
Panel B: Dependent variable				
FEV-ROA	0.0417	0.0336	0.000	0.11
FEV-ROE	0.091	0.082	0.000	0.33

Tables 5 and 6 illustrate that the largest VIF value is 1.223, implying that the sample has no multicollinearity, since none of the VIF values is up to 10 (Hair et al., 2006)

4.3. Regression Results and Discussions

Ordinary-Least Square (OLS) was used to evaluate the level of associations of debt finance and inventory management with firm economic value. As shown by Tables 7 and 8, the R^2 s for the Models 1a and 1b are .836 and .740, respectively. This implies that Model 1a has explained 83.6% and Model 1b has explained 74% of the total variance in the firm economic value.

Table 3: Pearson correlation analysis results

	DFA	IM
DFA	1	
IM	-0.380	1

**Significant at 1% level (2-tailed). *Significant at 5 per cent level (2-tailed)

Table 4: Pearson correlation analysis results

	DFO	IM
DFO	1	
IM	-0.427	1

**Significant at 1% level (2-tailed). *Significant at 5% level (2-tailed)

Table 5: Variance inflation factor - ROA models

Variables	Tolerance	VIF
DFO	0.818	1.223
IM	0.818	1.223

Table 6: Variance inflation factor - ROE models

Variables	Tolerance	VIF
DFA	0.855	1.169
IM	0.855	1.169

Table 7: Model Summary – Model 1a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.914	0.836	0.821	4.303

Table 8: Model Summary – Model 1b

Model	R	R square	Adjusted R square	Standard error of the Estimate
1	0.860	0.740	0.716	5.417

Table 9: ANOVA Analysis – Model 1a

1	Model	Sum of Squares	df	Mean Square	F	Sig.
	Regression	1984.809	2	992.405	53.600	0.000
	Residual	388.816	21	18.515		
	Total	2373.625	23			

Table 10: ANOVA Analysis – Model 1b

1	Model	Sum of Squares	df	Mean Square	F	Sig.
	Regression	1757.452	2	878.726	29.948	0.000
	Residual	616.173	21	29.342		
	Total	2373.625	23			

Table 11: Pooled OLS regression – Model 1a (ROA)

Variables	Expected sign	Coeff.	t	p-value	Tolerance	VIF
(Constant)			2.551	0.061		
Test variable						
DFA	-	-0.628	-6.574	0.000	0.855	1.169
IM	+	0.463	4.899	0.000	0.855	1.169

Tables 9 and 10 depict that the F-values for the Models 1a and 1b are statistically significant at the 1% level which means that the overall models can be interpreted.

Tables 11, 12, 17 and 18 illustrate the Pooled OLS regression results. Tables 11 and 12 show that there is a significantly negative association between DFA and FEV-ROA ($\beta = -0.628$, $t = -6.574$, $P = 0.000$, one-tailed significance) in the Model 1a, and the same direction of association is reported between DFO and FEV-ROA ($\beta = -0.543$, $t = -4.419$, $P = 0.000$, one-tailed significance) in the Model 1b. These findings are consistent with Kinsman and Newman (1998), Fernandez-Temprano and Tejerina-Gaite (2020) Assenga et al. (2018), Mishra and Kapil (2018), Yasser et al. (2017), Plalniappan (2017), Kumar and Singh (2013), McConnell and Servaes (1995), Short and Keasey (1999), Weir et al. (2002), Haniffa and Hudaib (2006), Majumdar and Chhibber (1999), Gleason (2000), Cheng (2009), Johnny Jermias (2008), and Aljifri and Moustafa (2007). Thus, hypothesis H_{1a} is accepted.

Tables 11 and 12 show that there is a significantly positive association between IM and FEV-ROA ($\beta = .463$, $t = 4.899$, $P = 0.000$, one-tailed significance) in the Model 1a, and the same direction of association is reported between IM and FEV-ROA ($\beta = 0.474$, $t = 3.858$, $P = 0.001$, one-tailed significance) in the Model 1b. These findings are consistent with several extant research (Jonsson and Mattsson, 2008; Capkun et al., 2009; Gaur and Kesavan, 2009; Pong and Mitchell, 2012; Sahari et al., 2012; Ahmad and Zabri, 2018; Lin et al., 2018). Therefore, hypothesis H_{2a} is accepted.

As shown by Tables 13 and 14, the R^2 s for the Models 2a and 2b are 0.628 and 0.559, respectively. This implies that Model 2a has

explained 62.8% and Model 1b has explained 55.9% of the total variance in the firm economic value.

Tables 15 and 16 depict that the F-values for the Models 2a and 2b are statistically significant at the 1% level which means that the overall models can be interpreted.

Tables 17 and 18 show that there is a significantly negative association between DFA and FEV-ROE ($\beta = -.445$, $t = -3.092$, $P = .002$, one-tailed significance) in the Model 2a, and the same direction of association is reported between DFO and FEV-ROE ($\beta = -.350$, $t = -2.187$, $P = .040$, one-tailed significance) in the Model 2b. These findings are consistent with Kinsman and Newman (1998), Fernandez-Temprano and Tejerina-Gaite (2020) Assenga et al. (2018), Mishra and Kapil (2018), Yasser et al.

(2017), Palniappan (2017), Kumar and Singh (2013), McConnell and Servaes (1995), Short and Keasey (1999), Weir et al. (2002), Haniffa and Hudaib (2006), Majumdar and Chhibber (1999), Gleason (2000), Cheng (2009), Johnny Jermias (2008), and Aljifri and Moustafa (2007). Thus, hypothesis H_{1b} is accepted.

Tables 17 and 18 show that there is a significantly positive association between IM and FEV-ROE ($\beta = 0.508$, $t = 3.535$, $p = 0.002$, one-tailed significance) in the Model 2a, and the same direction of association is reported between IM and FEV-ROE ($\beta = 0.528$, $t = 3.295$, $p = 0.003$, one-tailed significance) in the Model 2b. These findings are consistent with several extant research (Jonsson and Mattsson, 2008; Capkun et al., 2009; Gaur and Kesavan, 2009; Pong and Mitchell, 2012; Sahari et al., 2012; Ahmad and Zabir, 2018; Lin et al., 2018). Therefore, hypothesis H_{2b} is accepted.

Table 12: Pooled OLS regression – Model 1b (ROA)

Variables	Expected sign	Coeff.	t	p-value	Tolerance	VIF
(Constant)			2.551	0.061		
Test variable						
DFO	-	-0.543	-4.419	0.000	0.818	1.223
IM	+	0.474	3.858	0.001	0.818	1.223

Table 13: Model Summary – Model 2a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.793	0.628	0.593	5.854

Table 14: Model Summary – Model 2b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.748	0.559	0.517	6.373

Table 15: ANOVA Analysis – Model 2a

1	Model	Sum of Squares	df	Mean Square	F	Sig.
	Regression	1216.291	2	608.146	17.746	0.000
	Residual	719.667	21	34.270		
	Total	1935.958	23			

Table 16: ANOVA Analysis – Model 2b

1	Model	Sum of Squares	df	Mean Square	F	Sig.
	Regression	1083.071	2	541.536	13.334	0.000
	Residual	852.887	21	40.614		
	Total	1935.958	23			

Table 17: Pooled OLS regression – Model 2a (ROE)

Variables	Expected sign	Coeff.	t	p-value	Tolerance	VIF
(Constant)			12.977	0.000		
Test variable						
DFA	-	-0.445	-3.092	0.002	0.855	1.169
IM	+	0.508	3.535	0.002	0.855	1.169

Table 18: Pooled OLS regression – Model 2b (ROE)

Variables	Expected sign	Coeff.	t	p-value	Tolerance	VIF
(Constant)			14.666	0.000		
Test variable						
DFO	-	-0.350	-2.187	0.040	0.818	1.223
IM	+	0.528	3.295	0.003	0.818	1.223

5. CONCLUSIONS AND IMPLICATIONS

This paper has examined the influence of debt financing and inventory management on company economic value for Saudi Arabia's energy companies between 2012 and 2019. The selected sample for this research comprises 32 firm-year observations. Employing Pooled OLS Regression, this research has demonstrated that debt financing has a negative impact on company profits. Additionally, it has also demonstrated that there is a positive correlation between company economic value and inventory management.

This research makes it clear that Saudi Arabia's energy companies must have an awareness about the influence that debt financing can have on their profits. They may have to consider the positives and negatives of equity financing. Furthermore, these companies must make their inventory control systems more robust as more effective inventory management leads to greater profit. A number of factors influencing debt financing/inventory management could be researched in future, e.g. corporate governance (ownership structures, quality of audits, audit committee, and Board of Directors). This research model could be reproduced for other GCC nations and in other Middle Eastern (Arab) markets to check for validity. This research can offer financial analysts, investors, auditors, banks, account/audit regulators, companies, stock markets, researchers, and academics fresh understanding of the correlations of debt financing/inventory management and company profits.

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