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Value drivers in Oil Companies: An Application of Variance Based Structure Equation Model

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ABSTRACT

This study aims to provide new insights into how the financial and operational information relate to the market valuation of both independent and integrated oil companies. Hence, the study examines the value drivers for value creation in oil firms. Specifically, it explores the effect of investment, financing, and dividend decisions on value creation in oil-based energy firms. It is important to identify factors for value creation in stock market to design effective policies for wealth creation. The study was based on 82 oil and energy firms selected based on average asset sizes and revenues during the 2009-2013 period. PLS SEM methodology was used to analyze the effect of various exogenous latent variables on the endogenous latent constructs of profitability and value creation.

Higher earning potential was associated with greater value creation for oil firms. Markets view high capital investments by oil companies positively, as these investments represent value creation for oil and gas firms. Higher cash flows lead to greater value creation for energy firms, and they might lead to greater profitability and hence greater value creation. Dividend policy of oil and gas firms also determines the valuation of oil firms. Higher dividend payout enhances the value of oil and gas firms. Profitability determines value creation in oil and gas firms.

The study did not find statistically significant differences between integrated and independent companies or between privatized national companies and private national companies in value creation among oil firms.

Keywords: Valuation, Investment Policy, Financing Decisions, Market Valuation, PLS, SEM

INTRODUCTION

Petroleum is the single largest component of the balance of payments and exchanges among countries. For trading nations, oil has the largest share in total energy utilization, as approximately two billion dollars a day of petroleum are traded worldwide. According to the World Bank statistics, National Oil Companies (NOC) control approximately 90 % of the world's oil and gas reserves and approximately 75% of the production.

The upstream sector of the energy industry consists of Exploration and Production (E&P) firms. Midstream companies comprise pipeline and marketing companies. Downstream companies include refiners and petrochemical companies. Oil and gas reserves in the form of hydrocarbon below the surface are the major assets of an E&P Company. These assets have not yet been produced and their extraction is economically viable.

One of the unique features of E&P firms is that their primary asset base is subject to continuous depletion and hence ought to be continually replaced through drilling activities or acquisition. Physical volumes of hydrocarbon are significant, and production volumes are expressed as barrels of oil equivalent (boe) or thousands of cubic feet equivalent (mcfe) for gas.

This paper attempts to understand the value drivers in the oil and gas firms.

Theoretical Perspectives for Value Creation in firms.

The primary value of any company depends on its cash flow and earnings. Value creation in firms is a function of variables like cash flow, growth characteristics, and risk attributes. Value driver analysis is an important tool in strategic planning analysis. Value drivers can be classified as growth drivers, efficiency drivers, and financial drivers. Value creation for any firm is a function of its investing and financing activities and depends also on how much cash generated from the operating activities is returned back to the shareholders. Firms with good financial strength can access additional funds through external financing. Debt and equity financing are two major sources of external financing. Expectations about future cash flow generation are important determinants the firm's ability to borrow. Firms that maximize shareholder wealth in fact create value for all the stakeholders. Prices and volume of products sold, costs, and investments determine shareholder returns. The major components of investment value drivers are fixed capital investment and working capital. Value drivers in operating margin, capital investments, and net working capital can be generated through scale economies in processes like purchasing, manufacturing, and distribution.

Value drivers in oil and gas firms

The main factors that affect the equity value of oil and gas firms are its reserve levels, volume of production, and current commodity prices.

The value of energy company depends on the company's operations. Exploration and Production (E&P) companies are very capital intensive and their value is a function of existing reserves, ability to replace depleting reserves, and the price of natural resources. The investors' perception of valuation of oil firms is often based on the current and estimated future value of the oil producer's reserves, which are subject to commodity price risk. The value drivers for an upstream company depend on company's ability to replace diminishing reserves with cost effective new reserves.

Earnings before interest, taxes, depreciation, amortization, and exploration expenses (EBITDAX) are an important value metric for oil and gas firms. One of the common relative valuation metrics to evaluate an E&P company's cash flow is EV/EBITDAX. Another metric is the barrels of oil per day. Oil field service company valuation is generally similar to that for non-oil field related companies.

At firm level, cost efficiency of operations, which span exploration, production, refining, marketing, and overhead spending, is a major driver for value creation. Horizontal concentration and vertical integration also results in value creation. Petroleum projects are highly capital intensive. Vertical integration is another significant feature of petroleum industry.

In contrast to manufacturing companies, the E&P firms' performance is judged based on the firm's ability to replace and grow resources at a favorable cost rather than profit margins and growth. Analytical ratios, like lifting costs and finding costs, are of high relevance in oil and gas industry. Earnings before income tax, depreciation, depletion, amortization, and exploration costs are an important pricing metric for oil and gas firms. Exploration costs in successful efforts companies are often referred to as exploration, abandonment, and dry hole costs. Net Asset Value is an important valuation metric for energy firms. Another important performance indicator is the return on capital employed (ROCE). Stock market analysts use this profitability measure in energy sector. Higher cash flows signify higher valuation for oil companies. Margin per barrel of oil equivalent (BOE) is an important margin metric in oil and gas industry. Enterprise Value to debt adjusted cash flow is another major valuation indicator. Other key performance indicators include oil and gas production growth, unit production costs, unit finding and development costs.

Linkage between value creation and drivers in oil and gas firms

Research has shown that value drivers, like growth, efficiency, and financial

factors, are linked to value creation in firms. The enterprise value of oil firms is often linked to drivers, such as growth and levels of proven reserves. Operational efficiency is also a major driver of value creation in complex oil and gas firms. Strong crude oil prices act as a catalyst to enhance liquidity and cash flow position of oil firms. Many exogenous variables can affect value creation in oil firms. The quality and quantity of the resources like oil reserves determine the technical complexity and implied cost structure of the production process in the upstream sector. The key drivers of value creation in oil and gas firms include cost efficiency of operations in exploration, production, refining, marketing, and overhead spending. Investment efficiency is also an important driver for value creation in oil sector. Technical excellence, reflected in terms of higher reserve replacement, field recovery rates, less fuel losses, and higher value product yield through refining, is a strong driver for value creation. Vertical integration is another important driver of value creation in oil and gas firms. Competition and capital markets scrutiny promote value creation by promoting best international practices. Presence of reserve replacement has positive implications for value creation. The enterprise value of oil and gas companies are linked to growth and level of proven reserves. Value creation in oil and gas firms is highly correlated with value drivers like strong corporate governance. Operating and financial performance are also value drivers of value creation in the oil and gas firms. Higher cash flow generation and profitability increase the market valuation of oil and energy firms.

Objective of the study

This study aimed to provide new insights into the relation of the financial and operational information with the market valuation of both independent and integrated oil companies. It examined the value drivers of value creation in oil firms. In other words, the study explored the effect of investment and financing and dividend decisions on value creation in oil based energy firms. It is important to identify factors for value creation in stock market to design effective policies for wealth creation.

This research paper explored exclusively the effect of firm specific characteristics or drivers on market valuation of oil and gas firms. The study attempted to understand the effect of financial and operational drivers on market value measures of energy-based firms. The scope of this research paper is relevant because it addresses the post economic crisis period and falling oil prices.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Industry sector based valuation of companies is advocated for varied reasons. Quirin, Berry, and Bryan (2000) and Shevlin (1996) suggested that cross-sectional

studies, which include observations from many different industries, are not effective for various reasons. Many industries have specialized accounting methods, regulations, and taxations, which makes it difficult to generalize the results of valuation studies. Industry specific analysis helps researchers consider the economic context of reported accounting information (Bernard & Stober, 1989; Lev & Thiagarajan, 1993). Bauman (1996) suggested that industry or contextual studies are more relevant.

Lev (1989) claimed that certain variables, like earnings, help users predict predicting future cash flows based on the financial statements and in the process, facilitate equity valuation analysis. Previous studies (Biddle, Seow, & Siegel, 1995; Dechow, 1994; Rayburn, 1986; Sloan, 1996) have found that earnings are more value relevant compared to operating cash flow. As Dechow (1994) reported, cash flows suffer more from timing and matching problems that reduce their ability to reflect company performance. Later studies (Bradshaw & Sloan, 2002; Francis & Schipper, 1999; Hodge, 2003) claimed that earnings quality has decreased in recent years.

The study by Fard (2011) revealed that the effect of oil and gas reserves volume on the financial value of large oil companies is approximately 1.73 times greater compared to that of the profits of the firms. Using the data from 1992-2005 for 114 oil and gas companies, Misund B. et al. (2008) examined whether an upheaval in the oil and gas industry has resulted in a structural shift in the relationship between the financial statement information and market valuation. Their result confirmed that a structural break took place in the valuation of oil and gas companies in the late 1990s. Additionally, Osmundsen et al. (2006) found that the major determinants of firm valuation are oil price, oil and gas production, and to a certain extent, reserve replacement. To examine the relationship between stock prices returns and financial risk factors of oil companies, Giovannini et al. (2006) used multivariate cointegration techniques and multivariate GARCH Model. In an earlier study, Quirin et al. (2000) identified reserve replacement, reserves growth, production growth, and finding costs as the major factors of equity valuation.

McCormack and Vytheeswaran (1998) observed no significant relation between value focused indicators and financial indicators. An increase of 10 percent in proven reserves has been found to lead to an average increase of 3.7 percent in stock price (Chua & Woodward,1994). Particularly financial statement and firm valuation comparison are challenging tasks for the analysts within the energy sector (Koester,1993). Studies like that of Johnston (1992) suggest that lower finding cost per BOE signifies efficiency. Future cash flows from proved reserves is an important factor that determines market values and cumulative returns of energy firms (Ghicas & Pastena, 1989; Harris & Ohlson,1987; Magliolo, 1986 while Harris et al. (1987)

suggested that net book value data explains the market value of oil and gas companies.

A more recent study by Kumar and Sujit (2016) found that dividend policy and cost efficiency are major determinants of valuation of oil companies. Their results indicated a negative relationship between intensity of capital investments and value creation. The relevance of book value has been found to be significantly lower for integrated companies than for pure upstream companies in a study that compared the relationship between different classifications of reserves and oil company returns (Misund et al., 2015). The study also revealed that the information on probable reserves does not have an effect on stock returns.

Research on the valuation of oil and gas industry have focused primarily on industry sector variables to understand the value drivers. The study presented here examined the financial and operating variables at firm specific level to understand the role of investment, financing, working capital, and dividend decisions as value drivers in the valuation of oil companies.

Data

The 82 sample firms were selected based on their average asset sizes and revenues during the 2009-2013 period. The data was collected from annual reports and yahoo finance, morning star, and google finance websites. To estimate the latent variables, three years' data were stacked together. To analyze the time and cross section specific effects, the sample companies were segregated into independent and integrated private and national oil companies, and year dummies were used.

Hypothesis

The following hypothesis were postulated for this study:

- Value creation is a function of the financial characteristics, like optimal investment, financing, working capital, and dividend policies of oil firms.

It is hypothesized that higher profitability results in higher oil firms' valuation. Higher cash flows result in higher market valuation of oil-based energy companies. Value creation is directly related to the earning potential of firms. The earning potential is measured by EV ratios, like EV/EBITDA and EV/Free cash flow.1 Firms with low EV multiples are considered to be undervalued in comparison with peer group. Such stocks have greater potential for price appreciation. Higher liquidity position and efficiency position of the firm would lead to greater value creation potential. Higher financial leverage results in increased financial risk and decreased

[1] Enterprise Value is defined as the sum of market value of equity and book value of debt.

value of oil firms. Higher capital investments and dividend payments are viewed positively by markets, resulting in higher market valuation of oil and gas based firms.

- Value creation is a function of the operational characteristics of oil and gas firms
  Two hypothesis can be formulated with respect to operating characteristics.

The growth of reserves leads to higher value creation for oil firms in the stock market. E&P firms with characteristics like high growth rate in reserves and production will have high earning opportunities. Oil companies with high growth rate of reserves have the potential to improve production and increase sales. Market analysts view high growth rate in reserves positively. Thus, the growth of reserves is an important valuation metric. The second hypothesis in the context of operating characteristics is that the valuation of oil companies is a function of the reserve replacement ability of oil firms. Analysts view higher reserve replacement ratio that is related directly to firm valuation positively. The reserve replacement ratio indicates the ability of an oil company to undertake exploration activity in order to replace the current production reserves. A replacement ratio of less than 100% for a continuous period indicates total depletion of reserves.

- Market valuation would be higher for integrated oil companies than for independent oil companies on account of the benefits of vertical integration.

The degree to which a firm owns its upstream suppliers and downstream buyers is referred to as vertical integration. The main advantages of vertical integration include economies of scale, economies of scope, cost reduction, and improved competitiveness. Higher degree of control over the entire value chain and improved supply chain coordination are other advantages of vertical integration.

Based on the discussion, the following hypothesis were tested in this study:

H1: Profitability Positively influence value of the company
H2: Cash flow is directly related to profitability
H3: Higher the earning potential higher will be the value of the company
H4: Higher Investment intensity leads to higher profitability
H5: Higher investment intensity leads to higher value for the company
H6: Growth potential leads to higher profitability.[2]
H7: Dividend policy increases company value
H8: High leverage positively affects value

[2] We tested the effect of growth potential on value but it turned out to be ineffective.

H9: High liquidity leads to higher value for the company.

H10: Integrated Oil Companies have higher market valuation compared to independent oil companies due to benefits of vertical integration.

METHODOLOGY

The structural equation modeling (SEM) procedure, which focuses on measurement and structural models simultaneously, was utilized in the study (Titman & Wessels, 1988). The covariance based structural equations modeling (CB-SEM) and partial least squares structural equations modeling (PLS SEM) are two structural equation models. Due to theoretical and methodological issues, PLS-SEM has been more widely used compared to CB-SEM (Hair et al., 2012). The advantage of PLS SEM is that it can be used to extend the existing theory. The comparative advantage of PLS-SEM over CB–SEM models is that in PLS SEM, large sample size and normal data to measure goodness of fit indices assumptions are not required (Chin et al., 2003; Hair et al., 2012; Hulland, 1999; Wetzel et al., 2009).

Both PLS and CB methods have certain advantages and disadvantages. This study used PLS because it has several advantages over CB methods. PLS, being a soft modelling technique, does not impose any requirements regarding distribution or measurement scale while at the same time, it estimates stable parameters. Non-normally distributed indicators normally produce high standard errors in CB method. We tested for the normality of the variables used in the model, and none of the variables showed normal distribution. As a result, the study used PLS- SEM rather than CB method. PLS handles complex models very easily with more efficiency. PLS estimates are expected to be more robust in the presence of inappropriately operationalized construct. One weak construct may influence all estimated parameters and latent variables estimates in CB method whereas it is limited to only the construct and variables in its direct proximity.

For this study, we used Smart PLS method to analyze the effect of exogenous latent variables on endogenous latent variables. The distinguishing factor of the PLS method is that it maximizes the explained variance of the endogenous latent variables instead of the theoretical covariance matrix (Henseler, Ringle, & Sarstedt, 2015). The two objectives of this study were to develop a model to explain the value drivers in oil industry and to verify its goodness of fit using ordinary least square method. PLS SEM is more appropriate for model development or prediction of theories (Hair et al., 2011, 2012; Henseler et al., 2015). Using PLS, we derived the estimated values of latent constructs, comprising a combination of exogenous indicators. To achieve the second objective, a regression was run to check the model's goodness of fit. The PLS

results were compared with regression results for derive a conclusion.

This study employed only the reflective measurement model, since no items were appropriate for formative measurement. The reliability and validity of the reflective measurement model should be assessed to determine its consistency. Composite reliability is used as an estimate of internal consistency of the construct, as suggested by Hair et al., 2011. Composite reliability values of 0.60 to 0.70 in exploratory research and values from 0.70 to 0.90 in advanced research are regarded satisfactory (Nunnally & Bernstein, 1994). The study by Awang et al. (2010) explained that the reliability is the extent to which a measurement model reliably measures the intended latent constructs. The study by Nunnally (1978) suggested that Cronbach's alphas greater than 0.7 indicate that the measurement model is reliable. The assessment of validity of reflective measurement model is checked through convergent validity and discriminant validity. Validity is the measure of the accuracy of an instrument used in a study (Linn, 2000).

Factor loadings were assessed using bootstrapping procedure in PLS SEM with minimum samples of 5000 and the number of cases equivalent to sample size (n=50). In bootstrapping process, the reflective and formative indicators with less significant loadings were removed from the model. The reflective indicator was deleted if the outer loading was less than 0.40. The effect of indicator deletion on AVE and composite reliability was analyzed if the outer loading was greater than 0.4. The reflective indicator was eliminated if the deletion increased the measures above the stipulated threshold. The reflective indicator was retained if the measures met the threshold criteria, with the outer loading being greater than 0.7.

Indicator reliability, internal consistency reliability, convergent reliability, and discriminant validity are tools used to assess the validity of reflective measurement models. The acceptance rule states that the underlying construct must account for at least 50 percent of each indicator's variance. The outer loadings were examined to analyze the indicator reliabilities for reflective measures.

Composite reliability and Cronbach's alpha are computed to analyze the internal consistency reliability of reflective measures. Composite reliability values of greater than 0.6 are generally acceptable. The Cronbach's alpha measure above 0.7 was acceptable.

The average variance extracted (AVE) or construct communality is the measure of convergent validity. Satisfactory convergent validity is achieved when each construct should account for at least 50 percent of the assigned indicators' variance. Fornell Larcker, Cross loadings, and the heterotrait-monotrait ratio (HTMT) are assessment factors to test discriminant validity.

The Fornell Larcker criteria state that the square root of AVE should be higher than the correlation of the construct with all other constructs in the structural model. HTMT values close to 1 indicate lack of discriminant validity and values close to 0.85 indicate threshold values.

To assess collinearity issues of the inner model, the latent variable scores is used to get the tolerance or Variance Inflation Factor (VIF) values. If the VIF value is equal to 5 or lower, as a thumb rule there is absence of collinearity problem. VIF analysis was conducted to assess collinearity. The VIF values of less than 5 indicate no collinearity issues. The subsequent step involves the assessment of the relevance of the formative indicators. The formative indicator's outer loading is analyzed if the outer weight is not significant.

Assessment of the Structural Model

The structural model is assessed in five steps. The initial stage involves the examination of collinearity issues. The second stage involves testing the significance and relevance of path coefficients. The other steps involve determination of R Square, measurement of effect sizes using F Square, and estimation of q square value to estimate the predictive relevance through Blind Folding.

Latent variables and their indicators

Exogenous latent variables included earning potential, growth potential, investment intensity, management efficiency, cash flow, liquidity leverage dividend policy, and liquidity. Endogenous latent variables comprised profitability and value of the company. The indicators for each exogenous and endogenous latent constructs are listed in Table 1. Preliminary model of the drivers of firm value is shown in Figure 1.

Table 1 Latent Constructs and Indicators

SL	Latent exogenous Construct	Indicators
1	Earning Potential	Enterprise value to earnings before interest, tax, depreciation and amortization(EVEBITDA)
		Enterprise value to earnings before interest and taxes ratio (EVEBIT)
2	Growth Potential	Growth Of Reserve (GR)
		Reserve Replacement Ratio (RRR)
3	Investment Intensity	Capital Expenditure sales ratio (CAPEXSA)
		Net Working Capital (NWCT)
4	Management Efficiency	Ratio of cost of goods sold and total assets (COGSTA)
		Fixed Asset Turnover (FAT)
		Total Assets Turnover (TAT)
5	Cash Flow Measures	Ratio of Free cash flow to equity and total sales (FCFESA)
		Margin Barrels of Oil Equivalent (MBOE)
		Ratio of Free cash flow to equity and total Assets (FCFETA)
6	Liquidity	Cash Ratio,
		Quick Ratio (QR),
		Current Ratio (CR)
7	Leverage	Ratio of long term debt to capital (LTDC)
		Debt equity ratio
8	Dividend Policy	Dividend payout ratio (DPO)
	Endogenous latent Construct	**Indicators**
9	Profitability	Net Profit Margin (NPM),
		Return on Assets (ROA)
		Return on capital employed (ROCE)
		Return on equity (ROE)
10	Value Creation	Price earning a ratio (PE)
		Price Sales (PS)
		Holding Period Returns (HPR)
		Share price

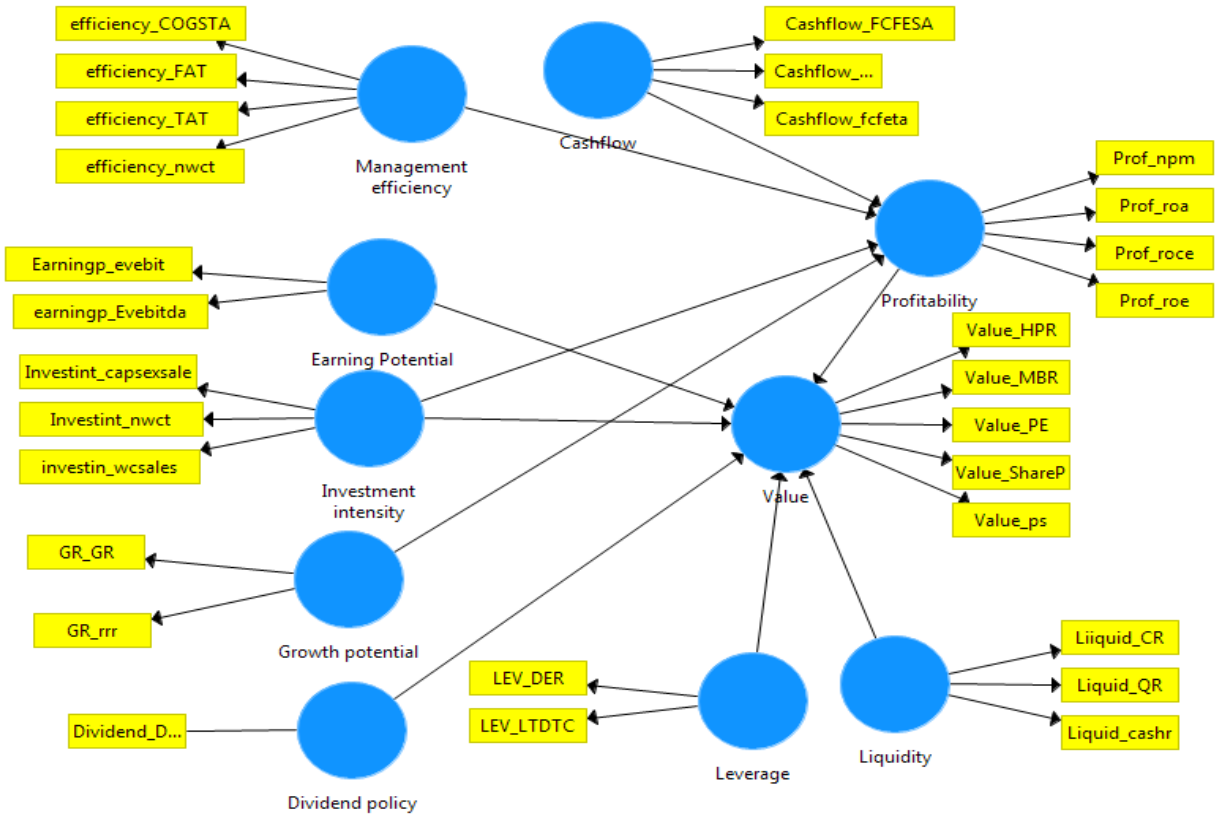

Figure 1 Initial Model of Drivers of Value in Oil Companies

EMPIRICAL RESULTS

In this study, all latent variables were reflective in nature, as seen in the model (Figure 1). If indicators representing a latent variable are highly correlated and interchangeable, then they are reflective. For all reflective indicators, the reliability and validity should be thoroughly examined (Haenlein & Kaplan, 2004; Hair et al., 2013; Petter et al., 2007). The first step involves identifying the indicators that are not explaining the latent variables.

Using the process of bootstrapping in SmartPLS, reflective indicators that were not meeting the criteria, that is, their outer loadings were smaller than .4, were removed from the model. If the outer loading was between 0.4 - 0.7, then the effect of indicator deletion on Average Variance Extract (AVE) and the composite reliability was analyzed. The reflective indicator was further removed if the deletion increased loadings above the threshold. If the measures already satisfied the threshold, the reflective indicator was retained. The reflective indicators, like ROCE (Profitability), NWCT and WCSALES (Investment Intensity), NPM (profitability), HPR (Value), and MBOE (cash Flow), were removed as their loadings were less than 0.4. The model was modified accordingly and re-estimated using the process of bootstrapping to

determine the reliability and validity of the latent variables.

The composite reliability was used as a measure of the internal consistency and of the construct. Values greater than 0.7 indicate an acceptable internal consistency. Table 2 explains composite reliability values for all the latent constructs. For convergent validity, the values of the average variance extracted (AVE) should be greater than 0.50 for all constructs. A value of 0.5 and above indicates an acceptable convergent validity. In this case, all latent constructs met the cut-off criterion, as shown in Table 2. Cronbach's alphas were also higher compared to the threshold limit (0.7), indicating that all the latent variables are reliable and valid, except for earning potential with Cronbach's alpha smaller than the cut-off value. Discriminant validity was analyzed using HTMT ratio of correlations. If the HTMT value were below 0.90, discriminant validity between two reflective constructs was established. The results showed that all values 9 between two reflective constricts were below 0. Finally, Fornell Larcker Criterion, which measures discriminant validity, was used to check whether the squared correlation between the two constructs is greater than any of the two constructs' AVE. In our case, squared correlation between the two constructs was less than any of the two constructs' AVE, supporting the discriminant validity of the constructs.

Table 2 Reliability and validity of Latent construct

Latent Construct	**Internal consistency**	**Cronbach alpha**	**Convergent validity (AVE)**
Cash flow	0.957	0.912	0.918
Dividend policy	1	1	1
Earning Potential	0.825	0.625	0.706
Growth potential	0.989	0.978	0.979
Investment intensity	1	1	1
Leverage	0.736	0.711	0.61
Liquidity	0.974	0.966	0.927
Management efficiency	0.896	0.945	0.743
Profitability	0.928	0.882	0.812
Value	0.85	0.824	0.603

Estimation of Reflective Measurement Models (outer model) of PLS-SEM

After deleting indicators, the measurement model was estimated. The PLS-SEM models, validities and reliabilities of reflective scales and multiple items, as well as the predictive ability of the model are presented in the tables 2 & 3.

Coefficient of determination, i.e., R-squared of Reflective Measurement Model, was 69% for value drivers while R-square value for Profitability was 14%. This means that all latent variables explain about 69% of the variance in value drivers. At the same time, cash flow, management efficiency, investment intensity, and growth potential together explains about 14% variance in profitability.

Table 3 Outer Loading of Indicator Reliability

	Original Sample (O)	**T Statistics (|O/STDEV|)**
Cashflow_FCFESA <- Cash flow	0.949	(100.12*)
Cashflow_FCFETA <- Cash flow	0.968	(177.90*)
Dividend_DPO <- Dividend policy	1	
Earning EVEBIT <- Earning Potential	0.718	(4.50*)
GR_GR <- Growth potential	0.99	(6.67*)
GR_RRR <- Growth potential	0.989	(6.56*)
Investint_CAPEXSA <- Investment intensity	1	
LEV_DER <- Leverage	0.996	(4.80*)
LEV_LTDTC <- Leverage	0.478	(2.05**)
Liquid_CR <- Liquidity	0.983	(6.59*)
Liquid_QR <- Liquidity	0.975	(5.76*)
Liquid_CashRatio <- Liquidity	0.929	(4.81*)
Prof_ROA <- Profitability	0.937	(71.78*)
Prof_ROCE <- Profitability	0.925	(31.44*)
Prof_ROE <- Profitability	0.837	(26.58*)
Value_MBR <- Value	0.874	(21.92*)
Value_PE <- Value	0.441	(3.04*)
Value_ShareP <- Value	0.966	(21.24*)
Value_PS <- Value	0.72	(7.89*)
Earningp_EVEBITDA <- Earning Potential	0.946	(9.95*)
Efficiency_COGSTA <- Management efficiency	0.803	(3.05*)
Efficiency_FAT <- Management efficiency	0.877	(3.66*)
Efficiency_TAT <- Management efficiency	0.903	(3.62*)

*Figure in parenthesis represents significance of t statistics, * represents significant t-stats at 1% level whereas ** represents significance at 5% level.*

Table 3 above shows the outer loadings of the indicator reliabilities after removing non-significant indicator variables. All reflective indicator variables were statistically significant at 1% level except Leverage, which was significant at 5% level. Latent constructs of Dividend policy and investment intensity had only one indicator, hence their outer loadings were equal to 1.

Collinearity among latent constructs was assessed using Variance inflation factor (VIF). If the collinearity was not an issue (i.e., VIF<5), then the assessment of formative measures entered the next stage. The examination of VIF matrix suggested no issue with multicollinearity.

Assessment of the Structural Model

The reliability of the model was assessed following the validity assessment. Relevance and significance of path coefficients were tested. The range of path coefficients varied between plus and minus 1. Path coefficients explain the significance of the relationships between latent variables of the model. Higher absolute values denote stronger relationship between constructs. Direct effect measures a one-way relationship between two constructs. Indirect effect measures the relationship between two constructs through at least one intervening construct. The total effect is the sum of the direct effect and all indirect effects linking the two constructs. Out of all the direct effects, latent variable cash flow was positively related to profitability, which was significant at 1% level. This indicates that higher cash flow is associated with greater profitability of oil firms. Dividend policy had a positive relation with value drivers, which was significant at 10% level. This shows that companies that pay higher dividends are valued higher in the market. Earning potential also had a positive relationship with value drivers of the oil companies, and this relationship was significant at 1% level. Investment intensity was positively related to value of the companies at 5% level. Thus, companies with higher investment intensity are viewed as more valuable. Finally, high profitability was significantly associated with higher value of the company at 5% level. Out of all indirect effects (indicated in bold), only cash flow turned out to have a significant effect on the value of the company.

Table 4 Path Coefficient Total Effects (Indirect Effects are Indicated in Bold)

Direct and Indirect Relationship	Original Sample (O)	Sample Mean (M)	T Statistics (|O/STDEV|)	P Values
Cash flow -> Profitability	0.447	0.435	5.406	0
Cash flow -> Value	0.02	0.019	1.835	0.067
Dividend policy -> Value	0.13	0.114	1.648	0.1
Earning Potential -> Value	0.81	0.805	10.057	0
Growth potential -> Profitability	-0.035	-0.046	0.475	0.635
Growth potential -> Value	-0.002	-0.002	0.433	0.666
Investment intensity -> Profitability	0.116	0.083	1.279	0.201
Investment intensity -> Value	0.162	0.173	2.425	0.016
Leverage -> Value	-0.006	-0.011	0.208	0.835
Liquidity -> Value	0.007	0.006	0.448	0.655
Management efficiency -> Profitability	0.037	-0.029	0.488	0.626
Management efficiency -> Value	0.002	-0.001	0.469	0.639
Profitability -> Value	0.045	0.044	1.947	0.052

F-square measures the size of the effects. It explains the effect of one exogenous construct on an endogenous construct in terms of R Square. The effect of earning potential on the value of the company was strong, as the F-square value was 2.07 and all other effects are weak.

Blindfolding is the technique used to obtain the cross-validated redundancy (Q^2). This technique is relevant for testing the predictive relevance of the structural model. Q^2 criterion stipulates that the structural model should be able to accurately predict each indicator of endogenous latent construct (Hair et al., 2011). Q-squared value of 0.10 for profitability signifies a weak effect whereas the value for 0.32 signifies moderate effect, as presented in Appendix 4. All dependent variables had Q-square value greater than 0, suggesting that they have predictive relevance.

Estimation of supplementary multiple regression models

This study further used regression analysis to complement the results of smart-PLS findings, as the Smart-PLS does not measure the goodness of fit. The analysis tested the statistical power of the model using Fisher's F. As mentioned earlier, the time series and cross section characteristics can be of significant importance; hence, the study used time series and cross section dummies. Multiple linear regression was

used to examine the supplementary model using the standardized scores (Henseler et al., 2015). The standardized scores for all the latent variables were obtained using Smart-PLS (Ringle et al., 2005). The R-square value for the regression was 0.83, and the adjusted R-square value was 0.69, indicating that the latent variables in this study can explain about 70% of the variation in value drivers. The value of R-square was similar in both the models. F-statistics was significant, supporting the overall goodness of fit of the model.

The first regression model (M1) was estimated without taking any dummy variables. Dividend policy, earning potential and investment intensity turned out to the significant determinant of value drivers in oil companies. This result is also similar to the findings of Smart-PLS model.

The second model M-2 with time dummies (3 dummies to represent 4 years) as well as model M-3 with independent, i.e., nonintegrated companies turned out to be insignificant. National privatized companies were also tested, and the model could not find any support for the difference in value drivers. SmartPLS results revealed that all models in Table 6 are valid with acceptable goodness of fit and statistical power. Hence we confirmed that the results are similar in both Smart-PLS and regression analysis.

CONCLUSIONS AND IMPLICATIONS

The three commonly cited financial drivers of value creation are sales, costs, and investments. Earnings growth, cash flow growth, and return on invested capital are specific financial drivers. Profitability, growth, and capital intensity are considered as important drivers of free cash flow and value of a firm. This study included sales increase, margin of activity profit, tax rate, working capital, expenses of capital, costs of capital, period of competitive advantage, and return on capital, as the major value drivers. Relative indicators, like turnover of capital and margin of gross profit, are also called drivers. The main drivers for shareholder wealth creation are financial, investment and operating decisions..

This study identified firm indicators underlying the latent variables of value drivers of oil companies. Latent variables were estimated using SmartPLS supplemented by regression analysis to obtain a goodness of fit and statistical power. Both direct and indirect effects were analyzed. Dividend policy, investment intensity, and earning potential turned out to significantly affect value of oil companies.

Higher earning potential was associated with greater value creation for oil firms. Markets view high capital investments by oil companies, which indicate value creation for oil and gas firms, positively. Higher cash flows lead to greater value

creation for energy firms. It can also be implied that higher cash flows lead to greater profitability and hence greater value creation. Dividend policy of oil and gas firms also determines valuation of oil firms. Higher dividend payout enhances the value of oil and gas firms. Furthermore, profitability determines value creation in oil and gas firms.

Limitations and future directions

The study focuses only the firm specific characteristics. Future studies could explore the joint effect of macroeconomic and firm specific variables, particularly in the context of recent oil price crisis.

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