Abstract
Purpose – The purpose of this paper is to determine the factors affecting the capital structure of companies engaged in the Indian energy sector.

Design/methodology/approach – Capital structure theories and empirical literature have been reviewed to formulate propositions concerning the factors/variables determining the capital structure of Indian energy companies. The examination is done using panel data techniques for the sample 141 companies operating in the Indian energy sector.

Findings – The results show firms’ age, asset turnover ratio, liquidity and firms’ size to be significant determinants of capital structure for the Indian energy companies, while profitability, debt service capacity, sales growth, non-debt tax shield and tangibility ratio to be insignificant determinants. Historically, profitability has shared a significantly negative relationship with debt ratio; however, the relation here is not significant.

Research limitations/implications – The focus of the current study is on Indian energy sector, the results obtained will not be applicable for other sectors.

Originality/value – The current research gives an insight into the determinants of capital structure of the companies engaged in the Indian energy sector, which are mostly overlooked due to the laws, policies and regulations governing the sector as a whole.

Keywords India, Panel data, Profitability, Regression, Capital structure, Energy companies

Paper type Research paper

1. Introduction
With the proposition of Irrelevance theory in 1958 and 1963 by Modigliani and Miller, capital structure decisions have been a well-researched topic for more than five decades. During the same time, many new theories have been proposed, regarding as to what motivates a company to select a particular source of funding over the other. The capital structure used by any firm across the globe is usually a mix of equity raised and debt funding. The utilisation of debt funding in a capital structure brings agency costs along with it. Jenson and Meckling (1976), suggested that agency costs are the outcome of the relationships between the stakeholders of the company and its management, and also the relationship between the lenders to the company and its stakeholders. Even with the agency costs being in play, the optimal mixture of equity and debt funding, which will lead to maximisation of profitability for the firm and the shareholders’ value, is said to be at the core of any discussion regarding capital structure (Addae et al., 2013).
Khan and Jain (2014) state that the financing decision is one of the most important decision related to the operations of a company. Capital is used by the companies to finance their assets, which in turn will generate revenue for the companies, resulting into profits earned. A financing decision as stated by Khan and Jain (2014) will entail two aspects. One, relating to the capital structure theories, which suggest that utilisation of debt funding will lead to a higher return to be enjoyed by the stakeholders and also the risks; and two, given the scenario, an optimal capital structure should be decided when the financing decision is being made.

It was found that with the liberalisation and opening of economies for cross-border trades, the dependence of the companies on the capital markets has increased, along with increased importance being placed on the institutional investors. With liberalisation, the opportunities to expand for the companies, to invest nationally and globally have increased vastly. However, for every decision that needs to be made about the expansion of business operations or investments, a company requires capital. Also, at the same time, the managers of the company need to plan the capital requirements of the company well in advance to ensure that lack of funds should not hamper the operations or investment opportunities to be undertaken in future. Simultaneously, the managers are expected to be aware of the merits and demerits of sources of funding, which should reduce the capital cost and increase profitability of the company.

Capital is important for the setting of a new business or for the continuing operations of an existing firm. In the same manner, for an economy to function smoothly, a strong energy sector is needed. India is one of the largest energy consumers in the world after the USA, China and Japan. The companies engaged in the Indian energy sector are governed by a series of laws and statutes laid down by the government, with the aim of providing energy at reasonable prices to all the segments of the society. The regulated Indian energy sector has a large presence of the government-owned companies. While there had been a small presence of privately held Indian companies earlier, the current scenario is different, where more private companies are making their presence felt in the Indian energy sector. Despite with the, opening of the energy sector to private players, the government-owned companies tend to dominate the energy sector in terms of newer investments made and creation of new assets. Another important factor underlining the Indian energy sector is the pricing of energy goods. Be it a unit of electricity or prices of petrol or diesel, these are monitored by the government authorities. As per current regulation for the Indian electricity sector, there are specified ratios of equity and debt funding to be used by the companies engaged in the power sector, along with determination of tariff and the return to be enjoyed by the companies.

Many studies have confirmed the relationship of economic growth with increasing energy demand. Over the years, the basic role of energy sector has been to provide a firm base for economic development. To elaborate on the role of energy sector, it is found that energy sector is a significant contributor to the nation’s GDP for both developed and developing countries alike. International Energy Agency (2015) suggests that for the fulfillment of the developmental goals set by governments, energy is central to it. For India, the energy demand has doubled since 2000, and there exists enormous opportunities in the future too. While the policy makers and governments are aggressively pursuing reforms in the energy sector, it is also imperative to understand how companies in this sector, both government and private, are faring in a regulated environment. A lot of research has been conducted by various international and government sponsored agencies into the energy sector with respect to the regulations and polices governing the sector; however, not much attention has been paid to the companies engaged in this sector. The current study attempts...
to address that gap. The focus of the current research is to understand the various
determinant of capital structure of the regulated Indian energy companies.

2. Literature review
As stated earlier, one of the important objectives of a firm is to maximise the value of its
shareholders, especially the equity shareholders. Given this objective, it is imperative for the
managers to decide an optimal financial mix or capital structure, which will lead to the
fulfilment of this objective. As a result, capital structure of any firm needs to be studied with
relation to its impact on the value of the firm (Khan and Jain, 2014). However, theoretically,
the value of a company can get affected in terms of cost of capital and future earnings due to
capital structure decisions. While the capital structure decisions may affect the
shareholders’ value, the financial leverage of a company has an impact on the value of the
firm through the cost of capital borne.

One of the earliest approaches to capital structure was suggested by David Durand
(1958), known as the Net Income Approach, stating that value of a firm is related to the
capital structure decisions taken. Implying that, changing the financial leverage of the
company will have an impact on the value of the firm, in terms of the cost of capital borne by
the company. Like, an increase in the debt funding will reduce the overall cost of capital
borne by the company leading to an increase in the value of company and a rise in the
market prices of its ordinary shares. The net income approach is based on three
assumptions:

(1) there are no taxes;
(2) cost of debt funding is lesser than cost of issuing equity; and
(3) debt funding by the company does not affect the risk perception of investors.

Another approach proposed by Durand was the Net Operating Income approach, which
states the value of the firm is independent of the degree of financial leverage. This approach
is opposite to the net income approach.

A cornerstone on capital structure theory was proposed by Modigliani and Miller (1958),
which later came to be known as the MM Irrelevance Theory. The MM theory states there is
no relationship between the cost of capital borne by the company, its financial leverage and
the value of the firm. This theory is similar to net operating income approach. The MM
theory is based on the following assumptions:

- existence of perfect markets;
- with the existence of perfect market conditions, the expectations of all investors
  from the firm are same;
- the existence of business risk is similar across the industry for all the firms
  operating;
- the dividend payout ratio is 100 per cent; and
- there are no taxes.

However, there are no perfect markets as proposed, and there exists information asymmetry
along with the existence of corporate taxes. The MM irrelevance theory laid the ground for
many of the other theories, which have been proposed over the period.

The trade-off theory suggests that a firm selects between the right mix of equity and debt
funding based on the costs and benefits of each source. The utilisation of debt funding in
firms led to the rise of trade-off theory. The purpose of this theory is to lay emphasis on the
usage of debt funding and its advantages like tax shields, on the cost of financial distress
like bankruptcy costs or cost of higher interest rates. **Pecking order theory** is another
important capital structure theory discussed at large. The pecking order theory suggests
that firms prefer internal sources of financing for their operations rather than going for
external borrowings. One of the key drivers for the pecking order theory is the presence
information asymmetry which increases the cost of capital. The preference for utilisation of
retained earnings by the firms is borne by the fact that issuing of new equity requires
floatation cost, which usually the companies do not want to bear. Also, the cost of raising
new equity is more than the cost of debt funding. According to Frank and Goyal (2008),
pecking order theory was first suggested by Donaldson in 1961, which was later adapted by
Majluf and Myers (1984), where the ranking of the sources of funding was done through
adverse selection model.

The actual financial behaviour is not supported by above proposed theories, as was
stated by Stewart C Myers (1984). The remaining section on the literature review covers the
empirical studies done globally to understand the determinants of capital structure and its
impact on the selected variables.

Myers and Majluf (1984) laid the foundation on the pecking order theory of financing,
where they suggested that external financing is better than raising equity. They opine that it
is safer for managers to issue safe securities than risky ones like issuing of bonds. Also, they
suggest that managers can retain earnings by restricting dividend payments when the
investment needs are modest, as they serve as marketable sorties or reserve borrowing
power.

Rajan and Zingales (1995) investigated the determinants of capital structure for the G-7
countries for the period 1987-1991. The focus of the study was limited to the larger
economies with reference to the non-financial companies functioning in these economies.
The results suggest that across the G-7 countries, the leverage ratio was more or less similar
at an aggregate level, irrespective of institutional differences prevailing in the various
economies, which earlier were thought to have an impact on the leverage ratio. It was also
found that the theories proposed on the basis of using American firms as point of references,
held true for other countries too. However, the authors state that there still exists a gap
between the proposed capital structure theories and existing capital structure evidences.

Shyam-Sunder and Myers (1999) in their pioneering study on corporate financing
behaviour found that pecking order of financing held true for the studied American
corporations. The strong presence of pecking order form of financing is guided by the firms
need to finance expected deficits with debt funding as compared to the static trade-off model
which suggests that firms tend to move towards an optimal debt ratio.

Pandey (2001) found for the Malaysian firms during 1984-1999, the overall debt ratios
were low, although short term debt ratio was found to be twice as much as that of the long-
term debt ratio. The debt ratios, both long and short term remained stable during the period
of study till 1995, and increased from 1996 to 1999. The empirical results for this period
showed that profitability, firm size, earnings volatility and tangibility was found to have
consistent influence over the short term and overall debt ratios throughout the period of
study. Profitability shared a significantly negative relation with the debt ratios through the
period of study when compared with other independent variables. The results also
suggested that debt ratios at market value are better in explaining the relation with
independent variables as compared to debt ratios at book value.

Sheikh and Wang (2001) found that profitability and liquidity has a negatively
significant relationship with debt ratios, suggesting that Pakistani manufacturing firms
tend to follow financing pattern suggested by pecking order theory. Also the presence of
information asymmetry tends to have an impact on the capital structure decisions of the companies listed on Karachi Stock Exchange. The firm size for the studied companies is found to have a positive relation with debt ratio, implying that larger firms favoured debt funding due to their ability to meet the payment obligations and also avail of the tax shield benefits. It was also found that the reliance on short term debt is more by the Pakistani manufacturing companies, which can be attributed to under-developed bond market or high costs of long term debts.

Guha-Khasnobis and Bhaduri (2002) in their study on Indian manufacturing and non-financial firms from 1990 to 1998 found financial leverage to be negatively correlated with profitability, suggesting the presence of pecking order of financing pattern. When taking the lagged values of leverage, it was seen that the coefficients of long term debt were significantly higher than that of short-term debt. Also the adjustment speed towards optimal capital structure was faster for short-term debt than for long-term debt. The firm size also plays an important role in the capital structure, as it was seen that small firms tend to be more favoured towards short-term debt as compared to long-term debt, possibly because of high transaction and information cost.

Bevan and Danbolt (2004) have studied UK firms and found that firm effects are important on the corporate financial structure. The results suggest that growth opportunities for the studied UK firms have a positive relation with both long-term and total debt ratios, while it shares a negative relation with short-term ratio. Also, firms’ size is found to be positively correlated with all debt ratios except short-term securitised debt, highlighting the inability of the small firms to access long-term debt financing. Profitability was found to be negatively correlated with all the debt ratios, while tangibility was found to be positively related to all the debt ratios.

Chen’s (2004) study of public listed Chinese firms show that the firms prefer short-term debt more as compared to long-term debt. Also, a further analysis of the firms show that neither pecking order theory nor trade-off theory has significant impact in explaining the capital structure decisions of these listed Chinese firms. The author suggests that Chinese firms tend to follow a “new pecking order”. This order is retained profits followed by equity and then lastly by debt. This new pecking order is due to the institutional differences prevailing in China and the extensive control wielded by the state governments over the corporates.

Pandey (2004) studied Malaysian listed companies from 1993 to 2000 and found that market power and capital structure have a cubic relationship suggesting that at higher and lower values of Tobin’s Q the studied Malaysian firms tend to use more debt. This finding is attributed to the interplay of prevalent conditions, agency costs and bankruptcy costs. The relationship between profitability and capital structure is U-shaped, suggesting the existence of a non-linear relationship. This finding is attributed to the interactions of agency costs, costs of borrowing and interest tax shield considered. It was also found that size and tangibility have a positive influence on the capital structure of the studied firms, while at the same time, growth, systematic risk and ownership have a negative influence.

Song (2005) studied three debt ratios of the Swedish firms and found significant differences in the determinants of these ratios. Tangibility, profitability, firm size and income variability were found to be significantly related to all three debt ratios, while non-debt tax shield is related only to short- and long-term debt. Tangibility was found to be positively related to long-term debt ratio, while short-term debt was found to be negatively related to it. Firm size was found to be positively related to total and short-term debt ratio, while it was negatively related to long-term debt ratio.
Eriotis et al. (2007) studied the Greek firms and found debt ratio to be positively related to firm size, suggesting that larger firms tend to use debt funds more as compared to smaller firms. Also, the results suggested that liquidity, interest coverage ratio and growth opportunities share a negative relationship with debt ratio. The negative relation with liquidity and interest coverage ratio for the Greek firms suggest that firms high on liquidity tend to generate high cash inflows and use internal sources of funding rather than debt. While firms with high interest coverage ratio show that these firms are cash rich and use less of debt capital. For the growth opportunities of the firms, the relation with debt ratio is negative, suggesting high growth prefer internal funding. The results for the study suggest the presence of pecking order theory of financing for the studied firms.

Daskalakis and Psillaki (2008) found similarities when studying SMEs of Greece and France. The result show positive relationship exists between firm size and leverage in both the countries, suggesting that larger firms tend to rely more on debt funding as compared to smaller firms. Asset structure and profitability share a negative relationship with leverage, supporting the pecking order theory of financing. The commonalities between the SMEs of both these companies can be attributed to similar institutional laws and regulations of these two countries, while the differences in capital structure determinants can be due to size and structural differences of the two financial systems or they may be firm specific.

Salawu (2009) found that during 1990-2004, for the Nigerian companies listed on the stock exchange, overall profitability was not impacted by the capital structure. He attributed this finding to the sparing usage of long-term debts by the studied firms. The underdeveloped Nigerian financial markets due to various factors have led to high reliance on the short-term loans.

Lima (2010) found agency cost of equity, operating leverage, growth rate, bankruptcy risk, tangibility and debt service capacity prove to be significant determinants of capital structure for Bangladeshi pharmaceutical companies. Agency cost of equity and bankruptcy risk was found to be negatively related to capital structure, while growth rate, operating leverage, tangibility and debt service capacity for the studied firms were found to be positively related to the capital structure of the Bangladeshi pharmaceutical companies.

Al-Najjar’s (2011) study of non-financial Jordanian firms show the existence of a negative relationship between leverage and profitability along with business risk. While on the other hand, results show that significantly positive relationship exists between firm’s size, market-to-book ratio, asset tangibility and liquidity with leverage. Also, the studied firms have a target leverage ratio and tend adjust quickly towards it in case of deviations, suggesting that disequilibrium costs and adjustment costs are important for these firms.

Azhagaiah and Gavoury’s (2011) study on Indian IT companies, during the period of 1999-2000 to 2006-2007, found that based on the total income of these companies, the low income IT companies were profitable, which was attributed to lower expenses and the reported profits were independent of the debt funding in their capital structures. For the medium-income Indian IT companies, debt funding has been lower; however, it still played an important role when the profitability of these firms was taken into account. For the high-income Indian IT companies, the expenses for these firms have been large, and thus, debt funding plays a vital role in their capital structure and tends to have a negative impact on the profitability of the high income IT companies.

Chen and Chen (2011) found profitability and growth opportunities to be significant determinants of capital structure of Taiwanese electronic companies. Profitability affects the capital structure in a negative manner for the firms preferring internal financing. Profitable firms tend to rely more on internal financing due to their assured cash inflows. Growth
opportunities tend to share a positive relation with capital structure, as high growth Taiwanese firms tend to rely more on debt funds to finance their growth options.

Ting and Lean (2011) have done a comparative study of capital structure of the government linked companies and non-government linked companies of Malaysia. The results reveal the existence of differences between the capital structure for the two sets. The overall debt ratios of the government linked companies including both the long- and short-term debt ratios are higher than the non-government linked companies. The firm size represented by logarithm total sales was found to be one of the factors attributed to the capital structure found in the Malaysian firms along with tangibility and profitability. The results also indicated that closeness of the government linked companies to the state played a vital role in accessing debt financing for these companies.

Babalola (2012) found the existence of curvilinear relationship between profitability and debt ratio, implying that capital structure decisions are essentially a trade-off between the costs of raising debt fund and the benefits of debt funds (tax-shields). With the usage of debt funds, the value of the firms will increase initially and then decrease with the increased use of debt funds. The empirical result of the studied Nigerian firms suggest that interest costs borne by debt are counterbalanced by the tax benefits availed.

Handoo and Sharma (2012) have done a comparative study of capital structures of Indian state-owned and privately held companies. They found that for the state-owned (public) companies, both equity and debt funding options are available; however, when raising debt funding, factors like firm size, age of the firm, cost of capital and debt servicing capability tend to play a significant role. While on the other hand, for private companies, profitability plays a major role in determining the capital structure mix. With increased profitability, the tax liabilities for the private companies also increase. To offset increasing tax burden, these companies turn to debt instruments as a source of funding, thereby enjoying the tax shield benefits offered. Apart from profitability, tangibility, cost of debt funding, tax rates and debt service capacity also play significant role in determining the capital structure mix of the Indian private companies.

Lim (2012) in another study on the Chinese public listed firms from the financial services found that with increase in firm size, the leverage also increases. While profitability decreased along with non-debt tax shields, earnings volatility and non-circulating shares with increasing leverage. Though China is following basic regulations of market economy, however, the control exerted by the state over the companies is one of the significant institutional determinants influencing the capital structure decisions.

Nadem et al. (2012) have studied Iranian listed companies to determine the capital structure from both static and dynamic data. The results show that in the static version of data, capital structure is positively related to tangibility, return on investment and firm size, suggesting that profitable companies will tend to use internal financing instead of looking at external sources. While the results of dynamic data show that working assets of the companies tend to have a negative relation with capital structure while tangibility is still positively related.

Purohit and Khanna (2012), in their study of capital structure of Indian manufacturing companies, find that asset growth for the studied companies shares a negative relation with leverage. This is attributed to information asymmetry suggesting that as investors’ have little information on the growth prospects of the companies and related agency issues, they tend to ask for higher premium. Also, the results reveal that companies with high future growth prospects will not go for debt funding fearing high costs associated with revelation of sensitive information.
Shubita and Alsawallah (2012) studied listed companies on the Amman stock exchange from 2004 to 2009 to understand the impact of capital structure on the profitability enjoyed by the said firms. Their findings revealed a significantly negative association between increased debts and profitability. They seem to share an inverse relation for the firms studied. They also found that with the increase in control variables like that of sales growth and sizes of firm, the profitability enjoyed by the companies tend to be increasing. They suggest that during an economic downturn, the sales tend to go down affecting the cash flows of the companies; thus, it becomes an important function for the managers to understand the present and future cash flows, review the liabilities and then take the decisions regarding the capital structure.

Soumadi and Hayajneh (2012) in their study of Jordanian non-financial firms found financial leverage to be negatively related to profitability proxied by return on equity (ROE). Also, the degree of financial leverage has no impact on the firms’ performance.

Addae et al. (2013) investigated the impact of capital structure decisions on the profitability of listed firms in Ghana during 2005 to 2009. The result of the regression analysis showed that for the listed firms in Ghana, there existed a significantly positive relationship between short-term debt and the profitability enjoyed by these companies. The authors are of the view that as short-term debt interest payments are tax deductible and carry lower interest rates, the profits available to the firms are higher, which explains the positive relationship between these two variables. Also, it was found that about 52 per cent of the operations and assets of the listed firms during the period of study were financed by short-term debt. As far as the relationship between long-term debt and profitability is concerned, the results showed a significantly negative result highlighting the fact that long-term debt was associated with higher interest payments and reduced profitability for the listed companies.

Mohammadzadeh et al. (2013) studied the relationship between capital structure and profitability in Iranian pharmaceutical industry from 2001 to 2010 for companies listed at Tehran Stock Exchange. The results of the correlation analysis of the profitability parameter with capital structure variables showed that there existed significant relation with net profit margin (NPM). The regression results revealed that short-term debt financing did not lead to profitability, also Iranian pharmaceutical companies exposed to long-term debt financing faced lowered profitability. The authors also opine that in Iranian pharmaceutical industry, the pecking order theory is present, as the companies prefer an internal source of funding rather than debt funding.

Taani (2013) studied the impact of the capital structure decisions on the performance of the banks listed with the Amman Stock Exchange for the period 2007 to 2011 for a sample of 12 commercial banks. The author had used Total Debt to Total Equity Ratio and Total Debt to Total Funds ratio as the proxy for capital structure. For the profitability parameter, ROE, Return on Capital Employed (ROCE), NPM and Net Interest Margin were used as the proxy for banking performance. The author found that total debt used by the banks plays a significantly important role on the net profit enjoyed by the banks and the ROE reported by these banks. The findings also suggest that the Jordanian commercial banks are highly levered institutions with debt being at 8.25 times of the equity capital.

Banerjee and De (2014) have tried to identify the variables affecting the ROA enjoyed by Indian iron and steel industry from 2003-2004 to 2010-2011, covering both the pre- and post-recession period from a sample of 130 companies. The results revealed that growth rate of assets, dividend payout, business risk, degree of operating leverage, age of the firm and size of the firm in terms of sales do not have a significant impact on influencing the ROA of Indian iron and steel industry. While the factors debt service capacity, financial leverage
and size of the firm in terms of assets were found to be statistically significant in explaining the ROA enjoyed by the Indian iron and steel industry. The authors also suggest that during the pre-recession period, financial leverage and debt service capacity of Indian iron and steel companies played an important role in determining the ROA earned, while in the post-recession period, firm size in terms of assets of the firm along with financial leverage and debt service ratio played significant determinants of ROA for the iron and steel industry.

Chadha and Sharma (2015) analysed the relationship between capital structure and profitability by studying 422 Indian manufacturing firms for a period of 10 years from 2003-2004 to 2013-2013. They have used return on assets (ROA), ROE and Tobin Q's as the proxy for the firms' profitability which also acts as the dependant variable. While, debt-to-equity ratio has been used along with size, age, tangibility, sales growth, asset turnover and ownership as the independent variables. The findings when ROA is used as the proxy for firm performance shows that there was no significant impact of the debt funding on the ROA; however, the other variables such as size, age, sale growth, asset turnover and ownership of the firm had a significant impact on the ROA enjoyed by the firms studied. ROE when used as the proxy for firm performance, highlighted the negative and significant correlation with the debt to equity (DTE) of the firm, suggesting that as the firms’ debt funding increased lesser portions of profit earned were enjoyed by the equity shareholders. The final variable Tobin Q's which when used as the proxy for the firms' performance, suggested to have no relationship with the DTE ratio of the firm. However, the independent variables other than DTE ratio were shown to have a positive and significant correlation with the Tobin Q's of the firms studied.

Correia et al. (2015) in their study of French firms found tangibility and firm size to have significant and positive on the firms’ debt level, while on the other hand, profitability for the studied firms was found to have a significantly negative relation with the debt levels. The growth opportunities for these firms were negatively correlated with total debt levels in a significant manner. While non-debt tax shield was found to have a significantly positive relation with the total debt levels of the studied French firms.

Sharma and Paul (2015) suggest that firms with high liquidity prefer to raise capital through equity issues rather than debt funding, suggesting that these firms tend to be less leveraged than their peers. In the Indian context, they find that accessibility to debt on favourable terms is skewed towards highly liquid firms. They opine that corporate debt markets in India are underdeveloped and most of the trading is concentrated in few top securities. The small- and medium-sized firms have almost no or very little access to debt market. The authors suggest that capital structure decisions for the studied companies are more influenced by accessibility to debt rather than choosing between raising equity or debt.

Chaklader and Chawla (2016) investigated the impact of growth, profitability, size of the firm, non-debt tax shield and liquidity on financial leverage by studying the NSE CNX 500 companies during 2008 to 2015. The findings of study suggest that the firms tend to favour trade-off theory of capital structure, translating to the fact that, growing firms will not favour debt as a source of funding due to the increased distress cost associated with it. With respect to the impact of non-debt tax shield on capital structure, the results show that firms with high depreciation and amortisation would be comfortable with cash operations and not seek out debt as a source of funding. On the other hand, profitable and tangible firms will look at debt funding. This attributed to the fact that profitable firms will be assured of its earnings and also be capable of taking of their interest cost and principal repayment obligations. While on the other hand, highly tangible firms will have an easier access to loan funds since the tangible assets could be used as collateral. Liquidity has a negative relation...
with leverage suggesting that firms high on liquidity would go for internal funding as opposed to borrowed funds.

While the above review of literature covers the empirical studies done over time regarding capital structure decisions and its impact on selected determinants, the next section of literature will address the need for the current research to be carried out.

International Energy Agency (IEA, 2012) in its study on the Indian energy sector found two trends emerging in the Indian energy market. First, the existence of energy shortage across different fuel sector ranging from coal, gas and oil to uranium. This deficiency will be directly hampering the economic and social development. Second, the increasing need to import more energy as a result of the country’s stagnating domestic production. IEA suggests that to address these issues, India needs a functioning energy market, suggesting the need for a system which can meet the national energy demand by adequate and timely investment in a sustainable way and business entities operating in the energy market are commercially viable.

IEA (2012, 2011) and Teri (2007) point out that the pricing of electricity in the country is also major obstacle in attracting private investment. With pricing mechanism highly in favour of the agriculture and household segments, the industries are left to bear the brunt of high per unit prices.

Anderson (1996) finds that due to the sensitive nature of the sector, many a times a complete waiver is given to the relatively weaker sections of economy in light of winning political favours. The Indian oil and gas sector is still comparatively competitive than the other segments of the Indian energy sector, in terms of the number of players and increasing level of presence in the different activity spheres.

IEA (2012) and Bandyopadhyay (2009) find that the pricing of this sector also suffers and acts as an impediment to attract private investors. The earlier concept of administered pricing mechanism (APM) is done away with; however, the government is controlling the prices by controlling the taxes levied on the petroleum products. To compensate the Oil Marketing Companies (OMCs), the government introduced the payment of under recoveries through oil bonds. These oil bonds were issued only to the government controlled enterprises, leaving the private companies to bear the losses. The oil bonds in turn create a huge burden on the government.

The above review of literature shows the various theories proposed and empirical studies done over the time regarding the capital structure decisions and its impact on selected factors across different industries, stock indices and sectors globally. The review of literature on the Indian energy sector shows the need for the current study to bring out the factors affecting the capital structure decisions of the Indian energy companies.

3. Objective of the study
The objective of the current research is to determine whether the selected variables of the regulated Indian energy companies have an impact on their capital structure. The Indian energy sector is governed by an array of laws and regulations and is dominated by a huge presence of government-owned companies. Also the pricing of the energy goods be it electricity or oil and natural gas has been long controlled by the governmental agencies which both the government and private energy companies are expected to follow. With a pre-determined price of the energy unit to be sold at, it becomes necessary to study the various factors affecting the capital structure decisions of the Indian energy companies.
4. Data and methodology

4.1 Data

The present research is based on the secondary data of the selected Indian energy companies. The companies were identified on the basis of six segment-wise classification listed by the Bombay Stock Exchange related to the energy sector as a whole like electric utilities; exploration and production; integrated oil and gas; oil marketing and distribution; refineries/petro products; non-electric utilities; coal; oil equipment and services; industrial gases; and heavy electric equipment. A number of steps were involved in the sample selection. Initially, a total of 430 companies in the energy sector were identified which were listed with Capitaline database. A final sample of 141 companies was taken considered based on the availability of the data. The period of study is from 2006-2007 to 2016-2017. The companies which had financial information for less than six years have been excluded from the final sample.

The above review of literature highlights that as the proposition of the MM Irrelevance theory, many new theories have come up since, and empirical studies have been done across various industries globally to understand what motivates a company to select a particular source of funding over the others. A look at the previous empirical studies done shows that out of various parameters to evaluate companies' performance, measures ROE, ROCE, ROA have been most widely used. The definition of capital structure has also undergone a change over the years. In a strict sense, capital structure should include only long-term borrowings; however, for many developing countries, the accessibility to long-term borrowings is restricted due to under development of capital markets. In such countries, it is seen that, short-term debt plays an important role in bridging the financial deficit. Thus, over the years, many studies have proxied capital structure ratio by short-term debt to total capital ratio, long-term debt to total capital ratio, total debt to total capital ratio and total debt to total assets ratio. Based on the above review of literature and the variables studied, the current research tries to find out the various determinants of capital structure of the Indian energy sector.

4.2 Determinants of capital structure

Based on the review of literature done in the previous section, the following section briefly describes the possible determinants of capital structure of the Indian energy companies. These determinants are denoted as profitability of firm, sales growth, firm size, tangibility ratio, asset turnover ratio, age of firm, debt service capacity, liquidity and non-debt tax shield.

4.2.1 Profitability of firms (PROF). The trade-off theory suggests a positive relationship between profits earned and capital structure. Increased usage of debt will lead to higher profits due to tax shield advantages. The pecking order theory on the other hand shows that firms use internal funds and debt when in need of new funding, instead of issuing new equity, thus suggesting a negative relationship between profitability and capital structure. The profitability for the current study is proxied by ROCE for the Indian energy companies. Many empirical studies have reported a negative relationship, like the studies of Shubita and Alsawallah (2012); Addae et al. (2013); Azhagaiah and Gavoury (2011); Chadha and Sharma (2015); Mohammadzadeh et al. (2013); Ting and Lean (2011) and Purohit and Khanna (2012).

4.2.2 Sales growth (growth). Firms with higher growth opportunities tend to be less leveraged since firms with growth opportunities might find it difficult and costly to rely on debt as a source of funding. The current study represents growth opportunities in the form of sales growth as percentage change in sales on a yearly basis. It is expected that firms with
higher sales growth would require a firm to be less leveraged. However, empirical evidence is non-conclusive to suggest a definitive influence of debt funding on sales growth. While, Chen (2004), Bhaduri (2002), Lima (2010) and Chen and Chen (2011) found a positive relationship between the two. Whereas, Eriotis et al. (2007), Purohit and Khanna (2012), Rajan and Zingales (1995) found the relationship to be negative.

4.2.3 Firm size (size). Size of the firm is an important determinant of capital structure. Firms size for the current study is determined by taking the natural logarithm of total assets for the selected companies. Firm size is said to have a positive relation with debt funding, as a firm with larger assets is expected to have more exposure towards debt funding. Studies like Shubita and Alsawallah (2012); Chadha and Sharma (2015); Banerjee and De (2014); Pandey (2004); Chaklader and Chawla (2016); Ting and Lean (2011) have used firm size as independent variable to determine its impact on capital structure.

4.2.4 Tangibility ratio (TANG). Tangibility is said to be the ratio of net fixed assets divided by total assets, as defined by Wiwattanakantang (1998). This ratio highlights the fixed assets investments vis-a-vis the long-term resources held by the companies. The trade-off theory suggests that companies with high-debt funding will tend to have higher proportion of fixed assets, which is expected to serve as collateral for future debts. Thus, a positive relationship is expected to be found between tangibility ratio and total debt in the Indian energy companies. Similar results have also been reported by Chen (2004); Pandey (2001; 2004); Bevan and Danbolt (2004); Song (2005); Nadem et al. (2012), Daskalakis and Psillaki (2008); Al-Najjar (2011) and Sheikh and Wang (2001).

4.2.5 Asset turnover ratio (ATR). This ratio signifies the efficiency with which a company uses its assets to yield positive returns. Muritala (2012) suggests that a positive relation could be expected between firm’s performance and its asset turnover. Chadha and Sharma (2015) find a negative relation between asset turnover and firm’s performance.

4.2.6 Age of the firm (age). Firm’s age is calculated as the number of years, as the date of incorporation in the period of study. Older firms tend to imply higher credibility and reputation in the market. It is also said that older firms tend to be more profitable than the younger firms. For the current study, the natural logarithm of number of years is taken. The variables are taken as the control variables for the current study.

4.2.7 Debt service capacity (dserv). A high-debt service ratio is preferable; however, a very high ratio suggests a conservative approach by the company towards usage of debt. A low exposure to debt will not enable company to use debt funds to the best advantage for their shareholders. This ratio has generally been found to be positively correlated with debt funds. According to agency theory, a firm’s ability to service its debt reduces agency costs and motivates a higher use of debt to enjoy higher tax shield. Studies such as Eriotis et al. (2007), Lima (2010), Handoo and Sharma (2012), Banerjee and De (2014) have used debt service capacity ratio as an independent variable to determine its impact on capital structure.

4.2.8 Liquidity. Firms higher on liquidity would tend to finance their projects through internal funds rather than employing debt funds. Chaklader and Chawla (2016); Sheikh and Wang (2001) and Eriotis et al. (2007) find a negative relationship between capital structure and liquidity. This finding is in order with pecking order theory, which suggests that liquid firms tend to rely more on internal financing than going for debt funds.

4.2.9 Non-debt tax shield. The basic reason why a firm undertakes debt is due to the fact that, the company gets tax benefits. Tax shield refers to the shielding of a firm’s income in the form of depreciation, amortisation, research and development expenditure, etc. Thus, the presence of NDTS has an inverse relation with debt funds in the capital structure. Jairo (2008) finds a significantly negative relationship between NDTS and debt. The same result
has been reported by Gonzalez and Gonzalez (2011), Correia et al. (2015) and Chaklader and Chawla (2016).

4.2.10 Dependent variable.
4.2.10.1 Total debt ratio. For the current study, capital structure ratio is considered as the dependent variable, as had been done in several past studies like Pandey (2001, 2004); Shyam-Sunder and Myers (1999); Bevan and Danbolt (2002, 2004); Guha-Khasnobis and Bhaduri (2002), Eriotis et al. (2007); Purohit and Khanna (2012), Chaklader and Chawla (2016). The capital structure ratio is proxied by total debt ratio, which is defined as total debt to total asset ratio (TDR).

4.3 Methodology
This study uses panel data methods, as the sample contains data across firms over a period. Also, Baltagi (2011) states that panel data tend to give better and richer variation, allowing the estimation of parameters in a more efficient way. Guha-Khasnobis and Bhaduri (2002) state that panel data estimates are based on large number of observation and are expected to be more robust. Second, the issue of multi-collinearity is reduced, as both the time and cross-sectional dimensions are present in the data. To understand and estimate the effect of total debt ratio, three panel data estimations have been used, namely, pooled ordinary least squares, fixed effects panel and random effects panel model. While many methods are available to study cross-sectional effects on each firm or on a group of firms, the most commonly used econometrics methods are that of fixed effects and random effects method model. The fixed effects model accounts for individual firms or a unit together, by giving each firm an intercept while at the same time assuming that for the whole data the slope coefficients are constant. While on the other hand, the random effects model, assumes the individual units to be uncorrelated and estimates the coefficients accordingly.

The equation for the panel data will estimated in the form given below:

\[
TDR_{it} = \alpha_1 + \beta_1 \text{Age}_{it} + \beta_2 \text{ATR}_{it} + \beta_3 \text{Dserv}_{it} + \beta_4 \text{Growth}_{it} + \beta_5 \text{LIQ}_{it} \\
+ \beta_6 \text{NDTS}_{it} + \beta_7 \text{PROF}_{it} + \beta_8 \text{Size}_{it} + \beta_9 \text{TANG}_{it} + e_{it}
\]

where:
- \(i\) = Number of cross-sections;
- \(t\) = period of study; and
- \(e_{it}\) = error-term of the equation.

Chaklader and Chawla (2016) state that panel data analysis is more robust than time-series or cross-section modelling, as it captures the differences across individual cross-sections much better. Chadha and Sharma (2015) cite Baltagi (2005) and state that panel data provides more rich information, more variability and less collinearity issues. The fixed effect model takes care of individual heterogeneity and also controls for the effect of missing variables. Pandey (2004) in his seminal work also used panel data analysis, which allowed the regression to be controlled for unobserved heterogeneity through individual effect. Daskalakis and Psillaki (2008) have also used panel data models and suggest that panel data reduces the issues of collinearity among the independent variables, thereby improving the efficiency of econometric models employed. Also, panel models allow for presence of dynamic effects.
5. Empirical findings and discussion
The following section discusses the descriptive statistics of the variables, both independent and dependent followed by the correlation matrix of the independent variables. The last subsection discusses the results of regressions carried out.

5.1 Descriptive statistics
The table (Table I) on descriptive shows the behaviour of the selected variables over the study period for the selected Indian energy companies across the various segments. The average debt used by the energy companies is 35.374 per cent of the total capital raised. The data collected show that some companies are highly leveraged with debt funding being 1.25 times of equity, while on the other hand, some of the selected energy companies have no debt exposure. The profitability of the selected companies averaged at 10.618 per cent for all the segments of the energy sector. This average is relatively low as compared to the capital-intensive nature of the sector as a whole. The ability to service debt of the Indian energy companies averaged at 166 times, suggesting that most of the companies are quite capable meeting the interest obligations and repayment of debts. However, a very high debt service ratio suggests that the selected companies are hesitant of borrowing funds to diversify their operations and improve the profitability. This is corroborated with the average liquidity for these companies, which stood at 12.34578, implying that the studied companies have a tendency to favour internal funds for financing their operations rather than going for borrowed funds. The asset turnover ratio for this sector stood at 1.043451, suggesting that efficient utilisation of the assets by the elected Indian energy companies to yield positive returns. A positive relationship could be expected from a company’s performance, in terms of its profitability and their asset turnover ratios.

Firm size for the current study is proxied by taking the logarithm of total assets for the elected energy companies. The average firm size is 3.1535, while the maximum firm size is 5.5997, suggesting a wide variability in the firm sizes of the Indian energy sector. Corroborating this fact, is the tangibility ratio for the energy sector, which averaged at 0.4144, highlighting that less than 40 per cent of the total assets in the elected energy companies are tangible in nature. While number is quite low as compared to the maximum tangibility ratio of 6.6875, the descriptive statistics suggests the existence of high variability even in terms of tangible assets across the various sub-sectors of the energy sector.

5.2 Correlation analysis
The correlation (Table II) between the independent variables used in the current study. It was found that there existed no high degree of correlation between the independent variables. In effect, proving that the regression equation formulated earlier will not suffer from the problem of multi-collinearity. The highest absolute value is 0.22647, thus suggesting that estimates will not be sensitive to changes in model.

5.3 Regression analysis
The regression results (Table III) for the pooled OLS method show that firm’s age, asset turnover ratio, liquidity, profitability and tangibility ratio are significant determinants of total debt ratio at 5 per cent level for the selected Indian energy companies. While the other variables like debt service capacity, sales growth, non-debt tax shield and firm size were found to be insignificant at 5 per cent level of confidence. The $R$-square of the pooled regression stood at 7.187 per cent, suggesting the presence of cross-sectional effects on the sample studied. This result is further corroborated with the $F$-statistics value of 9.706102, which is considerably lower (Table III).
<table>
<thead>
<tr>
<th></th>
<th>AGE</th>
<th>ATR</th>
<th>DSERV</th>
<th>GROWTH</th>
<th>LIQ</th>
<th>NDTYS</th>
<th>PROF</th>
<th>SIZE</th>
<th>TANG</th>
<th>TDR</th>
</tr>
</thead>
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<tr>
<td>Mean</td>
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<td>166.5692</td>
<td>243.3455</td>
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<td>10.6182</td>
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<tr>
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<td>2.2143</td>
<td>0.02867</td>
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<td>Maximum</td>
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<td>900.8872</td>
<td>107385.9</td>
<td>3821.066</td>
<td>5.7893</td>
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<td>5.5997</td>
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<td>Minimum</td>
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<td>−117.9600</td>
<td>−100.1499</td>
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<td>−315.4902</td>
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<td>1.6976</td>
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</table>

Table I. Descriptive statistics
The current sample contains data from across firms over a period time, which may lead to cross-sectional effects. To rectify this effect, both fixed effect and random effect panel methods are used. The results of the fixed effects panel regression (Table IV) show that firm’s age, asset turnover ratio, liquidity and firm size are significant determinants of capital structure puzzle

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-test</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
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<td>AGE</td>
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<td>TANG</td>
<td>0.249488</td>
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</table>

Notes: $R$-square: 0.071876; adjusted $R$-square: 0.064471; $F$-statistics (Probability): 9.706102 (0.0000); Durbin–Watson: 0.337521

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard error</th>
<th>t-test</th>
<th>Probability</th>
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</thead>
<tbody>
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<td>ATR</td>
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<td>TANG</td>
<td>0.024600</td>
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</table>

Notes: $R$-square: 0.853926; adjusted $R$-square: 0.831896; $F$-statistics (Probability): 38.76297 (0.0000); Durbin–Watson: 1.883647
structure at 5 per cent level of significance. On the other hand, debt service capacity, sales growth, non-debt tax shield, profitability and tangibility ratio are not significant in determining the capital structure of the Indian energy companies. The $R^2$ value at 85.3926 per cent is high and appear to explain the variations of total debt ratio significantly. Also the significant value of F-statistics at 38.7629 supports the significance of the regression model (Table IV). The Hausman test result suggest that fixed effects model is the most significant and better method of estimation (Table V).

The results of the regression with fixed effects panel method show that firm’s age, asset turnover ratio, liquidity and firm size are significant determinants of capital structure for the selected Indian energy companies. Of the total independent variables chosen for this study, five variables were found to be insignificant not only in terms of the $p$-value of these variables but also in terms of the coefficients obtained. To understand whether these insignificant variables have an impact on the overall result of the regression, we regress the equation again by dropping the insignificant variables one by one. Finally, by dropping all the insignificant variables together, to understand the change in results of the regression (Table VI).

In the step-by-step regression to understand the contribution of independent variables which were found to be insignificant (Table I), it is seen that overall the $R^2$ values of the regressions are lower (Table VI) as compared to the $R^2$ value (0.853926) of equation (1). Also the value of F-statistics for the step-by-step regression conducted (Table I) is comparatively lower than that of equation (1) at 38.76297. For most of the regressions done, the significant determinants of capital structure were firm size, firm age, profitability and tangibility. However, when profitability is dropped as an independent variable, the other significant variables are firm’s age, debt service capacity ratio, liquidity, firm’s size and tangibility.

5.4 Discussion
The findings of the regression suggest that firms’ age, asset turnover ratio, liquidity and firm size play a significant role in determining the capital structure of the Indian energy companies. While the relation between profitability and total debt ratio is negative, the variable profitability is insignificant based on its $p$-value. The relations between liquidity of the Indian energy companies share a negative relationship with its capital structure, although the coefficient is not very significant. This negative relation between liquidity and capital structure suggests that the selected Indian energy companies tend to finance their projects an operations by using internal funds rather than seeking external debt funds.

Firm’s age is found to be negatively significant with the capital structure for the selected companies. This finding suggests that younger firms tend rely more on borrowed funds to finance their operations, rather than the older and established firms. This finding is corroborated with a high debt service ratio, suggesting that older and cash-rich Indian energy companies tend to finance their operations internally. Asset turnover ratio also has a negatively significant relation with total debt ratio, suggesting that despite debt funds being used in the creation of assets for the Indian energy companies, the efficiency in utilisation of

<table>
<thead>
<tr>
<th>Table V. Hausman test result</th>
<th>Chi-square statistics</th>
<th>Chi-square d.f.</th>
<th>Probability</th>
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<td>Dependent variable</td>
<td>Dropped independent variable</td>
<td>$R^2$-square</td>
<td>$F$-statistics (Probability)</td>
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<td>-------------------</td>
<td>-------------------------------</td>
<td>--------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>TDR</td>
<td>Dserve</td>
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<td>31.93042 (0.0000)</td>
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<td>Growth</td>
<td>0.792926</td>
<td>28.97766 (0.0000)</td>
</tr>
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<td>NDTS</td>
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<td>30.33022 (0.0000)</td>
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<td>Profitability</td>
<td>0.814814</td>
<td>29.40284 (0.0000)</td>
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<td>TDR</td>
<td>Tangibility</td>
<td>0.816246</td>
<td>29.68378 (0.0000)</td>
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</table>

Table VI. Step-wise Regression on independent insignificant variables
those assets are not yielding positive returns. The debt service capacity is also insignificant in determining capital structure decisions for the selected companies. This fact is corroborated by the average debt funding used by the sector as a whole, which stood at 35.37 per cent, for a sector which is known to be capital-intensive. The sales growth variable is also an insignificant determinant, suggesting that sales revenue has little or no impact on the capital structure decisions taken. This point gets supported with the fact that for long pricing of energy products has been governed by a set of rules laid down by the regulating authorities to achieve the socio-economic targets.

Firm size shares a positive and a significant relation with total debt ratio, implying that as the firm grows, its financing needs are bridged with borrowed funds. While on the other hand, tangibility and non-debt tax shield do not have a significant impact on the capital structure.

With the step-by-step regressions used to understand the impact of each independent variables, it was seen that every variable selected as has an impact on the overall goodness of the regression (Table I), in terms of $R^2$-square and $F$-statistics value obtained (Tables I and VI).

6. Conclusion
The current empirical study has attempted to determine the factors affecting the capital structure decisions of selected Indian energy companies from 2006-20007 to 2016-2017. The analysis of the data was done by using econometric techniques, like, pooled OLS, fixed effects and random effects. The capital structure decision is proxied by total debt to total assets ratio.

The empirical data and its analysis suggest that firm’s age and liquidity have a significant yet negative relationship with capital structure, while firms’ size has a positively significant relationship with debt ratio. Conventionally, it is seen that profitability shares a negatively significant relationship with debt ratio, the same relation holds true for the Indian energy companies too. This result is in line with earlier studies Pandey (2001); Guha-Khasnobis and Bhaduri (2002); Bevan and Danbolt (2004); Daskalakis and Psillaki (2008); Al-Najjar (2011) and many more. The inverse relationship between capital structure and profitability suggests that increased exposure to debt funds tend to wipe out profits in way of interest payment and principle repayment obligations

An inverse relation with firm’s age suggests that younger firms tend to rely more on borrowed funds as compared to the older firms. The following two factors will explain this reaction more clearly. First, energy sector is known for its capital intensiveness and, second, the development of a dynamic energy sector is crucial for the economy to progress, and keeping this goal in mind, access to debt funds has been made easier than raising equity by the relatively younger companies. Also, with respect to liquidity, the inverse relationship implies the energy firms’ preference to finance their operations by utilisation of internal funds rather than going for borrowed funds. This result is true due to the presence of older and established energy companies who have dominated the Indian energy scenario for the past few decades, thus making them cash rich and more reliant on their internal funds. Firms’ size shares a positive and significant relation with debt ratio suggesting that for growing or expanding firms preference for borrowed firms is higher as compared to internal funds or raising of equity. This fact is corroborated with the earlier finding of inverse relation between the firm’s age and the capital structure.

For the Indian energy companies, while debt funding has played a significant role, it is also seen that these companies have been operating in a regulated environment for a long
period, which is absent in most of the other sectors or industries of the economy. Though in recent years, the government has slowly done away with APM while determining the prices of crude oil and its products; however, the energy pricing per unit is far from being market determined. It is argued that as energy is a public good and should be available to all, its price cannot be determined by market forces alone. There has always been an element of socio-economy development involved while setting the prices of energy products. However, while the argument on energy being a public good holds true, the various layers of regulations and policies, need to be removed to ensure a larger participation of the private participants, who are expected to bring along with them larger investments, leading to improved efficiency both operationally and financially.

While the current research tries to address the research gap in the Indian energy sector from a financial viewpoint by analysing the capital structure and its determinants, more specialised focus is required in the future. This study is expected to be helpful for the managers and policy makers to understand and address the gaps existing in the sector and its companies to make this sector more viable and attractive for future investments.

References


Further reading

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