The Relationship between Market Value, Capital Expenditures, Value Creation and Product Market Power

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Abstract

The present study's primary purpose is to investigate the relationship between the company's market value, capital expenditures, value creation, and the product market power of the companies listed on the Tehran Stock Exchange. The study's statistical population consists of 129 companies during 2013-2018. The Combined data method has been used to test the research hypotheses. The Herfindahl–Hirschman, the Lerner, and the Industry-adjusted Lerner Index measure product market power. To measure the company's market value, Maditinos et al. (2011) were used to measure capital expenditures. The model presented in Liao, Lin and Lin, (2016) has been used, and the Pulic Model (2004) to measure value creation. The results show a positive (negative) correlation between the market value of the company and the Herfindahl–Hirschman Index and Lerner Index (Industry-adjusted Lerner Index). There is a positive (negative) correlation between capital expenditure and the Herfindahl–Hirschman index and Lerner Index (Industry-adjusted Lerner Index). The results show a negative (positive) correlation between value creation and the Herfindahl–Hirschman Index (Lerner Index and Industry-adjusted Lerner Index).

Keywords

Market Value, Capital Expenditures, Value Creation, Product-Market Power

1. Introduction

One of the most important financial reporting goals is to provide useful information for appropriate decisions to succeed in competitive areas, including business, politics, and economics. The power of the product market is a critical criterion for assessing the quality of industries and firms in competitive fields (Baggs and Bettignies, 2007). The use of profitably competitive investment opportunities leads to selecting the most beneficial strategies, leading to a more efficient allocation of scarce resources and, finally, the enhancement of organisational performance (Rostami and Rezaei, 2021). Competitive pressure is an important determinant of managerial decision-making that has received empirical support in the literature (Datta, Iskandar-Datta and Singh, 2013). Considering the importance of increasing the strength of companies in the market of manufactured products, recognising the variables affecting the power of the company is very important (Jaspersen, 2016), which is considered as one of the essential industry attributes in explaining the fluctuation of corporate profits and the uncertainty of information identified (Haw and Lee, 2015). Peress (2010) states that large companies' power in the product market causes investors' business activities and uses accounting information through information reported in financial statements to predict future cash flows and profitability. On the other hand, the company's market value reflects the shareholders' wealth since the accounting system's final result is office value. Suppose the accounting measurements are carried out so that the office value is the same as the market value. In that case, other financial analysts do not need the accounting variables such as profit and cash flows. But in accounting measurements, the market value is not the same as a company's office value (Pirie and Smith, 2008). Jaspersen (2016) states that the company's market value is one of the criteria for the company's performance in the balanced assessment approach, so it's a prediction for investors and managers, and assessing the market power of the product is very important. Competition is a disciplinary device that motivates managers to stay in business efficiently (Alchian, 1950; Stigler, 1958; Shcimidt, 1997) and focusing on competition intensity and flexibility level can deal with the board's ambiguities on market structure and competitive status (Rostami and Rezaei, 2021). The threat of failure and liquidation reduces agency costs and incentivises managers to make value-increasing decisions (Grossman and Hart, 1992). Thus, product market competition forces powerful managers to use their powers, and when markets are less competitive, they have no incentives to make more effort. CEOs prefer to have a quiet life and are more likely to misuse their powers to extract personal rents, reducing value. Hart (1983) shows that competition in product markets provides incentives to managers to reduce managerial slack. Moreover, heightened competition increases the likelihood of failure for high-cost firms (Schmidt, 1997), and it can discourage managers from investing in risky investments (Salehi, Daemi and Akbari, 2020). However, there is not much room for costly mistakes in competitive product markets, and the threat of liquidation forces managers to make decisions for value increase (Grossman and Hart, 1992).

In Iran, creating a competitive environment and eliminating monopolies are among the controversial categories of Iran's economy, and after the implementation of No. 44 of the Constitution on privatisation and the relative change of government approach to the economy, the ownership structure of companies has changed somewhat and provided for the private sector to enter many areas of activity. The monopolies in the hands of the government in some industries have decreased, and the conditions have been prepared for the competitiveness of other industries. However, there are still restrictions and barriers to competing in products in some Iranian industries, and companies face unfair competition with state-owned- enterprises.

Another factor in the strength of the product market is capital expenditure. Since the quality and the product market power are the bases for a firm to make profits and create value, product market

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status may be an essential predecessor of capital expenditures (Liao, Lin and Lin, 2016). The results of Farooq and Pashayev (2020) also highlights the importance of product market competition on the expenditure in the emerging market, where agency problems are supposed to be high.

Further, the essential respect for the customer and the increasing market power is value creation. Value creation is an approach that an organisation takes to all its users, especially its customers. The customer focuses on all processes and activities and manages the organisation to address all the eliminator demands and customer needs (Johnson, 2002). Firms can achieve sales growth by strategically emphasising value creation or value appropriation activities. However, surprisingly little is known about the impact of pursuing these activities with internal resources and via strategic international alliances (Tower, Hewett and Saboo, 2021). Several studies (such as Akdogu and MacKay, 2012; Datta, Iskandar-Datta, and Sharma, 2011; Haushalter et al., Haushalter, Klasa and Maxwell, 2007; Fama, 1980) reveal that a firm's product market competition environment influences its investments and financing. Yet, how a firm's market value, Capital expenditure, and value creation affect product market power is an issue that has largely been overlooked. Therefore, the current study examines the relationship between the company's market value and capital expenditures and value creation on the product's market power.

The study has several contributions. First, to our knowledge, this is the first study investigating the relationship between the company's market value and capital expenditures and value creation on the product's market power. On the other hand, methods of measuring product market competition are always challenged. So, in this study, the Herfindahl – Hirschman Index (HHI), Lerner Index (LI), and industry-adjusted Lerner Index (LIIA) were used to measure product market competition. This research can be an effective step to understanding and motivating managers and investors to pay attention to the importance of product market competition and corporate investment. This study also provides empirical evidence of how a company's market value, capital expenditures, and value creation can affect product market competition. The findings of this study can show the importance and necessity of this research and fill the research gap in this field. This study can provide new evidence of the Iranian environment, enrich the relevant literature, and offer a relevant contribution to academic researchers in investment decisions.

The second part presents the theoretical foundations and background of the research and this research method. In the next section, the research findings are presented, and, finally, the discussion and conclusion are expressed.

2. Literature Review and Hypothesis Development
2.1. Product Market Power

Economic development has become one of the main goals of countries' economic policies and decisions, and efficient investment affects sustainable economic growth and development (Hall and Lerner, 2010). On the other hand, competitiveness is a central issue worldwide, referred to as achieving optimal economic growth and sustainable development. One of the characteristics of a successful company is having competitive power, and the obvious feature of unsuccessful companies is not having this power. Market competition is an effective factor in companies' investment and financial performance, and market competitiveness can lead to increased investment and business efficiency and affect the market value of companies and agency costs (Nugroho and Stoffers, 2020). Given the information role of the competitive environment, it seems that a strong competitive environment improves the oversight of management decisions about investment and its efficiency and creates an effective culture of corporate governance. This can be done by increasing

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the efficiency of managers, increasing transparency in decision making, improving the level of accountability of managers, reducing the risk of incorrect investment decisions, and realising the prices in the market (Paniagua, Rivelles and Sapena, 2018). Shepherd (1970) defines the product's market power as the company's ability to determine the quality, price, and nature of the product in the market. He argued that the product's market power further implies that the company will face less competitive threats. The growing competitive conditions are for companies with little market power. In other words, when a customer leaves a demand for different companies in a particular industry and stops buying from a company and closes the relationship with another company, the company first benefits the second company's market for its product Loses (Irvine and Pontiff, 2009). Competitiveness can be considered an opportunity to achieve a suitable position and stability in global markets (Van Hoose, 2010). Market competition is an essential benchmark for assessing industries and firms' quality in competitive areas, including business, political, and economic fields. Each firm or industry with high competitive ability in competitive markets is more competitive (Baggs and Bettignies, 2007). Because of the competitive conditions of the product market, managers face a lot of financial reporting problems. One of these problems is the balance between reporting transparency and the lack of disclosure of excessive information since financial reporting can help companies compete. It may compete with strategic information for competitors. It also affects the ability to do so (Gal-Or, 1985). Ownership costs and agency costs complement the relationship between product market competition and the disclosure of accounting information; therefore, companies that compete in their industry have fewer ownership and representation costs (Cheung, Jiang, and Tan, 2010). The strength of the product market is a natural safeguard against negative implications. Companies with market power have the potential to better off consumers' negative cash flow. This ultimately leads to more profitable earnings and cash flow (Peress, 2010).

Competition in the product markets plays a critical role in disciplining the managers and mitigating agency problems (Alchian, 1950; Stigler, 1958). Also, an increase in product competition increases the likelihood of failure, especially for those firms with high costs (Schmidt, 1997). Much of the industrial organisation literature (e.g., Lindenberg and Ross, 1981 and (Domowitz, Hubbard and Petersen, 1986) used the Lerner Index (LI) (see Lerner, 1934) for the product market power. Lerner Index is referred to as the price-cost margin scaled by sales. This measure does not isolate the firm-specific factors that influence the product market power from industry-wide factors. This metric can fluctuate due to industry-specific attributes that are unrelated to a firm's market power. Therefore, the industry-adjusted Lerner Index is the value-weighted industry-adjusted Lerner Index (Market Power) and captures firm-specific product market power. Industry-adjusted Lerner Index is the difference between the firm's price–cost margin and the sales-weighted price-cost margin of all firms within an industry. This modified Lerner Index measure captures the intra-industry market power of a firm purely.

Cremers, Nair and Peyer, (2008) use the industry median price–cost margin to obtain industry competitiveness. They argue that higher profit margins in the industry reflect a less intense competitive environment and that thin margins are associated with greater competitive pressures.

It is argued where a larger number of firms in the industry magnifies competition. Bikker (2004) stated that there are two ways of classification to assess the level of competition, namely, tests on structural and non-structural characteristics. According to Bain (1951), the structural methods focus on characteristics such as the level of concentration in the industry, the number of banks, market share, etc. In line with Mason (1939), the size of a firm has an impact on its competitive policies in the market.

Balakrishnan and Cohen (2011) argue that the number of firms in an industry reflects

competition for limited funds because firms compete for economic profits and funds from capital markets. They posit that, in the greater competition, firms in highly populated industries will provide a higher quality of information, and hence earnings management will be lower.

On the other hand, industry concentration is typically used to measure competition for industry-level analysis (as opposed to firm-level product power).

Weiss (1971) stated that the higher the industry's concentration level, the higher the monopoly and competition loss level. The low concentration of an industry indicates less market power held by the leading firms, which empowers them to consistently charge a price above those established by the competitive market (Van Hoose, 2010). Therefore, the industrial organisation literature claims that market power in fewer producers enables a firm to set a price above the marginal cost (Lelissa and Kuhil, 2018).

Also, the structure-conduct-perform (SCP) model suggests that market concentration lowers collusion cost between firms and ends in suboptimal profits for all market participants (Bain, 1951). The concentration degree in a market has been considered as one of the major structural characteristics in the traditional SCP paradigm, which predicts the level of competition (Meschi, 1997). The SCP assumes that market concentration and competition level are inversely related as industry concentration encourages collusion (Edwards, Allen and Shaik, 2006).

Conceptually, market structure is a classification system for the key traits of a market, including the number of firms, the similarity of the products they sell, and the ease of entry into and exit from the market. It mainly comprises the market share of its firms and, to a lesser extent, any barriers against new competitors (Bain, 1956).

According to Shepherd (1986), each market structure is somewhere in the range between monopoly (a high market share and entry barrier) and pure competition (low share and barriers).

Industry concentration is usually measured by the Herfindahl–Hirschman Index (HHI). Although HHI, as a measure of concentration, is fairly well rooted in industrial organisation theory (Curry and George, 1983), it could imply high and low competition. Recent research suggests that when market structure is assumed to be endogenous, it is unclear whether low values of concentration capture low or high competition, especially in cross-industry analyses (e.g., Demsetz, 1973; Raith, 2003; Aghion et al. 2005). Therefore, tension exists on the topic of whether industry concentration (competition) is associated with a low or high degree of industry competition (Datta, Iskandar-Datta and Singh, 2013).

Another indicator, namely the Boone indicator, has been used recently to assess the competition (Boone, 2008), representing the structural method relying on Demsetz's efficiency hypothesis (1973). It supported the efficiency–structure hypothesis, which linked the performance with the changes of efficiency targeting, the toughness of the relationship between the efficiency (measured in terms of average cost), and the performance (measured in terms of profitability) (Tusha and Hashorva, 2015). Schiersch and Schmidt-Ehmcke, (2010) stated that the empirical applicability and robustness of the Boone-Indicator are still unknown, and the traditional Lerner-Index is still the only measure that indicates the expected competitive changes correctly. Further, the Boone indicator's optimal specification and estimation remains an open question and should thus be debated (Maliranta et al., 2007). Therefore, in this research, the Boone indicator is not used to measure the product market power.

Herfindahl–Hirschman, common in empirical industrial organisation literature, is routinely applied (Datta, Iskandar-Datta and Singh, 2013). Based on the literature and studies, in this research, the Herfindahl–Hirschman index, Lerner-Index, and industry-adjusted Lerner Index are

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used for measuring product market power. Since we are using different proxies for industry competition unrelated to HHI, our conclusions from the industry level analysis should not be affected by the issues surrounding HHI as a measure of competition.

2.2. Capital Expenditure

Another factor influencing the market power of a product is capital expenditure. Capital expenditures are expenses that are used to generate future profits. In other words, these costs are spent on purchasing new and fixed assets and adding the value of fixed and productive assets available (Biddle and Hilary, 2006). The companies' managers will maximise the company's value and, to achieve this goal, are looking to implement profitable projects in companies, differentiating companies from other companies with similar activity. Execution of capital expenditures requires financing for the implementation of projects in the company.

The previous studies find that capital expenditures have a positive impact on the value of a company. However, most of these studies do not consider the impact of capital expenditures on product market power. Liao, Lin and Lin, (2016) stated that product market competition compels companies to adopt capital expenditure incentives. Corporate investing decisions involve management discretion. Management seeks to face fewer competitive threats in the market (Irvine & Pontiff, 2009), so the question remains whether the capital expenditures will affect Iran's product market power.

Liao, Lin and Lin, (2016) stated that measuring non-financial performance related to the product and product market situation may affect the company's investment decisions. Competition in the product market forces companies to take incentives for capital expenditure. The findings show that a company will not increase future capital expenditures when the industry faces competitive pressures.

2.3. Firms' Value and Value Creating

One of the critical factors influencing the product market power is the company's market value because the goal of companies is to create value and wealth for shareholders. Value creating is essential not only for investors but also for those who manage the company. The survival of organisations is to create value for their shareholders (Pirie and Smith, 2008). Value creation is an important factor in customer orientation and increasing competition in the product market and means an organisation's approach to addressing all stakeholders. In particular, its customers and this approach place the customer at the heart of all their activities and processes. This way, it engineers the organisation to satisfy customers' needs through products and services (Sharma, Krishnan and Grewal, 2001). In the strategic management literature, experts distinguish between value creation and value gaining.

It should be noted that the use of value and money exchange also increases when the proportionality and novelty of products or services increase. Creating these fittings and novelty in products or services often leads to a situation where supply is limited and demand is high. That is why competition is intensifying. The result of this competition is that the exchange of value (i.e., price) is reduced, and that decline and the downward trend continue to the point that supply and demand become equal. In addition, competition is not limited to the organisational level, but it is likely to compete at other value determination levels. This reduces the workforce's value since its bargaining power has fallen (Schumpeter, 2017). Competition among companies allows society to benefit from the advantages of low prices. There is an interconnected relationship between competition and value creation. Such a competition is due to value creation activities, but value

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creation is also the result. At the individual level, evidence suggests that competition increases the ability to achieve creative solutions that create value (Amit and Zott, 2001).

Value creation is crucial for a firm's success in the business market (Lusch and Vargo, 2006), and management seeks to face fewer competitive threats in this market (Irvine & Pontiff, 2009). In line with this argument, Li, Lu and Phillips, (2019) found that firms are more likely to have powerful CEOs in high-demand product markets where firms face entry threats and investors react more favourably to the announcements granting more power to CEOs. Further, CEO power is associated with higher market value, sales growth, investment and advertising, and the introduction of more new products.

Firms' value creation activities can be classified as facilitating customers' value creation by providing potential resources (e.g., products) (Grönroos and Voima, 2013). Competition in these product markets can help explain the relationship between CEO power and firm value. The empirical evidence on how competition affects the relationship between CEO power and firm value is scant and not clear. Han, Nanda and Silveri, (2016) find that powerful CEOs perform worse when market competition is high than other CEOs. Li, Lu and Phillips, (2019) found a positive relationship between CEO power and firm value in high-demand markets. According to Sheikh (2018), a positive association is between CEO power and firm value when the competition is high. However, the present research seeks to determine whether there is a relationship between market value and product market power.

Further, such a scenario will put industry concentration inversely related to the consumer's welfare and the number of firms in the industry (Shepherd, 1986). Also, if concentration falls, the firm's price gets closer to marginal cost, which leads to a fall in market power (Lelissa and Kuhil, 2018).

Bustamante and Donangelo (2017) argued that product market competition has two negative effects on stock returns: first, the waste of costs to compete in the product market. Second, The company's profit margin decreases because of competition in the product market. Therefore, companies in competitive industries have lower stock returns, resulting in less value.

Jory and Ngo (2017) show that companies that are dominant in the market power of the products are at lower risk. They stated that increasing the product's market power using the Herfindahl–Hirschman index increased the companies' stock returns, resulting in more value.

Sheikh (2018) found that CEO power has a positive and significant effect on firm value. However, this effect is driven by product market competition as CEO power positively affects firm value only in high competition markets and has no effect on firm value in low competition markets. Moreover, the results indicate that product market competition motivates powerful CEOs to use their powers to make value increasing decisions.

One of the approaches to value creation is the proposed Pulic (2004) model, which includes two major factors: capital construction and human capital (Iazzolino and Laise, 2016).

Blazsek and Escribano (2016) found a dynamic interaction between research and development costs and stock returns. Increased competition in the innovation of new products enables companies to invest more in research and development activities.

Given the theoretical and historical foundations, the research hypotheses are as follows:

H_1: There is a significant relationship between the company's market value and the Herfindahl–Hirschman index.

H_2: There is a significant relationship between the market value of the company and the Lerner index.

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H_3: There is a significant relationship between the company's market value and the Industry-adjusted Lerner Index.

H_4: There is a significant relationship between capital expenditures and the Herfindahl–Hirschman index.

H_5: There is a significant relationship between capital expenditures and the Lerner index.

H_6: There is a significant relationship between capital expenditures and the Industry-adjusted Lerner Index.

H_7: There is a significant relationship between value creation and the Herfindahl–Hirschman index.

H_8: There is a significant relationship between value creation and the Lerner index.

H_9: There is a significant relationship between the value creation and the Industry-adjusted Lerner Index.

3. Research Methodology

The statistical population of this research includes companies listed on the Tehran Stock Exchange that meet the following requirements:

1. Their financial period will end in March each year,

2. Selected companies are not part of investment companies, financial intermediation, holding, banks, and insurance,

3. During the research period, companies have no change in the financial period,

4. The information needed to research during the period from 2013 to 2018 should be fully presented.

According to the study's findings and the restrictions imposed above, this study's available sample includes 129 companies.

3.1. Research Model and Variables

To test the research hypotheses, models 1, 2, and 3 have been used. Three indicators have been used to estimate the product's market power. Models 1 represent the Herfindahl–Hirschman index, model 2 represents the Lerner index, and model 3 represents the Industry-adjusted Lerner Index.

$$
\begin{aligned}
HHI_{it} = {}& \beta_0 + \beta_1 LnMV_{it} + \beta_2 I_{it} + \beta_3 VA_{it} + \beta_4 LEV_{it} + \beta_5 ROA_{it} \\
& + \beta_6 MTB_{it} + \beta_7 LnSale_{it} + \beta_8 ATURN_{it} + \beta_9 ASize_{it} + \beta_{10} CURR_{it} \\
& + \beta_{11} No.Co_{it} + \beta_{12} IndustryDummy_{it} + \beta_{13} YearDummy_{it} + \delta_i + \theta_t + \varepsilon_{it}
\end{aligned}
$$

$$(1)$$

$$
\begin{aligned}
LI_{it} = {}& \beta_0 + \beta_1 LnMV_{it} + \beta_2 I_{it} + \beta_3 VA_{it} + \beta_4 LEV_{it} + \beta_5 ROA_{it} \\
& + \beta_6 MTB_{it} + \beta_7 LnSale_{it} + \beta_8 ATURN_{it} + \beta_9 ASize_{it} + \beta_{10} CURR_{it} \\
& + \beta_{11} No.Co_{it} + \beta_{12} IndustryDummy_{it} + \beta_{13} YearDummy_{it} + \delta_i + \theta_t + \varepsilon_{it}
\end{aligned}
$$

$$(2)$$

$$
\begin{aligned}
LIIA_{it} = {}& \beta_0 + \beta_1 LnMV_{it} + \beta_2 I_{it} + \beta_3 VA_{it} + \beta_4 LEV_{it} + \beta_5 ROA_{it} \\
& + \beta_6 MTB_{it} + \beta_7 LnSale_{it} + \beta_8 ATURN_{it} + \beta_9 ASize_{it} + \beta_{10} CURR_{it} \\
& + \beta_{11} No.Co_{it} + \beta_{12} IndustryDummy_{it} + \beta_{13} YearDummy_{it} + \delta_i + \theta_t + \varepsilon_{it}
\end{aligned}
$$

$$(3)$$

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3.1.1. Dependent Variable

In this research, the Herfindahl–Hirschman index, Lerner index, and Industry-adjusted Lerner Index were used to measure the product's market power.

Herfindahl–Hirschman Index (HHI): This index is the basis for evaluating the degree of evolution of the concentration indices. Herfindahl–Hirschman Index determines how the market size distribution between existing firms and the market structure is better than the concentration ratio. This indicator is used in the studies of He (2012), Marciukaityte and Park (2009), and Grullon and Michaely (2007) as a measure of power in the product market and is calculated as the ratio 1:

$$HHI = \sum_{i=1}^{nj} \left(\frac{Sales\ i,\ j}{\sum_{i=1}^{nj} sales\ i,\ j} \right)^{2}$$

(1)

In equation 1 $salesi, j$, in the case of a deduction, the company's sales and denominator are equal to the company's total sales in the industry. The Herfindahl–Hirschman index measures industry concentration. No matter how much is this indicator is, it shows more concentration and less competition in the industry, and vice versa. Since the existing software and databases only include companies listed on the Tehran Stock Exchange, the measurement criterion calculated may reduce the industry's competitiveness because it does not consider private companies.

Lerner Index (LI): This indicator equals the company's price minus the production's final cost. This indicator directly indicates market power characteristics: the company's ability to charge a price higher than the final cost. The challenge before using the Lerner index in empirical research is that the final costs are not visible. Hence, researchers generally calculate the Lerner index through the cost-margin (Booth and Zhou, 2008). According to Kale and Loon (2011), Gaspar and Massa (2006), the Lerner index is calculated as a profit-sharing divided by sales, as shown in equation (2).

$$LI = \frac{SALE - COGS - SA\&A}{SALE}$$

(2)

In this regard:

SALE: Represents the sales of the company.

COGS: represents the cost of goods sold by the company.

SG & A: Indicates the sales, general and administrative expenses

Industry-adjusted Lerner Index (LIIA): Industry-adjusted Lerner Index was used to capture firm-specific product market power. To do so, we compute the value-weighted industry-adjusted Lerner Index, the difference between the firm's price–cost margin the following equation describes and the sales-weighted price-cost margin of all firms within an industry.

$$LIIA = LIi - \sum_{i=1}^{N} \omega i LIi$$

(3)

LIi is the Lerner Index defined in Eq.(2) for firm i, ωi is the proportion of firm sales of firm i to total industry sales, and N is the total number of firms in the industry.

This modified Lerner Index measure captures the firm's intra-industry market power purely, therefore purging the effects of industry-wide factors common to all firms in a specific industry. Further, this adjustment addresses that different industries have structurally different profit margins

due to factors unrelated to intra-industry differences in firms' market power (Datta, Iskandar-Datta and Singh, 2013).

3.1.2. Independent Variables

$LnMV_{it}$: logarithmic of the market value of the company. The number of shares calculates the company's market value multiply stock prices at the end of the period.

I_t: is Capital expenditures and calculated based on Equation 4:

$I_{i,t}= (\text{Net Fix Assets}_{it} – \text{Net Fix Assets}_{it-1}) + DEPN_{it}$

$$(4)$$

In the above Equation:

$I_{i,t}$: company's capital expenditures.

Net Fix Assets$_{it}$: Equals to the net fixed assets of the firm i in the year t.

Net Fix Assets$_{it-1}$: Equals to the net fixed assets of i in the year t-1.

$DEPN_{it}$: is equal to the depreciation expenses of the company i in year t.

According to the article (Jory and Ngo 2017), the obtained number is divided into assets to scale the variable.

VA_{it}: One of the approaches taken in the field of value creation is the proposed Pulic's Model (2004), which includes two critical factors of capital construction and human capital, calculated as Equation 5 (Iazzolino& Laise, 2016):

$VA_{it} = HC_{it} + SC_{it}$

$$(5)$$

In the above relation:

VA_{it}: represents value creation.

HC_{it}: represents the human capital of company i in year t, which can be calculated according to the staff expenditures (wages and salaries).

SC_{it} represents the structural capital of firm i in the year t, which can be calculated through the total expenses of depreciation, interest rate, taxes, and net income.

It should be noted that the resulting number is divided into total assets to scale the variable with the other variables.

3.1.3. Control Variables

The control variables of this research are presented below:

LEV_{it}: Leverage can be calculated by dividing debt into assets.

ROA_{it}: represents the return on assets

MTB_{it}: Growth rate calculated by the ratio of market value to the book value of equity.

$LnSale_{it}$: This is logarithmic of company sales.

$ATURN_{it}$: variable of the turnover ratio of assets that can be calculated by dividing sales into total assets

$ASIZE_{it}$: The Dummy variable for auditing by the audit organisation and Mofid Rahbar (the reason for choosing these companies are that they have higher quality, higher earnings, and more professional independence than other institutions). If the Auditing organisation and Mofid Rahbar have audited the company, the variable equals 1; otherwise, zero.

$CURR_{it}$: The current ratio obtained through the division of current assets into total assets, and the higher it represents, the greater is the auditor's audit complexity.

$No.Co_{it=}$ number of firms in the industry

Industry Dummy: The industry's dummy variable.

Year Dummy: The dummy variable of the year.

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4. Empirical Results

4.1. Descriptive statistics

Table 1 depicts the information related to the variables of the model.

Table 1. Descriptive statistics of variables

Variable	mean	Std. dev.	Minimum	Maximum
HHI_{it}	0.030	0.124	0	0.954
LI_{it}	0.178	0.259	-2.796	1.967
LII_{it}	0.102	0.285	-2.814	1.967
$LnMV_{it}$	14.279	1.473	11.286	18.980
I_{it}	0.122	0.177	-0.748	0.681
VA_{it}	0.288	0.300	-1.272	1.275
LEV_{it}	0.602	0.226	0.090	2.315
ROA_{it}	0.111	0.151	-0.789	0.631
MTB_{it}	3.350	4.032	-53.351	26.177
$LnSale_{it}$	13.949	1.525	8.504	19.367
$ATURN_{it}$	0.922	0.586	0.014	5.144
$ASize_{it}$	0.255	0.436	0	1
$CURR_{it}$	0.661	0.191	0.142	0.963
$No.Co_{it}$	18.627	7.148	2	29

Resource: Research findings

4.2. Multivariate Regression Analyses

By analysing most of the variables' unit root, all are at no unit root level (stationary). The obtained LM statistic for each variable is reported in Table 2. Only the variables of ATURN it, A Size it, and CURR it is at the unit root level. The obtained LM statistic for the unit root test of this variable rejects the null hypothesis concerning the absence of unit root at a level with 99% probability.

Table 2. The results of the Hadri unit root test

Variable	Level	Variable	Level	First-order difference	Second-order difference
HHI_{it}	0.1463	ROA_{it}	0.9824		
LI_{it}	0.5717	MTB_{it}	0.9984		
LII_{it}	0.1458	$LnSale_{it}$	0.6263		
$LnMV_{it}$	0.4408	$ATURN_{it}$	0.0000 ***	1.0000	
I_{it}	0.7760	$ASize_{it}$	0.0000 ***	0.0002	1.0000
VA_{it}	0.9999	$CURR_{it}$	0.0000 ***	1.0000	
LEV_{it}	0.7314	$No.Co_{it}$	0.5874		

Note: the null hypothesis is the absence of unit root in variables. LM statistic is reported. *** and * are the level of significance of 99 and 90%.
Resource: Research findings

By one-time difference from these variables, the first-order difference of A TURN variables and CURR has no unit root. Moreover, the second-order difference of the A Size variable is also with no unit root.

To estimate the pattern, we should first realise whether the data are pooled or panel by the F test. This test's null hypothesis expresses that data are pooled, and hypothesis 1 declares that data are panel. If H0 is rejected after performing the F test, the question poses here that models of fixed effects or random effects do the model are analysable, the answer to which is the Hausman test. Given the integration test results presented in Table 3, the null hypothesis concerning the presence of pooled data is rejected at a 99% confidence level for the first two models. As for the third model, the null hypothesis concerning pooled data is rejected at a 95% confidence level, so panel data models should be used to estimate these three models' coefficients.

Table 3. The results of the integration test

	Calculated statistic	**Probability level**
Model 1	17.57	0.000 ***
Model 2	2.43	0.000 ***
Model 3	1.39	0.015 **

Note: *** and **show 99 and 95% significance level, Resource: research findings
Resource: Research findings

There are two general methods for estimating a panel data model: fixed effects and random effects. Hausman test is used for determining the appropriate model for estimation. In estimating the fixed effects model, it is assumed that there is a different intercept for each country, and this intercept can be correlated with the model's descriptive variables. This approach is also known as the Least Squares Dummy Variable (LSDV). In the random-effects model, the individual effects are fixed, but they change within the countries.

Table 4 shows the results of this test, through which the Hausman test statistic based on the estimation is 3.84, 8.51, and 3.83 for models 1-3, which is smaller than χ^2 the value, and the null hypothesis is not rejected. Hence, the random-effects model is selected as the most appropriate model.

Table 4. Hausman test result

	Calculated statistic	**Probability level**
Model 1	3.84	0.9010
Model 2	8.51	0.3857
Model 3	3.83	0.8724

Resource: Research findings

According to the discussed theoretical section, the empirical models were estimated based on panel data's random-effects method. In this phase, to analyse the market power, three models were estimated. In the first model, the Herfindahl-Harrishenman Index, in the second model, the Lerner index, and the adjusted Lerner index were used in the third model. The results of the estimation of these three models are illustrated in Table 5. The first column of this table shows the name of effective variables in market competition. As shown in Table 5, the estimation of the Feasible Generalised Least Squares (FGLS) model is reported. In this panel data model, four classic econometric hypotheses were analysed, and reliable reports were reported. These four hypotheses

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include linearity among variables, exogeneity of descriptive variables, homogeneity variance, and lack of serial autocorrelation among disruptive components.

Table 5. The results of model estimation

Variable	Model 1 Coefficient (p-value)	Model 2 Coefficient (p-value)	Model 3 Coefficient (p-value)
Constant	-0.5545 (0.000)	-0.0768 (0.388)	0.6721 (0.000)
$LnMV_{it}$	0.0397 (0.000)	0.0182 (0.000)	-0.0365 (0.014)
I_{it}	0.0510 (0.066)	0.0699 (0.008)	-0.0366 (0.000)
VA_{it}	-0.0815 (0.014)	0.4089 (0.000)	0.4828 (0.000)
LEV_{it}	0.0260 (0.004)	-0.0143 (0.005)	-0.0369 (0.024)
ROA_{it}	0.0891 (0.012)	0.3901 (0.000)	0.3558 (0.011)
MTB_{it}	-0.0037 (0.057)	-0.0030 (0.078)	-0.065 (0.057)
$LnSale_{it}$	-0.0115 (0.015)	0.0269 (0.018)	0.0337 (0.015)
$ATURN_{it}$	0.0024 (0.071)	-0.0696 (0.000)	-0.0705 (0.000)
$ASize_{it}$	-0.0270 (0.013)	0.0294 (0.087)	0.0423 (0.038)
$CURR_{it}$	0.0212 (0.083)	-0.0582 (0.005)	-0.0142 (0.038)
$No.Co_{it}$	-0.0004 (0.023)	-0.0010 (0.016)	-0.0050 (0.041)
Wald Chi2	155.58 (0.000)	903.82 (0.000)	481.88 (0.000)
Number of obs.	641	641	641
Log Likelihood	492.2151	255.9395	86.9383

Resource: Research findings

Given the used regressions, only the intercept of models 1 and 3 become significant. The intercept of these two models is -0.5545 and 0.6721 have a 99% significance level. In contrast, the firm's coefficient of the logarithm of market value is significant in all three models. The coefficient of the LnMV variable is positive in the first model with a 99% confidence level, so with a 1% increase in the logarithm of the market value of the firm, the Herfindahl-Harrishenman Index, which is indicative of market power, will increase by 0.0397% and the market power will be reduced. The coefficient of LnMV is positive in the second model and estimated negatively in the third model, and become significant with the respective confidence level of 99 and 95%. Thus, with a 1% increase in the firm's market value, the Lerner index will increase by 0.0182% regarding the second model estimation. Regarding the third model estimation, the adjusted Lerner index will decrease by -0.0356%, and by the decline of market competition, the firm's market power will increase.

The variable coefficient is only significant for all three models with respective 90, 99, and 99% significance levels. Given the estimation of the first and second model, with the increase of capital expenditures, market competition will increase based on the Herfindahl-Harrishenman and Lerner indices and decrease due to the firm's market power. In contrast, in the third model, the coefficient of capital expenditures is negative. By increasing such expenditures, market competition will reduce based on the Lerner Index and increase due to the firm's market power.

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The VA variable's coefficient is significant for all three models, so by increasing the value creation, the Herfindahl-Harrishenman index and market competition will reduce, and market power will increase. The coefficient of this variable is significant at a 95% confidence level. In contrast, the coefficient of this variable in the second and third models is positive. Hence, with a 1% increase in the VA variable, the Lerner Index will increase by 0.4089%, and the Adjusted Lerner Index will increase by 0.4828% at a 99% level.

The financial leverage variable is positive and significant in the first and most significant models of the other two models. The LEV variable's coefficient is significant in the first and second models at a 99% level and 95% level in the third model. Regarding the estimation of all three models, with a 1% increase in financial leverage, market competition will increase by 0.0260% based on the Herfindahl-Harrishenman Index and will reduce by -0.0143% based on the Lerner Index. By -0.0369%, based on the Adjusted Lerner Index, this would lead to the firm's market power.

Profitability increases market competition and consequently lowers the market power of the firm. The ROA's coefficient in the first, second, and third models is 0.0891, 0.3901, and 0.3558, respectively, with a 99% significant level. Hence, with a 1% increase in profitability, the Herfindahl-Harrishenman, Lerner, and Adjusted Lerner Indices will also increase.

The MTB variable's coefficient is -0.0037 in the first model with a significance level of 95%, so with a 1% increase in the growth index, the Herfindahl-Harrishenman Index and the firm's market power will reduce. Based on the second model, with a 1% increase in the growth index, the market competition based on the Lerner index will decrease by -0.0030% at a 95% level of significance. Based on the third model, with a 1% increase in the growth index, the market competition based on the Adjusted Lerner index will decrease by -0.065% at a 90% significance level.

The variable of LnSale has a negative and significant coefficient in the first model and is positive and significant in the other two models. The firm's sales logarithm coefficient is significant in models 1-3 at the 95% level. With a 1% increase in the sales logarithm of the firm, market competition will decrease by -0.0115 based on the Herfindahl-Harrishenman Index will increase by 0.0269% based on the Lerner Index and will increase by 0.0337% based on the Adjusted Lerner Index, and this would lead to the decline of market power of the firm.

In contrast to the other two models, the coefficient of assets turnover ratio is positive in the first model, significant at 90%. Hence, with a 1% increase in the variable of ATURN, the Herfindahl-Harrishenman Index will decrease by 0.0024%, the Lerner index will decrease by -0.0696%, and the Adjusted Lerner Index will decrease by -0.0705%, and the market power of the firm will increase.

The audit organisation's virtual variable of audit and Mofid Rahbar (A-Size) affects all three indices. Considering the first model estimation, if the audit organisation and Mofid Rahbar select the auditor, the market competition based on this index will decrease by -0.0270% at a 95% confidence level, and market power will increase. In contrast, the variable of A size is the increasing factor for Lerner and Adjusted Lerner indices.

The coefficient of CURR is positive and significant in the first model. The coefficient of current assets to total assets in this model is significant at the 90% level. With a 1% increase in current assets to total assets ratio, market competition will increase based on the Herfindahl-Harrishenman Index by 0.0212%, which will decrease by -0.0582% based on the Lerner Index, and will decrease by -0.0142 % based on the Adjusted Lerner Index.

The number of firms in the industry has been a reduction factor for all three variables. The Herfindahl-Harrishenman, Lerner, and adjusted Lerner Indices will decrease by -0.0004, -0.0010, and -0.0050% at a 95% level, respectively. In addition, the dummy variables of industry and year

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were also considered in the model, the coefficients of which are not significant.

5. Discussion and Conclusion

According to statistical data, the authors concluded a positive (negative) correlation between the firm's market value and the Herfindahl–Hirschman Index and Lerner Index (Industry-adjusted Lerner Index). This study's results are consistent with studies conducted in this field, including Jory and Ngo (2017). In line with Sheikh (2018), CEO power has a positive and significant effect on firm value. Product market competition motivates powerful CEOs to use their powers to make value increasing decisions.

This study shows a positive (negative) correlation between capital expenditure and the Herfindahl–Hirschman index and Lerner Index (Industry-adjusted Lerner Index). Still, according to Liao, Lin and Lin's findings (2016), when the industry faces competition pressure, a firm will not increase capital expenditures. Results of the study by Gholami and Khatiri (2016) indicated that competition in the product market with the Industry-adjusted Lerner Index has no significant effect on investment in capital expenditures. In contrast, Frank and Goyal (2009) concluded that with increasing competition in the product market, investment in fixed assets of companies would increase.

The results also show a negative (positive) relationship between value creation and the Herfindahl–Hirschman Index (Lerner Index and Industry-adjusted Lerner Index).

This study, like other research studies in this field, has a time and place constraint. The realm of time for all the tests performed and its domain is Tehran Stock Exchange. Therefore, it should be considered in its generalisation to other times and other statistical societies.

The obtained results based on Herfindahl-Harrishenman and Lerner indices show that firms gaining more market value and increasing their capital expenditures will cause firm competition in the product market and lower the power in the product market.

The firms' environment is currently growing and competitive, and firms for making progress require activity development through new investments. The managers are recommended to expand their market power by increasing the capital expenditure to send positive signals to the capital market. These positive signals would attract investors and their more appropriate decisions. In addition, the country and Stock Exchange authorities are recommended to pave the way for increased competition among the listed firms on Tehran Stock Exchange that, in turn, motivates the investors for productive investments and brings about economic flourishment.

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