IMPACT OF CORPORATE DIVERSIFICATION ON STOCK PRICE SYNCHRONICITY: A MODERATING ROLE OF GROUP AFFILIATION FIRMS

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PIDE2018FMPHILEAF06

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Year 2020

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CERTIFICATE

This is to certify that this thesis entitled **"Impact of Corporate Diversification on Stock Price Synchronicity: A Moderating Role of Group Affiliation Firms"** submitted by **Mr. Abdul Subhan** is accepted in its present form by the Department of Business Studies, Pakistan Institute of Development Economics (PIDE) Islamabad as satisfying the requirements for partial fulfillment of the Degree of Master of Philosophy in Economics and Finance.

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AUTHOR'S DECLARATION

I **Abdul Subhan** hereby state that my Mphil thesis titled **Impact of Corporate Diversification on Stock Price Synchronicity: a moderating role of group affiliation firms** is my own work and has not been submitted previously by me for taking any degree from this University **Pakistan Institute of Development Economics** or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my MPHIL degree.

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DEDICATION

Dedicated to my family, friends, and to the ones we have lost in these tough times…

ACKNOWLEDGEMENTS

In the name of Allah Almighty, most merciful, most gracious. As I start to write this acknowledgment I realize nothing would have been possible if it were not for the strength that Allah blessed me with to overcome all the obstacles faced during these times.

With the support system that I found in the shape of **my parents and siblings (Sunia Naeem, Abdul Hannan, and Iqra Naeem)**. For all that was, for all that is, and for all that is yet to come. This one is for **Neelofar and Naeem**, to infinity and beyond.

I express my gratitude to **Dr. Ahmad Fraz** who has proved to be an invaluable resource of knowledge and has mentored me through this journey of learning.

Also, I would like to thank all my friends for their unwavering support throughout this journey and the times leading up to this wonderful experience specifically **Ahmed Hassan, Danish Ali Latif, Hamid Gul, Imran Iftikhar, Muhammad Hassan, and Komal Altaf** . I will always hold you all dear and I thank you from the bottom of my heart.

ABSTRACT

This study contributes to the literature for Pakistan and also other emerging markets in terms of Stock price synchronicity, the impact, and importance of corporate diversification on the informational efficiency of the financial market, and lastly the role of Business/Industrial group affiliation on the Diversification-Synchronicity relation. Data from the Pakistani stock exchange was analyzed for 103 companies spanning the period from 2003 to 2019. Weekly stock prices were analyzed against the Diversification (entropy) measure; this also included a segmented analysis which tested the related and unrelated segments of diversification. Movements in the prices of undiversified firms were more synchronized with the market as compared to diversified firms. Foreign and local investors can use this information while allocating funds resulting in improvement of the overall quality of decisions. Informed investment decisions not only improve the returns for investors but also pave way for a better information environment. This study also supports and gives evidence on the information landscape of Pakistan in existing literature. Generalized method of moments was used for estimation in this study and it was found that diversification effectively decreases the synchronicity for Pakistani firms (lower synchronicity is linked with markets that are more efficient and also with higher firm-specific information content. The estimations were again tested with related and unrelated segmented diversification variables and they also returned the same results but with related diversification effecting Stock price synchronicity more than unrelated diversification. Group affiliations proved to only deteriorate the Diversification-Synchronicity relationship further. It also provides evidence for the debate that over diversification erodes firm value, even in informational asymmetric Stock markets like that of Pakistan.

KEYWORDS: Stock price synchronicity, corporate diversification, business groups, group affiliation, information content, emerging markets, Pakistan stock exchange.

JEL CLASSIFICATION: G12, G14, G20, G32, G34

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CHAPTER 1

INTRODUCTION

Information has always played an important role in determining stock price. It can be influenced by any public or private news i.e., changes in government policy, news related to company and industry. The Efficiency Market Hypothesis (EMH) explains that any change in information is incorporated into the price of a share. The issue of informational asymmetry is also a problem for all the stakeholders including investors or even the regulators. It causes investors to make investment decisions based on market factors and not firm specific variables. Researchers iterate the need for the reduction of informational asymmetry via mandatory or voluntary disclosures and also the regulation of financial information (Frankel & Li, 2004).

Stock prices comove with industry returns as well as market returns (King, 1988). This synchronized movement varies from market to market depending on the efficiency of that market to absorb that information and incorporate it. Morck, Yeung, & Yu (2000) have introduced the model of Stock Price Synchronicity (SPS); it tends to be higher in less efficient (developing) markets and lower in more efficient (developed) markets. Price discovery is better when more firm specific information is present, giving evidence of more informed trading (Durnev et al., 2003). Hence SPS serves as a great measure to gauge the level of informational efficiency and development of capital markets (Morck et al., 2000).

Stock prices in an efficient market only react to the information that is not expected in advance (Dasgupta et al, 2010). As economies grow in a country, we are likely to see growth or development of its capital markets. This development gives rise to

conglomerate ownership, an increase in the informational efficiency, and better price discovery. Diversification plays an integral part when it comes to investments of companies or individuals. It enables the person to safeguard their investment by offsetting the poor returns (losses) on some assets with higher returns on others.

Corporate diversification is defined as when an existing business or company enters into a new business, it can be new products in the same market or old products in a newer market (Brost & Kleiner, 1995). Martin & Sayrak (2003) define it as a single firm controlling different units operating in different industries where the sole/absolute control lies with a single firm. Zirek and Demirtas (n.d.) while testing the predictability of aggregate stock returns in international markets linked with different portfolios proved conclusively that earnings yield covaried positively more in countries that were less diversified and had higher synchronicity as compared to countries that had a higher diversification and lower synchronicity. Companies that are not linked to diversified industry groups in India are outperformed by their counterparts (Fauver, Houston, and Naranjo, 2003). Diversification can be segmented into related and unrelated diversification to give a better insight into the effects that it has on its movement with the market.

Business groups are a hub of power and a large player when it comes to the economic activity in the country; consequently, these groups ultimately own or control most of the productive assets of the country (Weinstein & Yafeh, 1995). These "business groups" actually show the concentrated ownership structure in the emerging markets (La Porta et al., 1998). These markets hold significance because in recent decades they have shown higher growth rates, a diverse internally generated demand, and access to a large base of resources (Kullu, Dyer, Yilmaz, and Sharma, 2019). Waseemullah and

Hasan (2018) report that group affiliation affects the firm value while testing standalone firms vs. group affiliated firms.

A good number of large companies in Pakistan operate under group affiliations similar to any emerging market. Khanna and Yafeh (2007) explain these business groups as firms although legally independent but connected to each other by formal or informal ties and acting in coordination.

1.1 | Problem Statement

Information has always been an integral part of investment decisions around the globe, but just having information is not enough. Knowing what to do with that information and how it plays into the overall market dynamic holds equal importance. Theory states that company specific variables must be incorporated in the price of the firm. How well this is incorporated in the prices depends on the informational efficiency of the market. To test how much the firm price varies with the market, the measure of stock price synchronicity (SPS) is used. Debate revolves around the fact that whether synchronicity captures the firm specific and market specific information. Emerging markets like that of Pakistan have higher synchronicity than developed markets meaning that firm prices more in sync. The market model used in the calculation of SPS captures the market specific information in the R^2. Furthering the debate on emerging markets there is a lack of knowledge on what factors affect the R^2. With more group structured holding amongst the companies developing, this study aims at finding if companies that diversify move more in sync with the market or the companies that don't diversify. More so diversification is further segmented into related and unrelated diversification to check whether there is any difference between the behavior of companies and ultimately its effects on the price information landscape for Pakistan. SPS here is used

as a proxy for stock price informativeness, it not only tells us how well firm specific information is incorporated into the prices but gives an insight into the development of the financial market.

1.2 | Research Questions

1. How does corporate diversification affect stock price synchronicity?
2. Whether having a business group affiliation strengthens the relationship or weakens it?
3. Does related diversification affect SPS more than unrelated diversification?

1.3 | Objective of Study

This study has the following objectives:

1. To investigate the impact of corporate diversification on stock price synchronicity in an emerging market, Pakistan.
2. To see the extent of the moderating role that business group affiliation has on the diversification-synchronicity relationship.
3. To see if related diversification affects the diversification-synchronicity relation more than unrelated diversification.

1.4 | Significance of Study

The Pakistani market stands among the leaders of the emerging markets around the world. It is worthy to be noted that previous studies show how emerging markets tend to be more aggressive with their growth and development. These markets tend to give higher returns as they carry higher risk of investment. But this volatility doesn't always mean higher returns; the market has seen its fair share of ups and downs in the recent past. In the context of an emerging market like that of Pakistan, it is affected more by various economic and socio-political than developed markets. Previous literature shows

that an emerging market is an indication of a growing economy. In efficient markets the firms' prices reflect all available information very quickly be it favorable or unfavorable news. So it holds immense importance that the quality of information and its inclusion into the informational landscape.

This study contributes substantially not only to existing literature regarding SPS but also towards corporate diversification and group affiliations. There has not been a single study to the best of my knowledge that tests the effects of corporate diversification on SPS for Pakistani equity market. Pakistan stock exchange has seen many ups and downs during recent years and has earned the title of the best and the worst market in the region. There have been studies that show how a wide array of news affects it and provide evidence on how emerging markets such as that of Pakistan behave differently than developed markets. This study adds to the literature in an attempt to better understand the information environment and the price adjustment dynamics.

With the increase in economic development, complex company ownership structures start emerging; literature states that an emerging market is a sign of economic growth. It can be observed that the Pakistani market is affected by political instability, government policies, and other social factors that riddle the rest of the country as well. These factors or news have exhibited to have a link directly with the performance of the market. This study provides evidence on the informational efficiency and inclusion for PSX. Also tests that if diversification help strengthen the information environment or not. Not only does this study provide proof of such a relationship existing but also checks for a moderating role of group affiliation on this relationship.

This study will help the investors in making more informed decisions regarding their investment in companies that have diversified or are a part of a business group. Doing

pioneering work on the movement of companies with market and to what extent do they take effect of the market factors? This study is also important for the regulators as it enables them to better understand the dynamics and workings of the equity market form a theoretical stand point. Lastly the findings of this study strengthen the literature on emerging markets and the mechanisms of the financial markets in them as from previous literature we know that the knowledge gained from developed markets does not always apply here.

1.5 | Research Gap

This study will fill the literature gap for the Pakistani market and for other emerging markets as well because to date there are no studies that have investigated this relationship for emerging markets. There have been some recommendations derived from the experience and knowledge gained from developed markets and may not apply to the emerging markets (Khanna & Palepu, 1997). This study not only tests how corporate diversification affects the comovement of stocks with the market but also test if being part of a group adds any value to the relationship or not as they have access to more resources than standalone firms. In addition to this, the diversification-synchronicity dynamic is further divided and seen if the firm's related diversification affects it more than unrelated diversification.

The literature is rich when it comes to testing the effects of Group affiliation and corporate diversification on firm value, but there have been only a few studies that check the effect of Diversification on SPS globally. While literature shows some work done on the Pakistani market regarding stock price synchronicity, business group affiliations, information asymmetry and the effect of diversification on the firm value[Fraz and Hassan, (2017); Waseemullah and Hasan, (2018); Khan et al, (2016)],

but nothing tests the Diversification-Synchronicity dynamic to the best of my knowledge. Diversification is tested further here, in segments to check if related or unrelated diversification affects the SPS any differently

1.6 | Organization of the Study

Following this, chapter 2 contains the literature review which discusses SPS (Dependent variable), corporate diversification (explanatory variable) and Group affiliation (moderating variable) at length. Following that Chapter 3 of this proposal continues the discussion with the description of data, the methodology used, and the control variables used.

CHAPTER 2

LITERATURE REVIEW

Even though the concept of Synchronicity has been discussed in detail and has a lot of literature explaining it, it is still considered very complicated in nature. This is because it focuses more on how much information isn't directly incorporated in stock prices rather than focusing on the information that is incorporated directly. If the stock moves more in sync or "Synchronicity" with the market then it shows less firm specific information incorporated and when it moves in a higher sync that shows higher firm specific information. Many if not all financial markets around the world try level best to increase their information inclusion efficiency. This basically represents the link between information and stock prices. This phenomenon is termed as Efficient Market Hypothesis (EMH), it talks about how prices of firms adjust within a certain time frame and it is dependent on the incorporation of firm specific information. Fama (1970) stated that all the available information regarding the firms will be reflected if the said market is efficient. This very efficiency of the market is what helps in a fair price discovery. A market is said to be efficient if the inclusion of information is reflected instantly or the time frame is so small that it is considered to be unbiased, also that the prices show all available information (Dyckman & Morse, 1986). To learn more about firm specific information, stock price informativeness, stock price synchronicity, group affiliations, and corporate diversification the history of each of the variables will be looked into.

2.1 | Stock Price Synchronicity

West (1988) mentions Stock price synchronicity for the first time where he presented a theoretical model that proved that when prices are discovered through it, the difference between the discovered price and the fundamental/intrinsic value of the stock is not very high when more information is incorporated in the model. This also raises the R^2 and results in more stable prices for the future. This, in some form, laid the foundation for the work on stock price synchronicity. But the main question here is that, is SPS itself a phenomenon or just a tool to measure one? The answer is SPS is basically just a tool to measure the phenomenon.

This then raises another question here which is, what is it trying to check exactly? One of the variables for the study will be stock price informativeness which is quantifiable by two different techniques one of which is discussed in the literature price synchronicity introduced by (Morck et al., 2000). Llorente (2002) discusses another one known as the information measure. Both of these techniques address different issues regarding the calculation of information incorporation but in this study SPS is used. For SPS, Roll (1988) builds up the previous literature and shows that stock return or stock price variations exhibit a reflection of both firm specific and market information but a very large part of it isn't explained by market level information. He concludes that the firm specific information just doesn't become a part of the price all of a sudden or right away but has to make its way into the price via informed trading in (French & Roll, 1986).

Chang & Choi (1988) link group affiliations and stock price synchronicity. Group affiliations have mainly been looked at or studied with the goal of finding out if being a member of such groups has any benefits on the firm's performance. Countries,

economies and financial markets are classified into the following categories; underdeveloped, developing and developed. Morck (2000) states that stock price synchronization is higher in emerging (developing) markets which indicate that lesser firm specific information is incorporated into the prices.

Price synchronicity first talked about in (Morck et al., 2000) interprets R^2 in the light of the results, which highlight the fact that in many markets around the globe, the level of price synchronization is not the same. In developed markets the number was lower and in developing/emerging markets it was higher. A lower value of R^2 represented a more efficient market, a lower SPS and in effect stocks that reflect better integration of firm specific information. The opposite was true for a higher value of R^2 which represents a less efficient market, a higher SPS and ultimately the stocks reflecting integrating more of the market wide information. The concept faced a lot of criticism like Todea (2018) describes SPS as an inverse measure of stock price informativeness. Teoh (2009) and Chan and Chan (2014) did not make it clear if the measure of SPS reflects price informativeness or just noise traders. Dasgupta (2010) further argues whether the measure is direct or inverse. It doesn't just capture the private information but also incorporates the specific information. Devos (2015), Kelly (2014) and West (1988) support this perspective by arguing that lower synchronicity generally associated with higher efficiency in the market is maybe a result of poor information and noise trading. French and Roll (1986), who originated the concept, suggested that it doesn't matter if it is trading or non-trading hours, any activity by the traders based on information increases the volatility in returns as well as the prices. When this is viewed under an analysis based on information environment it shows that the SPS will be reduced.

On the contrary, Chan and Hameed (2006) give a comparison between frequently traded stocks and irregularly traded stocks. Public information becomes a part of prices as soon as it is released but private information makes its way through to price after trading, based on that information, takes place. This study suggests that stocks that are traded more, have a faster/timely reaction to any sort of relevant information, making the price movements of those stocks more in sync with the market. On the other hand, stocks that are not traded frequently show a delay when any related information is incorporated into the price. Therefore, the synchronicity is lower and doesn't just depend on the quality of the information or how developed the market is but also the frequency at which the stock is traded.

2.2 | Business Group Affiliations

Weinstein & Yafeh (1995) discuss how business groups have all the power and play an important role when it comes to economic activity in a country. These groups ultimately own or control productive assets of the country. La Porta, Lopez-de-Silanes, Schleifer & Vishny (1998) tell us what role these "business groups" actually play in the emerging markets. They basically show the concentrated ownership structure in the market. Kullu, Dyer, Yilmaz and Sharma (2019) talk about significance of these markets which is that they show higher growth rates, have a diverse internally generated demand, and access to large base of resources. In comparison to developed markets these markets exhibit many similarities amongst each other but are also unique in their own ways and for these reasons they are appropriate candidates for examining information environment and its determinants.

Business groups are studied for the purpose of how they benefit other member firms' performance. (Chang & Choi, 1988; Khanna & Palepu, 2000a, b; Khanna & Rivkin,

2001) The growth in these emerging markets is mainly due to these groups. The concentrated owners and their abilities to monitor were studied by (McConnell & Servaes, 1990; Schleifer & Vishny, 1986; Weinstein & Yafeh, 1995). Most of these business groups are very diverse and have complex or pyramidal structures of ownership.

Chang and Choi (1988) observe that diversified group affiliated firms have superior profitability in Korea as compared to stand alone firms. Similarly in India, Khanna and Palepo (2000) find that firms associated with large business groups have higher profitability. This may be because they have the ability to withstand the high bureaucratic and coordination costs of management for these diverse operations. Classens (2000) found that for lower income countries there are higher excess values and for higher income countries the excess values are lower. This proves that business group fills the gap in underdeveloped capital markets and finances are arranged which would otherwise be difficult which results in better performance of the firm.

Khanna and Rivkin (2001) believe that the group affiliation- performance relationship has no fixed results as group affiliation increase firm profitability in some countries, decrease it in others, and even has no effect in a few countries after studying the sample of a few emerging markets. Khanna and Yafeh (2005) state business groups reduce risk for their affiliates and that risk is shared due to shared dividends, resources and intra group transfers by loans and receivables that are flexible in nature. It also provides a coinsurance function (Gopalan, 2007).

For group affiliated firms a group banks finance its needs, especially in emerging markets because all firms' main corporate funding comes from debts (Demirguc-Kunt & Levine, 2001; Love, Preve, & Sarria-Allende, 2007). These firms can access external

and internal capital markets when making their capital structure decisions (Bianco & Nicodano, 2006). Group banks affect cost of borrowing and decrease cost of loans in emerging markets. (Küllü et al., 2010). Group affiliation positively affects the banks performance and the banks in return structurally lead and control the firms (Francis et al., 2016). Business units performing in different industries under single firm's control is known as corporate diversification (Martin & Sayrak, 2003). Compared to focused firms Lang and Stulz (1998) initially talked about a diversification discount. Similarly, Berger and Ofek (1995) report similar results after studying a sample of international firms. Diversified firms trade 13-15 percent in comparison to other firms. Later Hund et al. (2010) reported a diversification discount of percent

Khanna and Yafeh (2007) explain these business groups as firms that are legally independent but have formal or informal ties and act in coordination with each other. Waseemullah and Hasan (2018) work on finding out whether being part of a group creates/adds value to the member firm or destroys it, looking at Pakistani Listed Firms and discuss the results under the light of market failure theory, where they tell us that the firms are being traded at discount (group affiliation premium/discount) and that having a group affiliation in Pakistan only hurts the firm value. This supports the failure theory as after the financial reforms, the institutional environment was gradually developing. In market failure the group affiliations benefit but other than that they suffer as they have to face stiffer competition from external markets. At the same time, they have to make policies that ensure their survival in an ever-changing institutional environment. Some researchers believe group affiliated firms perform better than firms that stand alone while others believe the opposite to be true.

2.3 | Corporate Diversification

According to corporate financial theory in order to minimize agency problems and efficient utilization of management expertise corporations should give this aspect proper attention (Denis, Denis, & Sarin, 1997; Jensen, 1986). According to a large number of studies on diversification have shown that focus leads to much more promising results and better performance as compared to diversification (De Long, 2001; Laeven & Levine,2007; Meyer, Milgrom, & Roberts, 1992). On the contrary, Khanna and Palepu (2000b) believe that in emerging markets value doesn't need to be destroyed by diversification.

It is better for the firm to have an internal market to fund its needs of capital as it serves to add value due to reduction of costs that otherwise exist if external funding is done. Internal market funds are less costly and increase value form the firm through capital. But when there is an internal market funding the firms it tends to enable the managers to overinvest who already have the tendency to invest in negative NPV projects (Jensen, 1986). Firms with imperfectly correlated earnings are combined and it is known as coinsurance effect. This is how the firm's unsystematic risk is reduced and value for the firm is increased value (Bhide, 1990; Lewellen, 1971; Shleifer and Vishny, 1992). Diversification allows high profit generating segments to cover for the low profit generating segments creating a tax advantage and reduces the losses (Majd and Myers, 1987). Resources can also be shared among the divisions and can gain maximum benefit from economies of scope (Teece, 1980, 1982). Diversified firms may use tools and strategies to reduce competition in the market like reciprocal buying, predatory pricing and collusion, this how they exploit the market as these tools are normally not available for focused groups (Scherer, 1980; Saloner, 1987; Villalonga, 2004a).

Lins and Servaes (1999) studied the impact of corporate diversification on firm value and found out by looking at samples of European firms and except German firms all other showed similar results. Doukas and Kan (2006) focused mainly on US firms and found diversification to be 12 percent of all diversified firms. Diversified firms can trade at a discount to reduce risk (Mansi & Reeb, 2002), institutional factors (Fauver, Houston & Naranjo, 2003) or due to the impact of increased leverage on firm value (Doukas & Kan, 2006). Diversification is really bad for firm value in fact it is known to "destroy" firm value due to insufficient allocation of resources across different segments of the firm. This is due to asymmetric information between central and division managers (Harris, Kriebel, et al., 1982; Wulf, 2009). Ataullah et al. (2014) connected agency effect of corporate diversification to insider trading in consistence to this debate. When managers try to gain maximum benefit personally through corporate diversification strategies and believe the firm value to be of secondary importance they will not be inclined to purchase their own firm's share if there is an open market. This displays a negative relationship between the two and acts as a cost of corporate diversification.

Rajan, Servaes, and Zingales (2000) and Scharfstein and Stein (2000) looked into the inefficient allocation of resources across the divisions in the firms through internal capital markets. The effect of internal capital markets on payout policies of the affiliated firms was studied by (Gopalan, Nanda, & Seru, 2014). Chang & Hong (2002) believe that the internal labor markets in the groups are much more efficient than the external ones. When the financial sources shifted to new ventures from existing affiliated sources during the Asian financial crisis in 1997 it brought forward a negative side of the effects of group leverage (Khanna & Palepu, 2000a).

These groups can also make transfers of technology and capital across borders very easy (Amsden & Hikino, 1994; Fisman & Khanna, 1998), share risks for member firms (Khanna & Yafeh, 2005) and have the power to control social relationships in their markets (Fisman, 2000). Gunduz and Tatoglu (2003) discovered that there is a negligible difference between the affiliated and unaffiliated firms in the Turkish market. Gonenc, Kan, and Karadagli (2007) noticed that only accounting-based firm performance is improved due to group affiliations and not market-based firm performance.

Corporate insiders are able to purchase value stocks and sell growth stocks to gain maximum benefit. These purchases provide the market with insider's private firm specific information and sale take private firm specific unfavorable information to the market. (Fidrmuc, Goergen & Renneboog, 2006). Jagolinzer, Larcker and Taylor (2011) believe that it is possible to reduce insider trading profits if the general counsel monitors the insiders closely as this reduces their ability to anticipate earnings surprises.Skaife, Veenman and Wangerin (2013) state that firms that give up material weaknesses have a higher profitability in internal control as compared to firms with effective control.

Khan & Khan (2011) while studying the possible difference between family and non-family firms in Pakistan concluded that nonfamily firms do not have higher ROA, ROE and Tobin's q but they on average performed better. On the contrary, being a part of a business group in Pakistan enables a firm to have higher liquidity and better growth opportunity as compared to non-group firm, this, in turn, means better performance and higher profitability. Group affiliations in Pakistan did show some adverse effect in regards that the shareholders considered group firms to have lower transparency and a

weak governance mechanism in contrast to non-group firms, this leads to the market discounting the group firms' value even though they outperform the non-group firms (Ghani & Ashraf, 2005).

Firms with advertising investments generally have higher insider profits than firms with no advertising investments (Joseph and Wintoki 2013). If shareholder rights are not restricted then insider profitability and transactions increases as it is affected by governance rules (Cziraki, De Goeij and Renneboog 2014). Public information on their prominent customers also enables inside traders to sell their own stock profitably. This happens in firms with a concentrated sales relationship (Alldredge and Cicero 2015). On the other hand benefits of corporate diversification by Williamson (1995) and later Stein (1997) include that corporate diversification promotes diversification premium that creates internal capital markets. In these markets divisions with less promising outcomes but high cash flows finance low cash flows with highly promising investment opportunities. This gives rise to diversification premium.

CHAPTER 3

DATA DESCRIPTION & METHODOLOGY

3.1 | Population & Sample

This study focuses on the companies listed on the Pakistan Stock Exchange. Ordinary stocks from 27 listed industries out of 36 on the exchange are analyzed between the period of 2003-2019. A total of 126 companies are identified, 23 firms are excluded on the basis of lack of data, bringing the final data pool down to 103 firms. Financial services are also not a part of this sample to make sure that the firms are comparable with each other. The data is collected from PSX and SBP's (state Bank of Pakistan) website.

3.2 | Model Specification

This study uses panel data analysis to estimate the effect of corporate diversification on stock price synchronicity. The data spans over different cross sections with respect to time. Generalized method of moment (GMM) is used when there is an endogeneity problem in our model. Endogeneity problem occurs due to three reasons:

1) Omitted variable bias
2) Simultaneity bias
3) Measurement error

Due to these three reasons, our explanatory variable correlates with the error term. The concern about biasness arising from endogeneity due to the dynamic nature of our model leads us to apply Generalized Method of Moment (GMM) approach that gives robust results (Chan and Hameed (2006), Liu, and Hou, (2019)). There are different possibilities for the endogeneity problem in our model. First, there is a possibility that synchronicity affects the economic policy that in turn affects our independent variables.

Second, there are chances that there exist some unobserved omitted variables like structural and institutional characteristics, that may be correlated with our independent variables and synchronicity in our model. Third, there is possibility of error in the measurement of our key variables that can cause the problem of endogeneity in our model. (Arestis, and Phelps, (2016)). The existence of endogenous covariates makes our OLS estimators biased and they are no longer BLUE. The general form of the regression model is:

$$Y_{it} = X_{it}\beta + \varepsilon_{it} \quad (3.1)$$

Where

$$E(X_{it}, \varepsilon_{it}) \neq 0 \quad (3.1.1)$$

To solve this endogeneity problem we introduce instrumental variables. These instrumental variables are such that they are highly correlated with the explanatory variable but not correlated with the error term.

$$Y_{it} = X_{it}\beta + Z_{it}\alpha + \varepsilon_{it} \quad (3.2)$$

Z_t is instrumental variable where:

$$E(X_{it}, \varepsilon_{it}) = 0 \quad (3.2.1)$$

Generalized method of moment (GMM) assumes fewer restrictions for the distribution of specified model. GMM is even applicable even when moment conditions are greater than parameters and also give most robust results in IV approach models (Wooldridge, 2010). To test the endogeneity in our model weak instrument test is used. The following Model (equations) is used for the estimation of common cross section regression:

$$Synch_{it} = \beta_0 + \beta_1 Div_{it} + \beta_2 Group_{it} + \beta_3 Div\_Group_{it} + \beta_4 Firm\ Sizeit_{it} + \beta_5 Growth\ Opportunity_{it} + \beta_6 Profitability_{it} + \beta_7 Earning\ Volatility_{it} + \beta_8 Leverage_{it} + \beta_9 Market\ to\ Book\ Ratio_{it} + \varepsilon \quad (3.3)$$

$$Synch_{it} = \alpha_0 + \alpha_1 Div\_Rel_{it} + \alpha_2 Group_{it} + \alpha_3 Div\_Rel\_Group_{it} + \alpha_4 Firm\ Size_{it} + \alpha_5 Growth\ Opportunity_{it} + \alpha_6 Profitability_{it} + \alpha_7 Earning\ Volatility_{it} + \alpha_8 Leverage_{it} + \alpha_9 Market\ to\ Book\ Ratio_{it} + \varepsilon \quad (3.4)$$

$$Synch_{it} = \Upsilon_0 + \Upsilon_1 Div\_UnRel_{it} + \Upsilon_2 Group_{it} + \Upsilon_3 Div\_UnRel\_Group_{it} + \Upsilon_4 Firm\ Size_{it} + \Upsilon_5 Growth\ Opportunity_{it} + \Upsilon_6 Profitability_{it} + \Upsilon_7 Earning\ Volatility_{it} + \Upsilon_8 Leverage_{it} + \Upsilon_9 Market\ to\ Book\ Ratio_{it} + \varepsilon \quad (3.5)$$

3.3 | Variables Description

3.3.1 | Stock Price Synchronicity

The dependent variable for this study is stock price synchronicity used as a proxy for stock price informativeness denoted by (SYNCH). The market model is used for estimation and the return variation is divided into two parts, market specific factors and firm specific factors. Morck et al. (2000), gave the model that is being used here. The equation below is a linear estimation that uses the weekly returns of the market and the weekly firm returns.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (3.6)$$

R_{it} is the return of the individual firm (i) in week (t), R_{mt} is the market index return in week (t) and ε_{it} represents the unspecified random factors.

R^2 is used to measure SPS (Durnev et al 2004). Higher the number higher the synchronicity and lower the number lower the synchronicity. In the equation below, 1-R^2 measures the variation due to firm specific information imbedded in the stock returns. The separation of firm specific factors and market specific factors enables us to examine the firm specific information. The calculated value of R^2 remains between (0,1), a logistic transformation is applied using the following equation.

$$Synch_i = log\left[\frac{{R_i}^2}{1-{R_i}^2}\right] \quad (3.7)$$

3.3.2 | Corporate Diversification

To measure corporate diversification, we use industrial (corporate) entropy index for several reasons: Sambharya (2000) discusses how this method of measuring diversification has fewer shortcomings than other methods, is more theoretically strong and technically rigorous. Horowitz & Horowitz (1968) explain that while in an analysis based on the market structure entropy is a useful tool to gauge the competitiveness of any industry where (P) is representative of the share that the firm has in an industry. But the best feature of this methodology over the Herfindahl index is that it divides the overall diversification into two components, related and unrelated diversification (Jacquemin & Berry, 1979).

Horowitz & Horowitz (1970) using this decomposition feature of entropy tried finding the source of industrial concentration for 21 industries between all and dominant regions. The measure is an analytically powerful and a flexible gauge of industrial diversity, it not only precisely defines economic diversity but also gives means to measure changes in diversity over time and along sectors. The capability of division into related and unrelated diversification or also referred to as (within set and between

set) further allows the analysis to find the extent of concentration or diversification between and within sectors (Attaran & Zwick, 1987).

The following equation is used to calculate the total diversification (Clarke et al., 2004).

$$ENT\_Tot_{it-1} = \sum_{h=1}^{N} P_{hit}\left(ln\frac{1}{P_{hit}}\right) \quad (3.8)$$

In the equation above P_{hit} are the sales originating in *h* sector during the time period *t* with the summation of *N* segments in total. This is during the period *t* in years where the firm *i* generates sales. The higher the value of entropy the higher the level of diversification for the firm.

$$ENT\_Unrel_{it-1} = \sum_{s=1}^{K} P_{sit}\left(ln\frac{1}{P_{sit}}\right) \quad (3.9)$$

In the equation above P_{sit} are the sales originating in *s* sector during the time period *t* with the summation of *K* segments in total. This is during the period *t* in years where the firm *i* generates sales.

This is calculated using the above equations we see that in the first equation we get the total entropy by using the total sales of the firm in related and unrelated segments. The second equation gives us the unrelated entropy by using the sales only in the unrelated segments. To find related portion of entropy (diversification) we simply subtract the unrelated entropy from the total. Further unrelated segments are explained as those which are different from the core business/activity of the firm (Khan, Fraz & Hasan, 2016).

3.3.3 | Group Affiliation Extent

Group affiliation extent acts as a moderating variable between stock price synchronicity and corporate diversification to test if it strengthens the relationship or not. It is taken as an independent variable in binary form, where “1” means being part of a business group and “0” if it is not. It is estimated as portion of group ownership in borrower firms. The value of group affiliation extent is in percentage form where 0% means no association and 100% means that all of the shares of that firm is owned by associated group (Kullu, Dyer, Yilmaz and Sharma, 2019).

3.3.4 | Control Variables

It is important to use some variables other than the explanatory variables are known as control variables to eliminate the possibility of any omitted variable bias. Previous literature on diversification and group affiliation both gives evidence of using several control variables. Firm size, Growth opportunity and Profitability acting as control variables for Diversification, whereas firm size (in assets), earnings volatility, leverage, market to book ratio. Trading volume and industry and year dummies acting as control variables for Group affiliation. Trading value data is extracted from PSX website. There will be industry differences in the data which are controlled with the use of industry dummies. Lastly we control for differences in variables due to changing market conditions with respect to time by including year dummies. The variables are discussed as follows.

3.3.4.1 | Firm Size

Firm size being the common control variable in literature for both explanatory variables. Many different proxies capture its different aspects, namely (total sales, market capitalization and total assets). No two firms are an exact copy of each other

when it comes to size. With the underlying assumption of this model, we need the firms to be homogenous so we control for the size differences that exist.

Dang, Li & Yang (2018) gave empirical evidence that "measurement effect" is present while calculating "size effect" meaning the proxy used for firm size effects the results of the analysis. Further they concluded that a different aspect of firm size is captured when a different proxy is used. If the control is pertinent to the size of product market then "total sales" approach should be used, if the analysis requires control of firm size in light of the total resources that can generate profitability then "total asset" approach should be used, lastly if the model requires for control in regards to the size in the market then the "market capitalization" approach should be used as it is a more market oriented and forward looking method.

Owing to the market orientated nature of the study at hand we will use the "market capitalization" approach, which is calculated via the following equation.

$$\boldsymbol{Market\ capitalization} = (Cost\ per\ share)\ x\ (Number\ of\ shares) \quad (3.10)$$

3.3.4.2 | Growth Opportunity

Growth opportunity is another control variable for diversification being used here. Majumdar and Rajuit, (2013) calculated it as a ratio of capital expenditures to sales. Formula is as follows:

$$\boldsymbol{Growth\ Opp} = \frac{Cap-Ex}{Sales} \quad (3.11)$$

3.3.4.3 |Profitability

Omari, Soda, Alshehadeh and Rawashdeh, (2017) measure profitability as the ratio of operating income to sales. Formula is given below:

$$\boldsymbol{Profitability} = \frac{Opr-Income}{Sales} \quad (3.12)$$

3.3.4.4 | Earning Volatility

Lin, Wu, Penm and Terrell, (2005) calculate earning volatility of the firms as the standard deviation of return on assets (ROA) and ROA is further calculated as operating income divided by total assets.

$$\boldsymbol{Earning\ Volatility} = Std(ROA) \quad (3.13)$$

$$\boldsymbol{ROA} = \frac{Opr-Income}{Total\ Assets} \quad (3.14)$$

3.3.4.5 | Leverage

Dey, Hossain and Rahman, (2018) measure leverage as a ratio of total liabilities to total assets while testing its impact on financial performance

$$\boldsymbol{Lev} = \frac{Total\ Liabilities}{Total\ Assets} \quad (3.15)$$

3.3.4.6 | Market to Book r#atio

Market to book ratio as explained by its name is calculated by the division of total equity market value with the total book value (Demspey, 2010).

$$\boldsymbol{Market\ to\ Book} = \frac{Total\ market\ value\ of\ equity}{Total\ book\ of\ equity} \quad (3.16)$$

CHAPTER 4

RESULTS & THEORETICAL DISCUSSION

4.1 | Descriptive Statistics

The following descriptive statistics in table 4.1 showcase the basic features of the dataset used in the study. Stats for central tendency are represented by mean, range by minimum and maximum values and the dispersion estimate is represented by standard deviation.

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
R2	1191	-1.943283	1.929455	-15.82007	2.148647
Div-Total	1191	.1835919	.2316579	0	.6931452
Group-Aff	1191	.4441646	.4970814	0	1
Div-Related	1191	.071878	.1067579	0	.367878
Div-unrelated	1191	.1117139	.1329425	0	.367876
Size	1191	6.86e+08	6.30e+09	5629.09	1.26e+11
Growth-Opp	1191	.1980804	2.088809	-.7415965	67.82259
Profitability	1191	.2387189	.7461774	-2.591747	12.27993
Earning-vol	1191	.3168793	5.448622	-.781227	188.0769
Leverage	1191	.5312051	.2332057	.0000962	2.017656
MBR	1191	22.78187	659.5609	-6.046367	22761.79

*Note: **R2** is synchronicity measure of firm. **Div-Total** is total diversification. **Group Aff** is group affiliation. **Div-Related** is diversification related. **Div-unrelated** is Diversification unrelated. **Size** is firm size values are in million. **Growth Opp** is growth opportunity. **Earning Vol** is earning volatility. **MBR** is market to book ratio. Values of growth opportunity, profitability, earning volatility, leverage, and market to book ratio are in percentage form.*

In the table above all of the variables have 1191 data points. The mean value for synchronicity measure (R2) is -1.943283 with its values lying between -15.82007 and 2.148647, a higher value showing higher synchronicity and a lower value showing lower synchronicity. The mean value for synchronicity is negative because primarily of how its calculated. The formula as discussed earlier in the methodology chapter gives a value between 0 and 1, when a logistic transformation is applied to a value less than 1 it always produces a negative value. The standard deviation for R2 is 1.929455; this is a relatively higher value indicating higher variation which could mean that the flow of firm specific information channeled towards the market varies amongst the listed firms. Total Diversification has a mean value of 0.1835919, the values for diversification range between 0 and 0.631452 with a value of 0 represents no diversification done by the firm at all and an increasing value showing an increase in diversification by the firm in terms of sales. It has a standard deviation of 0.2316579. Group affiliation being a binary variable has only 2 possible values, 0 or 1. With a mean value of 0.4441646 it has a standard deviation of 0.4970814. Moving further, the table discusses 2 more independent variables that are a segment of the total diversification to further the analysis, namely Related Diversification (Div- Related) and Unrelated Diversification (Div-Unrelated). They have mean values of 0.071878 and 0.1117139 respectively. Value range for Div-Related is between 0 and 0.367878. Whereas the range for Div-Unrelated is between 0 and 0.367876 while using the same logic pattern discussed earlier for total diversification. Standard deviation values for both are 0.1067579 and 0.1329425 respectively. Next are the control variables being used in the study namely Firm Size, Growth Opportunity, Profitability, Earning volatility, Leverage and Market to book ratio. Mean values for the above mentioned control variables are 6.86e+08, 0.1980804, 0.2387189, 0.3168793, 0.5312051 and 22.78187

respectively. Firm size having a value between 5629.09 and 1.26e+11 is calculated through market capitalization for the firms. Standard deviation for firm size is 6.30e+09 which is a relatively higher value suggesting that firms have a wide variety when it comes to the selection. Growth opportunity varies between -0.7415965 and 67.82259 with a standard deviation of 2.0888. Profitability has a minimum value of -2.591747 and a maximum value of 12.27993 with a standard deviation of -2.591747. Both the variables of growth opportunity and profitability are calculated and represented in terms of percentage. Earning volatility has a minimum value of -0.781227 and a maximum value 188.0769. the higher the value the higher the volatility in earnings in terms of ROA. The standard deviation is 5.448622. Leverage ranges from 0.0000962 to 2.017656, with a deviation of 0.2332057 along with the range. Lastly Market to book ratio is calculated to be between the values of -6.046367 and 22761.79 with a standard deviation from the mean value is 659.5609.

4.2 | Correlation Analysis

The following correlation matrix shows how total diversification and other independent variables are linked as a part of the information environment with R2 (Synchronicity).

Table 4.2: Correlation Matrix

	R2	DIV- TOTAL	GROUP AFF	SIZE	GROWTH OPP	PROFITABILITY	EARNING-VOL	LEVERAGE	MBR
R2	1.000000								
DIV- TOTAL	0.002009	1.000000							
GROUP AFF	0.153785	0.125582	1.000000						
SIZE	0.030312	-0.010199	0.105437	1.000000					
GROWTH OPP	-0.038967	0.023131	0.020693	-0.010011	1.000000				
PROFITABILITY	-0.034886	-0.072583	-0.068691	-0.004912	0.035612	1.000000			
EARNING VOL	0.013234	0.055675	0.034396	-0.001584	-0.002778	0.004787	1.000000		
LEVERAGE	-0.002060	-0.020816	0.066550	-0.044068	-0.027356	-0.087148	0.025842	1.000000	
MBR	0.013366	-0.022167	-0.025246	0.140513	-0.002329	-0.001845	0.001273	0.035956	1.000000

*Note: **R2** is synchronicity measure of firm. **Div-Total** is total diversification. **Group Aff** is group affiliation. **Div-Related** is diversification related. **Div-unrelated** is Diversification unrelated. **Size** is firm size values are in millions. **Growth Opp** is growth opportunity. Earning Vol is earning volatility. **MBR** is market to book ratio.*

The values can either have a positive sign (indicating that variables are positively correlated) or a negative sign (indicating that variables are negatively correlated). In order for the data to not have multicollinearity no value should exceed 85% and the values above are well below that. R2 positively correlates with total diversification, group affiliation, firm size, earning volatility and market to book ratio with coefficients of 0.002009, 0.153785, 0.030312, 0.013234 and 0.013366 respectively. Growth opportunity, profitability and leverage, on the other hand, are negatively correlated with -0.038967, -0.034886 and -0.002060 as coefficients. A relatively strong positive

correlation can be seen between Firm size and Market to book ratio variables at a coefficient of 0.140513 and between R2 and Group affiliation at 0.15378. Likewise, the strongest negative correlation can be seen between profitability and leverage at -0.087148.

4.3 | Weak Instrument Test

The instruments were tested to check if there endogeneity present within the data or not. For this, we used the Durbin Wu-Hausman Test (also known as Hausman specification test). The test uses the hypothesis that all variables are exogenous. But due to the results that are tabulated below, we can clearly see that the hypothesis (H_0: variables are exogenous) cannot be accepted hence proving that endogenity exists.

Table 4.3: Hausman Specification Test

Ho: variables are exogenous	
Durbin (score) chi2(1)	**= 57.581 (p = 0.0000)**
Wu-Hausman F(1,907)	**= 60.8397 (p = 0.0000)**

4.4 | Finding the Impact of Corporate Diversification on Stock Price Synchronicity.

With the evidence that the variables are endogenous, GMM (Generalized Method of Moments) is used for estimation of equations 1-3. This analysis has 3 main parts, firstly and mainly to check the extent of the impact that total diversification has on Stock Price Synchronicity which in turn would explain, if or not it helps with information inclusion into the market. Secondly and thirdly the effect of diversification is further segmented into related segment diversification and unrelated segment diversification

respectively to further deepen the analysis. Cross sectional pooled data is used that consists of 103 firms resulting in 1191 observations along an adjusted sample period of 2003-2019.

As R2 (Stock price synchronicity) is a bound variable between 0 and 1, to control for this the dependent variable is used after a logistic transformation ratio comprising of explained and unexplained variations same as the methodology used earlier (Piotrowski and Roulstone, 2002). As the value of independent variables has not gone through log transformation the following results will be interpreted as unit change causing percentage changes in the dependant variable.

4.4.1 | Impact of total Diversification

The results for the first equation which includes Total Diversification as the independent variable and also includes control variables(firm size, growth opportunity, profitability, earnings volatility, leverage and market to book ratio) are as follows.

Table 4.4: GMM regression results for total diversification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R2(-1)	**0.090219**	**0.002881**	**31.31051**	**0.0000**
DIV_TOTAL	**-0.569491**	**0.131224**	**-4.339848**	**0.0000**
GROUP-AFF	**-0.166992**	**0.148828**	**-1.122050**	**0.2621**
DIV-TOTAL * GROUP-AFF	**2.278440**	**0.507547**	**4.489123**	**0.0000**
SIZE	**2.61E-11**	**3.41E-12**	**7.663999**	**0.0000**
GROWTH_OPP	**-0.019382**	**0.001808**	**-10.71941**	**0.0000**
PROFITABILITY	**-0.199653**	**0.021669**	**-9.213851**	**0.0000**
EARNING_VOL	**0.023721**	**0.017812**	**1.331727**	**0.1833**
LEVERAGE	**-0.400130**	**0.109005**	**-3.670740**	**0.0003**
MBR	**0.000241**	**2.21E-05**	**10.93772**	**0.0000**

*Note: **R2(-1)** is first lag of dependent variable synchronicity. **Div-Total** is total diversification. **Group-Aff** is group affiliation. **DIV-TOTAL*GROUP-AFF** is interaction term. **Size** is firm size. **Growth Opp** is growth opportunity. **Earning-Vol** is earning volatility. **MBR** is market to book ratio.*

R2(-1) is the first lag for synchronicity and it is positively significant at 1% level of significance. Coefficient for Total diversification is -0.569491 with a standard error of 0.131224 and t-stat -4.339848 i.e it is significant at 1% level of significance. This indicates that a unit increase in total diversification reduces R2 by 0.569491%. The interaction variable of Group affiliation with total diversification is also significant at 1% level of significance with a coefficient of 2.278440. Firm size is also significant at 1% level of significance with a coefficient of 2.61E-11 and standard error and t stat of 3.41E-12 and 7.663999 respectively. A positive sign indicates that there is a positive relation between Firm size and R2. From the rest of the control variables Growth opportunity, Profitability and leverage are significant at 1% level of significance with coefficients as -0.019382, -0.199653 and -0.400130. All three of the above mentioned control variables are exhibiting a negative relationship with R2 as they have a negative sign. Lastly Market to book ratio is significant at 1% level of confidence shows a positive relation with R2 with a coefficient of 0.000241, standard error of 2.21E-05 and t stat of 10.93772.

4.4.2 | Impact of Related Diversification

The results for the first equation which includes Related Diversification as the independent variable and also includes control variables (firm size, growth opportunity, profitability, earnings volatility, leverage and market to book ratio) are as follows.

Table 4.5: GMM regression results for related segment diversification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R2(-1)	**0.090156**	**0.002731**	**33.01370**	**0.0000**
DIV_RELATED	**-1.304595**	**0.291521**	**-4.475138**	**0.0000**
GROUP_AFF	**-0.171806**	**0.138276**	**-1.242486**	**0.2143**
DIV_RELATED*GROUP_AFF	**5.670101**	**1.091642**	**5.194105**	**0.0000**
SIZE	**2.61E-11**	**3.27E-12**	**7.985931**	**0.0000**
GROWTH_OPP	**-0.019929**	**0.001709**	**-11.66388**	**0.0000**
PROFITABILITY	**-0.192534**	**0.018562**	**-10.37260**	**0.0000**
EARNING_VOL	**0.021349**	**0.019780**	**1.079316**	**0.2807**
LEVERAGE	**-0.346366**	**0.092044**	**-3.763037**	**0.0002**
MBR	**0.000231**	**1.76E-05**	**13.17177**	**0.0000**

*Note: **R2(-1)** is first lag of dependent variable synchronicity. **Div-RELATED** is related diversification. **Group-Aff** is group affiliation. **DIV-RELATED*GROUP-AFF** is interaction term. **Size** is firm size. **Growth-Opp** is growth opportunity. **Earning-Vol** is earning volatility. **MBR** is market to book ratio.*

R2(-1) is the first lag for synchronicity and it is positively significant at 1% level of significance. The coefficient for R2(-1) is 0.090156. Related diversification also shows a negative relationship with the dependent variable of R2. With a unit change in Related diversification, there is a decrease in R2 by 1.304595%. Related diversification is significant at a 1% level of significance with a standard error of 0.291521 and t-stat of -4.475138. The interaction variable of Group affiliation with related diversification is

also significant at 1% level of significance. With standard error of 1.091642 and a t-stat value of 5.194105. It exhibits a positive relation with R2 with a coefficient value of 5.670101. Among the significant control variables at 1% level of significance, Firm size and market to book ratio show a positive relationship having coefficients of 2.61E-11 and 0.000231. The remaining significant control variables (Growth opportunity, Profitability and Leverage) all have a negative relation with the dependent variable. The coefficients are as follows -0.019929, -0.192534 and -0.346366 respectively. Standard error and t-stat figures are as follows; 0.001709 and -11.66388 for Growth opportunity, 0.018562 and -10.37260 for Profitability, 0.092044 and -3.763037 for leverage.

4.4.3 | Impact of Unrelated Diversification

The results for the first equation which includes Unrelated Diversification as the independent variable and also includes control variables (firm size, growth opportunity, profitability, earnings volatility, leverage and market to book ratio) are as follows.

Table 4.6: GMM regression results for unrelated segment diversification

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R2(-1)	**0.090498**	**0.002952**	**30.65627**	**0.0000**
DIV_UNRELATED	**-0.858451**	**0.215525**	**-3.983067**	**0.0001**
GROUP_AFF	**-0.118137**	**0.154819**	**-0.763066**	**0.4456**
DIV_ UNRELATED*GROUP_AFF	**3.297667**	**0.894172**	**3.687956**	**0.0002**
SIZE	**2.57E-11**	**3.35E-12**	**7.682310**	**0.0000**
GROWTH_OPP	**-0.019466**	**0.001860**	**-10.46790**	**0.0000**
PROFITABILITY	**-0.203694**	**0.023002**	**-8.855458**	**0.0000**
EARNING_VOL	**0.026571**	**0.014805**	**1.794674**	**0.0730**
LEVERAGE	**-0.422103**	**0.118371**	**-3.565945**	**0.0004**
MBR	**0.000247**	**2.58E-05**	**9.584569**	**0.0000**

*Note: **R2(-1)** is first lag of dependent variable synchronicity. **Div-Unrelated** is unrelated diversification. **Group-Aff** is group affiliation. **DIV-UNRELATED*GROUP-AFF** is interaction term. **Size** is firm size. **Growth-Opp** is growth opportunity. **Earning-Vol** is earning volatility. **MBR** is market to book ratio.*

R2(-1) is the first lag for synchronicity and it is positively significant at 1% level of significance. The coefficient for R2(-1) is 0.090498. Like the diversification coefficients in the previous results we see here that unrelated diversification follows the same pattern regarding the relationship with R2. Unrelated diversification here is significant with standard error and t-stat of 0.215525 and -3.983067 at 1% level of significance. A unit change in unrelated diversification decreases the R2 by 0.858451%. The interaction variable of Group affiliation with unrelated diversification is also significant at 1% level of significance having standard error of 0.894172 and t-stat figure of 3.687956. The interaction variable exhibits a positive relation with the dependent variable R2 having a coefficient of 3.297667. From the significant control variables Growth opportunity, Profitability and Leverage have a negative relationship with the dependent variable having coefficient values as -0.019466, -0.203694 and -0.422103 respectively. Standard error values for Growth opportunity, Profitability and Leverage are 0.001860, 0.023002 and 0.118371. While t-stat values are -10.46790, -8.855458 and -3.565945. The last remaining two significant control variables are positively connected with the R2 at coefficients of 2.57E-11 and 0.000247. Firm size has a standard error of 3.35E-12 with a t-stat of value of 7.682310. Market to book ratio on the other hand has a standard error value of 2.58E-05 and a t-stat figure of 9.584569.

4.4.4 | Theoretical Discussion

The role of group affiliations for the Pakistani market on synchronicity did not prove to be significant enough but its interaction variable with diversification be it total or segmented, shows a positive relation with the dependent variable i.e it weakens the synchronicity-diversification dynamic than helping it. This in theory should mean that being a part of a business group in the local setting is harming the informational efficiency of the firm and is causing it to become more synchronistic with the market.

Being a part of an industrial or business group is somewhat similar to diversification itself as they provide assistance and support to each other. Selcuk, E. A. (2014) also argues that only those firms that get the benefits of diversification are not a part of any business or industrial group mainly because most of the benefits are already captured by the group dynamics.

While testing for the impact of corporate diversification on stock price synchronicity the results are indicative that more a company diversifies its operations, more the company moves away towards a lower synchronistic behavior. Keeping in mind that the negative relation between diversification and R2 shown in figure 4.4.1 to 4.4.3 indicates that higher diversification means lower synchronicity.

Afza, Slahudin and Nazir (2008) found a negative relationship existed between firm value and diversification. But later studies showed there are two contrasting effects of agency and informational effects for diversification and which effect takes precedence is down to how the diversification strategies are viewed by the stakeholders. (Ataullah et al., 2014). Over diversification can and does hurt the firm value and in turn, affects the firm's synchronicity as well. Khan, Fraz & Hasan., (2016) while researching on Pakistani market for the diversification-value destruction stance found that only in the presence of information asymmetry does that happen.

To carry on the discussion under the light of theory we see here that the results are in accordance with what the previous literature illustrates. The integration of information into the market depends on a lot of things, it can come down to however the capacity of the market to absorb and reflect information in prices or how fast the process takes place. These are synonymous to development in any economy. The less established and poorer an economy is, the higher will its fundamental correlation will be resulting in

the stock prices moving more in sync with the financial market (Morck et al., 2000). As established that a lower synchronicity measure means that more firm specific information content is absorbed and the economy or the market exhibits signs of development as compared to developing or underdeveloped economies (Roll, 1988).

Zirek and Demirtas (n.d.) used patterns of corporate diversification in the markets across countries and stock price synchronicity to determine the predictive powers of the information market, here returns information played a better roll in portfolios that were low in diversification and had high synchronicity because the portfolios which were diversified more had lower synchronicity and any information regarding cash flow that was a part of firm-level earnings got diversified away due to the low synchronistic movement of a more developed market. Morck et al., (2000) also tested the magnitude to which a country's stock prices are in synchronicity and also the level of its diversification across countries over a period of time. These results are further strengthened when segments of total diversification are tested i.e. related and unrelated diversification. The results tell us again that diversification has a strong negative relationship with stock price synchronicity in the Pakistani market. Here it is also observed that companies that diversify more in related segments than unrelated ones tend to move more independently from the market.

CHAPTER 5

CONCLUSION

5.1 | Summary and Conclusion

Stock prices have to be the single most important piece of information, that single number on its own is a complete picture, it not only tells you the current and actual state of the firms but also gives an insight into the past and future performance. Informational efficiency not only tells us how completely, any and all firm specific information is part of the firm's prices but also how quickly it makes its way into it. It is this instantaneity that determines how efficient or inefficient a market is. This can be measured through a number of different techniques and proxies but the one discussed here (stock Price Synchronicity) not only looks into the firm level information but paints a bigger picture that encapsulates the whole information landscape of Pakistan, which at its core is a market that represents nothing but growth and economic potential.

This study is in line with the theories on diversification and stock price synchronicity tested previously for developed and developing markets. The analysis is based on the literature pertaining to the relationship of corporate diversification with synchronicity, information asymmetry in underdeveloped and developing markets and lastly the workings and effects of business and industrial group affiliations for firms. With the results achieved from this study, it can be concluded that firstly corporate diversification has a significant effect at lowering down the synchronicity for firms. On further segmentation, it was seen that firms who choose related diversification than those firms that choose unrelated diversification have a bigger lowering effect on their synchronicity. The study further employed group affiliations of all the firms used for moderating analysis and found that it is possible that diversification only helps if the

said firm does not belong to any business group. Being part of a business group was seen to negatively affect the Diversification-Synchronicity relationship and is also in line with a debate that over diversification destroys firm value.

5.2 | future Research Direction

This study may pave way for the following future research directions

- An industry wise analysis to see which industry takes the most impact to its synchronicity form corporate diversification.
- Industry wise segmented related and unrelated diversification point of approach to the analysis.
- Whether higher diversification helps the firms during the time of financial crisis
- A period wise contrast on the changes in informational efficiency for the Pakistani stock market using synchronicity as a tool.
- To what extent is the group affiliations a damaging factor. A look beyond just a binary variable.

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APPENDICES

Appendix A: List of Companies

Table A1: List of companies

Companies	Sector
AL-GHAZI TRACTORS LTD	Automobile Assembler
ATLAS HONDA LTD	Automobile Assembler
HONDA ATLAS CARS (PAKISTAN) LTD	Automobile Assembler
INDUS MOTOR COMPANY LTD	Automobile Assembler
MILLAT TRACTORS LTD	Automobile Assembler
PAK SUZUKI MOTOR CO LTD	Automobile Assembler
Dewan Farooque Motors Limited	Automobile Assembler
Ghandhara Industries Limited	Automobile Assembler
Ghandhara Nissan Limited	Automobile Assembler
Hinopak Motors Limited	Automobile Assembler
Sazgar Engineering Works Ltd	Automobile Assembler
THAL LTD	Automobile Parts and Accessories
PAK ELEKTRON LTD	Cable and Electrical Goods
ATTOCK CEMENT PAKISTAN LTD	Cement Sector
BESTWAY CEMENT LTD	Cement Sector
CHERAT CEMENT COMPANY LTD	Cement Sector
D G KHAN CEMENT COMPANY LTD	Cement Sector
FAUJI CEMENT COMPANY LTD	Cement Sector
KOHAT CEMENT COMPANY LTD	Cement Sector
LUCKY CEMENT LTD	Cement Sector
MAPLE LEAF CEMENT FACTORY LTD	Cement Sector
JAVEDAN CORPORATION LTD	Cement Sector
Dewan Cement Limited	Cement Sector
Fecto Cement Limited	Cement Sector
Gharibwal Cement Limited	Cement Sector
Pioneer Cement Limited	Cement Sector
Power Cement Limited	Cement Sector
AKZO NOBEL PAKISTAN LTD	Chemical Sector
ARCHROMA PAKISTAN LTD	Chemical Sector
ENGRO POLYMER & CHEMICALS LTD	Chemical Sector
ICI PAKISTAN LTD	Chemical Sector
LOTTE CHEMICAL PAKISTAN LTD	Chemical Sector
COLGATE-PALMOLIVE (PAKISTAN) LTD	Chemical Sector
Biafo Industries Limited	Chemical Sector
Nimir Industrial Chemicals Limited	Chemical Sector
Nimir Resins Limited	Chemical Sector

Linde Pakistan Limited	Chemical Sector
Sitara Chemical Industries Limited	Chemical Sector
INTERNATIONAL INDUSTRIES LTD	Engineering
AMRELI STEELS LTD	Engineering
INTERNATIONAL STEELS LTD	Engineering
MUGHAL IRON & STEEL	Engineering
Bolan Castings Limited	Engineering
Crescent Steel & Allied Products Limited	Engineering
Metropolitan Steel Corporation Limited	Engineering
ENGRO CORPORATION LTD (PAKISTAN)	Fertilizer
ENGRO FERTILIZERS LTD	Fertilizer
FATIMA FERTILIZER COMPANY LTD	Fertilizer
FAUJI FERTILIZER BIN QASIM LTD	Fertilizer
FAUJI FERTILIZER COMPANY LTD	Fertilizer
FRIESLANDCAMPINA ENGRO LTD	Food and Personal Care Products
ISMAIL INDUSTRIES LTD	Food and Personal Care Products
MURREE BREWERY COMPANY LTD	Food and Personal Care Products
NATIONAL FOODS LTD	Food and Personal Care Products
NESTLE PAKISTAN LTD	Food and Personal Care Products
RAFHAN MAIZE PRODUCTS CO LTD	Food and Personal Care Products
UNILEVER PAKISTAN FOODS LTD	Food and Personal Care Products
Quice Food Industries Limited	Food and Personal Care Products
GHANI GLASS LTD	Glass and Ceramics
TARIQ GLASS INDUSTRIES LTD	Glass and Ceramics
ADAMJEE INSURANCE COMPANY LTD	Insurance
EAST WEST INSURANCE CO LTD	Insurance
EFU GENERAL INSURANCE LTD	Insurance
EFU LIFE ASSURANCE LTD	Insurance
IGI HOLDINGS LTD	Insurance
JUBILEE GENERAL INSURANCE COMPANY LTD	Insurance
JUBILEE LIFE INSURANCE COMPANY LTD	Insurance
PAKISTAN REINSURANCE COMPANY	Insurance
DAWOOD HERCULES CORPORATION LTD	Inv.Banks / Inv.Cos. / Securities Cos.
BATA PAKISTAN LTD	Leather and Tanneries
SERVICE INDUSTRIES LTD	Leather and Tanneries
SHIFA INTERNATIONAL HOSPITALS LTD	Miscellaneous
PAKISTAN SERVICES LTD	Miscellaneous
MARI PETROLEUM COMPANY LTD	Oil and Gas Exploration Companies

OIL AND GAS DEVELOPMENT CO LTD	Oil and Gas Exploration Companies
PAKISTAN OILFIELDS LTD	Oil and Gas Exploration Companies
PAKISTAN PETROLEUM LTD	Oil and Gas Exploration Companies
ATTOCK PETROLEUM LTD	Oil and Gas Marketing Companies
HASCOL PETROLEUM LTD	Oil and Gas Marketing Companies
PAKISTAN STATE OIL COMPANY LTD	Oil and Gas Marketing Companies
SHELL PAKISTAN LTD	Oil and Gas Marketing Companies
SUI NORTHERN GAS PIPELINES LTD	Oil and Gas Marketing Companies
SUI SOUTHERN GAS COMPANY LTD	Oil and Gas Marketing Companies
PACKAGES LTD	Paper and Board
ABBOTT LABORATORIES PAKISTAN LTD	Pharmaceuticals
AGP LTD	Pharmaceuticals
GLAXOSMITHKLINE CONSUMER HEALTHCARE PAKISTAN LTD	Pharmaceuticals
GLAXOSMITHKLINE PAKISTAN LTD	Pharmaceuticals
HIGHNOON LABORATORIES LTD	Pharmaceuticals
SEARLE COMPANY LTD	Pharmaceuticals
SAIF POWER LTD	Power Generation and Distribution
ALTERN ENERGY LTD	Power Generation and Distribution
ENGRO POWERGEN QADIRPUR LIMITED	Power Generation and Distribution
HUB POWER COMPANY LTD	Power Generation and Distribution
K-ELECTRIC LTD	Power Generation and Distribution
KOT ADDU POWER COMPANY LTD	Power Generation and Distribution
NISHAT POWER LTD	Power Generation and Distribution
DOLMEN CITY REIT	Real Estate Investment Trust
ATTOCK REFINERY LTD	Refinery
BYCO PETROLEUM PAKISTAN LTD	Refinery
NATIONAL REFINERY LTD	Refinery
JDW SUGAR MILLS LTD	Sugar and Allied Industries
TANDLIANWALA SUGAR MILLS LTD	Sugar and Allied Industries
Mehran Sugar Mills Limited	Sugar and Allied Industries
IBRAHIM FIBRES LTD	Synthetic and Rayon
TRG PAKISTAN LTD	Technology and Communication

AVANCEON LTD	Technology and Communication
SYSTEMS LTD	Technology and Communication
PAKISTAN TELECOMMUNICATION COMPANY LTD	Technology and Communication
FEROZE1888 MILLS LTD	Textile Composite
GUL AHMED TEXTILE MILLS LTD	Textile Composite
INTERLOOP LTD	Textile Composite
KOHINOOR TEXTILE MILLS LTD	Textile Composite
MAHMOOD TEXTILE MILLS LTD	Textile Composite
NISHAT CHUNIAN LTD	Textile Composite
NISHAT MILLS LTD	Textile Composite
SAPPHIRE FIBRES LTD	Textile Composite
SAPPHIRE TEXTILE MILLS LTD	Textile Composite
DAWOOD LAWRENCEPUR LTD	Textile Composite
PAKISTAN TOBACCO COMPANY LTD	Tobacco
PHILIP MORRIS (PAKISTAN) LTD	Tobacco
PAKISTAN INTERNATIONAL AIRLINE CORP	Transport
PAKISTAN INTERNATIONAL BULK TERMINAL LTD	Transport
PAKISTAN INTERNATIONAL CONTAINER TERMINAL LTD	Transport
PAKISTAN NATIONAL SHIPPING CORP	Transport
UNITY FOODS LTD	Vanaspati and Allied Industries

Appendix B: Industry wise Summary statistics

Table B1: Automobile Assembler

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	71	-1.962434	1.405888	-7.249435	-0.171279
Diversific~l	71	0.0214659	0.0367956	0	0.156915
Groupaffil~n	71	0.6338028	0.4851932	0	1
Dive~Related	71	0.0040982	0.0077274	0	0.0359016
Dive~related	71	0.0173677	0.0291357	0	0.1210134
FirmSize	71	1.27E+09	7.69E+09	1339817	5.73E+10
GrowthOppo~y	71	0.029135	0.0280353	0.002483	0.1495762
Profitabil~y	71	0.0968856	0.0700557	-0.030959	0.2543767
Earningvol~y	71	0.1937559	0.1512637	-0.054868	0.7594167
Leverage	71	0.4831399	0.203093	0.0000962	0.9098999
Markettobo~o	71	323.3013	2701.002	0.3164437	22761.79

Table B2: Automobile Parts and Accessories

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	15	-1.619687	1.617758	-6.875313	0.065172
Diversific~l	15	0.1876781	0.068907	0.0755273	0.2916084
Groupaffil~n	15	0	0	0	0
Dive~Related	15	0.0467714	0.0214467	0.014335	0.0815852
Dive~related	15	0.1409067	0.0475135	0.0611923	0.2100232
FirmSize	15	1.52E+07	1.46E+07	1467840	4.91E+07
GrowthOppo~y	15	0.026192	0.0229441	0.0069098	0.0835834
Profitabil~y	15	0.1378579	0.0631116	0.0444765	0.2533027
Earningvol~y	15	0.1454268	0.0664951	0.065354	0.2446363
Leverage	15	0.2042108	0.1216978	0.0936936	0.4377579
Markettobo~o	15	1.03084	0.4450878	0.4556745	1.96671

Table B3: Cable and Electrical Goods

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	15	-1.496543	1.685837	-6.027285	0.3162545
Diversific~l	15	0.1614793	0.1664764	0.0252379	0.5298795
Groupaffil~n	15	1	0	1	1
Dive~Related	15	0.0465209	0.0631746	0.0038409	0.1955704
Dive~related	15	0.1149584	0.104015	0.021397	0.3343091
FirmSize	15	9.72E+09	1.53E+10	653422.6	4.22E+10

GrowthOppo~y	15	-0.034877	0.1938711	-0.316627	0.6097365
Profitabil~y	15	0.0853035	0.0997875	-0.158864	0.216834
Earningvol~y	15	0.0589961	0.0611906	-0.075733	0.1436554
Leverage	15	0.5833467	0.1466152	0.3673965	0.7898794
Markettobo~o	15	0.4608903	0.6490926	0.000084	1.715929

Table B4: Cement Sector

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	118	-1.034017	1.40382	-6.194887	1.162146
Diversific~l	118	0.4203459	0.2009948	0	0.6931452
Groupaffil~n	118	0.6271186	0.4856331	0	1
Dive~Related	118	0.1573598	0.0964497	0	0.3587732
Dive~related	118	0.2629862	0.1100187	0	0.367876
FirmSize	118	2.93E+07	4.33E+07	247712.5	2.70E+08
GrowthOppo~y	118	0.8793209	6.229439	0.0068506	67.82259
Profitabil~y	118	0.2389785	0.1059402	-0.039511	0.4913232
Earningvol~y	118	0.1451086	0.0896381	-0.028218	0.3894932
Leverage	118	0.4530507	0.1646024	0.1519256	0.8645502
Markettobo~o	118	1.602783	1.170643	0.1249832	8.523449

Table B*5*: Chemical Sector

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	77	-2.237571	2.431594	-15.82007	0.3524176
Diversific~l	77	0.0977534	0.1477374	0	0.5432127
Groupaffil~n	77	0.1428571	0.3522217	0	1
Dive~Related	77	0.0281397	0.0471109	0	0.2036687
Dive~related	77	0.0696137	0.1013216	0	0.339544
FirmSize	77	2.16E+08	1.17E+09	2375760	7.76E+09
GrowthOppo~y	77	0.0210636	0.0772619	-0.122471	0.3791848
Profitabil~y	77	0.0934874	0.1423273	-1.036273	0.2687305
Earningvol~y	77	0.1541951	0.0931984	-0.151081	0.3521388
Leverage	77	0.4672935	0.1633401	0.205715	0.8456731
Markettobo~o	77	3.502562	2.928463	0.4692323	13.5749

Table B6: Engineering

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	34	-1.595848	1.466593	-6.758097	0.7352488
Diversific~l	34	0.3300989	0.2145678	0	0.6278703
Groupaffil~n	34	0.1176471	0.327035	0	1
Dive~Related	34	0.1141787	0.0858167	0	0.2630682
Dive~related	34	0.2159202	0.1305967	0	0.3648021
FirmSize	34	1.12E+09	3.35E+09	3386678	1.43E+10
GrowthOppo~y	34	0.0798249	0.0743035	0.0139775	0.3111818
Profitabil~y	34	0.102471	0.0351031	0.0418583	0.2103346
Earningvol~y	34	0.1076593	0.0394512	0.0265159	0.1937166
Leverage	34	0.6239509	0.1166395	0.2488411	0.7588648
Markettobo~o	34	1.765593	1.188035	0.4479926	6.503452

Table B7: Fertilizer

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	58	-0.685984	0.7928167	-2.564436	0.8938825
Diversific~l	58	0.0100622	0.0423584	0	0.2170207
Groupaffil~n	58	0.7931034	0.4086186	0	1
Dive~Related	58	0.0023985	0.0104202	0	0.0548041
Dive~related	58	0.0076637	0.0319618	0	0.1622166
FirmSize	58	2.24E+09	1.65E+10	1.21E+07	1.26E+11
GrowthOppo~y	58	0.1376	0.2052562	0.0105745	0.9267643
Profitabil~y	58	0.6057593	0.6546701	-0.006724	2.518501
Earningvol~y	58	0.3839413	0.360384	-0.003207	1
Leverage	58	0.6475242	0.0995748	0.4175978	0.8392459
Markettobo~o	58	2.421342	1.039882	0.8215181	4.616248

Table B8: Food and Personal Care Products

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	90	-3.28856	1.625735	-7.970469	-0.007077
Diversific~l	90	0.1664886	0.1665929	0	0.6680154
Groupaffil~n	90	0.6222222	0.4875478	0	1
Dive~Related	90	0.049293	0.0584476	0	0.3006965
Dive~related	90	0.1171956	0.1106585	0	0.3673189
FirmSize	90	5.30E+08	4.42E+09	472450	4.20E+10
GrowthOppo~y	90	0.0590071	0.0614768	0	0.4538935
Profitabil~y	90	0.1554239	0.0900317	0.0037766	0.5735363

Earningvol~y	90	0.2711963	0.2895457	0.0053807	2.098525
Leverage	90	0.538841	0.260867	0.1201932	0.9555324
Markettobo~o	90	18.75023	33.53782	0.2816291	248.2127

Table B9: Glass and Ceramics

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	24	-2.004144	1.12505	-4.385158	-0.122796
Diversific~l	24	0.2791467	0.0927392	0.1230945	0.445792
Groupaffil~n	24	1	0	1	1
Dive~Related	24	0.0796892	0.0353627	0.0263451	0.1495224
Dive~related	24	0.1994575	0.0575823	0.0967494	0.2962696
FirmSize	24	8131552	8990936	5629.09	3.48E+07
GrowthOppo~y	24	0.187966	0.1764348	0.0303277	0.6756556
Profitabil~y	24	0.1815475	0.0727243	0.048441	0.3550884
Earningvol~y	24	0.1597556	0.0624462	0.0393509	0.3073349
Leverage	24	0.40071	0.117084	0.2367675	0.638287
Markettobo~o	24	0.8326445	0.9043506	0.000917	3.249872

Table B10: Insurance

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	71	-2.348598	2.158657	-10.55162	0.1645069
Diversific~l	71	0	0	0	0
Groupaffil~n	71	0	0	0	0
Dive~Related	71	0	0	0	0
Dive~related	71	0	0	0	0
FirmSize	71	1.60E+07	1.20E+07	1712040	5.59E+07
GrowthOppo~y	71	0.2153652	0.559828	-0.227226	2.754573
Profitabil~y	71	1.215015	2.687204	-1.1668	12.27993
Earningvol~y	71	0.0599108	0.0926897	-0.250576	0.5286348
Leverage	71	0.5677695	0.2495411	0.036813	0.9483782
Markettobo~o	71	2.081288	1.57435	0.321578	7.141009

Table B11: InvBanks InvCos Securities Cos

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	13	-1.139613	0.9322313	-3.418979	0.1826326
Diversific~l	13	0	0	0	0
Groupaffil~n	13	0	0	0	0
Dive~Related	13	0	0	0	0
Dive~related	13	0	0	0	0
FirmSize	13	2.63E+07	1.32E+07	1.42E+07	5.38E+07
GrowthOppo~y	13	0.1627331	0.248356	0.0014091	0.8981046
Profitabil~y	13	0.4734034	0.5316921	0.0607792	2.105596
Earningvol~y	13	0.1123862	0.0918464	0.0013247	0.3610597
Leverage	13	0.3978038	0.1621241	0.2037341	0.7235584
Markettobo~o	13	1.038771	0.63387	0.2551009	1.989267

Table B12: Leather and Tanneries

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	28	-4.093119	2.09222	-9.428737	-1.668555
Diversific~l	28	0	0	0	0
Groupaffil~n	28	0	0	0	0
Dive~Related	28	0	0	0	0
Dive~related	28	0	0	0	0
FirmSize	28	1.09E+07	9877371	782960	3.32E+07
GrowthOppo~y	28	0.1840435	0.1341877	0.0366123	0.5724298
Profitabil~y	28	0.1536441	0.0414477	0.0731221	0.2165114
Earningvol~y	28	0.0853224	0.0449897	0.015754	0.1545544
Leverage	28	0.3578474	0.1759945	0.0900219	0.599227
Markettobo~o	28	1.369737	1.08763	0.1754882	4.200092

Table B13: Miscellaneous

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	28	-4.093119	2.09222	-9.428737	-1.668555
Diversific~l	28	0	0	0	0
Groupaffil~n	28	0	0	0	0
Dive~Related	28	0	0	0	0
Dive~related	28	0	0	0	0
FirmSize	28	1.09E+07	9877371	782960	3.32E+07
GrowthOppo~y	28	0.1840435	0.1341877	0.0366123	0.5724298
Profitabil~y	28	0.1536441	0.0414477	0.0731221	0.2165114
Earningvol~y	28	0.0853224	0.0449897	0.015754	0.1545544
Leverage	28	0.3578474	0.1759945	0.0900219	0.599227
Markettobo~o	28	1.369737	1.08763	0.1754882	4.200092

Table B14: Oil and Gas Exploration Companies

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	58	-0.272534	1.102305	-3.442922	2.148647
Diversific~l	58	0	0	0	0
Groupaffil~n	58	0.2758621	0.4508512	0	1
Dive~Related	58	0	0	0	0
Dive~related	58	0	0	0	0
FirmSize	58	2.66E+08	2.67E+08	5469500	1.12E+09
GrowthOppo~y	58	0.2186546	0.1335748	0.0314604	0.6952531
Profitabil~y	58	0.4868625	0.1125898	0.2516809	0.7017176
Earningvol~y	58	0.2389337	0.1243909	0.0657612	0.4940814
Leverage	58	0.3764257	0.1801521	0.1739306	0.8248964
Markettobo~o	58	2.708146	1.417137	0.6643612	6.802277

Table B15: Oil and Gas Marketing Companies

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	76	-0.744640	0.8626783	-2.409839	1.214488
Diversific~l	76	0.0108587	0.0505476	0	0.3112215
Groupaffil~n	76	0.7368421	0.4432733	0	1
Dive~Related	76	0.0028017	0.0140135	0	0.089248
Dive~related	76	0.008057	0.0366026	0	0.2219735
FirmSize	76	3.62E+07	2.55E+07	9396440	1.06E+08
GrowthOppo~y	76	0.0434381	0.0609245	0.0007525	0.3905511
Profitabil~y	76	0.020419	0.0396445	-0.203606	0.0630673
Earningvol~y	76	0.0796818	0.0821267	-0.167166	0.2450349
Leverage	76	0.7822934	0.1363486	0.5283478	1.204072
Markettobo~o	76	2.778349	4.560672	-6.046367	38.78898

Table B16: Paper and Board

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	15	-1.70377	1.518204	-4.907204	0.1437212
Diversific~l	15	0.1205911	0.0559799	0.0607508	0.2453949
Groupaffil~n	15	1	0	1	1
Dive~Related	15	0.0267181	0.0160898	0.0109839	0.0645574
Dive~related	15	0.0938731	0.0399372	0.0497669	0.1808375
FirmSize	15	2.69E+07	2.16E+07	6850770	7.60E+07
GrowthOppo~y	15	0.2455819	0.2317679	0.0327888	0.8431629
Profitabil~y	15	0.071948	0.0412124	-0.015786	0.1334471
Earningvol~y	15	0.0307212	0.0292707	-0.006824	0.1146158
Leverage	15	0.3379698	0.0930371	0.178419	0.5444277
Markettobo~o	15	0.8800899	0.5222951	0.2395952	1.890917

Table B17: Pharmaceuticals

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	51	-1.687151	1.019093	-4.892223	0.5403474
Diversific~l	51	0.1859987	0.0638898	0.010119	0.3310805
Groupaffil~n	51	0.4705882	0.5041008	0	1
Dive~Related	51	0.0461504	0.0190389	0.0013264	0.0972792
Dive~related	51	0.1398484	0.0450503	0.0087926	0.2338013
FirmSize	51	5.60E+09	1.95E+10	478310	8.54E+10
GrowthOppo~y	51	0.0136058	0.0627771	-0.086244	0.3480115
Profitabil~y	51	0.1337791	0.1368646	-0.736280	0.2653402
Earningvol~y	51	0.1884445	0.1582666	-0.781227	0.3731814
Leverage	51	0.3829731	0.1379517	0.1575913	0.7063859
Markettobo~o	51	2.782273	2.582198	0.0014998	8.13096

Table B18: Power Generation and Distribution

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	55	-1.57674	1.204608	-7.473903	-0.078464
Diversific~l	55	0	0	0	0
Groupaffil~n	55	0.3272727	0.4735424	0	1
Dive~Related	55	0	0	0	0
Dive~related	55	0	0	0	0
FirmSize	55	5.44E+07	5.61E+07	5205100	2.34E+08
GrowthOppo~y	55	0.0443604	0.0650702	0.0001431	0.2482545
Profitabil~y	55	0.1423993	0.1317692	-0.216045	0.4185891
Earningvol~y	55	0.0985814	0.0822713	-0.155898	0.217594
Leverage	55	0.6174411	0.1845606	0.1002529	0.9255777
Markettobo~o	55	1.590843	0.8614065	0.2762026	4.178962

Table B19: Refinery

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	45	-0.9334116	0.8253631	-2.863397	0.7935857
Diversific~l	45	0.3470679	0.1205322	0	0.5186345
Groupaffil~n	45	0.6666667	0.4767313	0	1
Dive~Related	45	0.1091539	0.0465173	0	0.1889329
Dive~related	45	0.237914	0.0748167	0	0.3297016
FirmSize	45	1.96E+07	2.02E+07	2729016	1.20E+08
GrowthOppo~y	45	0.0286612	0.0432059	0.000797	0.1775002
Profitabil~y	45	0.0147068	0.0426689	-0.135575	0.097519
Earningvol~y	45	0.0424108	0.0775754	-0.142453	0.2180677
Leverage	45	0.5711025	0.2431005	0.1032794	1.094118
Markettobo~o	45	5.572836	30.77289	-2.291261	207.2241

Table B20: Sugar and Allied Industries

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	38	-3.717955	2.109383	-10.45512	-0.076752
Diversific~l	38	0.2416071	0.2653491	0	0.6861435
Groupaffil~n	38	0.3684211	0.4888515	0	1
Dive~Related	38	0.092456	0.1138236	0	0.3610707
Dive~related	38	0.1491511	0.1556889	0	0.3664701
FirmSize	38	7.53E+08	1.45E+09	973139	5.77E+09
GrowthOppo~y	38	0.1202503	0.1400033	0.0091022	0.6091695
Profitabil~y	38	0.1045794	0.0588685	-0.031508	0.2225828
Earningvol~y	38	0.1062229	0.0687223	-0.061312	0.2547187
Leverage	38	0.7411665	0.0982912	0.485598	0.8813835
Markettobo~o	38	1.684241	0.615668	0.555692	3.25025

Table B21: Synthetic and Rayon

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	15	-2.560985	1.221951	-4.926414	-1.029534
Diversific~l	15	0.0150323	0.0099284	0.0011557	0.0320029
Groupaffil~n	15	1	0	1	1
Dive~Related	15	0.002196	0.0015815	0.0001147	0.0050861
Dive~related	15	0.0128363	0.0083497	0.001041	0.0269167
FirmSize	15	1.65E+07	4317561	9256210	2.39E+07
GrowthOppo~y	15	0.12625	0.1849647	0.0068054	0.7129414
Profitabil~y	15	0.056616	0.035672	0.0018395	0.1307364
Earningvol~y	15	0.0528921	0.0315507	0.0012505	0.1032525
Leverage	15	0.4375853	0.139296	0.1712867	0.6736939
Markettobo~o	15	0.9602404	0.5421918	0.4719688	2.037568

Table B22: Technology and Communication

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	18	-0.847128	0.7830475	-2.783415	1.347797
Diversific~l	19	0.4204524	0.1379126	0.2006649	0.6930514
Groupaffil~n	19	0.5789474	0.5072573	0	1
Dive~Related	19	0.1739748	0.1099216	0.0494228	0.3678771
Dive~related	19	0.2464776	0.0587813	0.1512421	0.3520963
FirmSize	19	5.69E+07	6.41E+07	3860000	2.15E+08
GrowthOppo~y	19	0.2379407	0.2691233	0.0026618	1.163494
Profitabil~y	19	0.1778015	0.1358127	0.0397448	0.5632594
Earningvol~y	19	0.1031079	0.069895	0.0160833	0.2918447
Leverage	19	0.4309669	0.1993156	0.0988002	0.7391578
Markettobo~o	19	1.542288	0.9562954	0.4357083	3.282385

Table B23: Textile Composite

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	113	-2.812629	2.340243	-9.304555	1.270972
Diversific~l	113	0.5182581	0.2139476	0	0.6931438
Groupaffil~n	113	0.4867257	0.5020502	0	1
Dive~Related	113	0.276933	0.1067219	0	0.367878
Dive~related	113	0.241325	0.1235385	0	0.3676181
FirmSize	113	1.12E+07	1.55E+07	288060	1.19E+08
GrowthOppo~y	113	0.3511797	2.198978	-0.741596	18.3849
Profitabil~y	113	0.1634472	0.4572173	-2.591747	1
Earningvol~y	113	1.845666	17.67822	-0.10364	188.0769
Leverage	113	0.5424294	0.1880073	0.0394317	0.8698041
Markettobo~o	113	0.7520635	0.9648688	0.0724035	9.294386

Table B24: Tobacco

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	26	-3.855449	2.241581	-9.304986	-0.926781
Diversific~l	26	0.0023615	0.0107977	0	0.0549362
Groupaffil~n	26	0	0	0	0
Dive~Related	26	0.0004044	0.0019066	0	0.0097209
Dive~related	26	0.0019571	0.0088926	0	0.0452153
FirmSize	26	1.31E+08	1.84E+08	7697540	7.41E+08
GrowthOppo~y	26	0.0669282	0.0403439	0.0129141	0.1521776
Profitabil~y	26	0.1313575	0.1112255	-0.062520	0.3344781
Earningvol~y	26	0.2179134	0.1803118	-0.046370	0.590879
Leverage	26	0.5224712	0.1899611	0.1719882	0.8627832
Markettobo~o	26	13.69653	12.87863	1.293033	41.70595

Table B25: Transport

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	38	-1.855411	1.111219	-4.87055	-0.246402
Diversific~l	39	0.2163356	0.2966835	0	0.692648
Groupaffil~n	39	0	0	0	0
Dive~Related	39	0.0937052	0.1338758	0	0.3636704
Dive~related	39	0.1226304	0.1663425	0	0.3654359
FirmSize	39	1.49E+07	1.26E+07	1467420	4.95E+07
GrowthOppo~y	39	0.2962842	0.7004793	0.0061653	4.088245
Profitabil~y	39	0.1585446	0.2644881	-0.577070	0.8199887
Earningvol~y	39	0.1507529	0.2743479	-0.149862	0.9877388
Leverage	39	0.7053096	0.5266428	0.135478	2.017656
Markettobo~o	39	2.827646	4.81838	-0.287482	19.32414

Table B26: Vanaspati and Allied Industries

Variable	Obs	Mean	Std. Dev.	Min	Max
R2	2	-1.85242	1.62914	-3.004396	-0.7004444
Diversific~l	2	0.4337321	0.2449066	0.260557	0.6069073
Groupaffil~n	2	0	0	0	0
Dive~Related	2	0.1583392	0.1249489	0.069987	0.2466914
Dive~related	2	0.2753929	0.1199577	0.19057	0.3602159
FirmSize	2	5276750	462405.4	4949780	5603720
GrowthOppo~y	2	0.3362857	0.3125292	0.1152942	0.5572772
Profitabil~y	2	0.0489149	0.0030141	0.0467836	0.0510462
Earningvol~y	2	0.0486292	0.0284684	0.028499	0.0687594
Leverage	2	0.5337412	0.1101005	0.4558885	0.611594
Markettobo~o	2	1.887185	1.277206	0.9840635	2.790306