

**Natural disasters and the operating
performance of firms: Evidence from Pakistan**



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DECLARATION

I Haider Ali (Registration No. PIDE-FMBA2015 (3.5) 01) student of (MBA) finance session 2015-2019, hereby undertake that, I have written this thesis entitled “ *Natural Disasters And Operating Performance Of Firms: Evidence From Pakistan*” by myself under the guidance of my supervisor Dr.Naseem Faraz. I have read it carefully and take all the responsibilities of the mistakes.

Haider Ali

DEDICATION

This report is dedicated to My Parents.

My Father who always offered me unconditional love

And support.

My Mother, for her motherly care and support

And who is always a source of motivation and

Strength for me.

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ABSTRACT

Pakistan is one of the developing countries where natural disasters are phenomenal. Natural disasters cause not only human losses, but it also effects the businesses and performance of the firms. Limited literature is available in the context of Pakistan, using firm location in districts and firm-level data, this thesis attempted to estimate the impact of the natural disasters on the operating performance of firms in Pakistan. For natural disasters, we capture the effect of major disasters of earthquake 2005, and flood 2010. The operating performance is measured in terms of profit-to-sales ratios, total assets, stock returns. We compare the outcomes of firm located in districts which were severely affected by these disasters to the firms which were located in less or not affected districts. Our findings suggest a significant negative effect of the natural disasters on the operating performance of the firms. Firms exposed to disasters have 4 times lower productivity, 3 times lower returns on assets compared to firms who located in not affected districts.

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CHAPTER 1

INTRODUCTION

The disasters that are calamitous and sudden and occur by chance and seriously imbalance the functioning of society are known as “Natural Disasters”. Available resources and the procedures that are normally applied to balance a chaotic action cannot be used to handle such events adequately. The infrastructure of a society and its environment get destroyed as a result of a natural disaster. Natural disasters result in large scale loss of human life as well as damage businesses in natural disaster exposed areas.

Pakistan faced a lot of natural disasters since its independence that took the life of thousand of peoples and also destroyed the infrastructure of the country. Among the natural disasters faced by Pakistan two type of disasters are very frequent that are floods and earthquakes. The major natural disasters that struck Pakistan caused losses of \$28.29 billion and this amount does not includes a major and irrecoverable loss of life of 112,464 people (NDMA). Climate Risk Index tells about the vulnerability of countries to natural disasters and Pakistan is ranked at sixth place on this list as a country vulnerable to natural disasters such as storms, epidemics, floods, earthquakes, avalanches and cyclones.

According to a classical theory of economics there are four major factors of production that are land, labor, capital and enterprise. Capital encompass all the natural resources used to initiate a business and it also includes land whereas enterprise is also a kind of entrepreneurial effort to promote business. This results that there are only two major factors of production that are labor

and natural resources. Natural resources and the natural condition of an area are directly and indirectly related to operating performance of firm. For example, if there is a flood in a country, it affects the labor employment, raw material, and ultimately affect the production of the firms that results in reduction of the GDP. It tells that for any firm/business the availability of natural resources is very important and natural disaster impacts it in an unfavorable way. (Sadia, Nawaz, Bashir, Awan, 2013)

Considering the importance of natural disaster consequences, this study investigates the effects of natural disaster on the operating performance of the firms in Pakistan. A limited literature is available in the context of Pakistan, using firm location in districts and firm-level data, we estimate the impact of the natural disasters on the performance outcomes of the firms. For natural disasters, we capture the effect of major disasters of earthquake 2005, and flood 2010. The operating performance is measured in terms of profit-to-sales ratios, total assets, stock returns. We compare the outcomes of firm located in districts which were severely affected by these disasters to the firms which were located in less or not affected districts. In case of Pakistan floods are more prominent as they have caused more damage to property as well as the lives of people. Around 20 million people were affected from flood of 2010. And if we relate it with the performance of firm we come to know that this type of natural disaster is more severe to operations of business, where there are employees that have been affected by the disaster as well as the supply chains, offices and the cash inflows/outflows that are to be monitored by banking system and that keep the business alive. For example, in a situation like flood no bank will be operating and companies cash transactions will stop that will not let the production activities to continue as there has been no payment made to suppliers eventually the production system of company stops and it will impact in unfavorable way on the returns of company as well as operating performance.

Data on the sample of firms of non-financial sector has been gathered for this research from secondary sources and the time span for this research data is set for seventeen years from 2001-2010. Specific data from 2008-2010 has also been used to get the results. Different variables that are selected for performing statistical tests that include total assets, equity, profit before and after tax, sales, taxes, dividend, paid-up capital, and return on asset. The data which is gathered from secondary sources is then refined by adding locations of company offices and sector in which company is falling. Panel data has been used. And the statistical technique used for this research is difference in differences.

This research is important as it is going to add in literature for economics by showing what losses economically a firm experiences in a natural disaster. This is a firm level study, whereas in past there are studies which study the losses caused to a country by a natural disaster. This study proves empirically that the operating performance of a business firm gets effected when a natural disaster occurs on a state level.

BACKGROUND

Pakistan is a country that has always been a victim of natural disasters since its very inception. Like other south East Asian countries Pakistan also continues to suffer from natural as well as manmade hazards that threaten to damage the environment, infrastructure lives and livelihood of citizens of Pakistan and they include floods, earthquake, cyclones etc. The reports on world disasters that tell that more than 1 lac people have been killed in natural disasters in Pakistan from 1993-2010 indicates the seriousness of these disasters.

Earthquakes of smaller magnitude frequently occur in Pakistan as the country lies in seismic belt. Chaman fault line along Quetta, Mekran fault line along sea coast, Himalayas, Karakorum and part of Hindu Kush ranges in north are the places of origination of most of the Earthquakes in Pakistan. Stats show that from 1974 to 1990 in the northern areas of Baluchistan and NWFP approximately 5669 people were killed due to earthquakes. In Feb, 2004 there was an earthquake in NWFP that took the life of 24 people and affected 1,29,000 people. Pakistan's vulnerability to disasters is well reflected in these stats. There have also been other disasters like coastal cyclones in the area of Badin and Thatta 1999, affecting 0.6 million people. The losses to infrastructure were estimated to a worth of Rs 750 million.

That was a brief history and types of natural disasters that Pakistan has to face in past. Our study and research is focusing on two of the major and severe natural disasters that struck Pakistan and damaging Pakistan on a large scale basis. First is the earthquake of Oct 8, 2005. It is the most severe earthquake in the history of Pakistan as it took the life of seventy eight thousand people (78,000) and affected more than 25,00,000 people. Second major natural disaster in Pakistan was flood of July/Aug 2010 that affected 20 million people. These two events shock Pakistan and its economy deeply and put the country in survival mode rather than production.

Developing countries also face natural disasters like earthquakes, floods, cyclones etc. These natural disasters affect the country's economy badly. As in most of the cases the economy of a country is basing upon agriculture and industrial sector and these natural disasters when hit the country they effect its industries as well as agriculture lands resulting a shortfall in production as the businesses and agriculture productions are affected adversely and the country goes in a survival mode.

Businesses are interlinked with each other and when a natural disaster strikes a country than the economy as a whole goes down i-e in 2010 when Pakistan was effected by flood more than 80% of agriculture land was devastated and Pakistan is an exporter country of cotton and textile products. More than 14% loans of banks are given to textile sector. As a result performance of both sectors banking and textile undergone a negative impact as the performance of banking sector greatly depends on non-performing loans like the performance of textile sector greatly depends on capital and cotton farms.

Another problem that is being faced by the business firms is that the major factor that counts in firms performance is procuring or acquiring raw material at right time. And in the event of natural disaster this major component is not available like in the case of flood 2010 textile sector was unable to produce export items because cotton farms were hit by flood and also there was no route for the suppliers to provide raw materials to businesses. So there is a huge relation and dependence of performance of business firms over environment and natural disasters

There have been a lot of natural disasters in Pakistan and they effected the country in a very adverse way as far as our economy, property, and businesses and most importantly lives of people are concerned. There have been so many studies conducted on natural disasters in Pakistan in past years addressing and reporting the problem in disaster management and lack of preparatory measures taken in advance to avoid or minimize the potential loss caused by these disasters in advance. There are also some research paper on the loss impacted by natural disasters to Pakistan economy and the increasing actions of humans to destroy that part of environment that is good to as a safety from disasters i-e cutting of trees which can proof as a resistance to flood

There has been no study conducted on the impact of natural disasters on the operating performance of firms. Nobody ever revealed or addressed this issue that what are the problems that are faced

by the business firms that effect their working or daily operations when natural disasters struck a country. There has been no evidence of research found that relates or links this important topic. So, there is this question or problem that is itching many scholarly minds, investors, shareholders and business owners that what type of increase or decrease in profits a company will see in case of natural disasters. Research is the only way to address this problem and find a solution that is helpful in forecasting the trends of businesses in different stable and unstable environments.

This study addresses the impact of natural disasters on operating performance (Returns on Asset) of a firm. The data of 460 companies have been taken. And these are non-financial companies of different sectors including textile spinning, textile weaving, textile composite, woolen, synthetic and rayon, jute, sugar and allied, cement, tobacco, refinery, power generation and distribution, oil and gas marketing companies, engineering, automobile assembler, automobile part and accessories, transport, technology and communication, fertilizer, pharmaceuticals, chemical, paper and board, Vanaspati and allied, food and personal care products, glass and ceramics and miscellaneous. Seventeen years of data has been taken of different variables including paid up capital, equity, total sales, profit before tax, profit after tax, cash dividend, stock dividend, total assets, and total taxes. The time period is from 2001-2017.

In this study we have checked the impact of two major natural disasters (earthquake of Oct 8, 2005 and flood of July/Aug 2010) on the operating performance of the companies. In order to check their full impact we have taken the natural disasters separately and applied some test by keeping all other variables constant.

Following are the events that were faced by Pakistan in past years, an earthquake of medium range hit Rawalpindi on Sept 3, 1971. Abbotabad experienced six shocks of medium range on Sept 4, 1971 which left cracks in the buildings. Sept 10, 1971 proved a tragic day for Gilgit as it got hit

by an earthquake which killed 100 people and more than 1000 houses were ruined. Another earthquake of a high intensity originating in northern areas of Pakistan took the life of four childrens and damaged houses and buildings on June 30, 1974. It was not more than 6 months that another tragic day recorded in Pakistan on Dec 28, 1974 where a high intensity earthquake measuring 7.4 on scale took the life of 5300 people and more than 17000 people were injured. And a loss to infrastructure was also a result of this earthquake leaving 4400 houses devastated. For a couple of years Pakistan was fortunate that nothing big happened until Feb 28, 1997 when the areas of interior Sindh, Punjab and Baluchistan were jolted by an earthquake measuring 7.2 on scale and killing 100 people. So many people lost houses and it also had effected major buildings of different cities. There were other small scale earthquakes in the year 2002, 2004, 2010, 2011, 2012, 2013, 2015, 2016 and 2017.

And if we talk about floods there have been many floods in Pakistan including 2003 flood due to the heavy monsoon rainfalls in the areas of province Sindh. It was such a devastating flood for Sindh that it took the life of 484 people and 4476 villages were effected by this flood.

In 2007, monsoon rainfalls badly effected KPK, Sindh and Baluchistan. It was such a severe flood that it took the life of 130 people in KPK, 815 people in Baluchistan and Sindh and more than 2200 people were displaced. In September 2011-12 more than 400 people died and 5.3 million people were effected 1.7 million acres of land was flooded. In Aug/Sep 2013-2014 more than 80 people died due to heavy rainfall in Azad Kashmir and flooding of river Ravi and Jehlum.

Significance

There have been so many studies in Pakistan on natural disasters. But those researches were targeting the natural disasters individually like some studies are fully engaged and targeting the

earthquakes in Pakistan and their effects on Pakistan economy, damages or losses caused to Pakistan and about how we as a country can perform well to make our disaster management better and learn from the past.

And then there are other studies that are only targeting a specific natural disaster that is flood. The researchers have done a lot of deep work on causes and effects of flood on the country, threats produced as a result of these floods and the steps that can be taken to mitigate our losses or the plans to safeguard maximum lives. And they have added a valuable literature for natural disaster management authorities that can look up to it and decide what steps they can take to forecast these disasters and in time of disaster how they can better react and manage people, safeguard their lives and protect the infrastructure.

These studies also reflect extensive research done on how these disasters (earthquakes and floods) affect growth of a country by having an impact on gross domestic product. There are very few studies that link these natural disasters with business firms as a whole and not as an individual disaster. There is no study in Pakistan that checks the impact of natural disaster on the operating performance of firms, or which can tell what situation will a firm be facing in these disasters or how they can continue their workings or what direction a company has to follow in these circumstances.

The significance of our study is that it is the first paper on impact of natural disasters on operating performance of firms. In this paper there is an extensive data that includes the variables of operating performance of a firm and how firms operate under a natural disaster. What type of impact a natural disaster has on the working of different sectors of stock exchange. This research paper will help many investors, shareholders and all the stakeholders to know that what type of scenario will develop when a disaster hits a country. How they have to take the decisions regarding

their operations, what type of financial losses they can face and the amount of finances that should be kept as a backup for absorbing these effects neutralizing them and restructuring of firms to a level that they had lost and competing again with their competitors.

AIMS OF THE STUDY

The aim of the study is to explore the impact of natural disasters on operating performance of firms. By taking in account this aim of study we have framed these following objectives of study.

OBJECTIVES OF THE STUDY

- To check out the impact of “natural disasters” on Profits and Profit-to-sales of non-financial sector firms.
- To check out the impact of “natural disasters” on returns on assets, size of total assets of non-financial sector firms.
- To check out the impact of “natural disasters” on dividends of non-financial sector firms.
- To check out the impact of “natural disasters” on productivity and firm efficiency of non-financial sector firms.
- By doing this, this study fill the gap in literature and provides evidence on the operating performance of the firms in Pakistan.

SCOPE OF THE STUDY

This research is focusing on the selected sub-sample of firms that are listed companies in Pakistan. In future there should be studies must be to include larger sample to estimate the model. Moreover, this study is only checking the impact of natural disasters on non-financial listed firms. Future

studies can check the impact of natural disasters on financial as well as non-financial sector firms. Considering the importance of natural disaster effects, focusing on larger set of firms will provide robust analysis.

CHAPTER 2

LITERATURE REVIEW

Disastrous events cost lives and annihilate organization, structures, and machinery, and along these lines influence both work and capital. They additionally not just disturb the business tasks of firms specifically, yet in addition affect the activities of non-influenced firms through upstream and downstream supply linkages. However, crushed capital is normally supplanted, and firms yield and profitability may certainly recuperate.

Leiter et al (2009) inspect the capital aggregation, business, and efficiency development of European firms influenced by surges, and find that work development and amassing of physical capital are fundamentally higher in locales encountering significant surge occasions. They additionally find that the beneficial outcome is more grounded for firms with a higher offer of immaterial resources. De Mel et al (2012) lead a progression of studies of undertakings in Sri Lanka following the 2004 tidal wave and look at their recuperation from the fiasco.

In their field tests, they arbitrarily give awards to chosen endeavors and explore the effect of the gifts on the organizations recuperation. They locate that immediate guide had a noteworthy positive effect on the benefits of tidal wave influenced undertakings in the retail business, however not in the assembling business. Be that as it may, they don't research the job of acquiring from banks, which are real suppliers of assets. The uniqueness of our examination lies in the way that we explore the effect that harm to banks has on non-influenced and additionally influenced borrowers.

Two investigations by a group of specialists individuals (Hosono et al 2012, Miyakawa et al 2014) researched the impacts of bank harm because of a cataclysmic event on getting firms capital venture and fare conduct.

De Mel et al (2011) find that the organizations that endured more harm to their advantages due to the overwhelming tidal wave in Sri Lanka in 2004 showed littler benefits, deals, and capital stock. Cole et al (2013) and Tanaka (2015) find that the plants situated in the most crushed areas amid the 1995 Kobe Earthquake showed littler business and esteem included development. These discoveries are conflicting with innovative devastation.

Then again, Hosono et al (2012) who additionally center around the Kobe Earthquake discover greater speculation by the organizations situated inside the influenced territory than those situated outside, supporting the imaginative annihilation theory. Likewise predictable with this theory, Leiter et al (2009) locate that European firms situated in locales influenced by a noteworthy surge in 2000 had higher resource and business development as contrasted and non-influenced firms, in spite of the fact that they additionally find that the organizations in the influenced districts displayed littler esteem included. At long last, Cole et al (2013) discover some proof for a short-run increment in the efficiency of harmed plants after the Kobe Earthquake, despite the fact that they additionally report that this impact vanished over the long run.

Notwithstanding causing financial misfortunes and fatalities, cataclysmic events likewise upset corporate tasks. However, few examinations investigate the effect of cataclysmic events on corporate benefit and the instruments firms use to alleviate these effects. Hsu, Lee, Peng and Yi (2018) in their paper examine such effect utilizing U.S. catastrophic events influenced areas, which Barrot and Sauvagnat (2015) distinguish by utilizing the Spatial Hazard and Loss Database (kept up by the University of South Carolina).

To survey the effect of these calamities on firms working execution, the researchers utilize the U.S. Natural Protection Agency's (EPA) lethal discharge stock (TRI) database to recognize the influenced firms U.S. processing plant areas. They find that assembling firms with a greater amount of their processing plants situated in states that encounter catastrophic events are related with fundamentally bring down profit for resources (ROA). Specifically, a firm that has the majority of its industrial facilities situated in one state can understanding around a one-rate point decline on its ROA when a catastrophic event strikes.

When utilizing a subsample of firms that are coordinated on related control factors, they found that the effect of catastrophic events on working execution is considerably more grounded. In particular, the point gauge on the proportion of catastrophic events diminishes from -0.012 to -0.020 , a 67% expansion in extent. These investigations measure a normal, antagonistic impact of cataclysmic events on firm gainfulness.

Skidmore and Toya (2002) is considered as the primary bit of exact research. In that paper the quantity of catastrophic events was standardized by the land region in 89 nations over the time of 1960 to 1990. The creators achieved the nonsensical end that debacle hazard may advance long haul monetary development. They found that recurrence of climatic debacles is decidedly associated with human capital amassing, development in all out factor profitability and per capita GDP development.

Raschky (2009) find that the offer of immaterial resources influences firms weakness under calamities, and both Henriët, Hallegatte, and Tabourier (2012) and Todo, Nakajima, and Matous (2015) demonstrate that the system impact of supply chains likewise matters.

In a research paper a creator built up a scientific model for fiasco event and response and gathered information for 28 calamity occasions in 26 nations over the time of 1960 to 1979. The fundamental discoveries of this examination were that after a catastrophic event GDP expanded by 0.4 percent, capital arrangement, monetary and exchange shortage and the load of outside stores were additionally expanded, while expansion did not change. (Albala-Bertrand, 1993)

The key macroeconomic variables have a strong relationship with natural disasters and it impacts on the trade balance and economic growth in a diminishing way. Key macroeconomic variables like investments, saving, fiscal and trade balances, human capital, physical capital and technology have a long run relationship with natural disasters (Popp, 2006a). Due to reconstruction and destruction hypotheses output growth is negatively impacted due to climatic disasters while it has a positive relation with disasters that are geophysical. A study by Narayan (2003) produced the evidence that natural disasters have short run impact on the economy and affect the net saving, per capita income, net trade, investment and the balance of payments as well.

A study by Attiya Javaid (2007) explains the effect of the earthquake of October 8, 2005 on the behavior of KSE activities and its impact on the price changes in stock market. A data consisting of Sixty firms that were listed on Karachi Stock Exchange were taken, and simple market model of econometrics was applied to check the behavior of KSE. The results explain the unanticipated shock in an informative way and also explains the pricing behavior of stocks. The results reflected both positive and negative effect and information about the KSE stocks. The sectors about which the investors had expectations of increasing upcoming demand showed an increase, and their return and volume increased these sectors included the cement, steel, food, and banking sectors, which shows there had been expectations of investors that were fulfilled. As the people had the information about March 2005 market crash in their minds so the volatility did not increase in a

significant way. The paper gives a strong evidence that Stock Market of Pakistan is very responsive to unforecasted shocks and is very fast in stabilizing the market activities. The findings also explain that Stock market of Pakistan is very flexible and that it recovered soon after the unanticipated shock.

There are different ways in which lives of people get effected by floods. The routine patterns of life get interrupted, farming lands and the valued efforts of farmers get wasted, and the hard work of people for livelihood is affected, and in adverse scenario, floods lead to massive displacements and it causes even large amount of deaths. Asif, Sajid and Rafi in their paper in 2016 researched on flood related three threats that are mortality, damage to property and non-fatal effect on the population. The technique that is used is 2SLS. The paper works on how these threats impact the gross domestic product (GDP) of Pakistan. The timespan that was used to check the impact consists of forty five years from 1972-2013. The findings tell that gross domestic product and disaster management reduce the scale of flood related threats. And as compared to many other countries these floods and their increasing frequency in Pakistan increases these threats related to floods due to the reason of not learning from past experiences and poor disaster management policy and systems. The findings also highlight the fact that there is a strong adverse relationship between floods and economic growth and the damage which the floods bring to the infrastructure is the most strongest and leaves long-lasting and deep impacts on economic growth as the country rather than moving forward move in an opposite direction.

LITERATURE GAP

If we sum it, we can say that the existing literature reflects a broad explanation about the causes and effects of natural disasters and how they affect our GDP and economic growth. There is also extensive literature available on how the management authorities have responded in past to

these disasters and what could have done to avoid major losses and to safeguard the lives of people.

This research theses focusses on the gap identified in the literature and checks the impact of natural disaster on operating performance of firms of non-financial sector.

CHAPTER 3

METHODOLOGY AND HYPOTHESES DEVELOPMENT

METHODOLOGY

The statistical technique that has been use in this research to check the data is “Difference in Differences”. This technique is used to check the differential effect of an experiment on specific experiment group with a control group. It calculates the impacts of independent variables on the variables of the outcome group that is dependent variable. This technique requires data to be used for research of two time periods. One data set, which is used before the application of treatment and the second one is after the special treatment

HYPOTHESES

A hypotheses is a specific statement to predict something. It is a concrete way of telling whatever a researcher expects will happen in his study. Based on above theoretical evidences the hypotheses of this research is as follows

The Impact Of Natural Disasters On Operating Performance Of Firms

This hypotheses has been set to meet the research process. It is also important to tell here that the same hypotheses has been set for both of the natural disasters which are under research (Earthquake 2005 and Flood 2010)

CHAPTER 4

DATA COLLECTION

The researcher used the data of 460 non-financial companies from (2001 –2017). The data was obtained from the secondary sources and is taken from websites such as business recorder and from companies annual reports. The sectors that are used are and other information is as under

POPULATION

Population for the study is constituted on the non-financial companies textile spinning, textile weaving, textile composite, woolen, synthetic and rayon, jute, sugar and allied, cement, tobacco, refinery, power generation and distribution, oil and gas marketing companies, engineering, automobile assembler, automobile part and accessories, transport, technology and communication, fertilizer, pharmaceuticals, chemical, paper and board, Vanaspati and allied, food and personal care products, glass and ceramics and miscellaneous

SAMPLE

The collection of samples which we done for this study is convenient sampling. Panel data has been used. The data is available in continuous series and financial information is available only of 460 non-financial companies. Data used is on yearly/annual basis.

TIME HORIZON

The time period for which data is used in research is for seventeen years i.e. 2001-2017.

UNIT OF ANALYSIS

The unit of analysis was the individual non-financial organizations.

VARIABLES

This section involves the names and explanation of the variables that have been selected for research. This is a very important part of research as the variables are used in building up a research model and it also helps to choose an experimental design. Variable selection is one of those things that makes a research important and makes researcher enthusiastic and interested for researcher. There are two type of variables that are used in research. The first type is named as independent variable. They are the type of variables that put their on dependent variable and they are impact free to change and does not depend on other things. The second type of variables are known as dependent variables. These are the variables that depend on independent variable and the change in independent variable will also result in a change in dependent variable. The variables which are in a list of dependent variables are sometime effected by other dependent variables.

Following is the list of variables that are used in this research theses

PAID-UP CAPITAL

When a company starts its operations it does not have large amount of finances for its operations and it wants the normal public to get interested in its formation and working. So, the company divides the total value of company in units called shares. And the amount which the company get by selling these units or shares to normal people is called tha paid-up capital.

It is very important for a company to generate funds. Because finances play that much important role for a firm like oxygen plays for human body.

Equity

The second variable that we have used in data is equity. The amount of money left after the company meet its obligations or something the company is liable for is the share of investors that is known as equity.

Total Asset

All the possessions of the company that are used by it in its operations or that are physical or intangible, moveable or immovable are called assets of company and if we combine all those possessions than it represents total assets

Sales

This is another very important variable that is present in the data under use in this research. Every company produces something or gives services that are given for some consideration in response to those services. The total amount in money that a firm generates after selling something a product may be or by rendering services is called total sales of a company. It reflects the companies overall performance in a period.

Profit Before Tax

This value represents the total amount of earnings that a company or business firm gets after subtracting its expenses from gross amount of earnings but it also includes the total amount of liability that a business firm has towards government on its total produced items or services.

Profit After Tax

This variable represents the total amount of earnings that a company has made in a specific period by producing and selling products or rendering services after subtracting the

operating expenses and the liability towards government that is known as tax is called profit after tax.

TAX

The amount of money that is put on every citizen of a country for his welfare is also put on companies. This is that total amount the firm has payed to government of the country in which it is continuing its operations. It is very important variable as it gives information about the company's character and positive or negative attitude towards the policies of government.

Total Dividend

This variable is very useful about the company's performance. It represents the total amount that a business firm has announced to give to its shareholders as a result of company's good performance and increased amount of earnings. This value also tells about company's attitude towards its shareholders and the dividend policy that the company is following.

RETURN ON ASSET

Another important variable that is used for measuring the impact of natural disaster on operating performance of firm is return on asset. It is taken as one of the important ratios which can be used to check the operating performance of firm. It is calculated by averaging total returns of company on total assets of company.

CHAPTER 5

DATA ANALYSIS

Data analysis is an important section of research. This section tells about everything that is linked with data including the sources from which data has been obtained, what type of changes have been made to data, formulas applied on data, variables selection criteria, experimental techniques and everything associated with data.

Data which is used in this research is taken from secondary sources including websites and company annual reports starting from 2001-2017. Companies of non-financial sector are taken and data is selected on annual basis. Data section has different columns including company name that tells about the name of company by which it is registered. Then it has a column of location which tells about the districts or place in which the respective areas in which natural disaster affected severely. Then there is a column of sectors which tells different sectors in which these companies are falling. Different variables that have been explained earlier have one column each with values of the year written in data section.

Following is the regression equation of this research paper

$$OP_{ijt} = \alpha + \beta \cdot ND + \gamma X_{ijt} + \varepsilon_{ijt}$$

where, on the left side, we have taken **OP** (operating performance) as the dependent variable and on the right side we have the independent variable being **ND** (natural disaster). **X_{ij}** is the set of controlled variables. **α** is the intercept term which shows the operating performance of the respective firm when the effect of all other independent variables is zero. **β** shows the effect of natural disasters on the operating performance of the firm. If the value of **β** is positive, it shows

that there exists a direct relationship between the natural disaster and the operating performance of the firm. One unit increase in beta increases the **OP** by β units. While γ indicates the effect of controlled variables on the operating performance of the respective firm. “t” in the equation represents time

ϵ is the error or disturbance term which includes all the unexplained variation in the model that is not explained by the variables included in the model.

SUMMARY STATISTICS OVERALL (2001-2017)

TABLE.1

Variable	Obs	Mean	Std. Dev.
Return on asset	6,356	0	3.5
Sales to profit ratio	6,054	-0.80	30.7
Sales	6,358	9394.50	41535.6
Profit after tax	6,440	566.50	4199.9
Equity	6,360	3272.7	17088.7
Stock dividend	6,440	2.1	17
Cash Dividend	6,441	36.3	158.6
Paid-up Capital	6,518	1188.3	5087.7
Size	6,322	2.6	1.1
Firms	460		
Observations	6,629		

This table 1 represents the overall summary of data that the researcher has used in this theses. The table contains four columns. First column contains the variables. All the variables that has been used in this research are mention along with their values.

The second column is of observations. It represents the number of observations that have been observed. The third column is explaining the mean value of all the variables that have been used. And the last column of standard deviation tells the amount of deviation the variables are showing from mean value. Like the mean value of return on asset is **0** and it is showing deviation of **3.5** from mean value.

Summary Statistics Overall from (2008-2012)

TABLE.2

Variable	Obs	Mean	Std. Dev.
Return on asset	1,702	-0.139027	6.703398
Sales to profit ratio	1,646	-1.863398	56.86398
Sales	1,703	11922.46	47267.81
Profit after tax	1,726	531.5723	4546.574
Equity	1,704	3386.067	13909.06
Stock dividend	1,726	3.019508	27.95952
Cash Dividend	1,727	34.10165	112.4593
Paid-up Capital	1,728	1456.471	5597.62
Size	1,747	3.152833	1.065494
Firms	460		
Observations	1,747	0.08071	0.272467

This table 2 represents the overall summary of data from 2008-2012 that the researcher has used in this theses. The table contains four columns. First column contains the variables. All the variables that has been used in this research are mention along with their values.

The second column is of observations. It represents the number of observations that have been observed. The third column is explaining the mean value of all the variables that have been used. And the last column of standard deviation tells the amount of deviation the variables are showing from mean value. Like the mean value of return on asset is **-0.139027** and it is showing deviation of **6.703398** from mean value.

SUMMARY STATISTICS BEFORE 2010 (2001-2010)

TABLE.3

Variable	Obs	Mean	Std. Dev.
Return on assets	3,613	0.026458	0.862196
Profit to sales ratio	3,419	0.03	0.86
Sales	3,613	-0.21	7.12
Profit after tax	3,651	4764.10	20399.80
Equity	3,614	258.25	2328.47
Stock dividend	3,651	1534.22	7005.99
Cash dividend	3,652	2.41	14.82
Paid-up Capital	3,728	20.92	63.80
Firms	460	768.70	3728.55
Size	3,618		
Total Observation	3,815	2.34	1.07

This table 3 represents summary statistics of data before 2010. Because we want to check the impact of natural disaster on operating performance of firms so we have to use two reference points one before the disaster and one after the disaster so that if there is an impact of natural disaster on companies performance it get highlighted in the summary statistics for that year.

First column contains the variables. All the variables that have been used in this research are mention along with their values.

The second column is of observations. It represents the number of observations that have been observed. The number of observations has been reduced or decreased as compared to the overall statistic summary table because we have used data of just ten years here. The third column is explaining the mean value of all the variables that have been used. And the last column of standard deviation tells the amount of deviation the variables are showing from mean value. Like the mean value of return on asset is **0.026458** and it is showing deviation of **0.862196** from mean value.

Summary Statistics Before 2010 (2008-2010)

TABLE 4

Variable	Obs	Mean	Std. Dev.
Return on assets	675	0.0185945	0.1674165
Profit to sales ratio	652	-0.0413105	1.371041
Sales	675	9345.48	35830.82
Profit after tax	685	368.5538	3775.784
Equity	675	2814.349	10272.65
Stock dividend	685	3.562365	24.63902
Cash dividend	686	26.93723	92.36768
Paid-up Capital	686	1212.58	4466.406
Firms	460		
Size	697	3.030129	1.068332
Total Observation	697	0	0

This table 4 represents summary statistics of data before 2010 till 2008. Because we want to check the impact of natural disaster on operating performance of firms so we have to use two reference points one before the disaster and one after the disaster so that if there is an impact of natural disaster on companies performance it get highlighted in the summary statistics for that year.

First column contains the variables. All the variables that have been used in this research are mention along with their values.

The second column is of observations. It represents the number of observations that have been observed. The number of observations has been reduced or decreased as compared to the overall

statistic summary table because we have used data of just two years here. The third column is explaining the mean value of all the variables that have been used. And the last column of standard deviation tells the amount of deviation the variables are showing from mean value. Like the mean value of return on asset is **0.0185945** and it is showing deviation of **0.1674165** from mean value.

SUMMARY STATISTICS AFTER 2010 (2010-2017)

Table 5

Variable	Obs	Mean	Std. Dev.
Return on asset	2,743	-0.07	5.29
Sales to profit ratio	2,635	-1.54	45.88
Sales	2,745	15487.97	58168.67
Profit after tax	2,789	969.93	5775.28
Equity	2,746	5560.63	24549.39
Stock dividend	2,789	1.70	19.50
Cash Dividend	2,789	56.49	228.17
Paid-up Capital	2,790	1748.89	6430.95
Size	460		
Firms	2,704	3.04	1.03
Observations	2,814		

This table 5 represents the statistics summary of the years after 2010. As we have used difference in difference technique that measures the effects on data in two periods of time one before the

given treatment and then second time after the treatment to a group that is known as experimental group.

First column contains the variables. All the variables that has been used in this research are mention along with their values. The second column is of observations. It represents the number of observations that have been observed. The number of observations has decreased as compared to the overall statistic table because the number of years have been reduced. The third column is explaining the mean value of all the variables that have been used. And the last column of standard deviation tells the amount of deviation the variables are showing from mean value.

Summary Statistics after 2010 (2010-2012)

TABLE.6

Variable	Obs	Mean	Std. Dev.
Return on asset	702	-0.3711824	10.43604
Sales to profit ratio	675	-1.156082	20.3768
Sales	673	12831.35	48964.93
Profit after tax	679	603.3064	4289.824
Equity	674	3586.907	13974.95
Stock dividend	679	3.506377	36.92319
Cash Dividend	679	36.04776	112.3276
Paid-up Capital	679	1582.101	6057.619
Size	716	3.234637	1.077799
Firms	460		
Observations	683	.1332357	0.340078

This table 6 represents the statistics summary of the years after 2010 till 2012. As we have used difference in difference technique that measures the effects on data in two periods of time one before the given treatment and then second time after the treatment to a group that is known as experimental group.

First column contains the variables. All the variables that has been used in this research are mention along with their values. The second column is of observations. It represents the number of observations that have been observed. The number of observations has decreased as compared to

the overall statistic table because the number of years have been reduced. The third column is explaining the mean value of all the variables that have been used. And the last column of standard deviation tells the amount of deviation the variables are showing from mean value.

RESULTS

This section talks about the result which were estimated using firm-level data by matching information of firm locality with the natural disaster areas. We compare the outcomes of the firm which were located in the natural disaster affected areas with the outcomes of the firms which were located in the less affected or not affected areas. The results are presented in following sections that includes the effects on the return on the assets (ROA), assets, productivity, profits and sales and the dividends on stocks of the firms.

Effect Of Natural Disaster On The ROA And Assets

We start result discussion with the returns on the assets (ROA). We compare the returns on the assets of firms who locate in the natural disaster affected areas with the returns on the assets of the firms who locate in areas that are not affected or less affected by the natural disasters. Results are presented in Table 7. It shows that the effect of the natural disaster on the firms returns on assets is negative. This result is statistically significant at 5% level of significance. It confirms the expected results. As natural disasters might affect the assets and infrastructure of the firms it might also affect the revenues and profits of the firms, in this scenario the ROA must reduce. Results suggest that the ROA of firms who locate in the natural disaster affected areas is reduced by 3 time lower compare the ROA of the firms who locate in other cities.

We use wald test and estimate the restricted model in column (2), results shows a consistent behavior. It again suggest that the returns on assets are 3 time lower firms expose to natural disasters compared to firms in other areas. In addition, the size of the firms have positive effects on the assets. It is consistent with theory by suggesting that larger firms are able adjust risk, and their assets would not reduce frequently. In column (3), we look at the size of the assets. Results indicated that natural disasters and size of assets have

predicted effects. The natural disasters have negative effects on the total assets of the firms. This result is consistent even when we exclude the control variables in column (4). Next we check the impact on the equity, natural disaster also effects the firm equity negatively but statistically insignificant.

Table 7: Effects of Natural Disaster on the Returns on Assets, and Assets and Equity of firms

	ROA	ROA	Ln (total assets)	Ln (total assets)	Ln (Equity)	Ln (Equity)
Natural Disaster	-3.40*** (0.33)	-3.86*** (0.33)	-0.028 (0.039)	-0.022 (0.040)	-0.050 (0.060)	-0.067 (0.077)
Size of Firm	0.35*** (0.07)	-	0.203*** (0.023)	0.340*** (0.024)	0.161*** (0.083)	0.350*** (0.042)
Log Equity	-0.99*** (0.01)	-	0.197*** (0.021)	-	0.726*** (0.071)	
Paid-up Cap	0.00 (0.00)	-	0.001** (0.00)	-	0.000 (0.000)	
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.31	0.23	0.78	0.63	0.77	0.43
Observations	3,978	4,314	6,049	6,049	5,046	5,046

Effect of Natural Disaster on the Productivity and Profitability

In this table we have checked the natural disaster effects on the efficiency or productivity of the firms. The productivity of the firm is measured as the ratio of firm profits to sales (profits/sales). Again we compare this productivity of the firms who live in the natural disaster affected cities compare to firms which locate in less effected or not effected cities. The results are presented in Table 8. It shows that the effect of natural disaster on firms productivity is negative. This result is statistically a significant. The table is also showing a significant decrease in profit to sales ratio, it reduces productivity of the exposed firms by 4 times lower compared to firm who locate in other areas. This effect is statistically significant at 1% level of significance. This is most important effect of the natural disaster as it reduces the productivity or efficiency of the firms. This effect is again consistent when we exclude control variables in column (2). Next we see what happens to the profitability of the firms. Results in column (3) provides information that the natural disaster effects is negative on the profits. It does not statistically significant, but it is negative. We also look at the efficiency in terms of sales of the firms.

Table 8 : The Effects of Natural Disaster on the Productivity and Profitability of the Firms

	Productivity (Profits/Sales)	Productivity (Profits/Sales)	Ln (Profits)	Ln (Profits)	Ln (Sales)	Ln (Sales)
Natural Disaster	-4.014*** (0.380)	-3.970*** (0.398)	-3.50 (0.36)	-3.50 (0.36)	0.052 (0.050)	0.019 (0.017)
Size of Firm	-0.084 (0.070)		0.39 (0.06)		0.495*** (0.044)	
Log Equity			0.47 (0.09)	0.68 (0.09)	0.583*** (0.068)	
Log Assets	-0.110 (0.070)		0.01 (0.12)	0.01 (0.12)	0.061*** (0.011)	
Paid-up Cap	0.000 (0.001)		0.00 (0.01)	0.0 (0.01)	0.000 (0.000)	
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.50	0.50	0.50	0.52	0.50	0.25
Observations	5044	5045	4252	4252	6,048	6,048

Overall, natural disaster have negative effect on the sales also. The effect on sales is consistently negative when we do not include the control variables in the regressions.

Effect of Natural Disaster on the Productivity and Profitability 2008-2012

In this table we have checked the natural disaster effects on the efficiency or productivity of the firms specifically for the years 2008-2012. The productivity of the firm is measured as the ratio of firm profits to sales (profits/sales). Again we compare this productivity of the firms who live in the natural disaster affected cities compare to firms which locate in less effected or not effected cities. The results are presented in Table 9. It shows that the effect of natural disaster on firms productivity is negative. This result is statistically a significant. The table is also showing a significant decrease in profit to sales ratio, it reduces productivity of the exposed firms by 5 times lower compared to firm who locate in other areas. This effect is statistically significant at 1% level of significance. This is most important effect of the natural disaster as it reduces the productivity or efficiency of the firms. This effect is again consistent when we exclude control variables in column (2). Next we see what happens to the profitability of the firms. Results in column (3) provides information that the natural disaster effects is negative on the profits. It does not statistically significant, but it is negative. We also look at the efficiency in terms of sales of the firms.

In table 9 the specific effect has been measured using only 4 years data.

**Table 9: The Effects of Natural Disaster on the Productivity and Profitability of the Firms:
Data 2008 to 2012**

	Productivity (Profits/Sales)	Productivity (Profits/Sales)	Ln (Profits)	Ln (Profits)	Ln (Sales)	Ln (Sales)
Natural Disaster	-5.110*** (0.310)	-4.331*** (0.338)	-3.92*** (0.39)	-3.91*** (0.38)	0.089 (0.06)	0.081 (0.03)
Size of Firm	-0.023 (0.080)		0.45 (0.08)		0.623 (0.611)	
Log Equity			0.52 (0.11)	0.62 (0.11)	0.412* (0.210)	
Log Assets	-0.110 (0.070)		0.03 (0.11)	0.03 (0.11)	0.092*** (0.030)	
Paid-up Cap	0.000 (0.001)		0.00 (0.01)	0.0 (0.01)	0.000 (0.000)	
City	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.56	0.58	0.59	0.59	0.49	0.35
Observations	1641	1641	1650	1650	1703	1703

Effect of Natural Disaster on the Dividends

In this table we have checked the natural disaster effects on the dividend of the firms. The dividend of the firm is taken as a progress indication from a business firm. Again we compare the dividend of the firms who live in the natural disaster affected cities compare to firms which locate in less effected or not effected cities. The results are presented in Table 10. It shows that the effect of natural disaster on firms cash dividend as well as stock dividend is negative. This result is statistically significant. The table is also showing a significant decrease in cash dividend, the natural disaster decreases the cash dividends by 2.6 times compare to firms who do not locate in the natural disaster affected areas. It also has negative effect on the stock dividends, but statistically insignificant.

Table 10 : The Effects of Natural Disaster on the Dividends

	Cash	Cash	Stock	Stock
	Dividends	Dividends	Dividends	Dividends
Natural Disaster	-2.185*** (0.550)	-2.640*** (0.520)	-0.114 (0.222)	-0.090 (0.221)
Size of Firm	0.189*** (0.073)	0.223*** (0.022)	0.101 (0.068)	0.055 (0.067)
Log Equity	0.150 (0.090)		0.030 (0.150)	
Paid-up Cap	0.000 (0.000)		0.000 (0.001)	
City	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
R ²	0.36	0.36	0.24	0.25
Observations	2,955	2,955	556	556

Overall, our results for returns on assets, size of assets, productivity or efficiency of the firms in terms of profit-to-sales ratios, profits, sales and the dividends of the firms shows that natural disasters affect the firms efficiency outcomes negatively. It most of the cases it reduces productivity substantially in disaster exposed areas compared to area where natural disaster effects were minimal.

CONCLUSION AND RECOMMENDATION

Pakistan is also one of the developing countries and due to falling in a landscape that is not fortunate for disaster country undergoes so many disasters as explained previously among which earthquakes and floods are common. Natural disasters cause not only human losses, but it also effects the businesses and performance of the firms. There has not been much research on the impacts of natural disaster on business firms and very less literature is available in the context of Pakistan, using firm location in districts and firm-level data, this thesis attempted to estimate the impact of the natural disasters on the operating performance of firms in Pakistan. For natural disasters, we capture the effect of earthquake 2005, and flood 2010. The operating performance is measured in terms of profit-to-sales ratios, total assets, stock returns. We compare the outcomes of firm located in districts which were severely affected by these disasters to the firms which were located in less or not affected districts. Our findings show a negative effect of natural disaster on profits earned by companies, dividend declared by companies, and the efficiency by which companies were working. Also the productivity of firms has decreased and our study empirically suggest a significant negative effect of the natural disasters on the operating performance of the firms.

This research is going to play an important and helpful role as it is going to add in literature for economics by showing what losses economically a firm experiences in a natural disaster. This is a firm level study, whereas in past there are studies which study the losses caused to a country by a natural disaster. This study proves empirically that the operating performance of a business firm gets effected when a natural disaster occurs on a state level and it gets effected in a significantly negative way.

LIMITATION

Although the current study is an effort to provide understanding to non-financial sector firms and to investors however, few limitations of the study are there. The first limit that has been faced by this research is that the sample of data that has been taken is not of overall market. It is just of non-

financial sector companies listed at the respective stock exchange. There is also a limitation that only yearly data has been used in this research and new research on this topic can extend this data to daily or monthly basis if need. The locations of the companies field office or factory location has been used which can be extended to all the locations of a specific company including registered head offices and go downs of company to check more accurately the amount of damage that has been done to a company. This research has focused on only two major disaster that Pakistan has faced. It can be extended to all the earthquake and flood effects that have been faced by companies since their creation. This research has a time span of seventeen years starting from 2001 and ending on 2017, later researchers can increase this time span to twenty or thirty years or the way it is suitable.

REFERENCES

- Sadia, B., Bashir, M. A., Nawaz, M., & Zaman, K. (2013). Effects of Disaster-Related Mortality on Gross Domestic Product in Pakistan. *International Journal of Ecology & Development*TM, 24(1), 62-80.
- Cavallo, E. A., & Noy, I. (2009). The economics of natural disasters: a survey.
- De Mel, S., McKenzie, D., & Woodruff, C. (2012). Enterprise recovery following natural disasters. *The Economic Journal*, 122(559), 64-91.
- Uchida, H., Miyakawa, D., Hosono, K., Ono, A., Uchino, T., & Uesugi, I. (2015). Financial shocks, bankruptcy, and natural selection. *Japan and the World Economy*, 36, 123-135.
- Hosono, K., Miyakawa, D., Uchino, T., Hazama, M., Ono, A., Uchida, H., & Uesugi, I. (2012). Natural disasters, damage to banks, and firm investment.
- Cole, M. A., Elliott, R. J., Okubo, T., & Strobl, E. (2013). *Natural disasters and plant survival: The impact of the Kobe earthquake* (No. 13063).
- Tanaka, A. (2015). The impacts of natural disasters on plants' growth: Evidence from the Great Hanshin-Awaji (Kobe) earthquake. *Regional Science and Urban Economics*, 50, 31-41.
- Hsu, P. H., Lee, H. H., Peng, S. C., & Yi, L. (2018). Natural disasters, technology diversity, and operating performance. *Review of Economics and Statistics*, 100(4), 619-630.
- Barrot, J. N., & Sauvagnat, J. (2016). Input specificity and the propagation of idiosyncratic shocks in production networks. *The Quarterly Journal of Economics*, 131(3), 1543-1592.
- Skidmore, M., & Toya, H. (2002). Do natural disasters promote long-run growth?. *Economic inquiry*, 40(4), 664-687.

Leiter, A. M., Oberhofer, H., & Raschky, P. A. (2009). Creative disasters? Flooding effects on capital, labour and productivity within European firms. *Environmental and Resource Economics*, 43(3), 333-350.

Henriet, F., Hallegatte, S., & Tabourier, L. (2012). Firm-network characteristics and economic robustness to natural disasters. *Journal of Economic Dynamics and Control*, 36(1), 150-167.

Todo, Y., Nakajima, K., & Matous, P. (2015). How do supply chain networks affect the resilience of firms to natural disasters? Evidence from the Great East Japan Earthquake. *Journal of Regional Science*, 55(2), 209-229.

Albala-Bertrand, J. M. (1993). Natural disaster situations and growth: A macroeconomic model for sudden disaster impacts. *World Development*, 21(9), 1417-1434.

Popp, D., Hascic, I., & Medhi, N. (2011). Technology and the diffusion of renewable energy. *Energy Economics*, 33(4), 648-662.

Narayan, P. K. (2003). Macroeconomic impact of natural disasters on a small island economy: evidence from a CGE model. *Applied Economics Letters*, 10(11), 721-723.

Sardar, A., Javed, S. A., & Amir-ud-Din, R. (2016). Natural Disasters and Economic Growth in Pakistan: An Enquiry into the Floods Related Hazards' Triad.

Javid, A. Y. (2007). *Stock market reaction to catastrophic shock: Evidence from listed Pakistani firms* (No. 22199).

