EFFECTS OF EXPORT ORIENTATION, EXCHANGE RATES, AND LEVERAGE ON FIRM PRODUCTIVITY: EVIDENCE FROM PAKISTAN

AFAQ KHAN

REG NO: PIDE2017 FMS MS06

(FINANCE)

SUPERVISED BY:

DR. ABDUL RASHID

DEPARTMENT OF BUSINESS STUDIES

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS

(2019)

Pakistan Institute of Development Economics

CERTIFICATE

This is to certify that this thesis entitled: **"Effects of Export Orientation, Exchange Rates, and Leverage on Firm Productivity: Evidence from Pakistan"** submitted by Mr. Afaq 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 Science in Management Sciences**.

External Examiner:

Dr. Arshad Hassan
Dean
CUST, Islamabad

Supervisor:

Dr. Abdul Rashid
Associate Professor
IIUI, Islamabad

Head, Department of Business Studies:

Dr. Nadeem Ahmed Khan
Head
Department of Business Studies
PIDE, Islamabad

Dedication

Dedicated from core of my heart to my beloved grandmother Edith Aziz Khan and my respected teacher Dr. Abdul Rashid.

ACKNOWLEDGEMENTS

I am thankful to Lord Jesus for his love and blessing though out my life. Foremost, I would like to express my sincere gratitude to my advisor Dr. Abdul Rashid for the continuous support of my MS study and research, for his patience, motivation, enthusiasm, and immense knowledge. His guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better advisor and mentor for my MS study.

Besides my advisor, I would like to thank the rest of my thesis committee: Dr. Ahmad Faraz, Dr. Iftikhar Ahmed, Dr Arshad Hassan for their encouragement, insightful comments, and hard questions.

My sincere thanks also goes to PIDE faculty for serving me best to complete this research thesis. I would also like to thank my friends and class fellows who helped me a lot in academia as well as in other disciplines of life.

Last but not the least, I would like to thank my family: my parents Mr. Abdul Jalil and Mrs. Aksa Jalil and my brother Sharoon Khan for always supporting me.

Thanks to all of you!

Abstract

This research empirically investigates the effects of macroeconomic and firm-specific variables on firm level productivity growth. The analysis is carried out for unbalanced panel of 241 exporting firms, listed on Pakistan Stock Exchange (PSE) over the period 2009-2017. The investigation provides evidence that export orientation of firms increases their productivity growth, that is, higher productivity growth of the firm is positively associated with greater export orientation. This study further determines behaviors of export-oriented firms under economic impact of currency appreciation and exchange rate uncertainty. Both exchange rate uncertainty and currency appreciation adversely effects the productivity growth of firms, however, the productivity growth of exporting firms are more harmed from uncertainty than currency appreciation. Furthermore, leverage and firm size is emerged as an essential determinant of productivity growth of the firm and positively affect the productivity growth of the firm. Overall, this study suggests that the government should properly regulate the foreign exchange market in order to control health of economy, and protect the exports of the firms from negative shocks of the exchange rate. In addition, government is supposed to provide incentives and better atmosphere of investment for firms to expand their activities and to contribute further to their exports.

Contents

List of Tables

List of Figures

Table of Abbreviation

CAPM	Capital Asset Pricing Model
CEE	Central and Eastern European Countries
CPI	Consumer Price Index
FDI	Foreign Direct Investment
GMM	Generalized Method of Moments
GPS	Generalized Propensity Score
KPF	Knowledge Production Function
LP	Levisohn and Petrin – Methodology (2003)
OLS	Ordinary Least Squares
PSX	Pakistan Stock Exchange
R&D	Research and Development
REER	Real Effective Exchange Rate
SECP	Securities and Exchange Commission of Pakistan
SBP	State Bank of Pakistan
TFP	Total Factor Productivity
2SLS	Two-Stage least squares

Chapter I

Introduction

‘‘Productivity isn’t everything, but in the long run it is almost everything’’—Nobel Laureate Paul Krugman.

The export market and its impact on economy is a major debate as increases in trade is linked with generating more income. However, there is lack of understanding that how export experience of firms’ affects firms’ productivity. Exports improves the health of a country’s economy and its businesses.

Globally share of Pakistan’s exports has reduced from 0.18 percent to 0.13 percent in FY2015-16, which is a biggest fall of year since 1980’s. As a result, the export share of other competitors got enough boost in world exports. The export share of India has shifted from 0.61 to 1.65 percent. Countries like Vietnam’s and Bangladesh’s has increased their export growth from 0.14 to 1.17 percent and from 0.06 to 0.19 percent, respectively (SBP Staff Notes, 02/17).

Businesses can enter international markets through exporting, foreign direct investments, leasing, or by indirect agents. Although exporting activities may not require high level of FDI’s (Falk et al., 2019). Exporting improves the efficiency and productivity through competition of firms, that increases the innovation in production. The previous studies favor exports as sustainable economic growth driver (Weiss, 2005). The case also affirms with perspective to South Asian economies (Kemal et al., 2002).

Firms that take part in exports have long run existence, high profitability, and improved performance. More export incentive industry tends to be more productive, the study of Sanghoon Ahn (2005) propose that firms’ dynamics (entry and exist, growth and decline) are

important component of productivity and innovation. Growth and technology diffusion has a vital impact on productivity of exporting firms.

Productivity is a measure of firm performance. Firms that participate in exporting activities are more competitive in international markets. Exporting gains can be achieved in areas where competition exists. Insufficient institutional development in areas such as labor market and capital market restricts the gains from exporting. In other words, efficiency gain from export market can be seen with in emerging competition in areas of the economy.

The exporting firms adopt new learning expertise which helps firms to gain enough knowledge to improve their output efficiency. Analysts claim that exporters acquire new knowledge from their international contacts. While others argue that high export productivity reflects self-selection of efficient firms. Exporters tends to adopt competitive management styles, high quality of trained labor to understand buyers demand and firms' ability to meet that perceived demand makes firms more technical experts (Fryges and Wagner, 2008).

The study of Loecker (2007) presents an evidence that exporters transform their productivity as they participate in global trade, they become productive enough to surpass competitors and improves faster than firms who sells at domestic market only. Less productive firms are forced to exist the market, as new entrants are more specialized and productive.

Productivity is a significant factor that determines the export decision if the firm has an adequate access to external finance (Berman and Hericourt, 2010). The firm's liquidity has a positive effect on exports i.e. most of liquid firms have higher export probability. The empirical results suggest that better financial system reduces credit constrains for the firms that are advanced in technology (Forlani, 2010).

Only productive firms serve international markets while least productive firms operate in domestic markets. The researches on European economies demonstrate causality between firm level export performance and productivity, that productivity premium rises with the exporting experience of the firms (Berthou et al., 2015).

The level of firms' export raises firms' productivity as a result during global financial crisis 2007-2008 productive firms sustained the stress in European economi es. The researcher shows that firms that exports are more advance in size and have higher paid wage labor and have long term survival chances (Aw and Hwang, 1995).

Monopolistic competitive model of trade with firm heterogeneity reveals that productivity is one of the important determinants of firm's survival for longer time period developed by (Melitz, 2003). Issues related to strategic choices and management practices also have strong influence on export performance.

Exporting can be a significant advantage for firms' productivity as previous literatures indicates that firms that trade have higher productivity. This approach gives us understanding that there is a systematic relationship between exporting and productivity.

This study also covers effects of exchange rate uncertainty and currency appreciation on exporters to determine causality with total factor productivity. The idea that exchange rates and sources of finance can affect firm behaviors indirectly which is considered by researchers to examine dynamics of exporting activities and productivity of firms (Caglayan and Demir, 2014; Toraganli and Yalcin, 2016).

This study investigates are exporters productive? Thus provides insight about productivity growth by classifying export oriented firms. This gives complete picture about export status of

firms on productivity growth. Additionally, study examines the impact of each variable with export orientation of firms to determine its impact on total factor productivity.

1.1 Research gaps

Productive firms have competitive advantage in international trade. Using exports as an indicator to measure the productivity of a firm, is based on the theme that, does exporting increases the productivity growth? Are firms productive enough to enter in export market? All these questions help us to understand the firm dynamics of export behavior.

Studies have conducted empirical researches in order to assess exporting patterns, financial factors, export decisions, aggregate productivity, and international trade of exporting firms (Berman and Hericourt, 2010). The previous discussions on exporting firms, concludes that, only productive firms engage themselves in global competition and learning.

Productivity can be taken as efficiency in production. Broadly it results from capital accumulation, adopting new technology, research and development, and export participation. Economist over past couple of decades have covered about how firms turns input into output, how firm level export growth, trade growth and aggregate level productivity are positively correlated (Melitz, 2003; Weiss, 2005; Loecker, 2007; Wagner 2007; Greenaway et al., 2007).

Researchers have a significant contribution in investigating the link between export variable and productivity yield at micro and macro levels. Productivity differentials are in favor of exporting firms thus study of Bernard and Jensen (1999) leads to a new debate to design a suitable policy for firms to respond against level and shocks of economic forces.

Research by Wagner (2007) on findings from micro-econometric studies of self-selection and learning hypothesis, includes data from 34 highly industrialized countries (e.g. Germany, Canada, United Kingdom, and United States of America) ; Asian countries (Korea, China,

Taiwan, and Indonesia) ; Latin America countries (Colombia, Chile and Maxico) ; Developing countries (Slovenia and Estonia) and low income countries of Saharan Africa, is in favors that exporting firms are more productive as compared to non-exporters, however findings does not answer how a firm actually benefits from its export activates?

This research quantifies the effects of export orientation, exchange rates and leverage on productivity differentials of exporting firms. The researcher has further augmented the study to show the significance of productivity of export intensive firms, when exposed to currency appreciation, uncertainties of exchange rates, and firms' access to debt market.

To my knowledge none of previous studies have focused specifically Pakistan's economy to verifying exports-productivity linkage conditional on access to leverage market and under exposure of level and volatility of exchange rate. This study determines productivity growth and export participation by classifying the exporting firms on bases of their export orientation, i.e. 10%, 25%, 50%, 75%, and 100% output exported.

This approach calculates the combine impact of export oriented firms and exchange rates and leverage. Study not only provides us with level of threshold for comparing productivity but also gives an over view that at which level the exporters can be productivity under the economic impact of exchange rates and leverage.

The estimation of total factor productivity provides more unbiased estimation as labor productivity just represents on a part of productivity picture (Vu, et al., 2016). This study uses LP[1] methodology that employ inputs as proxy to determine total factor productivity.

[1] Levisohn and Petrin, (2003)

1.2 The objectives of the study

The objective is to quantify the effects of exports, exchange rates and leverage upon firm level productivity growth of Pakistan's Non-financial firms.

Objectives of this study contribute to the previous literatures in five important ways.

i. To empirically explore the total factor productivity of non-financial firms.
ii. To estimate impact of firms' exports on productivity growth.
iii. To measure export orientation of firms that requires an export classification of firms based on average more than 10%, 25% ,50%, 75% and 100% output exported.
iv. To determine effects of currency appreciation and exchange rate uncertainty on firm level productivity growth.
v. To quantify the relationship among export orientation and leverage on firm level productivity growth.

1.3 Research questions

This study covers the research questions as following:

i. Are exporters more productive?
ii. Is there significant relationship among export orientation on productivity?
iii. How productivity growth differs under the export- currency appreciation interaction?
iv. How productivity growth differs under the export-exchange rate uncertainty interaction?
v. How productivity growth differs under export-leverage market interaction?

1.4 Significance of the study

Previous studies highlighted about uncertainties in consumer demands that encourages different firms to upgrade their technologies, production facilities and quality of goods. These theories suggest that only productive firms endure in the aggressive export market.

This research estimates productivity of exporting firms. The study intends to determine the relationship that how export classification of firms' export orientation impact firm level productivity. However, to fill the gap of prior studies, researcher determine productive of exporting firms when manifested to changes and uncertainty of REER's and leverage.

This brings us to answer the questions like are these exporting firms productive? Does export and productivity linkage exist? Are policies and export patterns of firms being effective enough to enter in export markets? Do firms need to increase their technological adoption to be more export oriented? How financial constraints and sunk cost for new exporters affect their entrance in trade? How foreign currencies debt impact the firm exporting behavior? How global competition is inclined towards productive growth and economic development?

This research will assist in designing effective policies to achieve healthy economy goals. More over study provides future researchers with detailed references on topics regarding productivity determinants, export intensity, exchange rate shocks and volatility, and sources of finance.

1.5 Study plan

The study is organized in following heads, Chapter II provides a brief survey of literature regarding impact of export orientation in determination of firms' behavior, level and uncertainty of exchange rate, access to debt market and firm size on total factor productivity determinants. Chapter III explains the theoretical frame work of exporter and productivity and describes the relationship among variables. Chapter IV describes firm level data sources and empirical model. Chapter V describes results and discussion portion of empirical models. Chapter VI covers conclusion and policy implication.

Chapter II

Literature Review

2.1 Firms' exports and productivity

Firms' exporting behavior are empirically tested since nineties, studies of Wagner (2007) includes investigation of empirical evidences to associate export activity and productivity on firm level data and he deduces that "outwards-oriented firms are more productive than inwards-oriented firms". Most of studies reviewed by Wagner examined influence of exporting activity on labor productivity as a conventional measurement. However, findings do not answer in which ways exporting activity causes change in productivity.

Helmut and Wagner (2008) determine that export-sales ratio increases labor productivity with increase of firms' export intensity. There is a negative association in firm's labor productivity growth and firm's international expansion. This negative result is concentrated with characteristics of level of economy, geographical and economic conditions prevailing in the country (Blalock and Gertler, 2004; Wagner, 2007).

Fryges and Wagner (2008) reviewed association in export-sale ratio and labour productivity growth using GPS method on panal data set of German manufacturing firms. Results concluded that exporting improves the labor productivity.

Wagner (2006a) used knowledge production function to study export behavior of Germany firms. He demonstrates that exporters that participate in global market are more engaged in learning and innovating processes from external sources. Contemporary knowledge is linked with higher productivity.

Similarly, Griliches (1979, 1990) determine knowledge function depends upon spending on research and development. He uses knowledge inputs in an econometric study to demonstrate that productivity of globally engaged firms are higher. As these firms are more innovative thus have high productivity.

Learning from sources varies that includes information flow from universities, patents registered, from customers and suppliers. Firms' also generate new innovation through technological learning that include advance designs, imitations, reverse engineering etc.

Productivity is efficiency which participates in production, that how much output is obtained from a given input. Researchers often use total factor productivity concept for measuring productivity because single factor productivity levels are affected by excluded inputs that have intense impact on measurement (Hiep and Ohta, 2009).

Cameron and Trivedi (2009) in their research emphasize that labor productivity just represents on a part of productivity picture. TFP reflects output produced from given level of inputs, higher the TFP greater the output.

Exporting contributes to productivity growth by two main mechanisms first by sale in domestic and foreign markets which helps firms to expand. Second by learning and gaining new knowledge and information can improve technical progress by gaining contacts with foreign partners encouraging competition and innovation as well as research and development (Vu et al., 2016).

2.2 Theoretical justification of firms' exporting behaviors

Productivity differentials between exporting and non-exporting sectors are found to be statistically significant and economically impacting. Survey conducted on macro econometric studies by Wagner (2007) which comprises of data for firms from 34 countries and was published during period between 1995 and 2006, reports that exporting firms are more productive than non-exporters (Wagner, 2007).

There are two alternative hypotheses that are concordant exclusively as to why exporting firms are expected to be more productive than non-exporting firms

Self-Selection Hypothesis: Only productive firms self-select them in export markets, under the condition of equal investment opportunity and trade. These productive firms serve international markets while least productive firms operate in domestic markets.

As firms bear an additional cost for selling of goods in foreign countries this extra cost includes marketing cost, transportation cost, cost of skilled employees, cost for producing, modifying, and improving domestic products for foreign consumption (Bernard and Wagner, 1997).

Only productivity firms can overcome additional cost when they infiltrate in market. Melitz (2003) determine that exporting firms are more productive in efficiency and firm heterogeneity. Exporting activities involve "efficiency hurdles" i.e. firms that are efficient are more credible to export than the firms that are not efficient enough to penetrate the market, may survive in domestic markets alone (Bernard et al., 2003).

Learning-by-Exporting Hypothesis: Learning hypothesis explains foreign markets have ability to learn and grow in advance technological innovations. Competition helps firms to improve their productivity growth.

Knowledge and expertise that international competitors have effect international sales. The relative advantage to exporting firms is that they are more productive due to its increasing export experience with top exporters than new entrants and non-exporters (Sanghoon Ahn, 2005).

Criscuolo et al (2005) investigate discrepancies in level of knowledge of export firms using the knowledge function and determine productivity framework. They examine correlation among productivity and firms' ability to discover new knowledge by investments in research and development projects. Productivity improves from knowledge and expertise that firms gain, is from its experience in the export market.

Globally engaged firms are more innovative in outputs. Firms that are in global competition improves much rapid than domestic businesses (Crespi et al., 2008). Financial liberalization increases the capital flow that provides more opportunities for firms, to avail debt and invest in equities.

Financial institutions are necessary for supporting global exchange of goods. Exporters depend more on external financing than domestic producers because financial constraints create the disconnection between productivity and export decisions (Berman and Hericourt, 2010; Manova, 2012).

2.3 Productivity and the exchange rate movements

Literature of Aghion et al (2009) offers empirical evidences that uncertainty has negative impact on firms' productivity. High degree of exchange rate uncertainty lowers the growth of a country and these fluctuations impact the growth of a firm with credit constraints.

The researches of Calvo and Reinhart (2002) and Calvo et al (2004) on the firms which has high external finance dependence, a sudden stop or a shock in capital inflow will rise riskiness, which impact strong on financial position. These shocks are escalated particularly when a firm face problem of "currency mismatch" i.e. when debt of a firm is in foreign currency and its assets and income are based on domestic currency.

The research of Gupta et al (2007) demonstrates that depreciation in domestic currency can affect firms in different manner. First the demand of exported goods increases in foreign due to depreciation in currency value. That is the competitive gain for a firm in international market, due to increase in the quantity of exported goods.

Second, currency depreciation will increase the cost of production for the companies that depends more upon the imports. The point to ponder is that, domestic production is highly exposed to currency depreciation.

Third the firms which have indebted in foreign currency lose their competitive edge in international market due to increase in their book value of liabilities as comparative to their assets. This is also known as balance sheet effect. As a result, depreciation in exchange rate restricts the availability of export finance and it reduces the net worth of firm.

Toraganli and Yalcin (2016) demonstrate that debt-export ratio is naturally hedged for the firms that export with low or moderate foreign currency, and is less sensitive to real exchange rate

changes. Eichengreen et al (2005) explore effects of currency mismatch i.e. inability to borrow internationally in the own currency.

In this situation if a firm's debt is in foreign currency while the income generated is in domestic currency this liability dollarization of companies leads to financial fragility. Having access to equity and leverage diminishes the negative effects of volatility (Demir, 2013).

Aghion et al (2009) in their study includes 83 countries macro data explaining that uncertainty impact is more critical for countries that have weak financial sectors thus reduces the productivity.

If a firm's borrowing depends upon current earning of a firm, then exchange rate shock can worsen it. That same firm will not able to invest in their research and development, and technology thus leading to unfavorable productivity growth effects.

Theoretical researches on exchange rate uncertainty have exposed various ways that can impact firms through different channels: (I) It changes cost of competitiveness (production cost) in advantageous and detrimental effects (Kandilov and Leblebicioglu, 2011; Klein et al., 2003; Sauer and Bohara, 2001); (II) It lessens the level of credit availability from banks (Bernanke and Gertler, 1990); (III) It magnifies uncertainty (Aghion et al. 2009); (IV) It affects firms balance sheet and net worthiness of firm (Braun and Larrain, 2005 ; Bernanke and Gertler, 1990).

Firms with higher total factor productivity and labour productivity can deal with exchange rate movements (Mitton, 2006; Arnold and Javorcik, 2009). The study of Demir (2010) present's uncertainty has adverse effects on firms' productivity. However, these effects are fundamentally dependent upon firm characteristics. Firms that deal with high uncertainty shocks use superior risk management techniques and access debt and capital market to hedge.

2.4 The effect of firm-specific variables on productivity

Financial openness has positive effect on firms' productivity growth. The firm characteristic variables include age of firm, size of firm, employees' wages and benefits. These are vastly included in previous studies to determine the productivity. The impact of firm size includes firm-specific factors that has positive effects on firms' exports (Aw et al., 2007).

The study of Demirhan (2015) discovers supremacy of exporting firms on bases of size, productivity and profitability comparative to non-exporter. Theoretically, firm size indirectly impacts the performance of a firm, as increase in size influence the productivity.

Leverage ratio is used extensively in literature to control financial conditions. Firm's financial health reveals firm's financing cost for participating in foreign market, using cash from domestic sales and debt markets that increases the probability of exporting (Demir, 2013).

Coricelli et al (2012) determine association of TFP and leverage with data of CEE Countries. They document that TFP of a firms increases with debt financing options, but if leverage rises from critical threshold, TFP declines. Empirical literature reports that firms can pledge for more collateral tangible assets that enhances financial health in terms of having easier access to outside capital.

Nunes et al (2007) demonstrate the linkage in debt financing and labor productivity. He found negative affect of leverage on labor productivity for firms having comparative low labor productivity. His panel data set include 162 firms over 5 years.

Minetti and Zhu (2011) in their study demonstrates that exporters are more liquid and less leveraged than non-exporters. Firms with high level of debt finds it costlier to invest in product quality, that's why higher debt signals risk of bankruptcy and discourage the investments.

2.5 Concluding remarks

There is empirical and theoretical literature on firm's productivity and exporting. Understanding this relationship is important for policy issuance, as governments play an important role by providing export supporting subsides for improving firms' in their technologies. However, prior evidences about exports and productivity is still a debate to set an appropriate policy that increases firm productivity through trade.

Exporting allow manufacturers to increase their production level and to specialize in their product range in global markets. Firms that export have higher productivity and performs more efficiently to get technical expert in production method and product design. Firms with long survival and large size reflects productivity improvement from knowledge and experience from international market.

In this study, total factor productivity is measured by using (Levinsohn et al., 2004) function to determine productivity growth of export oriented firms and to quantify the impact of exchange rate movements and leverage on firm productivity growth.

Chapter III:

Theoretical Underpinning

3.1 Export performance and productivity

There are empirical facts that productivity has positive and strong association with exporting activities of firms (Delgado et al., 2002). Theoretical models of industry assume that firms have innate ability to be productivity (Clerides et al., 1998). Only productive firms grow and survive the market movements, while ineffective firms will decline and fail (Bernard and Jensen, 1999).

Exports provide productivity advantages and competitiveness for firms to direct them to performance better. The export oriented firms have higher productivity for developing economics than at developed economies (Bernard et al., 2003). Firms that take part in exporting activates are more competitive in international markets as these firms' export they adopt new strategies and learning expertise, develop technological innovation so more productive firms self-selects into export market participation (Loecker, 2007; Wagner, 2006).

The study of Helpman et al (2004) explains general equilibrium that only productive firms are able to enter the global markets. Firms that participate in domestic market tends to be smaller than firms that participate in exports (Head and Ries, 2003; Wagner, 2007). The productivity distribution is based on empirical evidence by Girma et al (2004) shows that multinational firms dominate export firms, which in turn dominate non-exporters.

Export orientation of firms defined as those firms that on average export more than 0%, 10%, 25%, 50%, and 75% of outputs in export. The study provides the threshold by classifying in quantiles to determine optimal level at which export oriented firms are most productive.

Hypothesis 1: *There is a positive relationship between firms' export orientation and productivity growth of firms.*

The export-productivity link model suggests export promoting policies as firms that exports appears to have high productivity, extra capital intensiveness, and have higher paid labour (Melitz et al., 2008).

Total factor productivity is a measure to construct a production function based on (Levinsohn et al., 2004) model because this model addresses potential endogeneity problem. Following are export-productivity hypothesis found in previous literature showing export dependence on productivity growth of firms.

Export performance and productivity correlates on the fact that when firms are exposed to foreign competition they are forced to increase their productivity in order to be more competitive, this link is based on 'Export led growth" hypothesis (Balassa, 1978; Berthou et al., 2015).

Firms face efficiency hurdles, only credible productive firms survive in international market while low productive firms participate in domestic market activities (Bernard et al., 2003). There is always an additional sunk cost for selling the goods in foreign market which include production cost, marketing cost, labor cost, transportation cost etc.

Exporting firms develop positive learning effects when exposed to advance technological innovation and knowledge. Expertise that prevails in international markets create an edge for exporters than non-exporters.

3.2 Firms' export orientation and the currency appreciation

Exchange rate has an essential impact on global trade, it helps us to price goods and services around the world, with each country have its own currency that allow them to price their goods and their services accordingly.

Movements in exchange rate are shown either by depreciation or appreciation, the depreciation of currency can boost exports, businesses avail this option by exporting more and cheaper to make themselves productive and the import becomes expensive. Opposite is true for appreciation as exports are overpriced, imports get cheap (Krugman and Obstfeld, 1999).

Export oriented firms react positively to currency depreciation and have disastrous impact from volatility. A decrease in the real effective exchange rate shows the depreciation of the currency in contrast to other global currencies which will enhance exporting activity and thus productivity of firm increases.

While increase in REER has an inverse impact on the trade, exports become expensive and imports become cheap thus exports deteriorate and demands of product will increase in foreign market (Desai et al., 2008).

The currency appreciation has ambiguous impact on firm level productivity. The appreciation may increase firm growth, due to low wage demands because of lower expected domestic prices. Other factors are falling costs of capital goods and imported intermediates.

There is also a possibility that exchange rate appreciation can improve investments perspective of firms that have borrowed in foreign currency thus having positive affect on productivity (Caglayan and Demir, 2014).

In contrast, currency appreciation increase imports competiveness and decrease export orientation. Thus this negative effect of currency appreciation on productivity growth can be

of following reasons. The decline in exports can render firms to be less productivity as demand of products deteriorates and the quality of the product declines. Increase in import competition leads to cheap imports thus jeopardizing productivity growth of firms (Gupta et al., 2007).

To measure effects of currency appreciation on productivity growth of export oriented firms the study employs combine impact of logarithmic growth rate of REER with10%, 25%,50%, 75% and 100% export output on productivity growth.

The literature empirically tests this hypothesis by running combine regression of real exchange rate appreciation and levels of export orientation on productivity. By introducing 5 dummies of export classification will help us to determine export classification of firms' and exchange rate appreciation interactions and their effects on productivity at firm level.

Hypothesis 2:

2(a): "*The effect of currency appreciation is ambiguous on productivity growth of export oriented firms".*

2(b): "*Currency appreciation will make trade and productivity of export-oriented firms to crumble, decreasing firms' export competiveness and increase import competition".*

2(c): "*Currency appreciation may increase firms' growth' strengthen the trade and particularly productivity of firms".*

3.3 Firms' export orientation and the exchange rate uncertainty

The uncertainty is the major concern for policy makers. Aizenman and Marion (1998) find linkage between uncertainty and investment decisions, they statistically uncovered negative correlation among volatility measure and investments. Likewise, Arize et al (2008) determine the impact of uncertainty and export with negative association.

Impact of uncertainty affects the manager decisions about quantity of capital investment and timing as variation in uncertainty limits the ability of firms to raise capital because potential lenders are ineffectual to accurately judge credit worthiness of firms.

The studies of Campa and Goldberg (1995) were unable to determine any significant impact of uncertainty on investment behavior of firms, while studies of Goldberg (2004) reveals weakly significant but negative association among uncertainty and firms' investment behaviors.

Studies at sectoral level uses real effective exchange rates i.e. trade weights of each industry to construct a methodology to determine as changes in REERs' that causes variations in exchange rates, over the time.

This study investigates the combine impact of uncertainty and levels of export orientation of firms to determine changes in productivity growth. To explore uncertainty effects on productivity growth of exporting firms, this study combines the measures of uncertainty with 10%, 25%,50%, 75% and 100% exports of firms.

The literature empirically tests this hypothesis by running combine regression of real exchange rate uncertainty and levels of export orientation on productivity. By introducing 5 dummies of export classification will determine export classification-uncertainty interactions and their combine impact on productivity growth.

Hypothesis 3: *There is a negative relationship between exchange rate uncertainty and the productivity growth of export oriented firms. To be more precise, the higher level of uncertainty will have adverse effects on the productivity of export oriented firms.*

Demir (2013) documents that having entry to foreign and domestic equity, debt market limits the negative impact of uncertainty on productivity. Similarly studies of Baum et al (2010) investigates the negative empirical linkage between CAPM based uncertainty, cash flow and capital investment behavior of firms.

3.4 Firms' export orientation and leverage

Exporters depend more on external financing than domestic producers. Financial institutions are necessary for supporting global exchange of goods as it is evident in literature that financial constraints create the disconnection between productivity and exports decisions (Manova, 2012).

Credit rationing is an obstacle to exporters as it limits the supply of additional credit even on high interest rates that creates the market imbalance (Zhi and Minetti, 2011). Credit friction hinders the foreign exports more than domestic production as countries with weak financial institutions reduces the credit availability.

The firm liquidity has positive effects on export tendency for firms, as these firms are more inclined to external funding. The research of Nucc et al (2005) determines the relationship between TFP and leverage, they determined negative relationship for firms which have low short term debt availability.

Coricelli et al (2012) also demonstrated the relationship between TFP and leverage for Central and Eastern European Countries. The results show that total factor productivity growth increases with leverage, but if leverage rises from critical threshold, TFP declines.

The higher debt indicates risk of bankruptcy and deflate the investments due lack of money supply. Past studies confirms that total factor productivity and leverage, increases till a certain level further it will lower the growth.

To measure effect of leverage on productivity growth of export oriented firms, the study determines combine impact of leverage at 10%, 25%,50%, 75% and 100% export share on firm productivity growth.

The literature empirically tests this hypothesis by running combine regression of leverage and levels of export orientation on productivity. Introducing 5 dummies of export classification will help us to investigate export orientation and leverage interactions on firms' growth.

Hypothesis 4: *Leverage and the productivity growth of outwards-oriented firms is positive. To be precise, leverage can increase productivity growth of exporting firms.*

An increase in leverage causes the cost of debt to become larger and reduces the incentive to invest in production while attention from productivity growth is diverted to cash generation which erodes the benefits from leverage.

The study of Greenaway et al. (2014), demonstrate no significant relation among leverage and labor productivity of sample Chinese data set of 21,582 Chinese firms foreign and local companies over period of 2000-2005.

The study of Dimelis and Louri (2002) determine that foreign ownership shows higher efficiency in production. The results indicate that most productive firms are less sensitive to determinants like capital intensity and more sensitive to leverage and size. Likewise study of Caglayan and Demir (2014) founded impact of leverage to be positive and significant on productivity.

Overall theoretical model is based on export led hypothesis growth. The positive relationship indicates that higher the export share in market, greater will be productivity. Currency appreciation has ambiguous effect on productivity, it can have both positive and negative impact on productivity. The firms with smaller export-share have least impact of appreciations. Similarly, uncertainty adversely deteriorate productivity.

Higher debt represents more exposure to bankruptcy. The association among leverage and productivity is positive as some corporates strategically use financial leverage for advantage over competitors. Firm size is introduced as controlled variable, although firm size has a positive relationship with productivity.

An augmentation has been made in the model by using interaction terms to see impact of "export-uncertainty" interaction upon productivity. It describes the effects on productivity growth, when export oriented firms are exposed to exchange rate shocks. Similarly, "export-currency appreciation" interaction determines the effects of currency appreciation on exporters' productivity. "Leverage-export" interaction allows us to determine, productivity of outwards-oriented firms varies with exposure of debt financing.

Researcher has further classified firms on the bases of their export orientation at 10%, 25%, 50%, 75% and 100% export orientation output respectively. This helps us to calculate the impact on productivity of export behavior by classifying the firms on bases of their export orientation under economic influence of level and uncertainty of real exchange rates changes and leverage.

Chapter IV

Research design and Methodology

4.1 Description of data sample

To carry out the investigation researcher used unbalanced panel dataset for firms taken from the Pakistan Stock Exchange Ltd, published by the State Bank of Pakistan from year 2009-2017 which provides firm level information for a 9-years window.

The monthly data of REERs are collected from economic database of State Bank of Pakistan. Prior to estimation researcher had total unbalanced panel of 411 non-financial firms, from year 2001-2017. After calculating total factor productivity function through LP Methodology-Levisohn and Petrin (2003), which brings total to 351 firms from year 2009-2017 due to missing data values.

For calculating the export share to total sales, researcher excluded the firms with no or zero export. Researcher also drop some observations due to missing values of export variable. Thus left with 241 export oriented firms from year 2009-2017. The total observations were 1587 after taking logarithmic growth rate of TFP, number of observation falls to 1284 with a final number of 241 firms from year 2009-2017.

The data set provides us with export classification firms and their productivity growth, that examine investment prospects of export orientated firms on productivity growth.

Table 4.1: Summary of variables

Variables	Observations	Means	Deviation	Minimum	Maximum
$\Delta(\text{tfp})$	1,284	-0.965	1.424	-13.062	11.893
$\text{tfp}_{\text{i,t}-1}$	1,284	5.035	3.437	0.041	34.168
$\text{Exports}_{\text{i,t}-1}$	1,284	0.249	0.218	0.000	0.693
$\text{S}_{\text{i,t}-1}$	1,284	3.681	0.088	3.562	3.823
σ_{t-1}	1,284	0.022	0.007	0.128	0.386
$\text{Leverage}_{\text{i,t}-1}$	1,284	-0.617	0.455	-3.381	1.899
$\text{Size}_{\text{i,t}-1}$	1,284	15.325	1.385	10.634	19.492

$\Delta(tfp)$ is log difference of total factor productivity. tfp is calculated using production function by LP Methodology-Levisohn and Petrin (2003). σ is standard deviation of REERs; S is annual logarithmic growth rate of real effective exchange rate; *Leverage* is log of liabilities to assets ratio; *Export* is log of one plus foreign sales in total sales. $Size$ is the logarithm of firm's total assets.

The Table 4.1 shows summaries and measurements of quantitative data. This not only simplifies the dataset in sensible form but it enables comparison across different variables. The mean value is calculated to measure central tendency. While standard deviation is measure of dispersion. Maximum and minimum values are also presented and range can be calculated by differencing highest and lowest values.

$\Delta(tfp)$ has observations of 1284 that is because of log difference of tfp. The mean value is -0.965 which represents the variable in entire data set describing the average value. Standard deviation of is at 1.424 which shows how far numbers are in data set. Minimum value is at -13.062 and maximum value is 11.893. This negative sign is because of differencing.

The variable tfp is calculated using LP-estimator, which gives output in log form. The observations are 1284 are based on lagged firms' productivity which includes 241 non-financial exporting firms.

The mean value show center of tendency is at 5.035 while the measure of dispersion is 3.437 that shows high standard deviation as data was unbalanced panel. The minimum value of lagged tfp is at 0.041 and maximum value was 34.168.

Lagged $Export$ variable is log of one plus export share in total sale. Researchers usually add one in calculation to keep positive values of variable. For example, if firm's export share is equal to total sales then taking natural log, ln (1) =0, will provide us with 0 maximum value. Thus researchers while studying export share add one while taking natural log.

The mean value of lagged $Export$ is 0.249 which shows the location of distribution while standard deviation is 0.218 which show dispersion in the variable. The minimum value is 0.0000109 of lagged *Export*. The variable is in logarithmic form and data includes firms with smallest exporting share. While maximum value is 0.693 which is in log form with 100% export share in total sales.

Currency appreciation S is lagged logarithmic growth value of real effective exchange rates. The variable has 1284 observations while center of tendency is at 3.681 and variation is quite low that means numbers are closely arranged at 0.088. While minimum value of annual logarithmic growth rate of REER is at 3.562 and maximum value is at 3.823. The minimum and maximum values are closely occurring because it is taken as 12 months' average of the logarithmic growth rate of real effective exchange rate.

The information geometry of lagged value of monthly real effective exchange rate uncertainty σ variable of has a center value of 0.022 and variation is 0.007. The standard deviation of logarithmic monthly real exchange rate series has minimum value at 0.128 and maximum value of exchange rate uncertainty is at 0.386.

The model includes lagged firm specific variable in study. $Leverage$ is log of liabilities/Asset ratio thus center value is negative 0.617 having low dispersion of 0.455, with minimum value of -3.381 and maximum value of 1.899.

TheSize is log of total asset of firm that has mean value at 15.325 and standard deviation of data is 1.385. The bottom value is calculated to be 10.634 and top value is at 19.492 showing firms with large assets.

To analyze association between variables, Table 4.2 describes correlation coefficients of variables.

Table 4.2: Correlation Coefficients

	$\Delta(tfp)$	$tfp_{i,t-1}$	$Exports_{i,t-1}$	$S_{i,t-1}$	σ_{t-1}	$Leverage_{i,t-1}$
$tfp_{i,t-1}$	-0.2091	--				
$Exports_{i,t-1}$	0.0328	0.0289	--			
$S_{i,t-1}$	-0.2334	-0.1485	-0.0258	--		
σ_{t-1}	-0.1040	-0.0387	-0.0124	-0.2282	--	
$Leverage_{i,t-1}$	0.0967	0.0682	0.0158	-0.1425	0.0468	--
$Size_{i,t-1}$	0.0114	0.0975	0.0228	0.1303	-0.0478	-0.0811

This table shows how strong a relationship is between two variables. Correlations of sufficient magnitude can have the potential adverse effect on regression estimates. Multicollinearity is observed when an independent variables predict percentage of another variable's variance. Presence of multicollinearity can have serious implications in particular, it can impact accuracy of beta and standard errors and in worst case scenario, analysis will not work.

Model includes lagged firm productivity and other lagged explanatory variables. Researcher observes negative relationship between $\Delta(tfp)$ and $tfp_{i,t-1}$ i.e. 0.2091 which is weak relationship. While there is positive correlation between exports and productivity growth at 0.0328 which is negligible relationship. Currency appreciation and productivity growth has weak negative association with coefficient at 0.2334. While exchange rate uncertainty also has

weak negative relation with productivity have a coefficient of 0.1040. Leverage shows negligible relationship and so does the size variable.

Export has negative relationship with exchange rate movements. The appreciation and uncertainty has negative and weak relationship with export variable. Although there is no noticeable possibility of multicollinearity in variables that can impact negatively on regression analysis.

4.2 Model specification

To estimate TFP the study use LP-estimator[2], where output is the function of observable inputs and factor neutral i.e. efficiency parameter. To measure the effect of exports oriented firms on productivity, the researcher constructs an econometric model.

The benchmark specification of model is based on studies which contributes to determine productivity effects of firms' reaction under export growth, exchange rate changes and sources of finance (Caglayan and Demir, 2014; Chen et al., 2013; Aghion et al., 2009). The study uses lagged firm productivity to limit the reverse causality problem as dependent variable is based on past period and other firm specific factors as explanatory variable.

We consider productivity growth instead of total growth, but our regressions are estimated with the same set of control variables. To study firm level productivity growth researcher level, the equation by taking lag difference on both sides $(tfp_{i,t}) = \alpha_1 + \beta_2 X_t$ Where X_t is other explanatory variables transforming $(tfp_{i,t}) - (tfp_{i,t-1}) = \alpha + tfp_{i,t-1} + \beta_2 X_t$. In this study all the explanatory variables are main determinants to highlight TFP.

$$\Delta tfp_{it} = f(tfp_{i,t-1}, Exports_{i,t-1}, \sigma_{t-1}, S_{t-1}, Leverage_{i,t-1}, Size_{i,t-1}) \ldots\ldots\ldots \text{(Eq. 4.1)}$$

[2] Levinsohn and Petrin (2003) methodology

Where subscript *i* represents firms and *t* donates years. This equation represents tfp_{it} in year *t* for firm *i* is defined as "output in production function of observed inputs"; f is a function of "observable inputs that are exports, exchange rate uncertainty, currency appreciation, leverage and firm size".

4.3 The effects of firms' export orientation, real exchange rate movements and leverage on firms' productivity

Researcher adopts standard growth literature of Caglayan and Demir (2014) to examine the impact on productivity growth of export orientated firms with level and uncertainty of the real exchange rates, along with other firm-specific factors as explanatory variables. The base equation is as follow

$$\Delta(tfp_{i,t}) = \alpha + \beta_1 tfp_{i,t-1} + \beta_2 Exports_{it-1} + \beta_3 \sigma_{t-1} + \beta_4 S_{t-1} + \beta_5 Leverage_{i,t-1} + \beta_6 Size_{i,t-1} + \epsilon_{i,t} \quad \text{(Eq. 4.2)}$$

Table 4.3: Description of variables

$\Delta(\boldsymbol{tfp_{i,t}})$	Productivity growth i.e. log difference of TFP.
$\boldsymbol{tfp_{i,t-1}}$	TFP is the lagged dependent variable, calculated using production function by LP Methodology-Levisohn and Petrin (2003).
$\boldsymbol{Exports_{i,t-1}}$	Log of (one plus) share of exports in output
$\boldsymbol{\sigma_{t-1}}$	Annual average real effective exchange rate uncertainty which is calculated using standard deviation of logarithmic monthly exchange rate series.
$\boldsymbol{S_{t-1}}$	Currency appreciation which is calculated using 12 month average of logarithmic growth rate of real effective exchange rate (an increase is real appreciation).
$\boldsymbol{Leverage_{i,t-1}}$	Total liabilities to total assets

$\boldsymbol{Size_{i,t-1}}$	A control variable. Log of real total asset of firms
$\boldsymbol{\epsilon_{i,t}}$	Error Term

This research uses lagged firm productivity and other firm specific explanatory variables. Thus final equation (4.2) includes both difference and lagged productivity. The first model determines the relationship between export orientation and productivity. tfp is calculated using LP-estimator. The key parameter β_2 determines changes in productivity to become an exporter. For examining whether firms with higher export orientation behaves differently from others.

The study also examines effect of currency appreciation on productivity growth of firms. A real exchange rate appreciation has less impact on small export share in comparison to the firms with large export share (Cheung and Sengupta, 2012).Effects of real exchange rate appreciation on productivity are ambiguous ($\beta_4 \lessgtr 0$) (Caglayan and Demir, 2014).

The uncertainty assumes to take negative value showing negative influence on productivity growth. The exchange rate uncertainty can lower the cost of production and competitiveness of firms by not only reducing the credit availability from banks and intermediaries but also damages the balance sheet of firms, as a result it reduces the net worth (Caglayan and Demir, 2014).

The study also investigates firm's ability to have debt access, as exporting firms are usually low in liquid asset and high in leverage (Sanghoon Ahn, 2005). Most of new entrants have a risk of sunk startup cost so firms that are generally are inclined to low liquidity and high leverage because sunk cost that is incurred can be financed by increased leverage provided by some external financer (Greenaway et al., 2007; Park et al., 2010).

The firm size is a control variable and have significant influence on productivity. A large firm has high level of financial assets so it has more chance to enter in foreign market and get productive (Leung et al., 2008). Control variable is used to remove the effects of confounding variables from the equation.

4.3 The interactions of exports, exchange rates and leverage

To determines relationship between exports oriented firms and total factor productivity in response to fluctuation and movements in exchange rate, and debt opting ability of firms.

$$\Delta(tfp_{i,t}) = \alpha + \beta_1 tfp_{i,t-1} + \beta_2 Exports_{i,t-1} + \beta_3 \sigma_{t-1} + \beta_4 S_{t-1} + \beta_5 Leverage_{i,t-1} + \Psi(Exports_{i,t-1} \times S_{t-1}) + \Upsilon(Exports_{i,t-1 \times} \sigma_{t-1}) + \phi(Exports_{i,t-1} \times Leverage_{i,t-1}) + \beta_6 Size_{i,t-1} + \epsilon_{i,t} \quad \text{(Eq. 4.3)}$$

Where Ψ is the coefficient of interaction of appreciation and export-orientation of firms' as export orientation and imports dependence are determined by firm response to exchange rate movements; Υ is the coefficient of interaction between the uncertainty and export-orientation; ϕ is the coefficient of interaction to explore any heterogeneous effects of exports oriented firms with leverage that helps to explore firms' ability to use debt financing.

Here researcher is interested to see combine impact of S variable interaction, σ variable interaction, and $Leverage$ interaction with $Exports$ on firm level $\Delta(tfp)$.

The researcher further augments the model and introduces dummy variables of export orientation of firms. This export classification of export oriented firms' will help to explore effects on productivity growth.

$$\Delta(tfp_{i,t}) = \alpha + \beta_1 tfp_{i,t-1} + \beta_2 Exports_{i,t-1} + \beta_3\sigma_{t-1} + \beta_4 S_{t-1} + \beta_5 Leverage_{i,t-1} + \Psi_1({D_{i,t-1}}^{Export \leq 10\%} \times S_{t-1}) + \Psi_2\ ({D_{i,t-1}}^{10\%<Export \leq 25\%} \times S_{t-1}) + \Psi_3\ ({D_{i,t-1}}^{25\%<\ Export \leq 50\%} \times S_{t-1}) + \Psi_4({D_{i,t-1}}^{50\%<\ Export \leq 75\%} \times S_{t-1}) + \Psi_5({D_{i,t-1}}^{75\%<\ Export \leq 100\%} \times S_{t-1}) + \Upsilon_1({D_{i,t-1}}^{Export \leq 10\%} \times \sigma_{t-1}) + \Upsilon_2({D_{i,t-1}}^{10\%<\ Export \leq 25\%} \times \sigma_{t-1}) + \Upsilon_3\ ({D_{i,t-1}}^{25\%<\ Export \leq 50\%} \times \sigma_{t-1}) + \Upsilon_4({D_{i,t-1}}^{50\%<\ Export \leq 75\%} \times \sigma_{t-1}) + \Upsilon_5({D_{i,t-1}}^{75\%<\ Export \leq 100\%} \times \sigma_{t-1}) + \phi_1({D_{i,t-1}}^{Export \leq 10\%} \times Leverage_{i,t-1}) + \phi_2\ \left({D_{i,t-1}}^{10\%<\ Export \leq 25\%} \times Leverage_{i,t-1}\right) + \phi_3\ ({D_{i,t-1}}^{25\%<\ Export \leq 50\%} \times Leverage_{i,t-1}) + \phi_4({D_{i,t-1}}^{50\%<\ Export \leq 75\%} \times Leverage_{i,t-1}) + \phi_5({D_{i,t-1}}^{75\%<\ Export \leq 100\%} \times Leverage_{i,t-1}) + \beta_6 Size_{i,t-1} + \epsilon_{i,t} \qquad \text{(Eq. 4.4)}$$

The researcher classifies exporting firms in 5 lagged[3] dummy variables which are as following

${D_{i,t-1}}^{Export \leq 10\%}$, ${D_{i,t-1}}^{10\%<\ Export \leq 25\%}$, ${D_{i,t-1}}^{25\%<\ Export \leq 50\%}$, ${D_{i,t-1}}^{50\%<\ Export \leq 75\%}$, and ${D_{i,t-1}}^{75\%<\ Export \leq 100\%}$ for firms with 10%, 25%, 50%, 75% and 100% output exported.

The advantage of this model is to determines the relationship and reactions of export oriented firms on their productivity growth in response to uncertainty and movements. Similarly, interaction of leverage with export orientated firms' is provided to determine its effects on total factor productivity of firms'.

[3] To match the frequency of panel data

4.4 Existing results and discussions

According to the existing literatures, productivity and exports have a positive relationship (Demirhan, 2015). The study of Caglayan and Demir (2014) determine impact of currency appreciation on productivity to be ambiguous.

While study of Greenaway et al (2007) determined negative relationship among movements in exchange rate and exporting activity of firms. Cheung and Sengupta (2012) deduces negative association among volatility on export share of firms. Xu et al (2012) found insignificant association among volatility and export propensity.

Jensen (1986) determine debt financing affects productivity growth as higher leverage increases the chance of bankruptcy. To achieve advantage over the competitors some firms choose high leverage in order to make positive effect on their market position in this case leverage can have positive effect on productivity (Chaney, 2016).

The study of Greenaway et al (2014) found no significant relationship between leverage and labor productivity of 21,582 Chinese firms that includes foreign and local companies over period of 2000-2005.

The study of Dimelis and Louri (2002) demonstrate that foreign ownership exhibit high productivity and efficiency. Their results indicate that most productive firms are sensitive to determinants like leverage and size and less sensitive to capital intensity.

4.5 Variables of the study

The details of composition of variables used in study are as following

4.5.1 Estimating productivity

TFP is formulated using LP-estimator, where output is a production function of observable inputs and an efficiency parameter. LP-estimator captures variations that are not captured by function of observable inputs (Sharma and Mishra, 2011).

TFP measures increase in output regardless of increase in total inputs, thus it measures shifts in output due to change in production over time (Chen et al., 2013).

TFP is obtained as residuals of the following function

$$Y_{it} = A_{it}F(K_{it}^{\alpha_k}, L_{it}^{\alpha_l}, M_{it}^{\alpha_m}) \quad \text{(4.5)}$$

Where Y_t is output (State of output to market) of firm i in period t; A_t is efficiency parameter (Hicksian neutral efficiency level) , F is function of observable inputs, K_{it} input is stock of capital, L_{it} Labour, M_{it} intermediate Materials.

Taking natural logs of equation 4.5 results, in linear function. $\ln(A_{it}) = \alpha_0 + \varepsilon_{it}$ A_{it} is unobservable to researcher i.e. it is a measure of ignorance due to variation in output which cannot be explained on observable inputs.

$$Y_{it} = \alpha_0 + \alpha_k K_{it} + \alpha_l L_{it} + \alpha_m M_{it} + \varepsilon_{it} \quad \text{(4.6)}$$

α_0 measures the efficiency level of firms over the time; ε_{it} includes constant and residual of error term which is further decomposed into “least predictable” and unobservable component (Sahu et al., 2011) shown in equation (4.7)

$$\varepsilon_{it} = ц_{it} + ц_{it}^{q} \quad \text{(4.7)}$$

This results in following equation

$$Y_{it} = \alpha_0 + \alpha_k K_{it} + \alpha_l L_{it} + \alpha_m M_{it} + ц_{it} + ц_{it}^{q} \ldots. (4.8)$$

where $\omega_{it} = \alpha_0 + ц_{it}$ represents the firm level productivity and $ц_{it}^{q}$ is an unexpected deviation from mean resulted because of measurement error[4]. The measure of productivity resulting from equation (4.8) is used to evaluate impact of variable directly at firm level.

Researchers typically estimate equation (4.9) to solve ω_{it} for estimating firm level productivity. Estimated productivity can be calculated as follow

$$\widehat{\omega}_{it} = Y_{it} - \hat{\alpha}_k K_{it} - \hat{\alpha}_l L_{it} - \hat{\alpha}_m M_{it} \ldots (4.9)$$

To predict the level of productivity LP-methodology, use exponential of $\widehat{\omega}_{it}$, i.e. $\widehat{\Omega}_{it} = \exp(\widehat{\omega}_{it})$ as per study of Levinsohn et al., (2004). The prediction assumes that all the inputs are in log form that accordingly adjust ω_{it} .

In this case TFP (multifactor productivity) is used, as this concept is time-invariant to the use of observable inputs. There are methodological issues when use Ordinary Least square since input function are most likely to be correlated with error term, which introduces the problem of simultaneity also known as endogeneity problem. More over this biasness will lead to failure in estimation of production function (Levinsohn et al., 2004; Sharma and Mishra, 2011; Vu, et al., 2016).

Levinson and Pertrin (2003) estimation technique is used to estimate TFP where labor is free variable and capital is quasi-fixed that coefficient of capital will point downwards if there is a positive association among labour and capital.

[4]Un-predictable shocks of productivity (Olley and Pakes, 1996)

LP-estimator recognizes endogeneity in the function. In this estimator intermediate materials are used to avoid biasness. STATA uses *levpet* command to measure TFP from Levinsohn–Petrin estimator (Levinsohn et al., 2004).

State of output (Y) can be considered as total sales of firms, i.e. gross manufacturing output (Sahu et al., 2011). Capital (K) depicts the quality of trade credit firm use, the extent firm levers up and stock of capital goods owned (Kumar et al.,1999).

Researchers while studying the capital structure use firm size as proxies (Dang et al., 2018). Larger the firm size, easier it is for firm to get financed. Total assets owned by firms indicate firm size and also their natural logarithm terms (Setiadharma and Machali,2017).

Labour (L) is determined from wage bill as it captures marginal products of heterogeneous labour units. It is measured using proxy wage, i.e. hours of work per employee (Lopes and Teixeira, 2012). Material (M) is calculated as costs of raw materials and processing materials used in production of finished goods (Sharma and Mishra, 2011).

An issue in estimation of production function is correlation between level of inputs and unobservable productivity shock. OLS introduces simultaneity problem as productivity and input choices are likely to be correlated. Olley and Pakes (1996) use the investment decision to proxy for unobserved productivity. Levinsohn and Petrin (2003) depends on intermediate inputs rather than investment as a proxy because firms typically report positive use of materials and energy in each year (Van Beveren, 2012).

Levpet function sometimes give strange looking results because there is not enough variation in data for separate identification of all coefficients while using output version procedure that is opposite to value-added version. Procedure estimates material coefficient to be exactly one,

such estimation results are discarded. In this scenario researcher has no choice but to shift the specification to value-added form (Arnold J. M. 2005).

The table 4.5 show the results of LP- production function. TFP is calculated through omega function using Stata.

Table: 4.5 Results of LP-estimation

Output(Y)	Coef.	Std.Err.	Z	P>|z|	[95% Conf.	Interval]
Labour (L)	0.235178***	0.258675	9.09	0.000	0.1844785	0.2858774
Capital (K)	0.712411***	0.930874	7.65	0.000	0.5299635	0.8948592

Wald test of constant returns to scale: Chi2 = 0.31 (p = 0.5775).

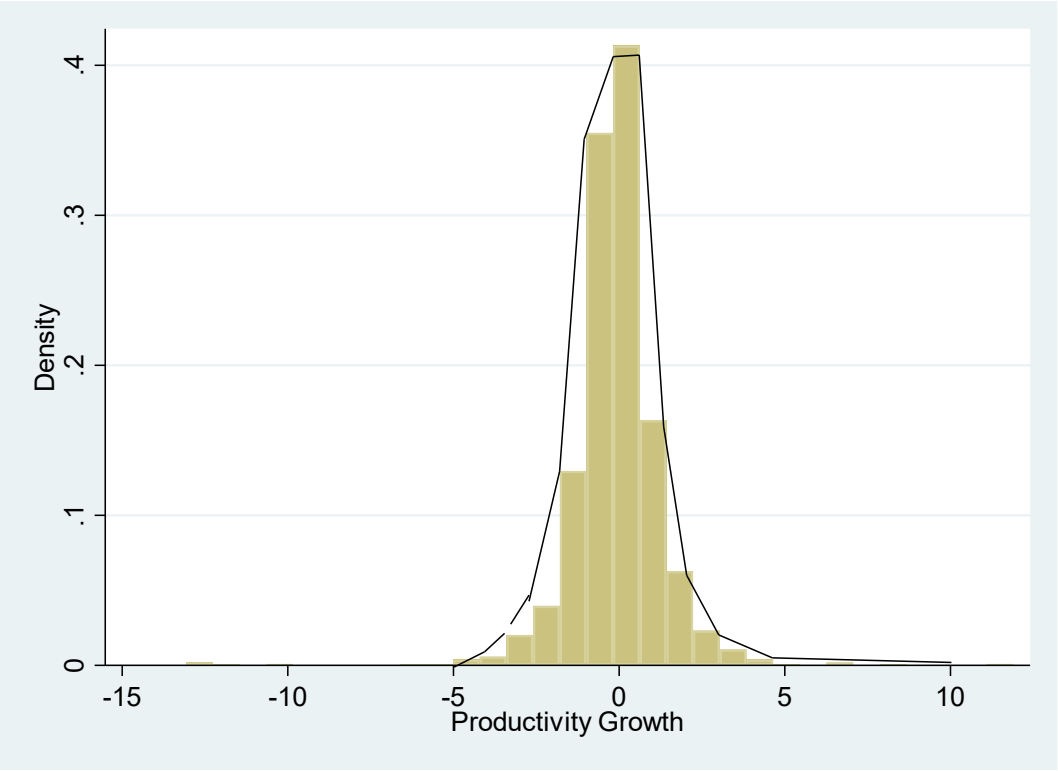

Figure 4.5. Firm productivity distribution

The plot in fig 4.5 shows productivity distribution of the sample that contains exporting firms of Pakistan. Almost half of observations display large number of less productive firms, which have negative productivity growth. Productivity distribution of firms, defined as logarithmic growth rate of total factor productivity.

4.5.2 Export orientation($Exports$)

In this study $Exports_{i,t-1}$ is a response variable in lagged form which is measured as natural logarithm of one plus to export share into total sales (Caglayan and Demir, 2014). Researcher add one, to exclude negative values of data prior to applying the log.

The study further classify exporting firms into 5 dummy variables on bases of export share in total sales. Each dummy variable is based on percentage level of threshold to classify firms with 10%, 25%, 50%, 75% and 100% output exported.

$D_{i,t-1}^{\text{Export} \leq 10\%}$, $D_{i,t-1}^{10\% < \text{Export} \leq 25\%}$, $D_{i,t-1}^{25\% < \text{Export} \leq 50\%}$, $D_{i,t-1}^{50\% < \text{Export} \leq 75\%}$, $D_{i,t-1}^{75\% < \text{Export} \leq 100\%}$ are dummy variables of firms at the 10%, 25%, 50%, 75% and 100%

export orientation thresholds. The estimation uses lagged dummy variables of export orientation to match it frequency of data.

For examining whether firms with higher export orientation behaves differently from others researcher divides firms' export orientation in quantiles to determine influence of productivity among low and higher export orientation. This requires export categorization which explores effects of changes in level of export orientation and productivity.

4.5.3 Real exchange rate appreciation (*S*)

The variable *S* is calculated as "12 months average of the logarithmic growth rate of real effective exchange rate[5]". An increase is real appreciation (Caglayan and Demir, 2014). The effect of real effective exchange rates is ambiguous on productivity.

On one hand, a currency appreciation may increase firm growth, due to falling cost of imported intermediate and capital goods, or lower wage demands because of lower expected domestic prices. It is also possible that, through balance sheet effects, exchange rate appreciation can improve the investment prospects of a firm that has heavily borrowed in foreign currency (Gupta et al., 2007).

In contrast, exchange rate appreciation decreases firms' export competitiveness and increases import competition. These factors—cheap imports, declining exports, and a possible deterioration in product quality due to lack of investment—in turn render the firm less productive as demand for its products declines (Desai et al.,2008).

[5] REER is a sort of adjustment for assessing the value of currency which explains countries competitiveness relative to other currencies (Spilimbergo et al., 2003; Chinn, 2006).
World bank regularly publish (REER) Consumer Price Index (CPI) based on individual countries. This holds international competiveness within foreign exchange rates. Here this study encounters a model in which inflation adjusted (real) effective (weighted) exchange rate is used.

4.5.4 Exchange rate uncertainty (σ)

Uncertainty influences the export behavior of firms (Caglayan and Demir, 2014). Asseery and Peel, (1991) literature shows that there are various methodologies to calculate uncertainty. The commonly employed measures of risk are the standard deviation approach and GARCH methodology.

Using logarithmic monthly real exchange rate series, researcher implement standard deviation approach to generate a measure of uncertainty (Ghosal and Loungani, 2000). The monthly observations are then annualized to match frequency of the panel data.

Uncertainty mimics volatility clustering that can be observed in high frequency financial series. Therefore, uncertainty and volatility can be used interchangeably in the study. An elevation in the uncertainty will have a negative effect on firms' productivity.

4.5.5 Debt markets ($Leverage$)

Leverage is debt to total asset ratio. It is an important measure under financial constraints as firms' financial health depends upon its ability to borrow. The financial constraints create disconnection between exporter and their productivity growth (Berman and Hericourt 2010).

The degree of financial health represents firms' finance cost to participate in foreign markets. Leverage influence the behavior of firms by disciplining management for interests of investors (Demir, 2013).

The study of Coricelli et al (2012) investigate that small firms have low leverage ratio comparative to large firms on average. Increase in value of debt is useful instrument for investment, but large loans have high cost of debt i.e. the interest company pays on borrowing encodes their default risk.

Therefore, companies shrink their size to avoid excessive loans. Highly-leverage firms reduce the incentives to invest in productive activities. Therefore, researcher investigates firms' ability to access leverage that may enhance productivity growth of export orientated firms'.

4.5.6 Firm size($Size$)

Firm Size is an important variable which signifies the productivity growth of a firm. Researchers can measure firm size by various proxies that includes, measuring the number of employees of the firm, calculating total assets, level of research and development and by calculating volume of sales.

Larger firms, have high financials and human resources, which provides better chance to enter in foreign market (Leung et al., 2008). Larger firms can reduce per unit cost of production, that increases the competitiveness. In addition, firm size improves the efficiency by producing variety of outputs known as economies of scope (Gabbitas and Gretton, 2003).

Size and productivity of exporting firms are found to be significant and positive in studies of Cheung and Sengupta (2012). Existing studies find that large firms are less financially constraint and exhibit higher cash flow.

Firm size is a control variable to that is held constant in the equation and for accurate ascription of the impact made to variable of interest. In equation 4.2, size is measured as logarithm of firm's entire assets (Devereux and Schiantarelli, 1990; Chen et al., 2013).

4.6 Estimation technique

To study the firms' productivity growth, we use GMM dynamic panel data estimator and implement a dynamic model adopted from empirical growth literature as in Caglayan and Demir, 2014; Aghion et al., 2009).

4.6.1 The GMM Estimator

Panel data is widely used recently by the researchers in different interest areas of economics and finance. GMM estimator is one of the best estimator for dynamic panel data estimation, as it gives consistent and reliable coefficient estimates of the variables.

Blundell-Bond (1998) is a dynamic panel data estimator, which recently became the most popular estimator among the researchers. This estimator is designed for situation when there are small number of time periods and large number of individuals (small T and large N).

While estimating the equation (4.2) and equation (4.3), researcher face major challenge of endogeneity. This will lead to a biased estimation. To tackle the unobserved heterogeneity and potential endogeneity we use System Generalized Method of Moments (GMM) developed by Blundell and Bond (1998).

The estimator combines in a system of equations with original equation that has a lag dependent variable that allows to takes into unobserved time-invariant bilateral specific effects. GMM transform the instruments instead of transforming the regressors, so that the instruments would become exogenous to the fixed effects.

However, due to the existence of autocorrelation in the error term, occasionally using lags as instruments would become invalid. There are various variables which are dynamic in nature, which means that they are depended upon their historical realizations.

The total factor productivity is one of them, which is dynamic in nature, as the last year TFP of a firm do have an influence on the current year's TFP, similar is case with variable like exports, real exchange rate appreciation and volatility, leverage and firm size.

Further, this estimator is used, when there are independent variables, correlated with either the contemporaneous or the past realizations of the error term, which indicates that the independent variables are not strictly exogenous, but rather they are either predetermined or endogenous.

4.6.2 Types of GMM estimator

There are two types of GMM estimator, namely, Arellano-Bond estimator (Difference GMM) and Blundell-Bond (1998) estimator (System GMM). In order to estimate the model, Arellano-Bond estimator (difference GMM) transform all the regressors, using differencing and then uses generalized method of moments.

On the other hand, Blundell-Bond (1998) estimator (System GMM) add an extra assumption, that first differences of the instruments variables are orthogonal to individual fixed effects. In fact, incorporating the above assumption intensely strengthens the efficiency of the estimator, by introducing an extra instrument. Blundell-Bond (1998) estimator consists a system of two equations, namely, the original equation and the transformed one, for that reason, it is called system GMM.

4.6.3 Why the Blundell-Bond (1998) estimator (System GMM estimator)

In real world, there are various variables which are dynamic in nature, which means that they are depended upon their historical realizations. The export performance of firms is one of them, which is dynamic in nature, as the last year export performance of a firm do have an influence on the current year's performance of the export, similarly last year productivity has influence on current year productivity.

The classical linear regression estimator (OLS) minimizes the residual sum of squares and its main assumption is that the regressors are uncorrelated to the error term. To estimate our model using classical linear regression estimators (OLS and 2SLS) would yield inconsistent results, as the dependent variable and its lag are correlated with the individual fixed effects, known as dynamic panel bias.

Thus, this correlation would attribute predictive power to the lagged dependent variable and will make it to be inflated. Beside this, the estimated coefficients are going to be underestimated. So, in this case, the OLS estimator provides unreliable and inconsistent coefficient estimates.

To handle problem of endogeniety there are two ways. First, to get rid of the fixed effects by transforming the data through difference GMM. Second, to find an instrument for lagged dependent variable, which is uncorrelated with error term and highly correlated with lagged dependent variable itself.

The estimator is designed for general application, it is not necessarily required to find instruments outside the dataset, rather the researchers can use instruments from within dataset. Usually, Yit-2 is considered as the natural candidate for lagged dependent variable, Yit-1. However, if the data are in transformed form, then, both Yit-2 and ΔYit-2 can be used as instruments for lagged dependent variable Yit-1.

These instruments are mathematically related to the lagged dependent variable, while uncorrelated to the error term. Therefore, in order to remove the dynamic panel bias and to make the estimation more efficient, Blundell-Bond (1998) transformed the instruments instead of transforming the regressors, so that the instruments would become exogenous to the fixed effects.

Further, it is also worth mentioning, that past changes in fact may carry more information about current levels. Moreover, it is not recommended to use deeper lags in GMM technique, as it may not reveal extra sufficient information, and using additional instruments will cause the problem of "many instruments" relative to the sample size, which will lead to the weakening of the power of over-identification test (Roodman, 2009).

It is the beauty of system GMM that time-invariant variables could also be incorporated in the model, which is not possible in differenced GMM, as through differencing, all the time invariant regressors and fixed effect is purged out from the model.

For the validity of the instruments, we will employ the J test of Hansen (1982). We will also apply the Arellano-Bond AR (2) test to observe the presence of second-order correlation in the residuals.

Chapter V

Results and Discussions

This chapter investigates the effects of exports share on firms' total factor productivity along with the other variables including the level and uncertainty of currency, leverage and firm size shown in equation 4.2. The results of two sets of regressions, equation 4.2 and augmented equation model based on equation 4.3 are presented in Table 5.1.

Table 5.1.Impact of Exports interaction with Exchange rate movement, uncertainty and Leverage on total factor productivity

	Dependent variable : $\Delta(tfp_{i,t})$				
REGRESSORS	(1)	(2)	(3)	(4)	(5)
$tfp_{i,t-1}$	-0.140***	-0.155***	-0.154***	-0.139***	-0.139***
	(0.0270)	(0.0304)	(0.0304)	(0.0270)	(0.0271)
$Exports_{i,t-1}$	0.103***	0.376***	1.580*	9.001**	8.789**
	(0.0286)	(0.134)	(1.638)	(4.353)	(4.307)
σ_{t-1}	-36.50***	-39.58***	-40.07***	-73.34***	-72.80***
	(6.535)	(8.716)	(6.946)	(18.91)	(19.14)
$S_{i,t-1}$	-10.06***	-11.25***	-12.37***	-17.89***	-17.70***
	(1.357)	(1.567)	(2.274)	(4.312)	(4.296)
$Leverage_{i,t-1}$	0.432***	2.045***	1.962***	0.432***	0.546**
	(0.0962)	(0.739)	(0.712)	(0.0948)	(0.245)
$Exports_{i,t-1} \times S_{i,t-1}$			0.332	2.460**	2.394**
			(0.442)	(1.197)	(1.184)
$Exports_{i,t-1\times}\sigma_{t-1}$		-0.0422		-11.50**	-11.32**
		(2.295)		(5.410)	(5.439)
$Exports_{i,t-1} \times Leverage_{i,t-1}$		0.386**	0.362**		0.0393
		(0.187)	(0.181)		(0.0730)
$Size_{i,t-1}$	0.115***	0.458***	0.463***	0.120***	0.120***
	(0.0366)	(0.101)	(0.108)	(0.0381)	(0.0389)
Constant	35.93***	36.21***	40.17***	64.20***	63.55***
	(4.779)	(5.273)	(7.870)	(15.40)	(15.35)
Observations	1,284	1,284	1,284	1,284	1,284
Number of cross sections	222	222	222	222	222
Number of instruments	205	206	206	205	205
N.Instrum./N. Cross-Section	0.923	0.927	0.927	0.923	0.923
Hansen J-Stat	197.44	199.36	197.52	191.90	192.93
p. value(I)	0.498	0.440	0.476	0.569	0.528
AR(1)	-4.72	-4.71	-4.70	-4.71	-4.71
p-value	0.000	0.000	0.000	0.000	0.000
AR(2)	-0.96	-0.91	-0.91	-0.98	-0.98
p-value	0.339	0.362	0.362	0.328	0.329

Notes: Estimate use two-step system GMM results - Blundell and Bond (1998). All growth rates are measured by logarithmic differences. Lagged levels of the series provide weak instruments for first differences in this case. Marginal significance levels refer to significance at (***) donates 0.01, (**) donates 0.05, and (*) donate 0.1. tfp is calculated using production function by LP Methodology-Levisohn and Petrin (2003). σ is real effective exchange rate uncertainty; S is annual logarithmic growth rate of real effective exchange rate; *Leverage* is log of liabilities to assets ratio; *Export* is log of one plus foreign sales in total sales. $Size$ is the logarithm of firm's total assets. ($Exports_{i,t-1} \times S_{i,t-1}$),($Exports_{i,t-1\times}\sigma_{t-1}$),($Exports_{i,t-1} \times Leverage_{i,t-1}$) determines export interaction with real exchange rate appreciation, uncertainty and leverage on productivity growth of firms**.** AR (1) and AR (2) tests check presence of first and second-order serial correlation respectively in the first difference residuals. Hansen J Stat is test for over-identification restriction.t-values in parenthesis computed from White heteroscedasticity –consistent standard error. P-values are given for test statistics.

5.1 The impact of lagged productivity, export share, currency appreciation and uncertainty of exchange rates, leverage and size on productivity growth of firms

In Table 5.1, lagged productivity has a negative and significant coefficient for all models, which imply that less productivity firms catch up quickly with their more productivity counterparts.

In Column 1 finds that firms' export participation has positive and significant impact on firms' productivity i.e. firms' with greater export share has high productivity across all the specifications.

The literature has provided enough evidence to support the argument that exporters are more productive. Results demonstrates that exports with coefficient of 0.103 points, having positive sign that is significant at one percent level of significance.

Exchange rate uncertainty has highly significant and negative impact on firms' total factor productivity. The literature has shown that uncertainty adversely impact the investment decisions of firms.

This imply that firms do not invest in productivity enhancing technologies and strategies when volatility is enhancing. Thus negative significance at one percent level with a coefficient of 36.50 points indicates that exchange rate volatility will cause productivity of exporting firms to decrease.

Column 1 also reveals that currency appreciation have a significant negative impact on productivity. An increase is a real appreciation. This indicates that negative effects of currency appreciation out weight positive effect. The effects of appreciations are ambiguous.

Exchange rate appreciation decreases the export performance and competitiveness hence deteriorating the trade and productivity while it increases import competition. The factors

include declining exports, cheap imports or possible deterioration in product quality due to lack of investments, as a result demand for its product declines and in turn render the firm to be less productive.

While Leverage appears with positive signs indicating that productivity of exporting firms enhances with external financing as it contributes positively to productivity. The firm's ability to borrow do affect the export performance positively and significantly. The coefficient estimates 0.432 and statistically significant at one percent shows TFP increases with leverage.

The Size of firm show that larger firms are more productive and have fast growth. This indicates that firms size play an important role in engaging firms in global market competition and in export performance thus enhancing total factor productivity of firms.

The J-statistics tests validity of instruments to anticipate orthogonality conditions. These results are in accordance with anticipated hypothesis.

5.2 Impact of exports interaction with currency appreciation and uncertainty, and leverage on productivity

The second column of table 5.1 presents the results based on equation 4.3, which augments the equation 4.2 model with export and exchange rate uncertainty and leverage interactions. These interactions allow us to determine whether impact of export orientation of firms' on productivity varies depending on firms' access to exchange rate uncertainty and leverage.

The interaction of export and uncertainty on productivity allows us to determine exporting behavior of firms under the impact of uncertainty. The change in export-uncertainty interaction emerges with negative insignificant coefficient of 0.0422 as firms that export found to perform worst under exchange rate shocks although the marginal effect of exchange rate uncertainty is found to be lower for these firms while having leverage interaction in regression model.

The estimation suggests that exporters having access to leverage have positive and significant impact having coefficient of 0.386 significant at five percent. This give us insight that exporting firms having access to external financing increases productivity which minimizes the impact of exchange rate uncertainties, showing that having easier access to outside capital increase financial health thus TFP rises.

The third column of table 5.1 based on export and real exchange rate appreciation and leverage interactions. The results of exports-real exchange rate appreciation suggest insignificant positive coefficient of 0.332 while including leverage and export interaction.

This can be explained by the fact that leverage helps to improve the productivity of export oriented firms to be able to stay competitive in export market thus minimizing the significant effect of exchange rate appreciation. The effect of leverage and export interaction is significant and positive at five percent with coefficient of 0.362 thus the effects of real exchange rate appreciations disappear.

To quantify the impact of exchange rate movement and export orientation on productivity, the forth column introduces the effects of exports and exchange rate uncertainty and currency appreciation interactions while dropping leverage-export interaction.

Consistent with previous researches, the effects of exchange rate uncertainty on productivity of export oriented firms have negative significance at five percent with coefficient of 11.50. This imply that net effect of uncertainty is higher on export oriented firm thus decreasing the productivity.

Furthermore, real exchange rate appreciation brings improvement in productivity as portraying positive significance at five percent with coefficient of 2.460 which imply that export oriented

firms need an improvement in their productive to be able to stay competitive while exchange rate appreciates.

This can be possible either because falling cost of imported intermediates and capital goods, can be possible with firms' that heavily relay on borrowing in foreign currency. There might be lower wage demand because of lower expected domestic prices. All of these conditions prove that currency appreciation can improve the investment prospective and may increase the firm growth.

The results that are introduced in column five demonstrates the level and uncertainty of exchange rate and leverage on productivity growth of export oriented firms. The overall result from uncertainty is same as previous studies i.e. negatively significant at five percent with coefficient of 11.32 thus confirming that exchange rate uncertainty has statistically and economically negative impact on productivity growth of export oriented firms.

Likewise, exports and leverage has positive but insignificant impact under the effect of level and uncertainty of exchange rate interactions, thus causing cost of debt to become large as exporting firms borrow in foreign currencies. Similarly, appreciation and export interaction is positively significant thus indicating that firms have to enhance their productivity to stay competitive in market.

The Table 5.2, classify export variable in 5 dummy variables based on 10%, 25%, 50%, 75% and 100% export orientation threshold to study the importance of changes in export orientation on productivity.

Table 5.2 Exports orientation dummy interactions with currency appreciation, uncertainty and Leverage on total factor productivity

Dependent variable :$\Delta(tfp_{i,t})$	
$tfp_{i,t-1}$	-0.243***
	(0.0522)
$Exports_{i,t-1}$	0.408***
	(0.394)
σ_{t-1}	
$S_{i,t-1}$	
$Leverage_{i,t-1}$	
${D_{i,t-1}}^{Export \leq 10\%} \times S_{i,t-1}$	14.26***
	(3.787)
${D_{i,t-1}}^{10\%<Export \leq 25\%} \times S_{i,t-1}$	13.47***
	(3.750)
${D_{i,t-1}}^{25\%< Export \leq 50\%} \times S_{i,t-1}$	14.96***
	(3.730)
${D_{i,t-1}}^{50\%< Export \leq 75\%} \times S_{i,t-1}$	14.14***
	(3.773)
${D_{i,t-1}}^{75\%< Export \leq 100\%} \times S_{i,t-1}$	15.80***
	(3.792)
${D_{i,t-1}}^{Export \leq 10\%} \times \sigma_{t-1}$	-69.90***
	(20.52)
${D_{i,t-1}}^{10\%<Export \leq 25\%} \times \sigma_{t-1}$	-0.158
	(25.00)
${D_{i,t-1}}^{25\%< Export \leq 50\%} \times \sigma_{t-1}$	-62.52**
	(28.89)
${D_{i,t-1}}^{50\%< Export \leq 75\%} \times \sigma_{t-1}$	-12.24
	(39.01)
${D_{i,t-1}}^{75\%< Export \leq 100\%} \times \sigma_{t-1}$	-95.00***
	(26.30)
${D_{i,t-1}}^{Export \leq 10\%} \times Leverage_{i,t-1}$	2.279**
	(0.899)
${D_{i,t-1}}^{10\%<Export \leq 25\%} \times Leverage_{i,t-1}$	2.687*
	(1.438)
${D_{i,t-1}}^{25\%< Export \leq 50\%} \times Leverage_{i,t-1}$	0.0604
	(0.658)
${D_{i,t-1}}^{50\%< Export \leq 75\%} \times Leverage_{i,t-1}$	0.694
	(0.909)
${D_{i,t-1}}^{75\%< Export \leq 100\%} \times Leverage_{i,t-1}$	2.356**
	(1.170)
$Size_{i,t-1}$	0.681***
	(0.187)
Constant	42.73***
	(12.90)
Observations	1,284
Number of cross sections	222
Number of instruments	167
N.Instrum./N. Cross-Section	0.752
Hansen J-Stat	162.84
p-value(I)	0.191
AR(1)	-5.03
p-value	0.000
AR(2)	-0.49
p-value	0.624

Notes: Estimate use two-step system GMM results -Blundell and Bond (1998). All growth rates are measured by logarithmic differences. Lagged levels of the series provide weak instruments for first differences in this case. Marginal significance levels refer to significance at (***) donates 0.01, (**) donates 0.05, and (*) donate 0.1. tfp is calculated using production function by LP methodology-Levinsohn and Petrin (2003). σ is real effective exchange rate uncertainty; S is annual logarithmic growth rate of real effective exchange rate; *Leverage* is log of liabilities to assets ratio; $Size$ is the logarithm of firm's total assets; *Export* is log of one plus foreign sales in total sales. To explore the effects of changes in export orientation on productivity, export classification of export oriented firms is done by taking 5 dummy variables. ${D_{i,t-1}}^{Export \leq 10\%}$, ${D_{i,t-1}}^{10\%<Export \leq 25\%}$, ${D_{i,t-1}}^{25\%<Export \leq 50\%}$, ${D_{i,t-1}}^{50\%<Export \leq 75\%}$, ${D_{i,t-1}}^{75\%<Export \leq 100\%}$ which takes 1 for firms at the 0%-10%,11%-25%, 26%-50%, 51%-75% and 75%-100% export orientation thresholds, respectively. Combining the impact of export orientation dummies with $S_{i,t-1}$, σ_{t-1} and $Leverage_{i,t-1}$ provides comparison to explore effect and changes in export orientation on productivity in response to the exchange rate movement, uncertainty and the leverage. AR (1) and AR (2) tests check presence of first and second-order serial correlation respectively in the first difference residuals. Hansen J Stat is test for over-identification restriction. t-values in parenthesis computed from White heteroscedasticity–consistent standard error. P-values are given for test statistics.

Table 5.2, demonstrate the regression of equation 4.4, which augments baseline model with interactions of export orientation thresholds level at 10%, 25%, 50%, 75% and 100% output exported while neglecting the impact of level and uncertainty of exchange rate and leverage due to multi-collinearity and for specifically determining productivity of export oriented firms and under economic influence of exchange rate movements and debt financing.

Export classification of firms' export orientation at 0%-10% with currency appreciation on productivity refine analysis with coefficient of 14.26 having positive and significant effect at one percent. This can be explained on the facts that real exchange rate interaction with at 0%-10% of output exporting firms need to improve their productivity to be able to stay competitive when real exchange rate appreciates.

Similarly, 10%-25% export orientation-real exchange rate appreciation interaction shows positive coefficient of 13.47 at significance level of one percent, determining that exporters at 10%-25% output exported should improve their productivity to meet their competitiveness under exchange rate appreciation. Export classification at 25%-50% and 50%-75% have positive and significant coefficients of 14.96 and 14.14 at one percent significance.

Currency appreciation can increase the firm growth by falling cost of imported goods. Wage demands gets low because of lower domestic prices. While firms 75%-100% export share have positive and significant coefficient of 15.80 which is significant at one percent.

Larger firms usually pause productions or firms are relaying on heavily borrowing on foreign currencies when currency appreciates thus productivity enhances. These positive and significant results captures improvement in productivity when exporting firms are in economic influence of currency appreciation. Export oriented firms take measures to improve their productivity to stay competitive when currency appreciates.

Uncertainty and export classification appears to be negative and significant for firms that export under threshold of 0-10%,25%-50% and 75%-100% with significance level at one percent, five percent and one percent respectively. This shows that uncertainty on these threshold is higher.

These results are consistent with previous researches, which shows exchange rate uncertainty has generally negative and significant impact on trade flows (Baum & Caglayan.,2010; Arize et al., 2008; Sauer & Bohara, 2001). Estimations suggest that firms' with 10%-25% and 50%-75% export share takes negative yet insignificant coefficients, this implies that net effect of uncertainty is higher on productivity of export oriented firms' and trade flow.

Leverage and export classification interactions appears to have positive and significant impact on productivity for firms that export under threshold of 0-10%,10%-25% and 75%-100% with significance level at five percent, ten percent and five percent respectively. As increase in leverage provide more financial opportunities to exporting firms for investment in their manufacturing and technological upgradation.

Leverage and exports classification at 25%-50% and 50%-75%, interactions appear to be insignificant yet positive. Thus positive sign indicates that firms can pledge for more collateral tangible assets to enhance their financial health in terms of having easier access to outside capital thus increasing the productivity. An availability of external finance contributes positively to productivity of export oriented firms.

Results are persistent with previous predications, and consistent with previously reported regression results that are affirmed in research of Caglayan and Demir (2014). The findings demonstrate, exchange rate appreciation is positive and significant at different export orientation threshold thus export oriented firms need to improve their productivity to be able to stay competitive.

Similarly, uncertainty interaction at different export orientation threshold appears to be negative which imply that uncertainty has significant and generally negative impact on trade flow thus net effect of uncertainty on export orientation threshold is higher.

Leverage have positive impact in productivity growth of exporting firms. Although results are similar to the previous equation 4.3, but export classification of firms' export orientation help us to study the divided sample in order to explore the effects of changes in export orientation on productivity.

Chapter VI

Conclusion and Policy Implications

6.1 Summery of the study

This study investigates the impact of export orientation of firms on firm level productivity growth. Researcher augment model using interaction terms to understand the joint economic effect of currency appreciation, exchange rate uncertainty and leverage on firm level productivity.

The study use firm level unbalanced panel data set of non-financial firms of Pakistan for the period 2009-2017. The aim is to investigate how export orientated firms can have competitive advantage in economic growth and international trade.

Literature also cover firms' dynamics of exporting behaviors. Export oriented firms can be classified as those firms with on average, that export more than 0%,10%,25%,50% and 75% to explore the effects of changes in export orientation on productivity.

As exporter depends on external financing so uncertainties and appreciation of currency values do impact export decisions. Leverage and its significance plays an important role in growth of exporters when supplied with additional credit, their productivity enhances.

6.2 Key findings

The most striking findings of the study are as follow. Exports has economically and statistically positive and significant effect on productivity. Which can be explained by fact that firms participating in exporting activates are more productive (Clerides et al., 1998; Bernard and Jensen, 1999; Delgado et al., 2002).

The empirical analysis reveals that real exchange rate appreciation have significant and negative impact on productivity growth. Although, export oriented firms are quite resilient and show improvements in productivity when currency appreciates.

As domestic currency appreciates so outwards-oriented firms have to improve their productivity to stay competitive. On other hand inwards-orientated firms are priced out of domestic market as import competition rises thus decreasing the investment in productivity and technologies. These results in line with hypothesis 2.

Moreover, exchange rate uncertainty has negative effect on productivity. The exchange rate uncertainty impact productivity growth of export oriented firms significantly which proves hypothesis 3 that higher level of volatility will have adverse effects on productivity of export oriented firms.

Likewise, leverage is found to have positive and significant effect on productivity. Export oriented firms are more productive when they use leverage to invest in productivity enhancing technologies. Through balance sheet effect, it is also possible that exchange rate appreciation improves the investment prospects of firms that have borrowed heavily in foreign currency thus it proves the hypothesis that TFP increases as leverage rise.

Export classification of firms' export orientation provide us with more insight that how statistically and economically firms have gains in their productivity. Although regression results were similar to equation (3) nevertheless this approach requires an export classification of firms' export orientation to explore the effects of changes in export orientation on productivity.

6.4 Limitation of study

The study is conducted on unbalanced panel dataset from year 2001-2017, but due to missing data values of variables researcher had no choice except to reduce data set to 2009-2017. The externally imported variable i.e. REER had to be annualized from monthly measures to match frequency of dynamic panel data. Some of the data was collected from hardcopy of State Bank of Pakistan journal.

Proxies were used to determine Levinsohn-petrin productivity function. The financial statement analysis of non-financial sectors provided by SBP had limited balance sheet analysis items due to which researcher had to be really specific in proxy selection, for the variables used in the study.

LP-estimator is a general model of determining TFP at firm level. The function sometimes estimates strange looking results because there might not be enough variation in data for separate identification of all coefficients while using revenue output version. Sometimes material coefficient is estimated to be exactly one, such results are to discarded. In this case researcher has no choice but to shift the specification to value-added form.

Many researches take productivity measure as labour productivity, due to lack of data of labour productivity researcher had to shift towards total factor productivity measure. Although there were lots of economic level aggregated productivity researches, but firm level productivity researches in dimension of finance is limited.

6.3 Policy implication and future directions

Overall this study shows that exchange rate uncertainty has an adverse impact in long run on productivity of export oriented firms. As currency appreciates, only possibility for export oriented firms is to improve their productivity to stay competitive. Furthermore, productivity growth premium is observed higher in leveraged export oriented firms.

The study presents response of 241 export oriented firms under economic impact of level and uncertainty of exchange rate and leverage on firms' productivity growth. These firms are survivors who have been involved in exporting activity among the total of 411 firms. Overall in reality impact of exchange rate movement is more severe than reported here.

This study can be extended in several directions. One can work on private firms, analysis may provide an interesting comparison of productivity across privately and publically listed firms. However, one can explore such effects through other channels, such as aggregate economic level effects.

One can also provide evidences to explore exporting behaviors by learning-by-exporting hypothesis and self-selection hypothesis using a firm level data set to find productivity gains for firm shipping their products.

Export is a main pillar of economic growth. The government are required to regulate the export market, by providing subsidies and tariffs relaxations. It is also mandatory for governments to regulate foreign exchange markets so to limit the impact of currency appreciation and uncertainties of exchange rates.

Trade liberation and efficient financial institutionalization in a country can increase exports and investor's trust to invest. Firms can improve their investment prospects in balanced economy. This mechanism will attract foreign business to invest, thus more FDI's will help

country to maintain a balanced real effective exchange rate, thus maintain a balanced index in stock market, this enhances aggregate productivity of a country.

Learning behavior and sense of competition will give new insight to product range and product quality. Innovation in production will increase efficiency, domestic producer can meet the demand of the order in time. Labors will be paid well and good will of company will increase.

Productivity has a vital impact in long run, it is an inborn ability of a firm to be productive. Only productive firms can enter in export market. This aggregate productivity can only be achieved by eliminating white collar crimes like corruption, money laundering, tax theft, and financial frauds.

References

- Aghion, P., Bacchetta, P., Ranciere, R., & Rogoff, K. (2009). Exchange rate volatility and productivity growth: The role of financial development. *Journal of Monetary Economics*, 56(4), 494–513.
- Ahn, S. (2005). Does exporting raise productivity? Evidence from Korean microdata. Working Papers id:3302, e-socialsciences.
- Aizenman, J., & Marion, N. (1999). Volatility and investment: interpreting evidence from developing countries. *Economica*, 66(262), 157–179.
- Arize, A. C., Osang, T., & Slottje, D. J. (2008). Exchange-rate volatility in Latin America and its impact on foreign trade. *International Review of Economics & Finance*, 17(1), 33-44
- Arnold, J. M. (2005). Productivity estimation at the plant level: A practical guide. *Unpublished manuscript*, 27.
- Arnold, J. M., & Javorcik, B. S. (2009). Gifted kids or pushy parents? Foreign direct investment and plant productivity in Indonesia. *Journal of International Economics*, 79(1), 42-53.
- Asseery, A., & Peel, D. A. (1991). The effects of exchange rate volatility on exports: Some new estimates. *Economics letters*, 37(2), 173-177.
- Aw, B. Y., and A. Hwang (1995). Productivity and the Export Market: A Firm- Level Analysis. *Journal of Development Economics* 47 (2): 313-332.
- Aw, B. Y., Roberts, M. J., & Winston, T. (2007). Export market participation, investments in R&D and worker training, and the evolution of firm productivity. *World Economy*, 30(1), 83-104.
- Balassa, B. (1978). Exports and economic growth: further evidence. *Journal of development Economics*, 5(2), 181-189.

- Baum, C. F., Caglayan, M., & Talavera, O. (2010). On the sensitivity of firms' investment to cash flow and uncertainty. *Oxford Economic Papers*, 62(2), 286–306.
- Berkes, M. E., Panizza, U., & Arcand, M. J. L. (2012). Too Much Finance? *International Monetary Fund*, (No. 12-161).
- Berman, N., & Hericourt, J. (2010). Financial factors and the margins of trade: Evidence from cross-country firm-level data. *Journal of Development Economics*, 93(2), 206-217.
- Bernard, A. B., & Wagner, J. (1997). Exports and success in German manufacturing, *Review of World Economics,*133(1), 134-157.
- Bernard, A. B., and J. B. Jensen (1999). Exceptional Exporter Performance: Cause, Effect, or Both? *Journal of International Economics* 47 (1): 1-25.
- Bernard, A. B., J. Eaton, J. B. Jensen, and S. Kortum (2003). Plants and Productivity in International Trade. *American Economic Review* 93 (4): 1268-1290
- Bernanke, B., & Gertler, M. (1990). Financial fragility and economic performance. *Quarterly Journal of Economics,* 105(1), 87–114.
- Berthou, A., Dhyne, E., Bugamelli, M., Cazacu, A. M., Demian, V., Harasztosi, P., & Soares, A. C. (2015). Assessing European firms' exports and productivity distributions: the CompNet trade module. *Working Paper research,* No 282.
- Blundell and Bond (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87(1): 115-143.
- Blalock, G., & Gertler, P. J. (2004). Learning from exporting revisited in a less developed setting. *Journal of Development Economics*, 75(2), 397–416.
- Braun, M., & Larrain, B. (2005). Finance and the business cycle: International, inter-industry evidence. *The Journal of Finance*, 60(3), 1097–1128

- Caglayan, M., & Demir, F. (2014). Firm productivity, exchange rate movements, sources of finance, and export orientation. *World Development*, 54(1), 204-219.
- Calvo, Guillermo A. and Carmen M. Reinhart (2002) "Fear of Floating," *Quarterly Journal of Economics*, 107(2), 379-408.
- Calvo, G. A., Izquierdo, A., & Mejía, L. F. (2008). Systemic sudden stops: the relevance of balance-sheet effects and financial integration. *National Bureau of Economic Research*. No w14026.
- Cameron, A. C., & Trivedi, P. K. (2010). Microeconometrics using stata (Vol. 2). College Station, TX: Stata press.
- Campa, J., & Goldberg, L. S. (1995). Investment in manufacturing, exchange rates and external exposure. *Journal of International Economics,* 38(3-4), 297-320.
- Chaney, T. (2016). Liquidity constrained exporters. *Journal of Economic Dynamics and Control,* 72(1), 141-154.
- Chen, M., & Guariglia, A. (2013). Internal financial constraints and firm productivity in China: Do liquidity and export behavior make a difference? *Journal of Comparative Economics*, 41(4), 1123-1140.
- Cheung and Sengupta (2012). "Impact of Exchange Rate Movements on Exports: An Analysis of Indian Non-Financial Sector Firms." *Journal of International Money and Finance* 39(1): 231-245
- Chinn, M. D. (2006). A primer on real effective exchange rates: determinants, overvaluation, trade flows and competitive devaluation. *Open economies review*, 17(1), 115-143.
- Coricelli, F., Driffield, N., Pal, S., & Roland, I. (2012). When does leverage hurt productivity growth? A firm-level analysis. *Journal of international Money and Finance*, 31(6), 1674-1694.

- Crespi, G., Criscuolo, C., & Haskel, J. (2008). Productivity, exporting, and the learning-by-exporting hypothesis: direct evidence from UK firms. *Canadian Journal of Economics*, 41(2), 619-638.
- Criscuolo, C., Haskel, J. E., & Slaughter, M. J. (2010). Global engagement and the innovation activities of firms. *International Journal of Industrial Organization*, 28(2), 191-202.
- Dang, C., Li, Z. F., & Yang, C. (2018). Measuring firm size in empirical corporate finance. *Journal of Banking & Finance*, 86, 159-176.
- De Loecker, J. (2007). Do exports generate higher productivity? Evidence from Slovenia. *Journal of international economics,* 73(1), 69-98.
- Delgado, Miguel A., Farinas, Jose C and Sonia Ruano (2002) "Firm productivity and export markets: a non-parametric approach", *Journal of International Economics,* Vol 57(2): 397-422.
- Demir, F. (2010). Exchange rate volatility and employment growth in developing countries: Evidence from Turkey. *World Development,* 38(8), 1127–1140.
- Demir, F. (2013). Growth under exchange rate volatility: Does access to foreign or domestic equity markets matter? *Journal of Development Economics*, 100(1), 74-88.
- Demirhan, A. A. (2016). Export Behavior of the Turkish Manufacturing Firms. *Emerging Markets Finance and Trade*, 52(11), 2646-2668.
- Desai, M. A., Foley, C. F., & Forbes, K. J. (2008). Financial constraints and growth: Multinational and local firm responses to currency depreciations. *The Review of Financial Studies,* 21(6), 2857–2888.
- Devereux, M. and F. Schiantarelli (1990), 'Investment, Financial Factors and Cash Flow Evidence from UK Panel data. *National Bureau of Economic Research,* p. 279-306

- Dimelis, S., & Louri, H. (2002). Foreign ownership and production efficiency: a quantile regression analysis. Oxford Economic Papers, 54(3), 449-469
- Eichengreen, B., & Hausmann, R. (2005). The Pain of original Sin. *Other people's Money: Debt Denomination and Financial Instability in Emerging Market Economies,* Chicago University.
- Falk, M., & de Lemos, F. F. (2019). Complementarity of R&D and productivity in SME export behavior. *Journal of Business Research,* 96, 157-168.
- Forlani, E. (2010). Liquidity constraints and firm's export activity. *Development Studies Working Paper*, (291).
- Fryges, H., & Wagner, J. (2008). Exports and productivity growth: First evidence from a continuous treatment approach. *Review of World Economics,* 144(4), 695-722.
- Gabbitas, O. & Gretton, P. (2003). "Firm Size and Export Performance: Some Empirical Evidence." *Productivity Commission Staff Research Paper,* April 2003.
- Ghosal, V., & Loungani, P. (2000). The differential impact of uncertainty on investment in small and large businesses. *Review of Economics and Statistics,* 82(2), 338–343.
- Girma, S., Greenaway, A., & Kneller, R. (2004). Does exporting increase productivity? A microeconometric analysis of matched firms. *Review of International Economics*, 12(5), 855-866.
- Goldberg, L. S. (2004) "Industry-specific exchange rates for the United States" *Federal Reserve Bank of New York Economic Policy Review*, 10(1).
- Greenaway, D., A. Guariglia, and R. Kneller. 2007. "Financial Factors and Exporting Decisions." *Journal of International Economics* 73 (2): 377–395.
- Greenaway, D., Guariglia, A., & Yu, Z. (2014). The more the better? Foreign ownership and corporate performance in China. *The European Journal of Finance*, 20(7-9), 681-702.

- Griliches, Z. (1979). Issues in Assessing the Contribution of R&D to Productivity Growth. *Bell Journal of Economics* 10 (1): 92-116.
- Griliches, Z. (1990). Patent Statistics as Economic Indicators: A Survey. *Journal of Economic Literature* 28 (4): 1661-1707.
- Gupta, P., Mishra, D., & Sahay, R. (2007). Behavior of output during currency crises. *Journal of international Economics*, 72(2), 428-450.
- Head, K., & Ries, J. (2003). Heterogeneity and the FDI versus export decision of Japanese manufacturers. *Journal of the Japanese and international economies*, 17(4), 448-467.
- Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *American economic review*, 94(1), 300-316.
- Hiep, N., & Ohta, H. (2009). Superiority of exporters and the causality between exporting and firm characteristics in Vietnam. *RIEB (Research Institute for Economics & Business Administration) Discussion Paper Series*, 239.
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American economic review*, 76(2), 323-329.
- Kandilov, A. T., & Leblebicioglu, A. (2011). The impact of exchange rate volatility on plant-level investment: Evidence from Colombia. *Journal of Development Economics,* 94(2), 220–230.
- Kemal, A. R., Din, M., Qadir, U., Fernando, L., & Colombage, S. (2002). Exports and Economic Growth in South Asia" *A Study prepared for the South Asia Network of Economic Research Institutes.*
- Klein, M. W., Schuh, S., & Triest, R. (2003). Job creation, job destruction and the real exchange rate. *Journal of International Economics*, 59(2), 239–265.

- Krugman, P. R. (2008). *International economics: Theory and policy, 8/E*. Pearson Education India.
- Kumar, K. B., Rajan, R. G., & Zingales, L. (1999). *What determines firm size?* (No. w7208). National Bureau of Economic Research.
- Leung, D., Meh, C., & Terajima, Y. (2008). *Firm size and productivity* (No. 2008, 45). Bank of Canada Working Paper.
- Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. *The Review of Economic Studies*, 70(2), 317-341.
- Li, H., Ma, H., & Xu, Y. (2015). How do exchange rate movements affect Chinese exports? —A firm-level investigation. *Journal of International Economics*, 97(1), 148-161.
- Lopes, A. S., & Teixeira, P. (2012). Worker productivity and wages: Evidence from linked employer-employee data.
- Macas Nunes, P., Neves Sequeira, T., & Serrasqueiro, Z. (2007). Firms' leverage and labour productivity: a quantile approach in portuguese firms. *Applied Economics*, 39(14), 1783-1788.
- Mahmood, A., & Ahmed, W. (2017). "Export Performance of Pakistan: Role of Structural Factors". SBP Staff Notes 02/17.
- Manova, K. (2012). Credit constraints, heterogeneous firms, and international trade. *Review of Economic Studies*, 80(2), 711-744.
- Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695-1725.
- Melitz, M. J., & Ottaviano, G. I. (2008). Market size, trade, and productivity. *The review of economic studies,* 75(1), 295-316.

- Minetti, R., & Zhu, S. C. (2011). Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics*, 83(2), 109-125.
- Mitton, T. (2006). Stock market liberalization and operating performance at the firm level. *Journal of Financial Economics*, 81(3), 625-647.
- Nucci, F., Pozzolo, A., & Schivardi, F. (2005). Is firm's productivity related to its financial structure? Evidence from microeconomic data. *Rivista di politica economica*, 95(1), 269-290.
- Olley, G. S., & Pakes, A. (1992). *The dynamics of productivity in the telecommunications equipment industry* (No. w3977). National Bureau of Economic Research.
- Park, A., D. Yang, X. Shi, and Y. Jiang. 2010. "Exporting and Firm Performance: Chinese Exporters and the Asian Financial Crisis." *Review of Economics and Statistic* 92 (4): 822–842.
- Petrin, A., Poi, B. P., & Levinsohn, J. (2004). Production function estimation in Stata using inputs to control for unobservables. *Stata journal*, 4(1), 113-123.
- Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and statistics*, *71*(1), 135-158.
- Sahu, S. K., & Narayanan, K. (2011). Total factor productivity and energy intensity in Indian manufacturing: A cross-sectional study. *International Journal of Energy Economics and Policy,* 1(2), 47-58.
- Sauer, C., & Bohara, A. K. (2001). Exchange rate volatility and exports: regional differences between developing and industrialized countries. *Review of International Economics*, 9(1), 133-152.

- Setiadharma, S., & Machali, M. (2017). The Effect of Asset Structure and Firm Size on Firm Value with Capital Structure as Intervening Variable. J*ournal of Business & Financial Affairs,* 6(4), 1-5.
- Sharma, C., & Mishra, R. K. (2011). Does export and productivity growth linkage exist? Evidence from the Indian manufacturing industry. *International review of applied economics*, 25(6), 633-652.
- Spilimbergo, Antonio and Athanasios Vamvakidis (2003) "Real Effective Exchange Rate and the Constant Elasticity of Substitution Assumption.'' *Journal of International Economics* 60(2):337–354.
- Toraganlia, N., & Yalcin, C. (2016). Exports, Real Exchange Rates and External Exposures: Empirical Evidence from Turkish Manufacturing Firms.
- Van Beveren, I. (2012). Total factor productivity estimation: A practical review. *Journal of economic surveys*, 26(1), 98-128.
- Vu, H. V., Holmes, M., Tran, T. Q., & Lim, S. (2016). Firm exporting and productivity: what if productivity is no longer a black box. *Baltic Journal of Economics,* 16(2), 95-113.
- Wagner, J. (2006). Exports, foreign direct investment, and productivity: Evidence from German firm level data. *Applied Economics Letters,* 13(6), 347-349.
- Wagner, J. (2006). *International firm activities and innovation: Evidence from knowledge production functions for German firms* (No. 25). University of Luneburg working paper series in economics.
- Wagner, J. (2007). Exports and Productivity: A Survey of the Evidence from Firm Level Data. *The World Economy* 30 (1): 60-82.
- Weiss, J. (2005). *Export growth and industrial policy: Lessons from the East Asian miracle experience (No. 26)*. ADB Institute Discussion Papers.