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Journal of Business, Economics and Finance

ISSN 2146-7943

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Journal of Business, Economics and Finance
Year: 2016 Volume: 5 Issue: 3

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ABSTRACTING AND INDEXING

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Journal of Business, Economics and Finance
Year: 2016 Volume: 5 Issue: 3

THE DYNAMIC INTERACTIONS OF WORLD NATURAL GAS MARKETS *

DOI: 10.17261/Pressacademia.2016321971

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ABSTRACT

The aim of this study is to analyse the short and long-term interactions between the natural gas markets in the context of Europe, Japan and the US that are the main constituents of natural gas consumption in the world and between the natural gas and oil markets. Within the framework of this study co-integration test is performed and the variable groups that have long-term relationships with each other are presented. Finally, the pairwise Granger causality test is performed in order to examine the short-term causality relationships and the results of uni-directional, bi-directional and non-casual relationships are found.

Keywords: energy market, natural gas, liberalization, cointegration, causality
JEL Classification: C10, F14, L95

1. INTRODUCTION

There are many energy sources in the world, besides their allocation and consumption are not well matched with each other. While some of the energy sources are consumed where they are produced, some are being shipped to remote areas. Natural gas is believed to be the most important energy source in meeting the global energy demand for the near future. The shipment of gas is carried out by the liquefied natural gas (LNG) form at -260 degrees Fahrenheit through pipelines to a liquefaction facility, which is generally located next to a port or railhead. After the liquefaction process, LNG can be loaded to a ship or a railroad car and carried to the facility destination at which it will re-gasified and shipped to the required destination through pipelines. In other words, LNG provides the transportation of natural gas. Barnes and Bosworth (2015) questioned whether the integration of global natural markets has increased as the trade of LNG has increased because of the decreasing transportation costs. The authors found that the increase in LNG trade plays a significant role on the increase of the integration of global natural gas markets. With the usage of LNG, the restriction on the trade between global natural gas markets started to decrease. As a result it became very important to deliver transfer LNG to multiple countries in order to increase the natural gas integration. When compared with traditional compressed natural gas (CNG), LNG has multiple delivery points and provides flexibility in gas shipments.

International Energy Agency points out that when compared with other energy sources, natural gas is friendlier with the environment, energy supply diversification is more efficient, and storage is easier and safer, cheaper and cleaner than gasoline and produces less greenhouse emissions. There are three main regional gas markets; OECD Europe, North America and Japan/South Korea. The natural gas import trade among them is as follows:

* This study was orally presented at The 5th Multinational Energy and Value Conference held between 7th–9th May 2015, Istanbul, Turkey and only the abstract was published in the conference booklet.

Europe is mainly importing from Norway, Russia and Algeria, North America is mainly importing from Canada and Mexico and Japan/South Korea is mainly importing from Indonesia, Australia, Malaysia and the Middle East. As the pipeline infrastructure and LNG shipment capacity are limited. In order to understand the dynamic interactions of natural gas prices in Europe, Japan and United States first of all the geographic, infrastructure and the market conditions of these three countries should be examined. The law of one price suggests that in a perfectly competitive market two identical goods should have the identical prices but the natural gas prices differ in the market. Natural gas prices can be affected due the specific supply and transportation costs, demand, weather and geographical conditions and diversification of import. Furthermore, because the supply of natural gas is limited with specific countries, a possibility of political risk may also affect the gas prices segmentation (Siliverstovs et al., 2005).

To start with European natural gas market structure, according to U.S. Energy Information Administration (http://www.eia.gov/todayinenergy/detail.cfm?id=15411) all EU members beside Turkey, Norway, Switzerland and the non-EU Balkan states, in 2013 30% of the totally natural gas consumption 30% of it was supplied by Russia. In addition to Russia, the natural gas imported to Europe is provided by Central Asia, the Middle East and Africa. EIA estimates that in 2030 Europe will have a dependency of more than 80% on natural gas import as its own reserves have decreased. Algerian gas serves to southern Europe whereas Norway and Netherlands serve to northern. Russian gas dominates in Germany and Italy where there is no LNG capacity beside Spain is the one with the biggest LNG consumer in Europe. Depending on this information, it is clear that Europe gas import depends on non-European gas and the gas infrastructure is needed to be expanded by installing new pipelines and LNG facilitates (Renour-Maissant, 2012). According to U.S. Energy Information Administration (http://www.eia.gov/countries/cab.cfm?fips=JA), Japan is the world's largest LNG importer with 37% of global purchase since 2012 beside its natural gas pipeline transmission infrastructure is not enough to meet this demand. The geographical location in which it is surrounded by mountains which restricts the pipeline system and the past regulation system in which the government restricted the investment for the sector can be shown as the main reasons. Mainly after the Fukushima disaster, Japan has turned its way to LNG in order to compensate the lost nuclear energy generation. Furthermore, Japan considers about the environmental factors, as a result in the reduction of greenhouse emissions natural gas seems to be the cleanest fossil fuel for Japanese. The prices of Asian LNG that depend on global crude oil prices have increased as a result of high demand of Japanese natural gas especially after Fukushima and the high crude oil prices until the middle of 2014. The recent decline in oil prices will seem to have a positive effect on Japanese revenues, which have been lower.

Natural gas market of United States is a big market with high number of suppliers, production capability and pipeline network inside. Recently, unconventional gas started to take place in the market, which has three types; shale gas, coal seam gas and tight gas. The major natural gas resources of the world are in the form of shale gas. The geographic distribution of shale gas is very important for the global energy sector. North America, South America, South Africa, Europe, Middle Asia and Arabia all have shale gas but for the United States shale gas seems to provide energy independency. The rest of the paper is organized as follows: Data and empirical methodology is given in the next section. Section 3 provides a summary statistics of the empirical findings. The paper ends with the conclusions and implications.

2. DATA AND METHODOLOGY

This paper investigates the short and long-term interactions among European, Japan and the United States natural gas markets and between the natural gas and oil markets. The methodology part is based on the study of Siliverstovs et al. (2005). The data covers the period of February 2000 to December 2010, totally 131 observations. For the empirical analysis, the data on energy prices are collected from the data book of Energy Prices and Taxes Statistics, which is published by International Energy Agency (IEA) in quarterly periods and the related databases are reached from OECD iLibrary (http://www.oecd-ilibrary.org/). These data are composed of average import prices within the context of Europe (Pipeline Gas and Liquefied Natural Gas/LNG), Japan (LNG) and the United States (Pipeline Gas and LNG), the average Henry Hub spot prices that reflect the natural gas spot prices along with Brent and West Texas Intermediate crude oil average spot prices that are taken as a benchmark for international oil prices.

First of all, in order to have compatibility among different prices, gas prices are converted into US$ per MBtu by IEA, using average conversion factors and oil prices are converted into US$/MBtu using the standard conversion factor (1bbl crude=5.46 MBtu). In the next step, unit root tests (Augmented Dickey Fuller, Phillips Peron and Kwiatkowski-Phillips-Schmidt-Shin) are applied in order to examine the stability series. According to Augmented Dickey Fuller (ADF) test, the first difference of the variable is that it is regressed on its own delayed value and the delayed values of its first differences and hence it is tested whether ADF coefficient is zero or not (Dickey and Fuller, 1979). Another unit root test made for the determination of stability is called Phillips-Perron (PP). The distribution theory on which Dickey-Fuller tests are based on assumes that the errors are statistically independent and have a fixed variance. Phillips-Perron (1988) approach allows loosening these assumptions relating to the distribution of errors (Enders, 1995). If the series of the variables are both integrated of the same order, the presence of a long-term relationship (co-integration vector) is investigated by using the co-integration test developed by Johansen (1988; 1991) and Johansen and Juselius (1990). Co-integration implies that there is a causal relationship between the variables but it does not reveal the direction of it. In the case of detection of a relation of co-integration that indicates the existence of a long-term relation between the variables, relations of Granger (1969) causality must be analyzed.

3. FINDINGS AND DISCUSSIONS

The results of ADF and PP unit root tests are presented in Appendix 1-2. The null hypothesis for the ADF and PP tests is that the variable has a unit root and is not stationary. All of the results indicate that the variables are non-stationary in level I (0), on the other hand the price series are stationary, I (1) when their first differences are taken. Findings of ADF unit root test are also supported by the findings of PP test. Once the unit root test results show that all variables are integrated at first level I (1), tests for co-integration can be applied. Appendix 3 reveals Johansen co-integration test results as determined by the Max-Eigenvalue and trace methods which examine the presence of a long-term co-integration relationship among European, Japan and the United States natural gas markets and between the natural gas and oil markets. The results display that there exists two-way co-integration vector between Henry Hub-Pipe US and Pipe Europe-Henry Hub whereas a single co-integration vector between Brent-LNG Europe, WTI oil-LNG Europe, WTI-Pipe Europe, Pipe US- LNG Europe, Pipe Europe-LNG Europe and Pipe Europe-Brent. There is no long-run relationship among other variables. Both the results of trace statistic and maximum eigenvalue support each other.

These results reveal that there is regional gas market integration in United States as the null hypothesis of no co-integration between Henry Hub spot prices and pipeline gas import prices is rejected with 1% significance level supporting the results of De Vany and Walls (1993), Serletis and Herbert (1999) and Siliverstovs et al. (2005). Moreover, there is a regional market integration in Europe, as the null hypothesis of no co-integration between LNG Europe and Pipe Europe is rejected with 1% significance level supporting the results of Asche et al. (2011, 2002), Siliverstovs et al. (2005) and Renour-Maissant (2012). It is found that there is a strong evidence of co-integration between the price of Brent oil and each of the European gas prices and between the price of WTI oil and each of the European gas prices at 1% significance level. Differently from the results of Siliverstovs (2005) and the multidimensional scaling analysis, the null hypothesis of no co-integration between European and Japanese gas markets is not rejected. Having found evidence of a co-integrating relationship, this implies causality in at least one direction. This paper evaluates Granger causality through a pairwise Granger causality test as short-run causality. From Appendix 4, it is deduced that there is a bi-directional causality between the Henry Hub-Pipe US, LNG Japan-LNG Europe and LNG Japan-Brent oil. Moreover, there is a uni-directional causality running from Henry Hub to LNG Europe, LNG Japan and Pipe Europe, from Brent oil to Pipe US, LNG Europe, LNG Japan and Pipe Europe, from WTI oil to LNG Europe, LNG Japan and Pipe Europe, from LNG Japan to Pipe US and Pipe Europe and lastly from Pipe US to Pipe Europe. There is no causal relationship between Brent-Henry Hub, WTI-Henry Hub and WTI-Pipe US.

4. CONCLUSION

This study analyzed the short and long-term interactions among the natural gas markets in the context of Europe, Japan and the United States that are the main constituents of natural gas consumption in the world and between the natural gas and oil markets covering the period from 2000.02 to 2010.12. The question of

whether natural gas markets are integrated with liberalization is important for many researches as many industrialized countries are trying to liberalize their natural gas markets by giving permission to third party access to infrastructure, reducing trading barriers and introducing privatization in order to increase efficiency and decrease prices. Considering the findings, the results of this study demonstrate that the interaction of natural gas markets within the inter-continental area is limited, whereas the natural gas markets of continental countries are liberalized that is consistent with the results of De Vany and Walls (1993), Serletis and Herbert (1999) for North America, Asche et al. (2011, 2002), and Renour-Maissant (2012) for Europe. Moreover, the study of Siliverstovs et al. (2005) is the first that regards the degree of natural gas market integration internationally and the findings of this study support them.

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Appendix 1: Augmented Dickey Fuller (ADF) Unit Root Test Results

Variable	ADF (Level)		ADF (First Difference)	
	Constant	Constant-Trend	Constant	Constant-Trend
LN(BRENT)	-1.207 [1] (0.669)	-2.789 [1] (0.203)	-9.641 [0]*** (0.000)	-9.606 [0]*** (0.000)
LN(WTI)	-1.309[1] (0.623)	-2.884 [1] (0.171)	-8.669 [0]*** (0.000)	-8.637 [0]*** (0.000)
LN(HENRY HUB)	-2.506 [0] (0.116)	-2.320 [0] (0.419)	-10.613 [0]*** (0.000)	-10.632 [0]*** (0.000)
LN(PIPE EUROPE)	-1.464 [3] (0.548)	-2.647 [3] (0.260)	-4.285 [2]*** (0.0007)	-4.286 [2]*** (0.0045)
LN(LNG EUROPE)	-1.481 [0] (0.539)	-2.012 [0] (0.588)	-9.834 [0]*** (0.000)	-9.805 [0]*** (0.000)
LN(PIPE US)	-2.599 [0]* (0.095)	-2.453 [0] (0.359)	-9.832 [0]*** (0.000)	-9.840 [0]*** (0.000)
LN(LNG US)	-2.182 [0] (0.213)	-2.133 [0] (0.522)	-10.433 [0]*** (0.000)	-10.448 [0]*** (0.000)
LN(LNG JAPAN)	-1.041 [2] (0.737)	-3.588 [2]** (0.034)	-4.820 [1]*** (0.0001)	-4.822 [1]*** (0.0007)
Critical Value 1%	-3.481	-4.030	-3.481	-4.030
Critical Value 5%	-2.883	-3.445	-2.883	-3.445
Critical Value 10%	-2.578	-3.147	-2.578	-3.147

Notes: MacKinnon (1996) one-sided p-values. The optimal lag-length for the test was selected by Schwarz Information Criterion. *, ** and * denote statistical significance at 1%, 5% and 10% level of significance respectively.**

Appendix 2: Phillips-Perron (PP) Unit Root Test Results

Variable	PP (Level)		PP (First Difference)	
	Constant	Constant-Trend	Constant	Constant-Trend
LN(BRENT)	-1,115 [2] (0.708)	-2.770 [3] (0.210)	-9.635 [1]*** (0.000)	-9.600 [1]*** (0.000)
LN(WTI)	-1.272 [3] (0.641)	-2.780 [4] (0.207)	-8.701 [2]*** (0.000)	-8.670 [2]*** (0.000)
LN(HENRY HUB)	-2.752 [5]* (0.068)	-2.604 [5] (0.279)	-10.635 [4]*** (0.000)	-10.650 [4]*** (0.000)
LN(PIPE EUROPE)	-1.556 [6] (0.501)	-2.083 [6] (0.549)	-10.682 [6]*** (0.000)	-10.711 [6]*** (0.000)
LN(LNG EUROPE)	-1.612 [5] (0.473)	-2.543 [6] (0.307)	-9.964 [4]*** (0.000)	-9.939 [4]*** (0.000)
LN(PIPE US)	-2.846 [5]* (0.054)	-2.734 [5] (0.224)	-9.786 [3]*** (0.000)	-9.790 [3]*** (0.000)
LN(LNG US)	-2.268 [1] (0.183)	-2.256 [1] (0.454)	-10.412 [3]*** (0.000)	-10.422 [4]*** (0.000)
LN(LNG JAPAN)	-0.905 [7] (0.783)	-2.573 [7] (0.293)	-8.282 [6]*** (0.000)	-8.258 [6]*** (0.000)
Critical Value 1%	-3.481	-4.030	-3.481	-4.030
Critical Value 5%	-2.883	-3.444	-2.883	-3.445
Critical Value 10%	-2.578	-3.147	-2.578	-3.147

Notes: MacKinnon (1996) one-sided p-values. The optimal lag-length for the test was selected by Newey-West using Bartlett Kernel . * and * denote statistical significance at 1% and 10% level of significance respectively.**

Appendix 3: Johansen Co-Integration Test Results

Variables	Hypothesis	Eigenvalue	TraceStatistic	Prob.	Max-EigenStatistic	Prob.
Henry Hub	H_0: r=0	0.222	38.313***	0.000	31.684***	0.000
Pipe US [4]	H_0: r≤1	0.051	6.628***	0.0010	6.628***	0.0010
Henry Hub	H_0: r=0	0.074	13.239	0.106	9.932	0.216
LNG Europe [1]	H_0: r≤1	0.025	3.306	0.069	3.306	0.069
Henry Hub	H_0: r=0	0.058	8.899	0.374	7.772	0.402
Brent [1]	H_0: r≤1	0.008	1.127	0.288	1.127	0.288
Brent	H_0: r=0	0.066	10.690	0.231	8.773	0.305
Pipe US [2]	H_0: r≤1	0.014	1.916	0.166	1.916	0.166
Brent	H_0: r=0	0.349	55.020***	0.000	54.227***	0.000
LNG Europe [4]	H_0: r≤1	0.006	0.793	0.373	0.793	0.373
Brent	H_0: r=0	0.038	5.344	0.771	4.873	0.757
LNG Japan [7]	H_0: r≤1	0.003	0.471	0.492	0.471	0.492
WTI	H_0: r=0	0.057	9.809	0.295	7.611	0.419
Henry Hub [2]	H_0: r≤1	0.017	2.197	0.138	2.197	0.138
WTI	H_0: r=0	0.066	11.413	0.187	8.755	0.307
Pipe US [2]	H_0: r≤1	0.020	2.658	0.103	2.658	0.103
WTI	H_0: r=0	0.305	46.870***	0.000	46.017***	0.000
LNG Europe [4]	H_0: r≤1	0.006	0.852	0.355	0.852	0.355
WTI	H_0: r=0	0.042	5.712	0.729	5.318	0.701
LNG Japan [7]	H_0: r≤1	0.003	0.393	0.530	0.393	0.530
WTI	H_0: r=0	0.227	33.616***	0.000	32.580***	0.000
Pipe Europe [4]	H_0: r≤1	0.008	1.036	0.308	1.036	0.308
LNG Japan	H_0: r=0	0.080	10.411	0.250	10.401	0.186
Henry Hub [6]	H_0: r≤1	8.71E-05	0.010	0.917	0.010	0.917
LNG Japan	H_0: r=0	0.086	11.181	0.200	11.175	0.145
Pipe US [6]	H_0: r≤1	5.54E-05	0.006	0.933	0.006	0.933
LNG Japan	H_0: r=0	0.047	6.832	0.597	6.095	0.601
LNG Europe [6]	H_0: r≤1	0.005	0.737	0.390	0.737	0.390
LNG Japan	H_0: r=0	0.042	5.712	0.729	5.318	0.701
WTI [7]	H_0: r≤1	0.003	0.393	0.530	0.393	0.530
Pipe US	H_0: r=0	0.092	15.036*	0.058	12.470*	0.094
LNG Europe [1]	H_0: r≤1	0.019	2.565	0.109	2.565	0.109
Pipe Europe	H_0: r=0	0.112	19.117**	0.013	15.432**	0.032
Henry Hub [1]	H_0: r≤1	0.028	3.685*	0.054	3.685*	0.054
Pipe Europe	H_0: r=0	0.088	13.257	0.105	11.668	0.123
Pipe US [4]	H_0: r≤1	0.012	1.589	0.207	1.589	0.207
Pipe Europe	H_0: r=0	0.169	25.028***	0.0014	23.359***	0.0014
LNG Europe [4]	H_0: r≤1	0.013	1.669	0.196	1.669	0.196
Pipe Europe	H_0: r=0	0.246	36.710***	0.000	35.737***	0.000
Brent [4]	H_0: r≤1	0.007	0.972	0.324	0.972	0.324
Pipe Europe	H_0: r=0	0.055	11.327	0.192	7.283	0.456
LNG Japan [3]	H_0: r≤1	0.031	4.043	0.044	4.043	0.044

Notes: MacKinnon-Haug-Michelis (1999) p-values [ ] Lag Length. *, ** and * denote statistical significance at 1%, 5% and 10% level of significance respectively.**

Appendix 4: Pairwise Granger Causality Tests Results

Null Hypothesis	F-Statistic	Prob.	Lags	Causal Relation
PGUS does not granger cause HENRY HUB (HH) HENRY HUB does not granger cause PGUS	3.536*** 41.341***	0.009 1E-21	4	HH↔PGUS
LNGEUR does not granger cause HENRY HUB HENRY HUB does not granger cause LNGEUR	0.875 9.174***	0.351 0.003	1	HH→LNGEUR
BRENT does not granger cause HENRY HUB HENRY HUB does not granger cause BRENT	0.831 0.266	0.363 0.606	1	No causal relation
PGUS does not granger cause BRENT BRENT does not granger cause PGUS	0.332 2.449*	0.718 0.090	2	BRENT→PGUS
LNGEUR does not granger cause BRENT BRENT does not granger cause LNGEUR	1.537 21.777***	0.195 2E-13	4	BRENT→LNGEUR
LNGJAP does not granger cause BRENT BRENT does not granger cause LNGJAP	0.713 14.801***	0.660 2E-13	7	BRENT→LNGJAP
HENRY HUB does not granger cause WTI WTI does not granger cause HENRY HUB	0.178 0.816	0.837 0.444	2	No causal relation
PGUS does not granger cause WTI WTI does not granger cause PGUS	0.379 3.312	0.684 0.039	2	No causal relation
LNGEUR does not granger cause WTI WTI does not granger cause LNGEUR	1.901 19.624***	0.114 2E-12	4	WTI→LNGEUR
LNGJAP does not granger cause WTI WTI does not granger cause LNGJAP	0.717 15.814***	0.657 3E-14	7	WTI→LNGJAP
PGEUR does not granger cause WTI WTI does not granger cause PGEUR	1.123 11.472***	0.348 7E-08	4	WTI→PGEUR
LNGJAP does not granger cause HENRY HUB HENRY HUB does not granger cause LNGJAP	1.611 2.583**	0.150 0.022	6	HH→LNGJAP
PGUS does not granger cause LNGJAP LNGJAP does not granger cause PGUS	1.599 2.571**	0.153 0.022	6	LNGJAP→PGUS
LNGEUR does not granger cause LNGJAP LNGJAP does not granger cause LNGEUR	3.135*** 9.102***	0.007 4E-08	6	LNGJAP↔LNGEUR
WTI does not granger cause LNGJAP LNGJAP does not granger cause WTI	15.814*** 0.717*	3E-14 0.717	7	WTI→LNGJAP
LNGJAP does not granger cause BRENT BRENT does not granger cause LNGJAP	0.276 3.968**	0.599 0.048	1	BRENT→LNGJAP
HENRY HUB does not granger cause PGEUR PGEUR does not granger cause HENRY HUB	11.677*** 0.379	0.0009 0.539	1	HH→PGEUR
PGUS does not granger cause PGEUR PGEUR does not granger cause PGUS	2.444* 1.186	0.0503 0.320	4	PGUS→PGEUR
LNGEUR does not granger cause PGEUR PGEUR does not granger cause LNGEUR	5.340*** 6.416***	0.0005 0.0001	4	LNGJAP↔BRENT
BRENT does not granger cause PGEUR PGEUR does not granger cause BRENT	12.087*** 1.031	3E-08 0.394	4	BRENT→PGEUR
PGEUR does not granger cause LNGJAP LNGJAP does not granger cause PGEUR	1.661 4.747***	0.179 0.003	3	LNGJAP→PGEUR

Note: *, ** and * denote statistical significance at 1%, 5% and 10% level of significance respectively.**

Journal of Business, Economics and Finance (JBEF), ISSN: 2146 - 7943

Journal of Business, Economics and Finance

Year: 2016 Volume: 5 Issue: 3

GENDER EARNINGS GAP IN URBAN PAKISTAN: EVIDENCE FROM ORDINARY LEAST SQUARES AND QUANTILE REGRESSIONS

DOI: 10.17261/Pressacademia.2016321972

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ABSTRACT

The objective of this paper is to analyze the gender earning gaps existing in urban areas of Pakistan using data from a household survey. The earning functions have been estimated separately for males and females using Ordinary Least Squares (OLS) as well as quantile regressions including education, literacy, experience, employment related variables such as type of industry and occupation and age as explanatory variables. The earning gaps between males and females have also been analyzed using the Blinder-Oaxaca decomposition method. Results suggest higher mean earnings for males as compared to females but higher incremental returns to investment in human capital for females at all levels of education. Further, higher returns to schooling have also been noted in bottom part of the income distribution i.e. 5th& 25th quantiles for workers of both sexes as compared to those present in the top of the distribution i.e. 75th& 95th quantiles at all educational levels. Education, industry of employment and occupations has been emerged as the main determinants of income gap between male and female workers in urban Pakistan.

Keywords: Education, employment, gender earnings gap, quantile regression, Pakistan.

JEL Classification: I26, J16, C21

1. INTRODUCTION

Gender equality is treated as a fundamental human right (UNDP, 2014b) and is a necessary foundation for peaceful, prosperous and sustainable world (UN, 2016). It improves the prospects of families, communities and nations and cause improvement in productivity as well as increase in income (UNDP, 2014a). Gender equality is also included in the Sustainable Development Goals (SDGs) to be achieved by 2030 and adopted by the United Nation's member states at the Sustainable Development Summit on September, 2015 (UNDP, 2016). Despite being included in the United Nation's Millennium Development Goals (MDGs), adopted by the world leaders under Millennium Declaration at the turn of the century, as one of the goals (Malhotra, Pande, & Grown, 2003) and witnessing considerable reductions, gender disparities still exist in number of indicators of education and employment in developing countries (UN, 2014). Moreover, it is also a fact and widely observed consistent phenomenon that women earn less than men (Polachek & Xiang, 2014) in spite of implementation of anti-discrimination policies and increased participation of women in the labor force as well as acquisition of higher women's capital.

Gender equality has been an interesting area for labor economists as well as for policy makers (Jung, 2014). The earnings of workers have been at the core of empirical research in the field of economics and other social sciences for decades (Montenegro & Patrinos, 2014). The differences between earnings of male and female workers expressed as percentage of male earning is termed as gender wage gap (Taniguchi & Tuwo, 2014). In the context of Pakistan, major contributions in the field of gender earnings gap come from but not limited to Ashraf and Ashraf (1993); Nasir (1998); Ashraf (2001); Aslam (2005); Nasir (2005); Siddiqui (2007); Qureshi (2012); and Ali and Akhtar (2014). All of these studies are based on estimation of earning functions through

conventional method of Ordinary Least Squares (OLS). As OLS regression technique give summary estimates by calculating the average effects of explanatory variables on the dependent variable (Coad & Rao, 2007) and is based on the mean of the conditional distribution of dependent variable in the regression analysis (Martins & Pereira, 2004; Wu & Liu, 2009). A more complete picture can be obtained by computing several regression curves matching to different percentage points of each distribution through quantile regressions (Cade & Noon, 2003; Coad & Rao, 2007; Pham & Reilly, 2007). The results of quantile regression (QR) are typically robust even for skewed distributions containing outliers in the response variables (Coad & Rao, 2007; Pham & Reilly, 2007) and are considered a standard analytical tool in the income and wage studies (Yu, Lu, & Stander, 2003). The current study is different from the earlier ones in number of ways. First, it is based on data for urban paid employees only and second, earning functions have been estimated by applying QR in addition to OLS. Third, gender earning gaps have been decomposed using Oxaca-Blinder decompostion method.

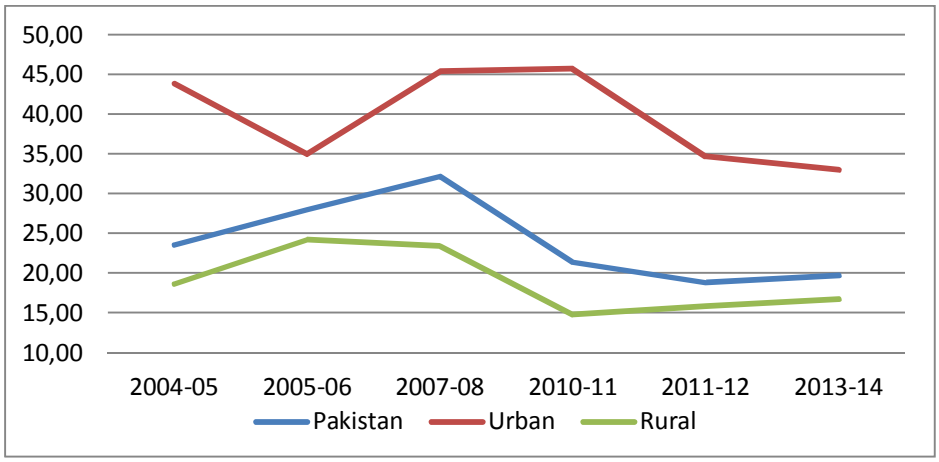
We have analyzed gender differences in income through Mincerian earning functions across various levels of education, experience, industry of employment, occupation and age for full-time paid employees residing in urban areas of Pakistan. In the context of Pakistan's labor market, the need of fresh study on gender earning gap arises on account of adverse law and order situation, increase in rate of inflation, growing energy crises tied with decreasing growth rate of economy. We have found higher mean earnings for males as compared to females but higher incremental returns to investment in human capital for females as compared to males at all levels of education. Our finding of higher incremental returns to education for females in comparison to males is in line with previous research done in Pakistan that includes Ashraf & Ashraf (1993), Nasir (1998), Ashraf (2001), Nasir (2005), Aslam (2005), Ali (2007), Siddiqui (2007), Qureshi (2012) and Ali & Akhtar (2014). While most of the previous studies on gender earnings differential in Pakistan are based on OLS, we have also estimated earning functions using QR.

According to results of QR, higher returns to schooling have been noted in bottom part of the income distribution i.e. 5^{th}& 25^{th} quantiles both for men and women as compared to those present in the top of the distribution i.e. 75^{th}& 95^{th} quantiles at all educational levels. Further, we have also found education, industry of employment and occupations as the main determinants of income gap between male and female workers in urban Pakistan. The rest of the paper is organized as follows. Some stylized facts in Pakistan's labor market are presented in the section II. Theoretical framework and data are discussed in section III whereas empirical results and findings are discussed in the section IV. Finally section V concludes the paper.

2. GENDER ISSUES IN PAKISTAN'S LABOR MARKET

Like other developing countries, substantial imbalances also exist in Pakistan's labor market and can be found in various socio-economic aspects such as labor force participation rate, employment and unemployment, enrolment and literacy rates, life expectancy and most importantly income of the male and female workers. Figure 1 shows the recent trend in gender wage gaps in terms of average monthly income of employees in Pakistan and its rural and urban areas from 2004-05 to 2014-15. The substantial differences in gender wage gap in urban and rural areas of Pakistan can be noticed. The downward trend in gender wage gap in urban areas is also visible.

Figure 1: Average Monthly Income of Female Employees as % Age of Males



Source: Authors' calculations based on HIES (Various issues)

2.1.Educational Attainment

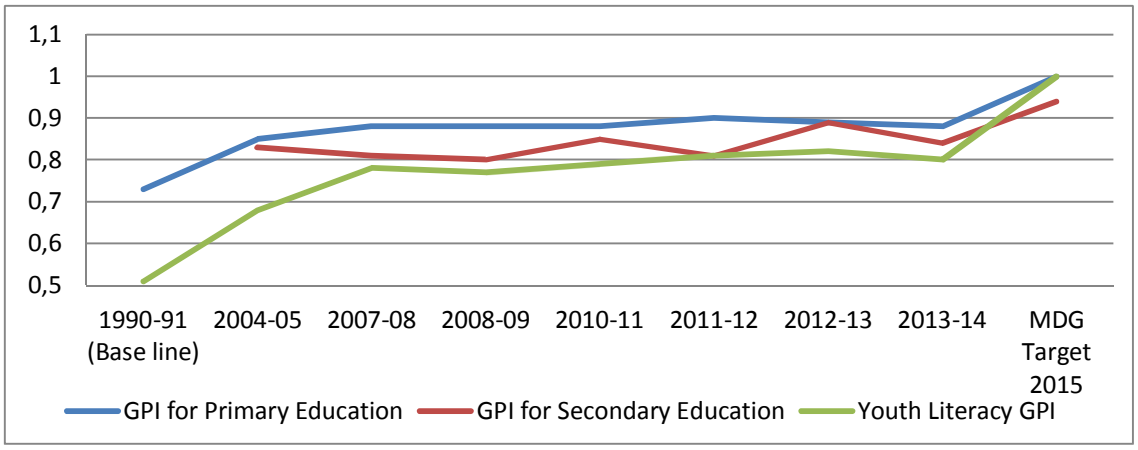
Investment in education is believed to bring justice, prosperity and opportunity (Brown, 2003) and improvement in social status (Bauer, Feng, Riley, & Xiaohua, 1992). Educational credentials are also considered to have strong bond with good jobs (Bauer, et al., 1992; Brown, 2003), higher rewards (Brown, 2003) and improved occupational status (Bauer, et al., 1992). In the words of Brown (2003) "Credentials are the currency of opportunity".

According to Sarwar, et al., (2013) human capital formation is the only way to reverse the negative impacts of growing population for a developing country like Pakistan because it directly improve earning ability of the poor (Son, 2010; Yamauchi, 2010). Human capital is also a fundamental factor for the improvement of living standards of people in a country (Dougherty & Herd, 2008). But, a fundamental challenge in fostering human capital formation lies in promoting the educational capital (Guichard & Larre, 2006). Education being the most important element of human capital is two ways process (Afzal, Malik, Begum, Sarwar, & Fatima, 2011) which faster economic growth (Jehan, 2000) and productivity on one side and reduces poverty on the other side (Afzal, et al., 2011; Montenegro & Patrinos, 2014).

In Pakistan, the gender differences between males and females exist in educational attainment. For example, literacy rate for males was 71% as compared to 48% for females during 2012-13 (Finance, 2014). Similarly, gross enrolment rate was 98% for males as compared to 83% for females whereas as net enrolment rate was 61% males and 54% for females (Finance, 2014).

Development of education was also included in the MDG's adopted by the UN. Pakistan had to achieve 100% primary education and 88% literacy rate by 2015 with gender parity index (GPI) equal to one. However, Pakistan has missed the MDG's goals as the overall literacy rate was just 58% against the target of 88% during 2013-14. Further, gender disparity in terms of literacy also exist in Pakistan which is clear from the fact that 47% of female were literate against 70% of males (Pakistan Economic Survey, 2014-15). Pakistan could not achieve the goals set in the MDGs due to lack of sustained leadership, economic instability, political turmoil, insecurity and recurrent natural disasters (UNDP, 2015). Albeit having witnessed considerable improvement if compared with baseline scenario in 1990-91, gender disparities still prevail not only in primary and secondary education but also in literacy in Pakistan (Figure 2).

Figure 2: Pakistan's Educational Achievements towards MDG's Targets

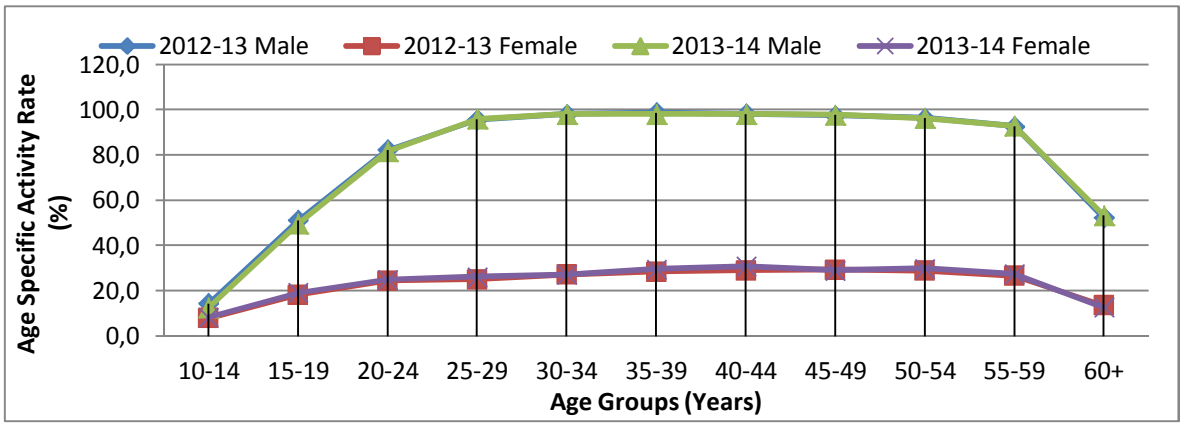


Source: Authors Elaborations upon data from PSLM 2013-14

2.2. Population and Employment

Currently, Pakistan is the 6th most populous country of the world (Sarwar, Fakher, Ali, & Mudassar, 2013) with total estimated population of 191.7 million in 2015 out of which 48.3 % were females (MOF, 2014). Whereas composition of population by sex has remained stagnant since last housing and population census in1998, the trend of growing urbanization is evident from the fact that proportion of urban population has increased from 32.5% in 1998 to 38% in 2013 (PBS, 2014). In the current study, we have restricted our analysis to a sample from urban areas of Pakistan in contrast to most of the previous studies which analysis both urban and rural areas.

Figure 3: Age Specific Activity Rate by Sex for Pakistan



Source: Compendium of Gender Statistics of Pakistan, 2014

According to Labor Force Survey (2012-13), the total civilian labor force in Pakistan was 45.69% of the total population comprising 35.08% of male and 10.60% of female. The labor force participation rates for males and females were 68.70% and 21.67% in 2012-13 respectively. The significant gender gaps exist in Pakistan in terms of labor force participation rates as is evident from figure 3. The participation of females in the labor force is drastically low as compared to their male counterpart across all age groups in Pakistan (Figure 3).

At global level, vulnerable employment rates, which is defined as proportion of contributing family workers and own account worker, are higher for women than for men. In developing regions, 60 per cent of women were in vulnerable employment in 2013, compared to 54 per cent of men (UN, 2014). In Pakistan, more than half of the female workers i.e. 55% were engaged as contributing family workers in contrast to 15% of males. Gender

differences also exist in the sector of employment and occupations. Females are generally engaged in low paid informal jobs in agriculture sector. For example, 75%, 11% and 14% of the employed women were engaged in the agriculture, industry and services sectors against 33%, 26% and 41% of males during 2012-13 in Pakistan respectively (PBS, 2014a). Like other researchers e.g. Ashraf & Ashraf (1993); Blau & Kahn (1992); Gornick & Jacobs (1998); Harkness (1996); Nasir (1998); Rice, (1999); Su & Heshmati (2013) and Taniguchi & Tuwo (2014), we have also used employment related characteristics like industry and occupation as explanatory variables in our estimated earning functions through dummy variables.

3. DATA AND METHODOLOGY

The returns to human capital and gender earning gaps can be estimated by following Mincerian approach as baseline framework (Pastore, Sattar, & Tiongson, 2013). According to Montenegro & Patrinos (2014), Mincerian model produce more stable results than one can expect. The basic earning function used in the current study in modified form can be written as under:-

$$lnw_i = \alpha + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \sum_{j=1}^{n} \delta Z_{ij} + u_i \quad (1)$$

where w_i is natural log of the monthly income for an i[th] individual. Dependent variable has been used in log-transformation form in order to correct for possible skew and heteroscedasticity (Vassil, Eamets, & Mõtsmees, 2014). S_i stands for the years of schooling, X_i is labor market experience of an individual in completed years. X_i^2 is the squared term of experience which has been included in the earning function in order to capture non-linearity in the earnings of individual throughout their life span (Pastore, et al., 2013; Willis, 1986). Z_{ij} is a vector of variables such as literacy, industry, occupation and age of individuals and u_i is error term representing other variables, not measured and assumed to be independent of the other explanatory variables.

The earning functions can also be used to estimate the returns to different levels of schooling by using the education dummies for each level (Montenegro & Patrinos, 2014). Keeping in view the education system of Pakistan five dummy variables for primary (D_p), middle (D_m), secondary (D_s), higher secondary (D_{hs}) and tertiary (D_t) levels have been defined. These dummy variables denote the fact that a person concerned has achieved that specific level of education (Montenegro & Patrinos, 2014). The dummy variable for individuals without formal schooling has been used as an omitted category and has not been included in the model in order to avoid the problem of singularity in the matrix. The extended model including these dummy variables takes the following form:-

$$\ln w_i = \alpha + \beta_p D_{pi} + \beta_m D_{mi} + \beta_s D_{si} + \beta_{hs} D_{hsi} + \beta_t D_{ti} + \beta_1 X_i + \beta_3 X_i^2 + \sum_{j=1}^{n} \delta Z_{ij} + u_i \quad (2)$$

OLS regression technique, presented in equation (1) and (2), give summary estimates by calculating the average effects of explanatory variables on the dependent variable (Coad & Rao, 2007) and is based on the mean of the conditional distribution of dependent variable in the regression analysis (Martins & Pereira, 2004; Wu & Liu, 2009). A more complete picture can be obtained by computing several regression curves matching to different percentage points of each distribution through quantile regressions (Cade & Noon, 2003; Coad & Rao, 2007; Pham & Reilly, 2007). QR has another advantage over OLS because it makes possible to obtain a complete conditional distribution of Y variable instead of focusing only on means as is the case in OLS (Fattouh, Scaramozzino, & Harris, 2001) and is considered a standard analytical tool in the income and wage studies (Yu, et al., 2003).

The QR was first introduced by Koenker and Bassett in 1978 (Coad & Rao, 2007; Koenker & Hallock, 2001) and keeping in view the setting of wage equation (see Martins & Pereira, 2004; McGuinness & Doyle, 2004) can be written as under:-

$$lnw_i = x_i \beta_\theta + u_{\theta i} with Quant_\theta(lnw_i | x_i) = x_i \beta_\theta \quad (3)$$

where x_i and β_θ denote the vectors of exogenous variables and parameters respectively. $Quant_\theta(lnw_i|x_i)$is the θ^{th} conditional quantile of ln w given x. According to Matins & Pereira (2004), the θ^{th} quantile, which lies between '0' and '1', can be defined as under:-

$$\min_{\beta \in R^k} \{\sum_{i:lnw_i \geq x_i\beta} \theta |lnw_i - x_i\beta_\theta| + \sum_{i:lnw_i \geq x_i\beta} (1-\theta)|\, lnw_i - x_i\beta_\theta|\} \quad (4)$$

The above equation can be written as:

$$\min_{\beta \in R^k} \sum_i \rho_\theta\, (lnw_i - x_i\beta_\theta) \quad (5)$$

where $\rho_\theta(\varepsilon)$ is defined as check function which is written as $\rho_\theta(\varepsilon) = \theta\epsilon$ if $\boldsymbol{\varepsilon} \geq 0$ or $\rho_\theta(\varepsilon) = (\theta - 1)\epsilon$ if $\boldsymbol{\varepsilon}$<0. This problem can be solved through method of linear programming. The least absolute deviation (LAD) is the most common form of quantile regression (Melly, 2002) and estimator of $\boldsymbol{\beta}$ can be obtained by setting θ=0.5. The various quantiles can be obtained by setting the various values of θ. For example, first and third quartiles can be obtained by setting the values of θ equal to 0.25 and 0.75 respectively.

After fitting the regression model given in the equation (1) through equation (5), the private return to different levels of education can be obtained as under:-

$$r_p = (\beta_p)/(S_p) \quad (6)$$

$$r_m = (\beta_m - \beta_p)/(S_m - S_p) \quad (7)$$

$$r_s = (\beta_s - \beta_m)/(S_s - S_m) \quad (8)$$

$$r_{hs} = (\beta_{hs} - \beta_s)/(S_{hs} - S_s) \quad (9)$$

$$r_t = (\beta_t - \beta_{hs})/(S_t - S_{hs}) \quad (10)$$

where S_p, S_m, S_s, S_{hs} and S_t are years required to complete primary, middle, secondary, higher secondary and tertiary education.

Analysis of the decomposition of earnings gap between male and female workers is another objective of this paper. According to Oaxaca & Blinder (1973) decomposition method, also followed by Su & Heshmati (2013) and Taniguchi & Tuwo (2014), the gap in income is divided into two parts. The observable differences in productive characteristics of individuals generate the first part of the income gap whereas the remaining gap is due to differences in the returns to individual level attributes (Boraas & Rodgers, 2003; Jung, 2014; Pham & Reilly, 2007; Su & Heshmati, 2013; Taniguchi & Tuwo, 2014; Weichselbaumer & Winter-Ebmer, 2003).

Specifically, the overall gap in income between male and female workers is equal to:

$$\mathrm{D} = \frac{\mathrm{INC_m}}{\mathrm{INC_f}} - 1 \quad (11)$$

where, $\mathrm{INC_m}/\mathrm{INC_f}$ is the ratio of male to female income. Logarithm of equation (2) along with combination of estimated result in equation (1) yields the overall male-female gap in income as under:

$$\ln \mathrm{D} = \ln \overline{\mathrm{INC}}_\mathrm{m} - \ln \overline{\mathrm{INC}}_\mathrm{f} = \overline{\mathrm{X}}_\mathrm{m}\, \hat{\beta}_\mathrm{m} - \overline{\mathrm{X}}_\mathrm{f}\hat{\beta}_\mathrm{f} \quad (12)$$

where $\ln \overline{\mathrm{INC}}_\mathrm{m}$ and $\ln \overline{\mathrm{INC}}_\mathrm{f}$ represent average values of log yearly income of males and females respectively. $\overline{\mathrm{X}}_\mathrm{m}$ and $\overline{\mathrm{X}}_\mathrm{f}$ represent average values of productive attributes of the males and females. $\hat{\beta}_\mathrm{m}$ and $\hat{\beta}_\mathrm{f}$ stands for vectors of estimated coefficients obtained from separate regressions for males and females.

Following Su & Heshmati (2013) and Oaxaca (1973) the equation (3) can be expressed for purpose of decomposition as under:

$$\ln \mathrm{D} = (\overline{\mathrm{X}}_\mathrm{m} - \overline{\mathrm{X}}_\mathrm{f})\left[\Omega\hat{\beta}_\mathrm{m} + (\mathrm{I} - \Omega)\hat{\beta}_\mathrm{f}\right] + [\overline{\mathrm{X}}_\mathrm{m}(\mathrm{I} - \Omega) + \overline{\mathrm{X}}_\mathrm{f}\Omega](\hat{\beta}_\mathrm{m} - \hat{\beta}_\mathrm{f}) \quad (13)$$

where, I stand for an identity matrix and Ω stands for sloping matrix of weights. Both explained and un-explained variations in the earnings differentials are explained by the Blinder-Oaxaca decomposition method (Chzhen & Mumford, 2010; Jung, 2014; Kingdon, 2001; Taniguchi & Tuwo, 2014; Weichselbaumer & Winter-Ebmer, 2003).

The current study is based on the individual level data obtained from a household survey known as PSLM conducted by Pakistan Bureau of Statistics (PBS) in 2010-11. Under PSLM; two types of surveys at district and

provincial levels are conducted whereas each survey is repeated in the alternate year. The district level surveys covers only social indicators, the provincial level surveys also known as Household Integrated Economic Survey (HIES), provide information on number of social and economic indicators like demographics, enrolment rates, literacy, employment, household size, income and consumption, savings etc.(PBS, 2014b). The current study uses the data from HIES which was obtained from 16341 households during July, 2010 to June 2011 (PBS, 2011).

The demographic section of 2010-11 survey provides information about 109181 individuals comprising 51% of male and 49% of female. However, keeping in view the requirements of the study, only the data relating to urban and paid employees was used and our final sample was reduced to 7842 individuals out of which 6828 (87%) were males and 1014 (13%) were females.

The main variable of interest in our study is monthly earnings, which has been used as a dependent variable in the earning equation. For comparison purpose only those workers have been included in analysis who reports their incomes on monthly basis from their major and primary occupations. Two measures of literacy skills i.e. reading & writing and numeracy, have also been used as categorical variables denoting the value of "1" if a person holds the skill and "0" otherwise. HIES provide information on completed years of schooling which has been directly used in the estimation of earning functions in equation (1) as well as for defining the five different dummy variables, which have been used as explanatory variables in the estimation of equation (2). The information on labor market experience at individual level was not available in the survey and has been derived by deducting completed years of schooling less six from age by following the literature (e.g Ali, 2007; Grajek, 2001; Montenegro & Patrinos, 2014 and Willis, 1986). Type of industry, nature of occupation and age has also been included in the earning function by defining different categorical variables. Operational definitions of variables are presented in table 1.

Table 1: Operational Definitions of Variables

Name of Variables	Description
ln_y	Logarithm of the monthly income earned from major employment
Education	
S	Completed years of schooling
Edu0	Without formal education; Reference group
Edu1	5 or less years of schooling
Edu2	8 or less but greater than 5 years of schooling
Edu3	9 or 10 years of schooling (secondary)
Edu4	11 or 12 years of schooling (higher secondary/college)
Edu5	13 or more years of schooling graduates, masters and professional degrees (university education)
Literacy	
Lit1	Reading and writing ability (Reference group) No ability to read and write
Lit2	Ability to solve simple arithmetic questions (Reference group) No ability to solve simple arithmetic questions
Experience	
Exp.	Experience in years calculated as age - completed years of schooling – 6
Exp_Sq	Exp. * Exp.
Industry	
Ind1	Agriculture, hunting, forestry, logging and Fishing
Ind2	Mining and Manufacturing
Ind3	Electricity, and gas
Ind4	Construction
Ind5	Trade & restaurants and hotels (Reference group)
Ind6	Transport, storage and communication

Ind7	Financing, insurance, real estate and other services
Occupation	
Occu1	Senior professionals and managers
Occu2	Technicians and associate professionals
Occu3	Clerks, service & sales workers (reference group)
Occu4	Skilled fishery & agricultural workers
Occu5	Trade & craft workers
Occu6	Assemblers, plant & machine operators
Occu7	Other elementary occupations
Age:	Age in completed years
age1	Under 20
age2	20-29
age3	30-39
age4	40-49
age5	50-59
age6	60 & Above

4. FINDINGS AND DISCUSSIONS

The average monthly earnings of male and female paid employees in urban areas along with mean earning gap are presented in table 2. In the overall sample, male and female monthly earnings stand at Rs.10807 and Rs.7702 showing a gap of Rs.3105. Female earnings stand at 71% of the male earnings and this finding corroborates the observations of Polachek & Xiang, (2014) and Blau & Kahn, (2007) that female earn consistently less than men on average. Monthly earnings of females having reading & writing skills (Lit1) are 84% of male's earnings as compared to 41% for those without these skills (Table 2). Females without having ability to solve simple arithmetic (lit2) earn 44% of male earnings whereas those having these skills earn 73% of male's earnings. The wider gender wage gap in earnings exist for women without education (60%) or having lower levels of education such as primary (Edu1) (64%), middle (Edu2) (50%) and secondary (Edu3) (34%). The lowest wage gap between male and female workers i.e. 33% exist when females have tertiary education (Edu5) (Table 2).

Table 2: Average Monthly Earnings of Paid Employees in Urban Areas by Gender (Rupees)

Variables		Male (M)	Female (F)	Gap (M-F)	F/M
Overall		10807	7702	3105	0.71
Lit1	No	6743	2737	4006	0.41
	Yes	12245	10319	1926	0.84
Lit2	No	7039	3095	3944	0.44
	Yes	11158	8178	2980	0.73
Levels of Education	Edu0	6833	2722	4111	0.40
	Edu1	6845	2492	4353	0.36
	Edu2	7550	3808	3742	0.50
	Edu3	9641	6396	3245	0.66
	Edu4	12421	7017	5404	0.56
	Edu5	23459	15685	7774	0.67
Type of industry	Ind1	8863	5693	3170	0.64
	Ind2	9461	2997	6464	0.32
	Ind3	15585	2860	12725	0.18
	Ind4	7452	4900	2552	0.66
	Ind5	7280	3765	3515	0.52
	Ind6	10579	8812	1767	0.82
	Ind7	14336	8640	5696	0.60

Occupation	Occu1	26179	13828	12351	0.53
	Occu2	17833	10520	7313	0.59
	Occu3	10389	4997	5392	0.48
	Occu4	8456	1725	6731	0.20
	Occu5	7944	2438	5506	0.31
	Occu6	8944	4375	4569	0.49
	Occu7	6831	3231	3600	0.47
Age	Under 20	4217	2565	1652	0.61
	20-29	7589	6436	1153	0.85
	30-39	11986	7725	4261	0.64
	40-49	14641	10861	3780	0.74
	50-59	16637	11502	5135	0.69
	60 & Above	10180	4168	6012	0.41
Marital status	Unmarried	6492	6067	425	0.93
	Married	13119	9114	4005	0.69
	Widow	9957	7575	2382	0.76
	Divorced	6027	4691	1336	0.78

Source: HIES, 2010-11, Author's Calculations

The monthly earnings of female paid employees belonging to urban areas as percentage of male's earning in various industries such as Ind1, Ind2, Ind3, Ind4, Ind5 (see table 1) were 64%, 32%, 18%, 66% and 52% respectively (Table 2). The highest mean wage gap between male and female worker was found in Ind3 and lowest in Ind6. Among occupations, the highest wage gap between male and female paid employees i.e. 80% was found in Occu4 (see table 1) because agriculture is traditionally a mail dominant occupation while the lowest i.e. 41% was found in Occu2. The difference in monthly earnings between male and female employees in the age group between 20-29 years was lowest i.e. 15% and was highest i.e. 59% for those in the upper age group of 60 years & above. Further, the mean difference in monthly income between unmarried men and women was only 7% for paid employees belonging to urban areas of Pakistan as against the 31% for those who are married (Table 2).

Table 3: Average of Variables

Variables	Both Sexes	Males	Females
ln_y	8.92	9.006	8.34
S	7.39	7.86	7.32
Lit1	0.728	0.739	0.655
Lit2	0.914	0.915	0.906
Edu1	0.139	0.149	0.067
Edu2	0.119	0.127	0.064
Edu3	0.192	0.204	0.109
Edu4	0.098	0.102	0.097
Edu5	0.186	0.316	0.166
Exp	20.972	21.192	19.493
Exp_Sq	630.25	635.59	594.28
Ind1	0.028	0.028	0.029
Ind2	0.164	0.169	0.129
Ind3	0.023	0.026	0.005
Ind4	0.132	0.15	0.01
Ind6	0.092	0.103	0.017
Ind7	0.416	0.36	0.791
Occu1	0.131	0.102	0.325
Occu2	0.08	0.074	0.122

Occu4	0.007	0.007	0.004
Occu5	0.142	0.142	0.14
Occu6	0.082	0.093	0.008
Occu7	0.34	0.352	0.26
Age1	0.104	0.105	0.096
Age2	0.319	0.314	0.353
Age3	0.224	0.223	0.231
Age4	0.199	0.2	0.196
Age5	0.118	0.12	0.103
Age6	0.036	0.038	0.022
Valid N	7842	6828	1014

Source: Authors calculations based on data from HIES 2010-11

The averages of variables used in the study are presented separately for males and females in Table 3. The standard deviations of the variables by the same categories have not been presented in the table in order to save the space and same are available with the authors. The difference in log-monthly income, the response variable in our model, between male and female workers was 0.666. Although, gender gap in primary and secondary education has considerably reduced during recent decades but still prevails in poor countries (Bertocchi & Bozzano, 2014). The same is true in case of our sample where the difference in average years of schooling between males and females stands at 0.540 (Table 3). According to Aslam (2005), the gender gap in education in Pakistan exists due to difference in labor market returns to education. The current study focuses on education as the main determinant of income because education is an important and popular policy levers in many countries (Emran & Shilpi, 2014). Women also lag behind than men in both measure of literacy i.e. lit1 & lit2 as well as across various levels of education from edu1 through edu5 (Table 3). According to Blau and Kahn, (2007) and Vassil, et al., (2014), women usually have less labor market experience as compared to men following the traditional division in the labor market and family considerations. The same is true in case of our sample where women having mean experience of 19.5 years fall short of men having average experience of 21.2 years (Table 3). As far as industry of the employment is concerned, majority of both men and women i.e. 36% and 79% were engaged in Ind7 followed by 17% and 13% in Ind2 (Table 3). The lowest proportion of urban workers of males and females were employed in Ind3 and Ind1 (Table 3).

Gender differences in occupation are expected due to labor market preferences of females who prefer to choose that occupation requiring less on the job training (Blau & Kahn, 2007). In our sample, highest proportions of males i.e. 35% and females i.e. 26% were engaged in Occu7 followed by 14% in Occu5. The lowest numbers of males and females workers in urban areas were engaged Occu4 (Table 3). Majority of both men and women employees i.e. 31% and 35% were in the age group 20-29 years (Age2) followed by 22% and 23% in Age3 respectively. The lowest proportions of employees of either sex were found in Age6 (Table 3).

The practice of estimation of rates of returns to investment in education is continuing since the late 1950s and estimates of the returns to schooling and to potential experience are a useful indicator of an individual's productivity (Montenegro & Patrinos, 2014). In a model with log-transformed response variables, like equation (1), the estimated parameters are interpreted as a percent change on wage when independent variable increases by one unit (Vassil, et al., 2014) and $\beta_1$in the wage equation can be viewed as the average rate of return to years of schooling to wage employment (Montenegro & Patrinos, 2014; Willis, 1986). The size of private returns to education is of great significance because it is the price an individual investor of education receives on his/her own investment (Psacharopoulos, 1985) and also explains personal income distribution (Psacharopoulos, 1985; Willis, 1986). The earning functions estimated separately for males and females through OLS method both for completed years of schooling as well as education dummies are presented in table 4. Education has been used as an explanatory variable in two distinct ways i.e. i) as completed years of schooling and ii) as education dummies representing different levels of education while treating no formal education as a reference category.

The average rates of returns to extra year of schooling in urban areas were 8.6% for males and 20.7% for females and were significant at 1% level (Table 4). The higher rate of return to schooling for females as

compared to males in all specifications of estimated earning functions have been found in our study which confirms the finding of other studies e.g. Ashraf & Ashraf (1993); Aslam (2005); Montenegro & Patrinos (2014) and Siddiqui & Siddiqui (1998). All education levels have been emerged as significant and positive determinants of income except for edu1 for males and edu1 & edu2 for females. Further, variation in estimated parameters is more for women which range from 0.07 to 1.86 than for men which range from -0.02 to 0.89 (Table 4). Lit1 is significant in all estimated specification except for females in education dummies whereas lit2 is significant for women but not for men. The average returns to extra year of experience which are significant for both males and females but are higher for females (9.2% & 7.3%) as compared to men (5.7% & 5.3%) in both specifications education years and education dummies. The coefficient of experience square is negative in the earning functions for both males and females (Table 4), which exhibits concavity of the earning functions and decreasing returns to the investment in human capital (Pastore, et al., 2013).

All industries of employment have been emerged as significant determinants of earnings of male workers but for females only two industries i.e. Ind3 & Ind6 are significant in OLS equations. Similarly, Occu2 & Occu7 are significant determinant of income for both males and females but Occu4 & Occu6 are insignificant. Further, returns to Occu2 & Occu7 are higher for females as compared to those engaged in the Occu3, the reference category. Age1 has been used as a reference category in the estimated earning functions. Males in the age groups 20-29, 30-30 and 40-49 earn more than those in the Age1 while females in these groups earn less. However, earnings of female in Age6 are higher as compared to those in the reference group but are significant in education dummies specification only as compared to male workers who earn less if compared with the reference category (Table 4).

Table 4: Results of OLS estimation for Males and Females

Dependent Variable: ln_y

	Males		**Females**	
Variables	**Edu Years**	**Edu Levels**	**Edu Years**	**Edu Levels**
S	0.086***		0.207***	
edu1		-0.022		0.074
edu2		0.107**		0.489
edu3		0.281***		0.909**
edu4		0.460***		1.054***
edu5		0.893***		1.855***
lit1	-0.261***	0.184***	-0.856***	0.085
lit2	-0.035	-0.025	-0.183**	-0.175*
Exp	0.057***	0.053***	0.092***	0.073***
exp_sq	-0.001***	-0.001***	-0.001***	-0.001***
ind1	0.097**	0.070*	-0.093	-0.037
ind2	0.157***	0.147***	-0.181	-0.137
ind3	0.325***	0.305***	-0.734**	-0.695*
ind4	0.203***	0.188***	0.13	0.253
ind6	0.225***	0.212***	0.550**	0.627**
ind7	0.116***	0.107***	-0.159	-0.113
occu1	0.432***	0.405***	0.13	0.234**
occu2	0.252***	0.239***	0.173*	0.249**
occu4	0.012	0.041	-0.228	-0.261
occu5	-0.094***	-0.071***	-0.095	-0.115

occu6	-0.039	-0.006	0.256	0.213
occu7	-0.126***	-0.115***	0.247***	0.216***
age1	-	-	-	-
age2	0.122***	0.165***	-0.314***	-0.176
age3	0.102**	0.183***	-0.527***	-0.216
age4	0.064	0.182***	-0.376	0.095
age5	-0.034	0.126	-0.278	0.356
age6	-0.322***	-0.1	0.223	0.975**
Cons	7.605***	7.647***	6.793***	6.936***
F Statistics	380.7	328.08	56.71	42.53
Adj. R^2	0.55	0.555	0.548	0.516
N	6828	6828	1014	1014

***significant at 1% level; **significant at 5% level; *significant at 10% level
Source: Authors Calculations

OLS estimates which are based on the mean of the conditional distribution of dependent variable in the regression analysis and are subject to be affected by the outliers present in a cross-sectional data. This is evident from the fact that mean earnings of both male and female workers having tertiary education were more than double of respective averages in the sample. Due to wide variation in the earnings of individuals, QR has been estimated for males and females and results are presented in Appendix (1) and (2) respectively. The results of QR at 5^{th}, 25^{th}, 50^{th}, 75^{th} and 95^{th} quantiles for male urban employees are presented in the appendix 1. The return to additional year of schooling at 5^{th} quantile for male workers stands at 9.1% and tends to decline from lower to upper quantiles and is 8.1% at 95^{th} quantile (Appendix 1). The lower levels of education like edu1 and edu2 are insignificant for urban male wage-earners at all levels of quantiles except 25^{th} and 75^{th} quantiles. However, higher levels of education like edu3, edu4 and edu5, have been emerged as significant and positive determinants of income for urban male employees at all levels of income distribution (Appendix 1).

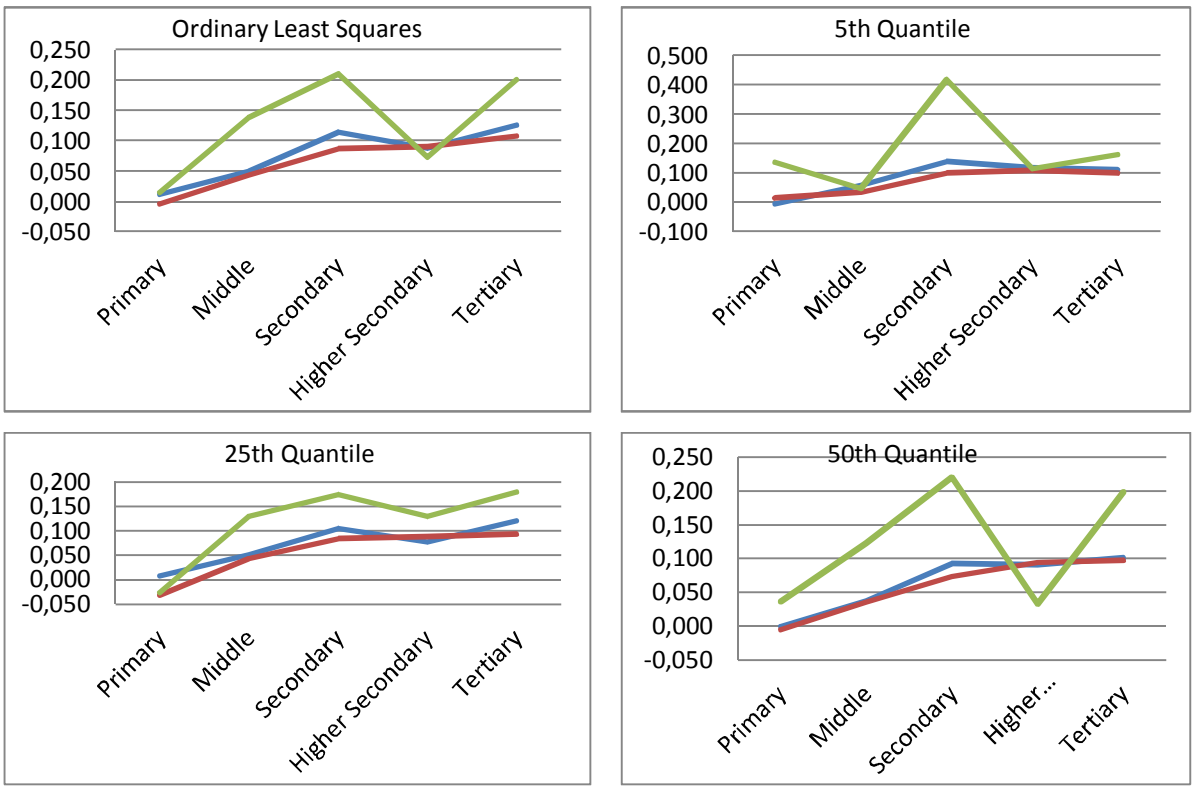
Moreover, the returns to additional year of experience for male employees in urban areas decline along with movement from bottom towards top of the distribution and stands at 7.9% and 3.6% at 5^{th} and 95^{th} quantiles in education years specifications. The concavity of the earning functions is also confirmed for male wage earners and is evident from the negative and highly significant values of the squared term of experience. All levels of industry have been emerged as significant determinant of income for male urban employees except for Ind1 at all quantiles. Occu1, Occu2 and Occu7 are significant determinant of income at all parts of the distribution against Occu4 and Occu6 which are insignificant. Further, males in the younger age groups in urban areas earn significantly more than older workers in Age6 (Appendix 1).

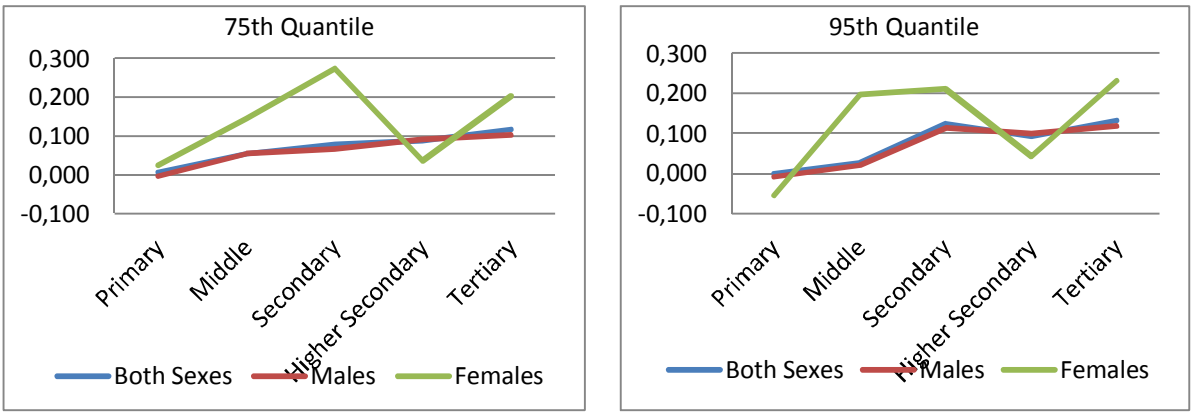
The earning functions for females estimated through QR at various levels of quantiles are presented in appendix 2. The average return to additional year of schooling for female workers in urban areas at 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} quantiles stands at 21.9%, 21.2%, 20.2%, 20.1% and 19.3% respectively (Appendix 2). Edu1 and edu2 are not significant factors of income at all estimated quantiles for female workers. But edu3 is significant factor of income for female employees belonging to middle and higher middle income groups. Likewise, edu4 is significant for females at 5^{th}, 50^{th}, and 75^{th} quantiles (Appendix 2). However, edu5 has been emerged as significant factor for determination of income of female employees irrespective of their position in the income distribution. Experience has also been emerged as positive and significant determinant for females at all levels of income distribution except for those in the 95^{th} quantile under education at levels specification (Appendix 2). Earning functions for females have also been found to be non-linear as is evident from negative and significant values of exp_sq term at all levels of estimated quantiles. This is consistent with finding of Aslam (2005), who found more convex education-earning profiles for women than men. Ind3 and Ind6 have been found as significant factor for income determination of female workers only in the lower-middle, middle, and upper-middle part of the income distribution. According to Blau and Kahn (2007), these gender differences in industry are also responsible for creating gender differences in income. Occu1 is significant for female workers in education levels specification at 25^{th}, 50^{th} and 75 quantiles whereas Occu2 is significant at 1% and 10% levels at 25^{th} and 95^{th} quantiles respectively. While Occu4 is insignificant at all quantile, the Occu6 and Occu5 are

significant at 5th (5% level) and 95th (10% level) quantiles respectively (Appendix 2). The Occu7 is mainly significant factor for the determination of income of female workers falling in the lower and lower-middle parts of the income distribution (Appendix 2). The gender differences in occupation account for considerable portion of gender earnings gap (Blau & Kahn, 2007). Moreover, age used in different groups has been found as significant determinant of income for females belonging to lower-middle and middle class only. Age has not been found as significant factor of income determination for females in the 75th and 95th quantiles (Appendix 2).

The private return to different levels of education for both male and female workers belonging to urban Pakistan have been calculated by using equations (6) through (10) and are presented in the figure 4. The private incremental returns to education for females are higher as compared to males in OLS estimates as well as in various quantiles at all levels of education except for 50th, 75th and 95th quantiles at higher secondary levels (Figure 4). For female workers, lower levels of education yield higher returns at bottom part of the income distribution while higher level of education give more returns at uppor part of the income distribution. For example, average returns to an additional year of schooling for female workers having primary and secondary education at 5th quantile were 14% and 42% as compared to 1% and 10% for their male counterparts respectively (Figure 4).

Figure 4: Returns to Education by Level of Education and Sex in Urban Pakistan





Another important objective of the current study is to decompose the gender income gap using Blinder-Oaxaca decomposition method whose results are presented in table 5. The log income difference between male and female workers in urban areas of Pakistan stands at 0.666 (Table 5). This gap has been decomposed into various constituents such as education, literacy, experience, industry as well occupations of employment and age of individuals. According to the results about 43% of the income gap between male and female employees arises due to difference in education as compared to 8.1% from the literacy rate but former being the positive and later is negative. The gaps in wages by gender exist due to difference in experience (Polachek & Xiang, 2014; Taniguchi & Tuwo, 2014). Women usually tend to have shorter experience of work due to exit and entry into the labor market following family reasons (Blau & Kahn, 2007; Pastore, et al., 2013; Polachek & Xiang, 2014; Taniguchi & Tuwo, 2014). Our decomposition suggests that differences in labor market experience constitute about 2% of income differences between male and female workers. Industry of employment has been found as positive contributor towards income gap between male and female paid employees in urban areas of Pakistan and its share stands at about 17%. Income gaps between male and female workers arising due to difference in occupation and age stand at -10.4% and 13.2% respectively (Table 5). In aggregates terms, our decomposition analysis is able to explain about 0.62 (93%) of total log income difference of 0.666 between males and females.

Table 5: Decomposition of Gender Income Gap

Variables	Attributable to differences in characteristics
log income difference	0.666
Education:	-42.519
Edu1	-0.008
Edu2	-0.018
Edu3	-0.041
Edu4	-0.062
Edu5	-0.437
Literacy:	8.109
Lit1	0.080
Lit2	0.136
Experience:	1.768
Experience	-0.298
Exp_sq	0.345
Industry	16.653
Ind1	0.003
Ind2	0.042
Ind3	0.011
Ind4	0.026

Ind5	0.011
Ind7	0.128
Occupation:	-10.419
Occu1	-0.035
Occu2	-0.013
Occu4	0.001
Occu5	0.006
Occu6	-0.002
Occu7	-0.097
Age:	13.201
Age1	0.000
Age2	0.114
Age3	0.091
Age4	0.018
Age5	-0.021
Age6	-0.025
Total Explained	0.617
Total Explained (%)	92.668

Source: Author's Calculations

5. CONCLUSION

The objective of this paper was to analyze the gender earning gaps existing in urban areas of Pakistan using data from a household survey known as Household Integrated Economic Survey (HIES). The earnings functions have been estimated separately for males and females using Ordinary Least Squares (OLS) as well as quantile regressions including education, literacy, experience, employment related variables such type of industry and occupation and age as explanatory variables. The earnings gap between males and females has also been analyzed using the Blinder-Oaxaca decomposition method. Results suggest higher mean years of schooling and experience as well as monetary earnings for males as compared to females. However, higher incremental returns to investment in human capital for females have been observed at all levels of education in both OLS and quantiles regression performed at 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} quantiles. Further, higher returns to schooling have also been noted in bottom part of the income distribution i.e. 5^{th}& 25^{th} quantiles both for male and female workers as compared to those present in the top of the distribution i.e. 75^{th}& 95^{th} quantiles at all educational levels. Further, according to decomposition analysis conducted through Blinder-Oaxaca method, education, industry of employment and occupations has been emerged as the main determinants of income gap between male and female workers in urban Pakistan. Private rates of return estimated through OLS and quantile regressions are used to explain the behavior of individuals in seeking different levels of education and are a useful indicator for the assessment of level of productivity of an individual. Policy makers can use the evidence provided through these estimates to design the programs aiming at the promotion of investment in education in order to reduce the gender differences in income. The findings also suggest offering incentive to low-income families for making investment in human capital through education.

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Appendix 1: Results of Quantile Regression for Males

Dependent Variable: ln_y

Variables	Q5		Q25		Q50		Q75		Q95	
	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels
S	.091***		.0797***		.080***		.076***		.081***	
edu1		0.072		-.154**		-0.024		-0.019		-0.043
edu2		0.172		-0.021		0.084		.146**		*0.021*
edu3		.371**		.149**		.231***		.279***		*.248****
edu4		.589***		.327***		.420***		.460***		.446***
edu5		.984***		.699***		.809***		.872***		.921***
lit1	-.297***	0.088	-.256***	.281***	-.239***	.199***	-.221***	.162***	-.194***	.221***
lit2	-0.026	0.022	0.000	0.013	-0.023	-0.032	.-.048*	-0.039	-0.077	-.100**
Exp	.079***	.072***	.061***	.061***	.052***	.050***	.043***	.040***	.036***	.033***
exp_sq	-.001***	-.001***	-.001***	-.001***	-.001***	-.001***	-.000***	-.000***	-.000***	-.000***
ind1	0.174	0.136	0.087	0.063	0.064	0.037	0.074	.099**	0.013	0.017
ind2	.201***	.241***	.186***	.173***	.156***	.144***	.102***	.104***	.089*	.068*
ind3	.421***	.398***	.409***	.366***	.386***	.337***	.280***	.309***	.179*	.213***
ind4	.201***	.235***	.186***	.186***	.201***	.180***	.160***	.162***	.165***	0.134***
ind6	.253***	.290***	.197***	.203***	.247***	.244***	.210***	.214***	.119**	.128***
ind7	0.063	0.093	.135***	.134***	.167***	.161***	.143***	.152***	.101***	.063**
occu1	.240***	0.131*	.348***	.306***	.435***	.443***	.575***	.510***	.684***	.601***
occu2	0.132	0.079	.278***	.216***	.255***	.262***	.263***	.257***	.295***	.299***
occu4	0.067	0.229	0.069	0.110	0.013	0.066	0.006	0.024	-0.041	-0.039
occu5	-.314***	-.332***	-.100***	-.088***	-.049**	-0.020	0.007	0.029	-0.003	0.047
occu6	-0.085	-0.042	-0.013	-0.012	-0.040	-0.007	-0.004	0.020	-0.074	-0.023
occu7	-.118*	-.134**	-.134***	-.127***	.131***	-.115***	-.133***	-.115***	-.213***	-.169***
age1	0.234	0.266	.271**	0.135	.240**	0.059	.223*	0.123	0.249	0.011
age2	.660**	.709***	.446***	.313***	.314***	.173*	.275***	.195*	0.246	0.047
age3	.593**	.698***	.418***	.297***	.278***	.164**	.313***	.239***	.303**	0.158
age4	.624***	.748***	.382***	.270***	.266***	.169***	.295***	.256***	.275**	.165*
age5	.416***	.529***	.268***	.197***	.193***	.149***	.272***	.221***	.238***	.190**
age6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cons	6.126***	6.135	6.988***	7.172***	7.494***	7.699***	7.922***	8.029***	8.431***	8.717***
Pseudo R2	0.287	0.288	0.294	0.296	0.337	0.342	0.396	0.402	0.451	0.462
N	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000

***significant at 1% level; **significant at 5% level; *significant at 10% level

Source: Authors Calculations

Appendix 2: Result of Quantile Regression for Females

Dependent Variable: ln_y

Variables	Q5		Q25		Q50		Q75		Q95	
	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels
S	.219***		.212***		.202***		.201***		.193***	
edu1		0.685		-0.131		0.183		0.124		-0.268
edu2		0.823		0.262		0.551		0.562		0.322
edu3		1.657		0.612		.992**		1.109**		0.743
edu4		1.887*		0.872		1.059**		1.182**		0.830
edu5		2.534**		1.595**		1.853***		1.994***		1.755**
lit1	-1.054***	-0.5284	-1.046***	0.318	-.726***	0.0335	-.793***	0.045	-.838***	0.117
lit2	-.471**	-.470**	-0.053	-0.098	-0.121	-0.0991	-0.152	-0.143	-.413***	-.363*
Exp	.129***	.102**	.107***	.104***	.104***	.089***	.0788***	.065***	.054***	0.0257
exp_sq	-.002***	-.002***	-.002***	-.002***	-.002***	-.002***	-.001***	-.001***	-.001***	0.000
ind1	.965*	0.956	-0.068	-0.093	-0.336	-0.336	-.498*	-0.334	-0.067	-0.098
ind2	0.0373	-0.217	-0.14	-0.085	-0.231	-0.181	-.369*	-0.242	0.114	0.139
ind3	0.113	0.107	-0.800	-0.798	-.967**	-.938**	-1.674***	-1.565***	-0.379	-0.343
ind4	0.374	0.430	-0.282	-0.277	0.125	0.552	0.064	0.336	0.191	0.314
ind6	-0.618	-0.591	.821**	.887***	.644**	.556*	0.301	0.463	-0.014	0.119
ind7	0.583	0.577	-0.211	-0.244	-0.225	-0.251	.-0.343*	-0.242	-0.242	-0.223
occu1	0.198	0.204	0.200	.348***	0.133	.334***	0.092	.284**	0.156	0.218
occu2	0.361	0.287	.353***	.399***	0.133	.372***	0.147	0.184	.310*	.383*
occu4	-0.271	-0.098	-0.413	-0.414	0.191	0.191	-0.381	-0.439	-0.342	-0.317
occu5	0.035	0.241	-0.075	-0.078	-0.116	-0.156	-0.173	-0.182	-.279*	-0.332
occu6	0.954	1.591**	0.619	0.594	0.301	0.267	0.023	-0.034	0.188	-0.073
occu7	.354*	.427*	.293***	.307***	.193*	0.141	0.108	0.078	.232*	0.182
age1	-0.148	-1.072	-0.571	-0.992	-0.449	-1.274**	0.178	0.145	-0.041	-0.722
age2	-0.621	-1.489	-0.852	-1.255**	-0.72	-1.342***	-0.184	-0.132	-0.177	-0.722
age3	-1.103	-1.693*	-1.000**	-1.338***	-.937**	-1.419***	-0.357	-0.289	-0.247	-0.571
age4	-0.937	-1.341*	-.814*	-1.052***	-.814**	-1.168***	-0.278	-0.11	-0.225	-0.376
age5	-0.954	.-1.066*	-.673**	-.759**	-.774***	-.818***	-0.193	-0.064	-0.212	-0.273
age6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cons	5.133***	6.220***	6.703***	7.243***	7.140***	8.099***	7.482***	7.516***	8.441***	9.361***
Pseudo R^2	0.2304	0.2123	0.2728	0.2581	0.3684	0.3528	0.4294	0.4092	0.4103	0.3892
N	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014

***significant at 1% level; **significant at 5% level; *significant at 10% level

Source: Authors Calculations

Journal of Business, Economics and Finance (JBEF), ISSN: 2146 - 7943

Journal of Business, Economics and Finance

Year: 2016 Volume: 5 Issue: 3

QUALITIES REQUIRED BY SME BUSINESSES IN TECHNICAL STAFF IN CASE OF CRISIS: WOODWORKING INDUSTRY SAMPLE

DOI: 10.17261/Pressacademia.2016321973

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ABSTRACT

Owners and/or managers of the small enterprises who are obliged to take the responsibility of making decisions at times of crises due to the very nature of these enterprises should have a perspective of strategic thinking and should be able to make an accurate analysis of the internal and external environments in order to overcome the crisis with minimal loss and damage. Sought qualifications are having information in automatisation with computer programs (Autocad, CAD/CAM, Solidworks etc.), practical technical detail and construction, having an innovative and entrepreneur structure, being able to make innovative design and produce solutions, knowing more than one foreign language, and being able to use CNC machines. It is seen that the enterprises in question have taken precautions for improving the quality of the innovative products and increasing the labour productivity as well as for reducing the costs in such periods.

Keywords: SME, woodworking, production.

JEL Classification: D20, J00, O15

1. INTRODUCTION

In our time, importance of educated person according to countries has become crucial to stand against intense competition with globalization tendencies. Human force which can adopt changing conditions, which can understand technological application, which are productive, which can communicate with environments, which can perform teamwork, which have profession information and skill constitute the basic force in development of a country (Icli, 2007). As education is a societal process, it is inevitable for this process to affect the development of economic life. Continuous education can contribute to increasing the efficiency of workforce, development of manufacturing system and well-fare of the society. The contribution of education to production and economy can be rendered through vocational education and training. Thus, a nation's production capacity can be increased by means of developing schooling ratio, education system, quality of the system, introduction of the graduates to the labor market, their recruitment and using their existing potential (Tasindi, 1999).

Small and medium sized enterprises (SME) are considered to be at the heart of the economic and social life all over the world since they can adapt to demand diversifications easily by creating more product variety with less investment, because they contribute to the interregional balanced development and employment significantly, are complementary of big sized enterprises as supplier industry and are affected by economic fluctuations (Kaygin and at al., 2008). Businesses and environment influence entail various threats and crises which organizations may face. Due to the devastating effects of crisis, coping skill of managers, in terms of organization is essential. To manage crisis, problems need to be identified in advance, as a way to prevent them from occurring; rather than to take steps to limit their consequences. As can be seen it is better to predict

and prevent crises from occurring or steps should be taken to limit their results, if they cannot be stopped (Colak, 2013).

Small and medium sized enterprises (SMEs) and family businesses are encouraged to be institutionalized to overcome the problems associated with uncertainty and growth. It seems that the term is attached variety of different meanings in Turkish context, very far from the original institutional theory. Even fundamental organizational principles and generally accepted business practices are suggested as methods towards institutional transformation (Ulukan, 2005).

2. LITERATURE REVIEW

Both in our country and in the world, there are many educational institutions constructed under various names to meet the need of furniture industry for qualified technical staff. These different educational institutions are responsible for training individuals with different qualifications determined by laws. Standards related to location, personnel, premises, facilities, equipments, tools and capacities of these educational institutions are set in advance and the institutions are constructed according to these standards to function optimally and efficiently (Anonymous 1, 2015).

The furniture industry is a labour-intensive and dynamic sector dominated by small and medium-sized enterprises (SMEs) and micro firms. Turkey furniture manufacturers have a good reputation worldwide thanks to their creative capacity for new designs and responsiveness to new demands. The industry is able to combine new technologies and innovation with cultural heritage and style, and provides jobs for highly skilled workers (Anonymous 2, 2016).

For a firm to conduct its activities within the principles of being economical, it needs to turn inputs into outputs in an efficient and effective manner. The purpose of the managerial staff is to fulfill the objectives of the organization. Moreover, the organization's adjustment to constantly changing environmental conditions and changing the existing structure when necessary is a requirement of the contemporary view of management. Hence, managerial staff is of great importance for the future of an organization (Burdurlu, 2004).

Firms have a special need for intermediate staff and they try to meet this need by means of in-service training they offer within the organization. This partially reduces the need for intermediate workers but not enough for the posts requiring higher level of education (Kaya, 2004).

Miller and Colleagues (2002) classified problems experienced by SMEs as follows:

- Finance procurement,
- Lowering general administrative expenses,
- Lowering employee expenses,
- State regulations and laws,
- Finding and holding qualified employee,
- Pricing of products and services,
- Development of marketing strategy.

One of important problems of small and medium-sized enterprises is the failure to find qualified employee and training problem. Problems in finding qualified employee cause these businesses not to have adequate effect in phases such as planning, standard, production, and quality control and not to reach desired competitive capacity. Personnel and training problems have a distinct importance for small and medium-sized enterprises. The fact that such businesses do not always make the same kind of work necessitates that employee to be hired makes various works. For instance, those working in an industry section making diverse manufactures need to be in montage one day, in lathe-levelling another day, and in welding work still another day. The fact that these businesses are generally labor-intensive businesses increases qualified employee necessity. The most important factor in failure to find qualified employees by small and medium-sized enterprises are

irregular payment policies and failure to provide sufficient social insurance to employees. As a result, trained employees leave for large-scale businesses (Anonymous 3, 2015).

Problems confronted with in vocational education result in shortage of qualified personnel, unemployment and lack of experience. These problems adversely affect the development and competitive power of the industry. In the Membership Declaration of the European Union, it is stated that development of vocational education policy of Turkey should be a priority for the sector (TUCCE, 2012).

There is a shortage of qualified personnel in the sector. Especially the shortage of CNC and wood processing operators in the production is worth special consideration. Though some vocational training courses are initiated by Turkish Employment Agency (TEA), there is not much demand for these courses. Vocational high school graduates do not prefer to work in workshops. The novice workers start with minimum wage then the wage gradually increases over years. It is important to resolve the problems of vocational high schools (e.g. instructor, equipment etc.) (MBSDA, 2013).

Qualifications desired to be found in employees to be hired by business authorities are:

- Basic skills and workforce literacy,
- Planning, decision-making, critical thinking and problem solving skills,
- Communication skill,
- Work ethics, administrative and leadership skills,
- Professional skill and computer using skill (Icli, 2007).

Vocational high school graduates do not prefer to work in workshops. The novice workers start with minimum wage then the wage gradually increases over years. It is important to resolve the problems of vocational high schools (e.g. instructor, equipment etc.) (MBSDA, 2013).

Factors affecting the training of qualified workforce can be stated as follows (Aktan, 2005);

- Increase in the speed to transition from order-focused production to mass-production,
- Furniture sector's maintaining its labor-intense characteristic,
- As most of the firms in the sector are family businesses, employment ratio of qualified personnel is low,
- In some certain parts of small and medium scale organizations, works are done by unqualified personnel,
- Problems in the employers' viewpoint of personal development and training,
- Lack of in-service training,
- Limited utilization of institutionalization mechanism,
- Inability to meet the needs and expectations of qualified personnel,
- Inadequate number of firms offering social security in the sector.

Every type of crisis can lead to spontaneous distortion of the interaction between humans, technology and other elements of the organization. First of all, crisis is a state which is unexpected and not easy to detect by the organization. There may be some signals of crisis. Yet, what is important at that point is that the organization should be able to recognize the signals and take measures to avert a crisis by displaying great sensitivity towards environmental changes (Tutar, 2000).

Turkish furniture industry is mostly composed of small and medium enterprises (SEMs) and these SEMs are mostly family businesses and managed by family members. In these organizations, the ratio of professional managers and qualified workforce is low (Anonymous 4, 2015).

3. DATA AND METHODOLOGY

Today, Turkish furniture industry mostly consists of small-scale organizations using traditional production methods. However, particularly within the last 15-20 years, the number of the middle- and large-scale organizations has increased. The important centers of furniture production are; Istanbul, Ankara, Bursa (Inegol), Kayseri, Izmir and Adana (Sakarya, 2006). Firms in the furniture industry can be found in many cities of the country. In terms of the number of formally registered furniture manufacturing companies and employment level, Istanbul takes the first place. The number of organizations manufacturing furniture in Istanbul is 3874 and it is followed by Ankara with 1971 organizations and then by Izmir with 1474 organizations. The total number of the furniture manufacturing organizations in these three cities makes nearly half of all the furniture manufacturing organizations in Turkey. In terms of the level of employment, the number of people working in the furniture manufacturing companies in Istanbul is 21.653 and it is followed by Bursa with 13.994 and Kayseri with 11.390 (MBSDA, 2013). Within the context of the current study, four cities (Ankara, Bursa-Inegol, Kayseri, Izmir) were randomly selected and the reasons for the selection of these cities are given below.

Ankara has always been an important center of furniture production. The most popular furniture production area of Ankara is called “Siteler” and it was established in 1960 with the initiation of the Chamber of Carpenters and now it is a big organized industrial site situated on 5000-decare area. There are many small and medium scale organizations operating in this site. The number of formally registered firms in this site is believed to be more than 10000. However, these firms are labor-intense organizations and the number of large scale firms is relatively small. According to the statistics issued by Turkish Statistical Institute (TSI), the number of workers per organization is 2,7 in the furniture sector of Ankara and this is lower than the average of Turkey. Another city where furniture production is intense is Bursa-Inegol Region and it is quite dynamic. It is located on the historical Silk Road and close to the sources of raw materials and the region has taken the advantages of its location and turned into a center of furniture production. In terms of the employment figures of the sector, Bursa-Inegol comes after Ankara. Yet, in relation to export figures, it takes the third place after Kayseri and Istanbul. Its success in export proves that it is on the way of becoming an international center of furniture manufacturing. Kayseri is one of the important centers of furniture production activities. The rise of Kayseri in the furniture sector started with the production of sofas, armchairs and beds. With the developments in technology and new investments, firms started to manufacture in every field of furniture sector and thus turned the city into an important furniture production center. According to the data issued by Turkish Union of Chambers and Commodity Exchanges (TUCCE) and export figures reported by TSI, Kayseri hosts the biggest furniture manufacturing organizations. The data reported by Kayseri Chamber of Carpenters, Furniture Dealers and Upholsterers show that the number of firms operating in the sector is more than 3500. Nearly 400 of these firms are performing fabrication mass production and exporting. According to data issued by TSI, the number of workers employed by per firm is 11,5 and this is over the Turkish average. In 2011, the amount of export is worth 322 million dollars and this makes Kayseri one of the most important furniture production and export center(MBSDA, 2013).

In the current study, the data were collected through a questionnaire including 10 items to elicit the demographic features of the participants and 10 items related to expectations from the personnel and problems. This questionnaire was administered to 66 furniture manufacturing firms from Izmir, Ankara, Kayseri and Bursa (Inegol) to determine the expectations of employers from their workers in furniture manufacturing industry and the problems they are confronted with.

4. FINDINGS AND DISCUSSIONS

As can be seen in Table 1; the production issues of the organizations are as follows: 15 of them are woodwork, 42 are panel furniture and 9 are design office and applications. The number of personnel is as follows: 21 have fewer than 10 workers, 15 have 10-19 workers and 30 have 20 or more workers. When the length of the organizations’ functioning in the sector is examined, it is seen that 12 of them have been operating for 0-4 years, 9 of them for 5-10 years and 45 of them for 10 years or more. Of the organizations, 39 export. The number of the organizations using CNC machines is 30. The number of organizations having a R&D unit is 48. This shows the importance attached to R&D by the organizations. Of the organizations, 39 have sales outlets.

The number of organizations having cooperation with educational institutions is 21. The number of organizations believing that the decrease in the importance attached to vocational and technical education has increased the shortage of qualified workers is 57. All of the organizations are recruiting technical personnel.

Table 1: Assessment Analysis of Business

Evaluation Questions	Variables	n	Percent(%)
Production issues of the organizations	Woodwork	15	22,8
	Panel furniture	42	63,6
	Design Office and application	9	13,6
The number of workers in the organizations	10'than down	21	31,8
	10-19 between	15	22,7
	20 years or more	30	45,5
The length of the organization's functioning in the sector	0-4 Years	12	18,2
	5-10 Years	9	13,6
	10 Years or more	45	68,2
Does your organization export?	Yes	39	59,1
	No	27	40,9
Is a CNC machine used in the organization?	Yes	30	45,5
	No	36	54,5
Is there a Re&De department in the organization?	Yes	48	72,7
	No	18	27,3
Does the organization have a sales outlet?	Yes	39	59,1
	No	27	40,9
Is there cooperation with educational institutions?	Yes	21	31,8
	No	45	68,2
Does the decreasing importance attached to vocationals and technical education increase the shortage of gualified personnel?	Yes	57	86,4
	No	9	13,6
Is it important to recruit technical personnel in the organization?	Yes	66	100
	No	0	0

As can be seen in Table 2, the organizations' expectations from their existing and prospective personnel can be expressed as follows according to order of importance; mastery in computer programs (72,7%) (Q1), knowledge about technical details and construction (68,2%) (Q6) and taking initiatives in the organizations (68,2%) (Q7), ability to persuade (63,6%) (Q4) and understanding of innovative designs (63,6%) (Q5), following technological developments (59,1%) (Q9) and competence in marketing (59,1%) (Q2), close attention to the problems of staff and coming up with solutions (45,5%) (Q8), mastery of foreign languages (40,9%) (Q3). The least requested qualification is the use of CNC machines (27,3%) (Q10). When the qualifications expected from existing and prospective personnel are statistically analyzed, it is seen that the most requested qualifications are knowledge about technical details and construction (Q6) and taking initiatives in the organization (Q7) and the least requested qualifications are mastery of foreign languages and (Q3) and use of CNC machines (Q10).

Table 2: Expectation Level Analysis from Employees of Businesses

Expectations	N	M.	S. d.	Not important at all		Not important		Undecided		Important		Very important	
				n	%	n	%	n	%	n	%	n	%
Q1: Competence in computer programs	66	4,64	,71	0	0	3	4,5	0	0	15	22,7	48	72,7
Q2: Competence in marketing	66	4,18	1,23	3	4,5	9	13,6	0	0	15	22,7	39	59,1
Q3: Mastery of foreign languages	66	3,82	1,27	3	4,5	12	18,2	6	9,1	18	27,3	27	40,9
Q4: Ability to persuade	66	4,45	,84	0	0	3	4,5	6	9,1	15	22,7	42	63,6
Q5: Understanding of innovative design	66	4,54	,72	0	0	3	4,5	0	0	21	31,8	42	63,6
Q6: Knowledge about technical details and construction	66	4,68	,46	0	0	0	0	0	0	21	31,8	45	68,2
Q7: Taking initiatives in the organization	66	4,68	,46	0	0	0	0	0	0	21	31,8	45	68,2
Q8: Close attention to the problems of staff and coming up with solutions	66	4,36	,64	0	0	0	0	6	9,1	30	45,5	30	45,5
Q9:Following technological developments	66	4,59	,49	0	0	0	0	0	0	27	40,9	39	59,1
Q10:Use of CNC machines	66	3,41	1,27	3	4,5	18	27,3	12	18,2	15	22,7	18	27,3

When the relationship between the length of the organizations' functioning in the sector and their expectations from their existing and prospective personnel is considered, it is seen that the high majority of the organizations operating in the sector for 10 years or more think that taking initiatives is very important. The organizations operating for 0-4 and 5-10 years attach relatively less importance to these qualifications; yet, they regard them as important. When the relationship between the length of functioning in the sector and expectations for the qualifications of having knowledge about technical details and construction and taking initiatives in the organization is examined, it is seen that all of the organizations view them as important qualifications to be possessed by their workers. When the relationship between the length of functioning in the sector and expectation for the qualification of following technological developments is examined, it is seen that while 21 of the organizations operation for 0-4 and 5-10 years find this qualification important, all of the 45 organizations operating for 10 years or more regard it as important. In relation to the use of CNC machines, 12 of the organizations operating for 0-4 and 5-10 years are undecided or view it as not important and 21 of the organizations operating for 10 years or more are also undecided or think that it is not important.

Table 3: Analysis of Activity Periods with Respect to Expectations

Length of functioning		0-4 Years		5-10 Years		10 Years or more		Total	
Expectations	Importance level	n	%	n	%	n	%	n	%
Understandingof innovative design	Not important at all	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	3	6,7	3	4,5
	Undecided	0	0	0	0	0	0	0	0
	Important	3	25	3	33,3	15	33,3	21	31,8
	Very important	9	75	6	66,7	27	60	42	63,7
	Total	12	18,2	9	13,6	45	68,2	66	100
Knowledge about technical details and construction	Not important at all	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	0	0	0	0
	Undecided	0	0	0	0	0	0	0	0

	Important	3	25	3	33,3	15	33,3	21	31,8
	Very important	9	75	6	66,7	30	66,7	45	68,2
	Total	12	18,2	9	13,6	45	68,2	66	100
Taking initiatives in the organization	Not important at all	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	0	0	0	0
	Undecided	0	0	0	0	0	0	0	0
	Important	3	25	3	33,3	15	33,3	21	31,8
	Very important	9	75	6	66,7	30	66,7	45	68,2
	Total	12	18,2	9	13,6	45	68,2	66	100
Following technological developments	Not important at all	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	0	0	0	0
	Undecided	0	0	0	0	0	0	0	0
	Important	3	25	6	66,7	18	40	27	40,9
	Very important	9	75	3	33,3	27	60	39	59,1
	Total	12	18,2	9	13,6	45	68,2	66	100
Use of CNC machines	Not important at all	0	0	0	0	3	6,7	3	4,5
	Not important	3	25	6	66,7	9	20	18	27,3
	Undecided	3	25	0	0	9	20	12	18,2
	Important	3	25	3	33,3	9	20	15	22,7
	Very important	3	25	0	0	15	33,3	18	27,3
	Total	12	18,2	9	13,6	45	68,2	66	100

High majority of the participants (n=48, 72,7%) from all the posts in the organizations think that competency in computer programs is a very important qualification and some of them (n=18, 27,3%) think that having the skill of using CNC machines is very important. When we look at the expectation for the qualification of innovative design conception, it is seen that 18 of the production managers find it important or very important and 21 of the designers find it important or very important but in other posts, this ratio decreases to a great extent. Moreover, in relation to qualifications of having knowledge about technical details and construction, taking initiatives and following technological developments, it is seen that 42 of the production managers and designers attach greater importance.

Table 4. Evaluation of the Relationship between the Posts in the Organizations and Their Expectations

Units of Study		**Production Manager**		**Designer**		**Personnel Manager**		**General Manager**		**Others**		**General Total**	
Expectations	Importance level	n	%	n	%	n	%	n	%	n	%	n	%
Competence in computer programs	Not important at all	0	0	0	0	0	0	0	0	0	0	0	0
	Not important	3	14,3	0	0	0	0	0	0	0	0	3	4,6
	Undecided	0	0	0	0	0	0	0	0	0	0	0	0
	Important	3	14,3	3	14,3	0	0	3	100	6	33,3	15	22,7
	Very important	15	71,4	18	85,7	3	100	0	0	12	66,7	48	72,7
	Total	21	100	21	100	3	100	3	100	18	100	66	100
Understanding of innovative design	Not important at all	0	0	0	0	0	0	0	0	0	0	0	0
	Not important	3	14,3	0	0	0	0	0	0	0	0	3	4,6
	Undecided	0	0	0	0	0	0	0	0	0	0	0	0
	Important	6	28,6	3	14,3	0	0	0	0	12	66,7	21	31,8

	Very important	12	57,1	18	85,7	3	100	3	100	6	33,3	42	63,6
	Total	21	100	21	100	3	100	3	100	18	100	66	100
Knowledge about technical details and construction	Not important at all	0	0	0	0	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	0	0	0	0	0	0	0	0
	Undecided	0	0	0	0	0	0	0	0	0	0	0	0
	Important	15	71,4	0	0	0	0	0	0	6	33,3	21	31,8
	Very important	6	28,6	21	100	3	100	3	100	12	66,7	45	68,2
	Total	21	100	21	100	3	100	3	100	18	100	66	100
Taking initiatives in the organization	Not important at all	0	0	0	0	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	0	0	0	0	0	0	0	0
	Undecided	0	0	0	0	0	0	0	0	0	0	0	0
	Important	9	42,9	3	14,3	0	0	0	0	9	50	21	31,8
	Very important	12	57,1	18	85,7	3	100	3	100	9	50	45	68,2
	Total	21	100	21	100	3	100	3	100	18	100	66	100
Following technological developments	Not important at all	0	0	0	0	0	0	0	0	0	0	0	0
	Not important	0	0	0	0	0	0	0	0	0	0	0	0
	Undecided	0	0	0	0	0	0	0	0	0	0	0	0
	Important	6	28,6	6	28,6	0	0	0	0	15	83,3	27	40,9
	Very important	15	71,4	15	71,4	3	100	3	100	3	16,7	39	59,1
	Total	21	100	21	100	3	100	3	100	18	100	66	100
Use of CNC machines	Not important at all	3	14,3	0	0	0	0	0	0	0	0	3	4,5
	Not important	3	14,3	6	28,6	0	0	0	0	9	50	18	27,3
	Undecided	3	14,3	6	28,6	0	0	0	0	3	16,7	12	18,2
	Important	6	28,6	6	28,6	0	0	0	0	3	16,7	15	22,7
	Very important	6	28,6	3	14,3	3	100	3	100	3	16,7	18	27,3
	Total	21	100	21	100	3	100	3	100	18	100	66	100

As can be seen in Table 5, 75% of 12 organizations operating for 0-4 years, 33,3% of 9 organizations operating for 5-10 years and 80% of 45 organizations operating for 10 years or more have R&D units and all of 12 organizations operating for 0-4 years, all of 9 organizations operating for 5-10 years and 46,7% of 45 organizations operating for 10 years or more work in cooperation with educational institutions.

Table 5: Relationship Analysis of Activity Periods with Respect to R&D Unit - School-Industry Cooperation

The length of the organization's funtioning in the sector	**Re&De Departmen**			**Total**
	Freguency	**Yes**	**No**	
0-4 Years	**n**	9	3	12
	%	75	25	100
5-10 Years	**n**	3	6	9
	%	33,3	66,7	100
10 Years or more	**n**	36	9	45
	%	80	20	100
The length of the organization's functioning in the sector	**School-Industry Collaboration**			**Total**
	Freguency	**Yes**	**No**	
0-4 Years	**n**	0	12	12
	%	0	100	100
5-10 Years	**n**	0	9	9
	%	0	100	100
10 Years or more	**n**	21	24	45
	%	46,7	53,3	100

As can be seen in Table 6, all of 15 organizations manufacturing woodwork (100%), 42,9% of 42 organizations manufacturing panel furniture and 33,3% of 9 organizations working in the field of design office applications work in cooperation with educational institutions and 36 of 48 organizations having R&D units find their personnel's having the skill of following technological developments very important and 12 of them find it important; 3 of the organizations not having R&D units find it very important and 15 of them find it important.

Table 6: Analysis of School-Industry Cooperation with Production Subject & Analysis of Following Technology with R&D department

Production issues of the organizations	**School-Industry Collaboration**			**Total**
	Freguency	**Yes**	**No**	
Woodwork	**n**	0	15	15
	%	0	100	100
Panel Furniture	**n**	18	24	42
	%	42,9	57,1	100
Design Office and Application	**n**	3	6	9
	%	33,3	66,7	100
Re&De unit in the organization	**Following Technological Developments**			**Total**
	Freguency	**Important**	**Very Important**	
Yes	**n**	12	36	48
	%	25	75	100
No	**n**	15	3	18
	%	83,3	16,7	100

According to Table 7, 65.6 % of the enterprises take precaution against crises while 34.44 % of them do not take precautions against crises. While employees work overtime in 70.8 % of the enterprises, 72 % of the enterprises state that they prefer those having professional certificates while hiring employees. The rate of the enterprises that consider emerging crisis environments as opportunity is 57.3 %. 66 % of the enterprises make internal situation analysis while 53.1 % of them prefer qualified labour force. 61.5 % of them stock products

while 59.4 % of the enterprises do not consider competitive environment as crisis threat. As for the methods used in determining the wages paid to the personnel, 38.5 % of the enterprises take work performance as basis while 32.3 %, 14.6 % and 6.3 % of the enterprises take minimum wage, contract and number of pieces produced as basis, respectively.

Table 7: Enterprise Crisis Situation Assessment Analysis

Scale Variables	Frequence (f)	Percent (%)	Applicable Percentage	Cumulative Percentage
Crisis Management				
Is there any precaution that you take against crisis?				
Yes	63	64,9	65,6	65,6
No	33	34,0	34,4	100,0
Do employees overwork (overtime) in your enterprise?				
Yes	68	70,1	70,8	70,8
No	28	28,9	29,2	100,0
Do you look for professional certificates (journeyman–mastership certificate) while hiring your employees?				
Yes	69	71,1	71,9	71,9
No	27	27,8	28,1	100,0
Do you make internal situation analysis as a precaution in cases of crises?				
Yes	64	66,0	66,7	66,7
No	32	33,0	33,3	100,0
Do you see any potential crisis environment as opportunity?				
Yes	55	56,7	57,3	57,3
No	41	42,3	42,7	100,0
Which labour force do you prefer in your production?				
Low-cost labour	7	7,2	7,3	7,3
Qualified	51	52,6	53,1	60,4
Both	38	39,2	39,6	100,0
Is competition environment a crisis threat for you?				
Yes	39	40,2	40,6	40,6
No	57	58,8	59,4	100,0
According to what do you determine the changes in the wages of the employees?				
Work performance	37	38,1	38,5	38,5
Amount determined by the state	31	32,0	32,3	70,8
Contract	14	14,4	14,6	85,4
Amount produced	6	6,2	6,3	91,7
Desire of the employees	8	8,2	8,3	100,0
Total	96	99,0	100,0	

While the number of insured personnel ranged between 5 and 10 prior to the crisis, this number reached 10-20 after the crisis. While the number of uninsured personnel was between 20 and 30 prior to the crisis, this number dropped to 10-20 after the crisis. The number of unqualified personnel was 10-20 prior to the crisis while the range expanded and number became 20-30 after the crisis. Export production of the enterprises was 20-30 % prior to the crisis while it reduced following the crisis and regressed to 10-20 %. While the import rate of the enterprises ranged between 10-20 % prior to the crisis, it changed considerably and exceeded 50 %. While enterprises do not take precautions against crises before the crisis, they take precautions following the crisis. While the enterprises wanted their employees to work overtime before the crisis, they did not want overwork after the crisis. While executives did not pay bonuses to the personnel before the crisis, they started to pay after the crisis. The 21st century -together with the radical changes in the work life dynamics and the emergence of conceptual knowledge, globalization, competition and new generations- has brought highly different lifestyle compared to previous ones.

Furniture industry that was traditionally labor-intense and working with low technology and capital is progressing towards being an industry that is relatively more information and capital-focused. The most important reason behind this transition is its undergoing a fast globalization process. Particularly the

disadvantage of small and medium-scale organizations operating in the sector is the lack of the competitive advantage of technology, qualified personnel, design, school-industry collaboration and marketing.

Businesses give importance that hired employees are equipped with sufficient information and skills, can keep pace with rapidly changing and developing technological innovations, and are individuals open to constant learning. Basic qualifications sought in an employee to be hired by business authorities can be ranked as; being responsible, representative skill, persuasion ability, being initiative, communication skill, planning, decision-making and problem-solving skills, adapting to professional ethic principles, having professional competence.

SME managements do not give importance to professional management approach. Owner, partner and/or manager of many businesses regard what have been learned by observations as adequate and they believe that they can constantly maintain their works with success.

Businesses stated that they first looked for good-humored personnel for peace of working environments, and then they wanted people to be hired as honest, hardworking, reliable, respectful, disciplined and prompt. Business owners give importance that employees to be hired are able to be use computer. Moreover, they want the employee to apply for job to be graduate of at least vocational school level, and to have certificates in accountancy, office programs, foreign language and diction, mainly a computer certificate. Lastly, businesses stated that they did not find education provided in vocational schools adequate; in accordance with obtained results, it was suggested that authorities having voices in their fields should consider these problems and initiate activities for solution of these problems.

All of the organizations attach great importance to the recruitment of technical personnel. Training of qualified human force that can enable societal development to occur can be ensured to a great extent through the education system. Qualified labor force is an inevitable element of an efficient economy. The way of having qualified labor force is a well-planned vocational education. Vocational and technical education is of vital importance to emerging economies. When the expectations from the existing and prospective personnel can be put into order of importance as follows; mastery in computer programs (72,7%), information about technical details and construction and taking initiatives in the organization (68,2%) and skill of persuasion and understanding of innovative designs (63,6%). The qualification least expected from personnel is the ability of using CNC machines (27,3%). When the qualifications expected from existing and prospective personnel are statistically analyzed, it is seen that the most requested qualifications are knowledge about technical details and construction and taking initiatives in the organization and the least requested qualifications are mastery of foreign languages and and use of CNC machines. While the organizations consider possessing technical information and innovative ideas to be important, they do not attach much importance to foreign language competence and skill of using CNC machines. The organizations mostly export products and the ratio of design information export in general export figures is too small.

As a result, there is a need to make attempts to establish better corporation between the sector and educational institutions, to provide better computer technologies education and to train more qualified labor force to meet the requirements of the age. What should be done by organizations is to get ready for a crisis and the adverse effects it will create, take the required measures, develop pre-emptive alert systems, manage the chaotic situation to be created by a crisis successfully and minimize the effect of a crisis. The required measures should be planned by organizations within the framework of “crisis management” before a crisis starts. Special attention should be taken not to destroy the future of the organization just to save the day (Colak, 2013).

5. CONCLUSION

Moreover qualified worker problem can be overcome easily through university-industry cooperation. There are a lot of Vocational High Schools providing furniture education all over the country. If the enterprises cooperate with these schools qualified students can be determined just during practical training and can be employed after graduation. The enterprises must increase the proportion of employing engineers and give priority to the forest industrial engineers and wood products industrial engineers for furniture sector. A legal arrangement can be recommended for this subject. Accordingly, employing at least one woodworking industrial engineer must become a legal compulsion for medium sized enterprises (Kaygin and at al., 2008). Education is the most

important power of development. A educated person is an important resource in gaining competation superiority. Nowadays the firms need personals who can catch up with the changing conditions, cope with the techonological practices, productive, owning communicative ability, cooperative to increase the power of competation. As in developed countries, there should be a stronger cooperation between the sector and universities, new furniture design departments can be opened at locations of intense furniture production, more academic research should be conducted on furniture industry and plans and programs need to be developed to enhance the cooperation between educational institutions and the sector. Vocational training in the sector of furniture manufacturing should be rendered more attractive and this is believed to contribute to the solution of the basic problems and the development of the sector.

Informing workers about up-to-date issues concerning effective and efficient production, following cutting-edge technologies, bringing innovations to the fields of application, elimination of potential deficiencies of experience and provision of training courses on the issues requiring specialization can enhance the existing skills and knowledge. Developing projects with development agencies, giving more active roles to adult education centers, increasing the amount of in-service training will enable workers to enhance their skills and experiences. It may be enabled that education and consultancy supports are provided in order that SME owners/managers can have a vision and strategical thinking can be enabled, thereby enabling them to have a corporate structure. Within this framework, in relation to university-industry cooperation development, it will be beneficial to add a legal dimension rather than voluntariness. SMEs have great problems in supplying qualified employee. This kind of businesses require versatile qualified employee more due to reasons such as being relatively high labor-intensive, and necessity to make different works in accordance with orders.

Qualified job vacancy in Turkish industry comprises a wide variety from apprentice-assistant master-master to vocational school graduates. Education programs for meeting qualified employee need comprise apprentice-assistant master-master and technical and administrative employees In diverse subjects and interventions. Within this framework, education level and education of personnel are also important. Education can generally provide benefits to organizations such as increase in work efficiency, morale boosting in the organization, decrease in control activities, decrease in working accidents, and continuation and compliance in business organization.

New education programs should be established for the training of designers in the sector. University-sector collaboration should be strengthened; in this way, both the quality of universities can be improved and qualified personnel need of the sector will be reduced. Consequently, training employees in accordance with expectations of changing and developing furniture sector and necessity of bringing permanent and innovative solutions to encountered problems are set forth.

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Journal of Business, Economics and Finance
Year: 2016 Volume: 5 Issue: 3

THE EFFECT OF FUTURES CONTRACTS ON THE STOCK MARKET VOLATILITY: AN APPLICATION ON ISTANBUL STOCK EXCHANGE

DOI: 10.17261/Pressacademia.2016321974

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ABSTRACT

The deregulation and financial liberalization have caused the increase of price volatility, interest and exchange rate risks. Managers and investors have started using derivatives to manage their risks. Since derivatives markets interact continuously with spot markets, the effect of derivatives markets on spot market volatility has become an important research topic. In this study, the impact of the derivatives markets on the Turkish spot market volatility and liquidity has been examined from January 2001 to December 2014 period. For this purpose, the impact of these futures contracts on spot market volatility and liquidity has been examined using EGARCH model and ARMA model respectively. It is found that derivatives markets reduce the spot market volatility and that they do not have a significant effect on the volume of the spot market. Furthermore, it is found that while an unexpected future trading volume increase the spot market volatility, an expected future trading volume does not have a significant impact on the spot market volatility.

Keywords: Futures market, spot market volatility, EGARCH Model, ARMA Model
JEL Classification: G13

1. INTRODUCTION

Foreign exchange rates and interest rates in international financial markets showed little change from 1945 to the early years of the 1970s. Since the mid-1970s, the international economic relations and trading have grown with the shrinking borders and the development of communications technology. As a consequence of the expansion of the economics relations and trading, free movement of capital began and in the financial markets excessive price volatility has occurred. The increase of volatility has raised the inflation and the exchange risk. During the same period, fluctuations in interest rates on the international market and fixed interest rate increase in the variable interest rate debt as well as borrowing trends, and consequently has brought the interest rate risk. In order to reduce the negative effects of inflation, interest rates and foreign exchange risk on the operators and investor, new financial techniques have been needed and then the derivatives markets was established. Derivatives markets are in continual relation with spot market due to the fact that derivatives provide some functions such as price discovery and risk management. Investors can hedge the risk that arises in the spot market and protect an actual position in the spot market by taking an opposite position on derivatives markets (Kolb and Overdahl, 2003:70). Also the market followers, with the price on the futures market, are able to get an estimated value on future price of an asset on the spot market the increasing importance of futures markets and their constant interaction with the spot market have attracted the attention of the market experts, academicians, practitioners and investors to know in which way the futures markets can influence the spot market volatility. The main purpose of this study is to provide the empirical evidence of the ongoing debate about the impact of futures market on the spot market volatility. Most of the previous studies

done in the Turkish market, where generally, focused on the impact of the futures market on the spot market volatility. In contrast to the other studies, the specific objectives of this study are as follow:

a- To examine the effect of introduction of futures contracts on spot price volatility.
b- To examine whether there is a presence of the leverage effect on the volatility after the introduction of futures contracts.
c- To examine whether the spot market volatility is affected by the trading activities (volume) of the futures market.
d- To investigate if there is any significant change on the spot market volume after the introduction of the futures contracts. In other word this study examines the impact of the futures contracts on the spot market liquidity.

The plan of this paper is as follow: In the second section, the literature review is presented. The third section describes the data and methodology. Findings are presented in the fourth section. Finally in the last section, we conclude the paper with some remarks.

2. LITERATURE REVIEW

The first research on the effect of the futures contracts on the volatility on the underlying spot market have be done on the United States market. After that, various researches relative to the subject have been carried across both the other developed and the emerging markets and led to three different views. The first view is that the futures contracts increase the volatility of the spot markets. The alternative view is the decrease of the spot market volatility after the inclusion of futures contracts. And the third one is that futures contracts had no effects on spot price volatility. Among those studies, different methods are used. Some group of researchers has investigated the impact of futures contracts on spot price volatility by comparing the change of volatility before and after the introduction of futures contracts. Others have examined whether the spot price volatility is affected by the futures trading activity (volume and open interest).

Many studies have investigated the impact of futures contracts on spot price volatility by comparing the return of the spot market before and after the introduction of the futures contracts. These can be grouped into three categories according to their conclusions.

Some studies claim that the volatility of the spot market decrease after the inclusion of the futures contracts. Researchers argue that the main cause of destabilization on the underlying spot market is a result of high degree of leverage and the presence of speculative uniformed traders in the futures markets (Cox(1976), Stein (1987), Antonious and Holmes (1995). The detail of studies that supports the destabilization hypothesis are presented below. Antonius and Holmes (1995), examined the impact of the FTSE 100 index futures on the spot price market using an GARCH model and found that the FTSE 100 index volatility increased after the introduction of the futures trading on the index. In addition, they found that the futures have improved the quality and the rate of information flow on the spot market rate. Bae, Know and Park (2004), studied the effect of the introduction on the index futures on the volatility of the underlying market in the South Korea market using the regression. They found that futures contracts led to an increase of volatility. Kumar and Mukhopadyay (2007), in the İndian market, studied the volatility of the NSE Nifty index after the inclusion of the futures contracts using the GARCH model. Results show that after the introduction of futures contracts, new information are reflected in the price more quickly and thereby increased the spot market volatility. For the same market, Mallikarjunappa and Afsal (2007), found evidence that futures contracts on S&P CNX IT have increased the volatility of the spot S&P CNX IT. Robanni and Bhuyan (2004), studied the impact of the Dow Jones Industrial Average (DJIA) on the spot market volality and trading volume, they found that the increase of the spot market volatility and a significant increase of it trading volume. Yu (2001) investigated any possible change in the volatilty of the underlying indexes with the inclusion of futures contracts to the US, England, Hong Kong, Japan and Australia using a GARCH(1,1)-MA(1). He found that except the England and Hong-Kong market, after the introduction of futures contracts, the volatility of stock returns increased in the other markets.

For the Chinese market, Arısoy (2008) used a GARCH and EGARCH model, to test the impact of the FTSE Xinhua A50 index futures contracts on the spot market. Results show an increase of the spot market volatility.

Furthermore, futures contracts led to an increase of the spot market volume. On the contrary, some studies claim that the introduction of futures trading decrease the spot market volatility. Some researchers argued that the main reason of this stabilization effect is the increase in liquidity. They argued that speculative activity migrates from the spot price volatility to the futures market due to the lower cost of transactions relative to futures market (Nikolaos et al., 2012; Galloway and Miller, 1997). The following studies found a reduction of the stock market volatility after the inception of futures trading.

Reyes (1996), investigated the impact of the futures contracts in the volatility of two stock markets (France and Danmark) using a MA-EGARCH(1,1) model. They observed that the introduction of futures contracts had led to diminish the volatility of the two stocks markets. Galloway and Miller (1997), researched the impact of S&P MidCap 400 index futures on the spot market volatility and trading volume. They found that a decrease in volatility of the stock market and an increase of it trading volume. McKenzie, et al (2001) investigated the impact of the introduction of futures trading on stock index into Australia stock market using a TGARCH model. He found that the introduction of futures had induced the reduction of stock market volatility. Bandivadekar ve Ghosh (2003) found decreased stock market volatility for the S&P CNX and BSE Sensex Nifty and an increase of the market efficiency after the introduction of the stock index futures contract. Alekais (2007) using a GJR-GARCH model, found that FTSE/ASE 20 index contracts had led to a reduction of the conditional volatility of the underlying market. Matanovic and Wagner (2012) researched on the DAX index in Germany stock market using an ARCH/GARCH model and found that the introduction of futures contract had reduced the conditional variance of the underlying market. Diesteldorf, et al., (2014), investigated the effect of the introduction of CSI 300 index futures in the volatility of the China, Hong-Kong and Singapore. He observed a reduction of the volatility of the three stock markets after the inception of futures contracts.

Regarding to the Turkish stock market, Kasman ve Kasman (2008) examined the effect of the introduction of BIST 30 index futures on the spot price volatility. They found that the introduction of futures contracts has reduced the spot price volatility using an EGARCH model. Çağlayan (2011) also find a decrease of the stock market volatility after the introduction of the BIST 30 index futures contracts using an GARCH(1,1), EGARCH, GJR-GARCH, APARCH model. Finally some empirical studies provide evidence that the introduction of futures trading on stock index had no significant impact on the volatility of the underlying market. The details of those studies are presented below:

Spyrou (2005), investigated the impact of the index futures contracts on the Greek spot market volatility. Using an EGARCH and GARCH models, they found that futures contracts has no effect on the spot market volatility. Debasish (2009) also found that the NSE index futures contracts did not influence the Indian spot market volatility. Gökbulut et al., (2009) observed that the introduction of the BIST 30 index futures contracts, has no significant impact on the spot market volatility. Xie and Huang (2014), found also the same evidence after examined the impact of the futures contracts on the China stock exchange.

3. DATA AND METHODOLOGY

3.1. Data

In order to investigate the impact of futures markets on the spot market volatility and liquidity, BIST-30 daily closing price and trading volume are used. The analysis was conducted over the sample period of January 2001 to December 2014. Since the BIST -30 index futures have been introduced on 4 February 2005, and in order to compare the structure of volatility and the difference of spot market trading volume of the spot, the sample is divided into pre- futures and post-futures. The BIST-30 daily close price and the trading volume are used from the period of 2 January 2001- 3 February 2005 (pre- futures period) and 4 February 2005 - 31 December 2014. Daily close price and trading volume for the BIST-30 index were obtained respectively from **www.borsaistanbul.com** and **www.finnet.com.tr.**

Also, data of the BIST -30 index futures are used over a period of 4 February 2005 - 31 December 2014, in order to test whether the price volatility of BIST-30 index is affected by the futures trading activity. Data were obtained from the Turkish derivatives market which are under the Istanbul Stock Exchange. The results of our analysis were obtained on the basis of R_t and V_t which are respectively the rate of return R and volume V in

period t computed in the logarithm Rt = ln(Pt/Pt-1) *100 and Vt = ln(vt/vt-1) *100. Pt and vt are respectively the values of BIST-30 index daily price an trading volume at the end of period t. The descriptive statistics of the BİST30 stock index are presented in the Table 1.

Table 1: **Descriptive Statistics of BIST 30 Return and Trading Volume**

Statistic	BİST30 Return	BİST30 Volume
Mean	0.0006	20.525
Median	0.022	0.846
Maximum	0.140	22.510
Minimum	-0.200	17.980
Skewness	-0.197	-0.490
Kurtosis	8.730	2.693
Jarque-Bera [p-value]	4728.8 [0.000]	153.80 [0.000]
***Q*(20)**	47.983 [0.000]	46536.9 [0.000]
***Q*$_s$(20)**	951.14 [0.000]	46759.1 [0.000]
LM(5)	70.129 [0.000]	4418.9 [0.000]
ADF	-58.781***	-12.805***
PP	-58.781***	-32.463***
KPSS	0.036***	0.214***

Table 1 indicates that the daily mean return is positive (0.06%) and the average standard deviation is 0.022. The average trading volume, in the period is 20,525 and the standard deviation is 0,846. The skewness and kurtosis values for both the returns and trading volume series determined whether the series are normally distributed. The highly significant Jarque Bera statistics reject the hypothesis that the daily returns and volume series of both BIST-30 index are normally distributed. The Box-Pierce statistic shows that the mean and the variance of the time series are autocorrelated. Also, the Lagrange multiplier (LM) tests to detect whether an ARCH effect exists. The LM statistics are significant for both of the two time series at the 5 percent level and then implies that there is significant ARCH effect in stock return and trading volume. All these results indicate that the stock returns and volume series are heteroscedastic. From this point, the use of GARCH will be more accurate for both the return and volume series. We find a time series to be stationary if the ADF, KPSS and PP tests are statistically significant at the 5% level. Results showed that both the stock returns and trading volume are stationary. This study is limited by the use BIST-30 index futures. Currencies, commodities and financial futures contracts are not included in the scope of this research. This is due to a very low of the trading volume of those contracts and the lack of trading volume some days.

3.2. Methodology

To analyze the effect of the introduction of futures contracts on spot price volatility, both GARCH and EGARCH models are employed. Both of those models are used in order to check the most appropriate models for our time series.

3.2.1. GARCH (p,q)

Developped by Bosselver and Taylor (1986), GARCH(p,q) model is used to capture better the tendency of returns to exhibit volatility clustering of financial series. In this model, positive and negative past values have a symmetric effect on the conditional variable (Jorion, 2005:358). GARCH model is represented as follow.

$$r_t = \alpha_{o+}\alpha_{1xt+}\epsilon_t \quad (1)$$

$$\sigma^2_t = \alpha_o + j=1q\beta j\sigma 2t\text{-}j + i=1p\alpha i\epsilon 2t\text{-}i \quad (2)$$

where $\alpha_o \geq 0$, $\beta j \geq 0$ and $(ai+ \beta i) < 1$

(1) and (2) are respectively the mean and conditional equation. r_t is the daily return on the BIST-30 index. σ^2_t is the conditional variance (volatility) at the time t, α_o is a constant, α_i is a coefficient that relates the past value of the squared residuals to current volatility. βi is a coefficient that relates current volatility to the last period volatility.

3.2.2. EGARCH (p,q)

Contrary to GARCH model which investigates the symmetric of volatility to positive and negative shocks, the EGARCH model is used to test the asymmetric response (Nelson, 1991:349). On the stock market, it has been proved that negative news affected the volatility of financial series more than positive news. This asymmetric response refered to a leverage effect. The leverage effect can be described as the effect of loss of shareholder value that lead to an increase of financial risk of the firm in the presence of bad news (decline of stock return) (Sahalia vd, 2011:2). The EGARCH (p,q) model proposed by Nelson (1991) is given by the equation

$$\log(\sigma^2_t) = \alpha_o + j=1q\beta j\log\ (\sigma 2t\text{-}j) + i=1p\alpha i\ |\epsilon t\text{-}i\sigma t\text{-}j| + k=1r\gamma k\epsilon t\text{-}k\sigma t\text{-}k \qquad (3)$$

γk indicates the leverage effect and refers to the presence of asymmetries. If $\gamma k < 0$, then negative shocks generate more volatility than positive shocks. If $\gamma k < 0$, then negative shocks have a stronger impact on the volatility than positive shocks. If $\gamma k > 0$, then negative shocks generate less volatility than positive shocks. This model is used both to account the presence of the leverage effect; while testing whether the introduction of futures contracts has an impact of spot volatility.

Models with dummy variable : In order to investigate the effect of futures contracts on the spot price volatility; a dummy variable which take the value 0 and 1 respectively before and after the introduction of futures contracts. If the coefficient of the dummy variable is statistically significant then the introduction of futures contracts has changed the spot market volatility of the BIST-30 index. The GARCH and EGARCH models with the dummy variable are presented below.

GARCH(p,q) model

$$\sigma^2_t = \alpha_o + j=1q\beta j\sigma 2t\text{-}j\ +\ i=1p\alpha i\epsilon 2t\text{-}i\ +\gamma D\ D_f\ \boldsymbol{\epsilon_{t-1}} \qquad (4)$$

EGARCH (p,q) model

$$\log(\boldsymbol{\sigma^2_t}) = \boldsymbol{\alpha_o} + j=1q\beta j\log\ \ (\sigma 2t\text{-}j) + i=1p\alpha i|\epsilon t\text{-}i\sigma t\text{-}j|\ +\ k=1r\gamma\epsilon t\text{-}k\sigma t\text{-}k\ +\ \gamma D\ D_f \qquad (5)$$

In case that the coefficient of the dummy variable γD is positive, then the introduction of stock index futures has increased the volatility of spot market. Conversely, if the coefficient is negative; there has been a decrease of volatility. If the coefficient is equal to zero, that means that the index futures have no significant impact on spot price volatility.

Furthermore, we test if there is any relationship after the inception of futures on the Turkish stock market between the level of futures trading volume and the volatility of the underlying index. Following the approach used by Bessembinder and Seguin, we use an ARMA (p,q) model to decompose the time series of the futures trading volume into expected and unexpected component. The unexpected trading volume represents a sudden change in the trading volume within day to information shocks, while the expected component is considered as the natural activity in futures market. We include those additional variables in the condition variance equation of EGARCH model

$$\log(\sigma^2_t) = \alpha_o + j=1q\beta j\log\ \ (\sigma 2t\text{-}j) + i=1p\alpha i|\epsilon t\text{-}i\sigma t\text{-}j|\ +\ k=1r\gamma\epsilon t\text{-}k\sigma t\text{-}k\ +\ \gamma D\ D_f + \ \ \delta_1 UNEXVOLt + \delta_2 EXVOLt \quad (6)$$

where UNEXVOLt is the unexpected component and EXVOLt the expected components of futures trading volume. δ_1 and δ_2 represents respectively the coefficients which show the effect of the unexpected. If the coefficients are statistically significant then the futures trading volume have an impact on spot market volatility. The sign of those coefficients will indicate whether there is an increase impact (positive) or a decrease impact (negative).

Using an ARMA model, we also split up the spot trading volume in two sub categories: The spot trading volume before the introduction of futures contracts and the spot trading volume after the inclusion. We include a coefficient γd in the mean equation in order to investigate its statically significance. If the coefficient is statistically significant then there is difference of the spot market volatility after the introduction of the futures contract, on the contrary case there is no difference.

3. FINDINGS AND DISCUSSIONS

In this section, the results of our analysis will be presented.

3.1. Effect of Futures Contracts on Spot Price Volatility and Leverage Effect

In table 2, the results of GARCH and EGARCH models are reported. The first column shows the GARCH model result, the second column, the leverage effects with the EGARCH model result and the last column show the extended EGARCH model result which represents the EGARCH model after the inclusion of the dummy variable. The results showed that the EGARCH model is the best model to estimate the volatility, since the log-likelihood value of the EGARCH model (8729,493) is superior to the log-likelihood value of the GARCH model (8727.171). According to the result, ARMA(9,8) is the most appropriate model to estimate the average of the return series.

Table 2: **Effect of Futures Trading on Spot Market Volatility and Leverage Effect**

	GARCH		**EGARCH**		**EXTENDED EGARCH**	
M	0.0001		0.0001		0.0001	
AR(1)	-1.224		0.944***		-0.690	
AR(2)	-1.375		-0.127		-0.647	
AR(3)	-1.056		-0.282		-0.905	
AR(4)	-0.966		0.295*		-0.284	
AR(5)	-0.734		-0.572***		-0.758**	
AR(6)	-0.519		0.521*		-0.288	
AR(7)	-0.031		-0.273		0.012	
AR(8)	0.030		-0.114		-0.202	
AR(9)	-0.002		0.001		-0.002	
MA(1)	1.224		-0.944***		0.691	
MA(2)	1.374		0.126		0.646	
MA(3)	1.054		0.282		0.904	
MA(4)	0.963		-0.295*		0.283	
MA(5)	0.731		0.573***		0.757**	
MA(6)	0.516		-0.523*		0.284	
MA(7)	0.027		0.273		-0.017	
MA(8)	-0.034		0.116		0.198	
Ω	0.0001***		-0.363***		-0.416***	
A	0.086***		0.185***		0.175***	
B	0.903***		0.970***		0.959***	
Γ	-		-0.056***		-0.064***	
N	1.112***		1.133***		1.142***	
γ_D	-		-		-0.031***	
Q (70)	67.023	[0.093]	67.839	[0.082]	66.707	[0.098]
Q_s (70)	52.466	[0.094]	63.768	[0.709]	58.693	[0.830]
LM(1)	0.172	[0.678]	0.074	[0.784]	0.000	[0.996]
Ln(L)	8727.171		8729,493		8733.029	

The results shows that, the coefficient of the dummy variable which measures the impact of the futures trading on spot market is negative γD(-0.031) and is significant at the %1 level. Therefore, there is a decrease in spot price volatility associate with the introduction of futures. Our findings demonstrate compliance with those of Bologna and Cavallo (2002); Kasman and Kasman (2008); Caglayan 2011); Diesteldorf et al., (2014). Also the table provides the results of the EGARCH model which has investigated the presence of leverage effect after the inception of futures trading on spot market volatility. The coefficient γ which captures this presence is negative γ (-0056) and statistically significant at the %1 level. Therefore negative shocks have a greater impact on volatility than good news.

3.2.Effect of Futures Trading Activity on Spot Market Volatility

The results of the impact of futures trading activity (volume) on the volatility of the spot market are presented in Table 3. Firstly The first column in the table reveals the GARCH results, the second column , the results of EGARCH models and the last column the extended EGARCH model which take place as a result of addiction of expected and unexpected trading volume variable in the EGARCH conditional variance equation .

Firstly, we used the GARCH and EGARCH models to know which model is appropriated to our times series. We found that the log-likelihood of EGARCH model(6144,94) is greater than the log-likelihood of GARCH model (6138,216). These results indicated that the EGARCH model provides the best fit of the stylized fact of stock returns. That is why we choose the EGARCH model to investigate the effects of futures trading activity (volume) on spot market volatility.

Table 3: Effect of Futures Trading Activity on Spot Market Volatility

	GARCH		**E-GARCH**		**Extended E-GARCH**	
μ	0.001***		0.001***		0.001***	
AR(1)	0.429***		0.355***		-0.087***	
AR(2)	-0.398***		1.019***		-0.459***	
AR(3)	0.392***		0.620***		0.338***	
AR(4)	-0.382***		-0.930***		0.022	
AR(5)	0.407***		0.272***		0.812***	
AR(6)	-0.901***		-0.875***		0.314***	
AR(7)	0.003		0.000		0.005	
MA(1)	-0.424***		-0.341***		0.103***	
MA(2)	0.408***		1.033***		0.463***	
MA(3)	0.383***		-0.627***		-0.345***	
MA(4)	0.394***		0.944***		-0.024	
MA(5)	-0.403***		-0.281***		-0.807***	
MA(6)	0.881***		0.874***		-0.336***	
ω	0.0001***		-0.445***		-0.654***	
α	0.077***		0.163***		0.177***	
β	0.898***		0.960***		0.927***	
γ	-		-0.076***		-0.105***	
ν	1.410***		1.435***		1.485***	
δ_1	-		-		0.420***	
δ_2	-		-		-0.003	
Q (70)	62.334	(0.292]	58.318	(0.427]	64.391	[0.234]
Q_S (70)	67.422	(0.565]	66.435	(0.599]	97.231	[0.017]
LM(1)	0.001	(0.968]	0.838	(0.359]	1.978	[0.159]
Ln(L)	6138.216		6144.97		6164.863	

Results show that, the estimated coefficient of unexpected trading futures volume is positive δ_1(0.420) and significant at the 1%level. This indicates that unexpected futures trading volume has positive and significant effect on stock market volatility. In other words, a sudden change in a trading volume of futures contracts, increases the spot market volatility. This result concur with those of Bessembinder and Seguin (1992)'s, and Kamaiah Sakthivel (2009). Furthermore, although that the estimated coefficient of expected trading futures volume is negative δ_2(-0.003), it is not significant at the 1%level. Then, when a expected trading volume occurred in the future market, it has no significant impact of the volatility of the spot market. This finding is in line with those of Shembaragaman (2003) and Illueca ve Lafuente (2003).

3.3.Effect of Futures Contracts on Spot Market Liquidity

The results of the impact of futures contracts on spot market trading volume are presented in Table 4. ARMA (9,8) is the most appropriate model to estimate the trading volume series according the Akaike information criterion.

Table 4: Effect of Futures Contracts on Spot Market Liquidity

	ARMA	
μ	23.689***	
γ_0	-0.039	
AR(1)	0.968***	
AR(2)	-0.762***	
AR(3)	1.044***	
AR(4)	-0.134	
AR(5)	0.643***	
AR(6)	-0.719***	
AR(7)	0.645***	
AR(8)	-1.070***	
AR(9)	0.385***	
MA(1)	-0.385***	
MA(2)	0.572***	
MA(3)	-0.668***	
MA(4)	-0.234***	
MA(5)	-0.688***	
MA(6)	0.228***	
MA(7)	-0.510***	
MA(8)	0.687***	
ADJ.R²	0.871	
F-ist	1312.477	[0.000]
DW-ist	2.011	
***Q*(70)**	59.804	[0.242]
***Q*$_s$(70)**	785.40	[0.000]

Results presented in Table 4 show that the coefficient of dummy variable indicates the difference of the spot market trading volume after the inclusion of futures contracts is negative but was no statistically significant. According to this result, the introduction of futures contracts has not made a significant difference on the spot market trading volume. Therefore the introduction of BIST index futures contract has not created a difference on the liquidity of Istanbul Stock Exchange.

5. CONCLUSION

This study examines the impact of futures markets on the spot market volatility and liquidity in the Turkish stock market. Using an EGARCH, we firstly investigate whether there is a change on the spot price volatility before and after the introduction of BIST-30 index futures. The evidence suggests that the introduction of

futures contracts had caused a significant decrease of the spot price volatility. One reason of this stabilization effect is an increase of the level of available information of participants, and the speculation activity that migrates from the spot to the futures market. In addition, futures markets provide the spot market liquidity and directly a decrease of the spot market volatility is expected (Antonio and Holmes, 1995; Edwards, 1998; Pilar and Rafael, 2002). However the last results of this research does not support this view since it had not found a statistically significant difference in the Turkish Stock market after the introduction of BIST 30 index. We further tested with the EGARCH whether there is a presence of leverage effect on the spot market volatility, after the introduction of futures contracts. The results indicate a presence of the spot market volatility, in other words bad news that flow in the market, increase the volatility more than the good news. This can be explained by the fact that investors overreacted to bad news more than good news. Besides, we investigated whether the futures market trading volume affect the spot price volatility. Using both GARCH and EGARCH model, we examine the effect of the expected and unexpected BIST-30 index futures trading volume on the underlying spot market. In our test, EGARCH has been found to be the best model to estimate the volatility. Results show that there is no significant impact of the expected futures trading volume in the spot price volatility. However, when an unexpected future trading volume took place in the market place, there is an increase of spot price volatility. Unexpected trading volume may have been caused by speculative activity. Speculators in futures markets, suddenly by changing their position, lead to a change of the trading volume. Unexpected trading volume may also result from the entrance of new uniformed traders in the market. In both cases, the negative perception of the unexpected trading volume in the futures market may lead to the increase of the spot market volatility. Finally using an ARMA model, we test whether the inclusion of BIST-30 index futures lead to an increase or a decrease of the spot market trading volume. Our results indicate there is no statistically significant difference of the level of the spot market trading volume after the introduction of futures markets. The reason of this behavior is the low level of trading volume in the Turkish derivatives market and those markets do not have impact of the spot market trading volume.

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Journal of Business, Economics and Finance (JBEF), ISSN: 2146 - 7943

Journal of Business, Economics and Finance

Year: 2016 Volume: 5 Issue:3

TRADE CREDIT IN ITALY: FINANCING TO SELL

DOI: 10.17261/Pressacademia.2016321975

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ABSTRACT

The analysis considers Italian SMEs and investigates, over the years 2006-2011, the existence of interdependencies between trade credit policy and trade debt policy and the co-existence of conditions of complementarity and substitutability between trade credit and other financing sources. Linear regression models on a yearly basis are used and these models are put under observation for six years.The paper shows that there are interdependencies between trade credit policy and trade debt policy; trade credit can be a complementary and substitute source of financing to bank loans; conditions of substitutability and complementarity can also be observed by considering separately firms involved in agricultural or industrial activities and firms that perform services.

Keywords: Trade credit, trade debt, bank-firm relationship, SMEs, intercompany financing

JEL Classification: G10, G20, G21

1. INTRODUCTION

Italian firms characterise themselves by an elevated recourse in self-financing, bank debts – especially over short periods – multiple exposures (Banca d'Italia 2010, 2011, 2012) and intercompany financing. Many reasons lead to the use of trade credit which can be traced to real and financing functions. Real functions refer to credit offers which support the selling policy. Trade credit may be a way to strengthen client relationships, to guarantee product quality and to allow discrimination of prices; ultimately, this represents a possible response to the variability of demand and a way to improve the profitability of firms. From a financing point of view, trade credit may represent an alternative form of financing in the short term. This paper focuses on the relevance of transactional and financing motivations, as well as the dual function of substitutability or complementarity of trade credit in comparison to other forms of third party financing.

The empirical analysis is carried out on Italian SMEs during the period immediately before and after the outbreak of the financial crisis (2006-2011). This study contributes to reference literature for various reasons. Firstly, Italy represents an important case to study the determinants and the implications of trade credit, as it is characterised by an elevated practice of trade credit, much higher than other European countries. Secondly, this study was carried out over a six-year period, before and during the economic and financial crisis, allowing us to observe the financial function of trade credit even in times of crisis. Thirdly the survey investigates the possibility that recourse in trade credits can be influenced by the enterprise's characteristics (size and age) and by their territoriality and business sector. For these purposes the Italian economic system represents an

[1] This paper is the result of a joint effort and a continuous exchange of ideas among the two authors. The individual parts are attributed as follows: Candida Bussoli has written Literature Review, Data and Methodology, Findings and Discussions; Claudio Giannotti has written Introduction and Conclusion.

important contest at an international level, as it consists of SMEs characterised by different economic development conditions, also depending on their location: northern and central regions compared to southern regions and islands. Finally, in literature the financial reasons for recourse in trade credit are usually dealt with debtor firms. This study also takes into consideration creditor firms, and the overall net position of enterprises: the difference between trade receivables and payables that contributes to the financial needs for working capital. The results of this study confirm that there are interdependencies between trade credit policy and trade debt policy. Trade credit, also available in periods of crisis, can be a complementary and substitute source of financing to bank loans. Conditions of substitutability and complementarity can also be observed by considering separately firms involved in agricultural or industrial activities and firms that perform services.
The paper is organized as follows: the second section gives us a brief review of the literature that leads to the research hypotheses; the third section illustrates the methodology and the sample, and the fourth discusses the results. The last paragraph sets forth brief conclusive assessments and the implications of the studied phenomenon.

2. LITERATURE REVIEW

Trade credit is the financing between enterprises, resulting from the granting of agreed deferred payments to the client by the supplier. Through the provision of trade credit, the seller forgoes an immediate cash flow, for real-type motivations, in the hope to set up, expand or consolidate relations with customers.

The main aim is to begin a relationship with potential clients and to expand relationships with existing clients: trade credit can be a useful support tool for sales policies and a way to undertake and consolidate relationships with customers, thanks to the product quality guarantee and price discrimination. (Lee and Stowe 1993; Long Malitz and Ravid 1993; Schwartz and Whitcomb 1978, 1979). Another aim is represented by the consolidation of business relations (Emery 1987). Apart from real-type motivations, recourse in trade credit also has financial motivations. Literature weighs on the relevance of the financial reasons for the use of trade credit, distinguishing the transactional and financial components. The transactional element refers to trade credit as a synchronisation tool between receipts and payments instead of using the money, for a better forecast of cash flow, and treasury management planning in case of unexpected payments. From this point of view Schwartz (1974) and Ferris (1981) claim that the demand and supply of trade credit for transactional reasons explain the short-term and very short-term components of trade credit, which reduces the transaction costs and the liquidity buffers for precautionary reasons.

Other studies on the transactional costs hypothesise a positive relationship between demand variability and supplier loan (Emery 1987; Long, Malitz and Ravid 1993). Long, Malitz and Ravid (1993) demonstrated that enterprises which face variable demand make more use of trade credit than enterprises that have steady demand. Transactional reasons refer to the use of trade credit which synchronizes receipts and payments and proves to be convenient both for the seller and the purchaser: the short-term duration and the granting of discounts, when paying by cash, distinguish this operation from trade credit for financial reasons. A survey carried out by Banca d'Italia (Finaldi Russo and Leva 2004) demonstrated that transactional reasons are predominant for enterprises which make a more intense use of trade credit. Financial reasons are of lower importance and the influence of financial reasons affects trade debt much less than real-type motivations. The importance of financial reasons in intercompany financing operations is justified by the increased availability of trade debt compared to other sources of funding, the convenience of trade debts being less onerous compared to other sources, the higher ductility of the financing source which, on one hand, has no complex contractual formulas and on the other hand may have an extended duration with no extra costs. Inaccurate information on the financial system and the presence of weak financial institutions (Fisman, Love 2001) and also weak legal recovery rules (Carmignani 2004) may determine substitutability or complementarity between trade credit and bank financing. Imperfections in the financial markets may determine the rationing of bank financing (Schwartz 1974), which has a greater influence on the financing of opaque or young enterprises (Huyghebaert 2006). The rationing of bank financing may lead to recourse in trade credit as a fall-back determined by the insufficiency and inadequacy of sources of finance from third parties or banks (Duca 1996; Jaffe and Stiglitz 1990; Petersen and Rajan 1997). Complementarity conditions and an extended recourse in trade credit is noted when non-financial enterprises know how to monitor the credit capacity of a firm, and they are able to transfer funds,

borrowing from intermediaries and granting deferred payments to other firms, otherwise rationed for reasons of misinformation (Demirguc, Kunt and Maksimovic 2001). In this case, trade credit can also be a signal: information that financial intermediaries receive from relationships with non-financial firms granting deferred payments can mitigate misinformation that may cause problems for opaque enterprises and may decrease the conditions of credit rationing. Opaque firms that are predominantly small in size can be subject to credit rationing (Stiglitz and Weiss 1981) and can turn to trade credit as an alternative source of financing. Trade credit, obtained according to the assessment made by the credit provider in respect of the creditworthiness of the firms to be financed, increases the good reputation of creditors and allows them to earn easy access to bank credit. Alphonse Ducret and Severin (2004) therefore claim that trade credit can be replaceable, but also complementary to bank debts. The substitutability and complementarity between trade credit and bank credit can occur in the economic-financial system with the prevailing real motivations for recourse in trade credit. The importance of financial motivations may also appear where larger sized firms that do not have to worry about limited access to the financial market, in terms of funds and costs, act as intermediaries, offering trade credit to smaller firms which face greater difficulties in accessing credit market (Emery, 1984: Mian and Smith, 1992; Schwartz, 1974). The financial motivation to use trade credit implies that the provision of trade receivables could have a positive impact on the profitability of larger sized firms, in this way consolidating their relationship with clients. An even more positive impact is expected for small and medium-sized enterprises as the higher percentage of trade payables may represent the availability of intercompany financing even in situations of opacity and credit rationing by banks or other intermediaries.

It may be therefore useful to investigate the importance of financial determiners of intercompany credit and the existence of relationships of substitutability and complementarity between intercompany credit and other sources of financing by third parties. Small and medium-sized enterprises can be subject to conditions of sale from suppliers that have a larger market share: the offer of trade credit, imposed by the exploitation of the market power of suppliers, may determine the adoption of a balancing strategy, financing the supply of trade credit with trade debt. To investigate the financial reasons for recourse in intercompany credit, it is necessary to acknowledge the existence of an interdependent relationship between trade credit policy and trade debt policy, the existence of relationships of substitutability and complementarity between intercompany credit and other sources of financing by third parties and the influence of the business sector.
As claimed in literature and for the above reasons, the following research hypotheses are formulated:

HP1: A strict interdependence relationship exists between trade credit policies and trade debt policies for small and medium-sized enterprises.
HP2: Conditions of substitutability and complementarity coexist between intercompany credit and financing from banks or third parties for small and medium sized enterprises.
HP3: Conditions of substitutability and complementarity coexist between intercompany credit and financing from banks or third parties for small and medium sized enterprises that belong to industry and services sectors.

3. DATA AND METHODOLOGY

In coherence with literature, to verify the research hypotheses, linear regression models on a yearly basis are used and these models are put under observation for six years. The variables used for the analysis are presented in Table No. 1.

To verify the research hypotheses the following models are used:

$$Y_{ik} = \alpha + \beta_1 inbanel_i + \beta_2 inbanol_i + \beta_3 inalen_i + \beta_4 inalol_i + \beta_5 cosden_i + \beta_6 ros_i + \beta_7 roe_i + \beta_8 curr_i + \beta_9 solven_i + \beta_{10} ldim_i + \beta_{11} logeta_i + \beta_{12} darea_i + \varepsilon$$

$$Y_{ik} = \alpha + \beta_1 inbanel_i + \beta_2 inbanol_i + \beta_3 inalen_i + \beta_4 inalol_i + \beta_5 cosden_i + \beta_6 ros_i + \beta_7 roe_i + \beta_8 curr_i + \beta_9 solven_i + \beta_{10} ldim_i + \beta_{11} logeta_i + \beta_{12} darea_i + \beta_{13} varspec_i + \varepsilon$$

Table 1: Regression Variables

NAME	*DESCRIPTION*	*MEASURE*
crclta	Incidence of trade receivables	Ratio of the sum of accounts receivable in the short and medium term and total assets
deforta	Incidence of trade payables	Ratio of the sum of trade payables in the short and medium term and total assets
crmerta	Incidence of net mercantile credit	Ratio of the difference between trade receivables and trade payables and total assets
ros	Return on Sales	Ratio of operating income and sales revenues
roe	Return on Equity	Ratio of net income and shareholders' equity
inbanel	Incidence of short-term bank debt	Ratio of short-term bank borrowings and shareholders' equity
inbanol	Incidence of medium and long-term bank debt	ratio of medium and long-term bank debt and shareholders' equity
inalen	Incidence of debts to other financiers in the short term	Ratio of debt to other financiers in the short term and shareholders' equity
inalol	Incidence of debts to other financiers in the medium to long term	Ratio of debt to other financiers in the medium and long-term and shareholders' equity
curr	Current ratio	Ratio of current assets and current liabilities
solven	Solvency ratio	Ratio of equity to total assets
cosden	Impact of financial charges	The ratio of total financial charges and the sum of short and medium - long-term bank debt
ldim	Firm's size	Natural logarithm of the number of employees
logeta	Firm's age	Natural logarithm of firm's age at the time of the analysis
darea	Dummy variable for the territoriality	Dummy equal to 1 if the firm is located in the Centre and North of Italy

Where *i* identifies the single observations of the sample; Y_{ik} is the dependent variable expressed by *k* independent variables; $\beta_1, \beta_2, \ldots$are the parameters that have to be estimated with the model; α is the constant and ε is the error. Enterprises may adopt a combination of trade receivables and payables that is coherent both in terms of amount as in terms of duration. To verify the first research hypothesis this analysis considers two regression models in which the dependent variables are: the incidence of account receivables on total assets (*crclta*) and the incidence of account payables on total assets (*deforta*). The difference between the two models consists in the presence (net models) or not (gross models) of an extra independent variable (*varspec*), specular in relation to the dependent variable. In the net model that shows as the dependent variable the incidence of trade receivables on total assets, the incidence of trade payables is considered among the explanatory variables. In the net model that shows as the dependent variable the incidence of trade payables on total assets, the incidence of trade receivables is considered among the explanatory variables (Fabbri and Klapper 2008, Gibilaro and Mattarocci 2010). If the decision to include the specular variable results statistically significant and determines an improvement in the statistical significance of the model, trade credit policy and trade debt policy can be considered closely interrelated.

To verify the second and third research hypotheses this analysis considers only the results of the gross models. Useful predictors are *inbanen, inbanol, inalen, inalol, cosden*, related to the incidence of debt towards banks and third parties - for short and long-term periods - on shareholder equity and the rate of financial charges on the total bank debt. The independent control variables are related to the general characteristics of the firms (*ldim, logeta* and *darea*) and to the financial and economical balance conditions (*ros, roe, curr, solven*).
The existence of a significant dependency relationship between trade payables and receivables and the independent financial variables could confirm the use of intercompany credit for financial purposes.
The existence of a positive relationship of dependency between the dependent variables and bank loans could show system conditions which allow a *complementary* use of intercompany financing and bank financing. The existence of a negative relationship of dependency could signal an *alternate* use of intercompany credit with respect to bank financing. The dynamic of the ratio between net mercantile credit and total assets (*crmerta*) is also investigated. Net mercantile credit is very significant for the purpose of analysis, as it represents the amount of working capital that may be covered by financial debts. The existence of significant dependent relationships of the variable *crmerta* compared to the independent financial variables could confirm the importance of financial motivations in the recourse in trade credit.
The reference sample is composed of SMEs where the balance sheets were available in the Aida Bureau Van Dijk database in November 2013.
The enterprises present the following characteristics:

- Legal status: active firms; independent firms;
- Joint stock companies and limited companies;
- Number of employees less than 250;
- Total assets less than 43 million euros;
- Financial statements availability: for the years 2006 to 2011.

The study was carried out for the years 2006 – 2011 and the sample is made up of enterprises from all over Italy and very different in terms of location and business sectors, according to the classification of economic activities by the Italian National Institute of Statistics (ISTAT): ATECO classification 2007. Firms that conduct financial activities (Ateco codes: 64, 65, 66) were not included in the sample.

Table 2: Descriptive Statistics – 2006

Variable	Obs	Mean	Std Dev	Min	Max
crclta	864	0,370	0,203	0,000	0,981
deforta	864	0,282	0,162	0,000	0,909
crmerta	864	0,088	0,200	-0,772	0,699
inbanen	864	1,885	19,831	0,000	577,306
inbanol	864	0,428	1,346	0,000	27,590
inalen	864	0,046	0,458	0,000	11,746
inalol	864	0,027	0,178	0,000	2,215
cosden	722	5,693	3,974	0,000	19,750
ros	843	5,462	6,647	-42,490	29,110
roe	861	8,337	16,403	-109,620	88,490
curr	863	1,647	0,969	0,020	9,650
solven	865	0,308	0,197	0,001	0,994
ldim	865	9,041	0,806	6,032	10,544
logeta	865	3,192	0,593	1,099	4,595
darea	865	0,894	0,308	0,000	1,000

Table 3: Descriptive statistics - 2011

Variable	Obs	Mean	Std Dev	Min	Max
crclta	865	0,327	0,200	0,000	0,966
deforta	865	0,230	0,145	0,000	0,892
crmerta	865	0,097	0,182	-0,860	0,752
inbanen	865	1,607	19,154	0,000	559,466
inbanol	865	0,397	1,076	0,000	15,922
inalen	865	0,028	0,318	0,000	8,589
inalol	865	0,017	0,151	0,000	3,877
cosden	736	4,252	3,183	0,000	19,940
ros	839	3,649	6,869	-47,000	29,130
roe	861	3,843	18,467	-130,320	97,400
curr	861	1,745	1,146	0,120	9,820
solven	865	0,367	0,213	0,001	0,989
ldim	865	9,252	0,823	5,439	10,632
logeta	865	3,406	0,466	2,079	4,644
darea	865	0,894	0,308	0,000	1,000

In order to verify the third research hypothesis, the sample is divided into industrial and service firms: industrial firms belonging to ATECO sectors 01-53 and service firms belonging to ATECO sectors 55-99.
From a geographical point of view most of the firms are located in the North: the sample, therefore, reflects the economic and productive Italian systems, which are characterized by a greater number of enterprises located in the northern regions compared to the firms which are located in southern and central regions.
The descriptive statistics are calculated on the available data for the first and last year considered and they are presented in Tables no. 2 and 3.

4. FINDINGS AND DISCUSSIONS

The linear regression models are statistically significant in all years under observation, for all dependent variables considered alternatingly. The results of the collinearity tests allow us to exclude problems of collinearity: the values of the *Variance Inflation Factor* (VIF) are always inferior to the critical threshold of literature (Fox 1997). The results of the *White heteroskedasticity test* demonstrate heteroskedasticity problems. Therefore robust standard errors analyses are conducted.

The first research hypothesis is verified by comparing the gross models (Tables no. 4 and 6), that don't consider the specular variable as a regressor, and the net models (Tables no. 5 and 7), that consider the specular variable as a regressor (*varspec*). The comparison between gross and net models shows that the net models allow an improvement of the analysis (the value of R-squared increases significantly). We can, therefore, assume - in line with reference literature (Fabbri and Klapper 2008, Gibilaro and Mattarocci 2010) and confirming the first research hypothesis – that there is an interdependent relationship between trade credit policy and trade debt policy.

Table 4: Regression Analysis 2006-2011 - Dependent Variable: *crclta* - gross models

	2006		**2007**		**2008**		**2009**		**2010**		**2011**	
inbanen	0,0008	***	0,0008	***	0,0009	***	0,0011	***	0,0011	***	0,0009	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0280	***	-0,0222	**	-0,0549	**	-0,0739	***	-0,0503	***	-0,0351	***
	0,0009		0,0325		0,0170		0,0000		0,0051		0,0009	
inalen	-0,0213	**	0,0080		-0,0166		0,0323		-0,0100		0,0217	
	0,0319		0,8837		0,5996		0,3792		0,2639		0,1922	
inalol	-0,0412		-0,0234		0,0086		-0,0027		0,0337		0,0256	
	0,3584		0,3490		0,5677		0,9039		0,3991		0,7973	
cosden	-0,0024		-0,0027		0,0006		-0,0047	**	-0,0078	***	-0,0075	***
	0,1841		0,1394		0,7475		0,0226		0,0001		0,0002	
ros	-0,0038	**	-0,0041	**	-0,0028	*	-0,0004		-0,0004		-0,0027	*
	0,0386		0,0139		0,0560		0,7700		0,7694		0,0864	
roe	0,0016	***	0,0020	***	0,0032	***	0,0019	***	0,0018	***	0,0023	***
	0,0012		0,0003		0,0000		0,0006		0,0092		0,0000	
curr	0,0419	***	0,0411	***	0,0393	***	0,0372	***	0,0466	***	0,0447	***
	0,0046		0,0044		0,0001		0,0000		0,0001		0,0002	
solven	-0,3650	***	-0,3453	***	-0,4933	***	-0,5470	***	-0,5350	***	-0,5463	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0074		-0,0012		-0,0101		-0,0275	***	-0,0192	*	-0,0190	**
	0,4528		0,8957		0,2619		0,0059		0,0589		0,0496	
logeta	0,0091		0,0115		0,0037		-0,0044		-0,0072		-0,0007	
	0,4285		0,3426		0,7410		0,7224		0,5732		0,9595	
darea	0,1126	***	0,1159	***	0,0700	***	0,0655	***	0,0698	**	0,0417	
	0,0000		0,0000		0,0043		0,0063		0,0103		0,1313	
deforta												
crclta												
Cons	0,3971	***	0,3190	***	0,4773	***	0,7241	***	0,6346	***	0,6451	***
	0,0001		0,0011		0,0000		0,0000		0,0000		0,0000	
N	707		711		702		707		704		720	
R^2	0,1497		0,1635		0,2395		0,2659		0,2529		0,2704	
F	16,3329		27,4496		23,2727		26,8994		22,4732		26,3636	

Level of significance: (***)1%; (**)5%; (*)10%

Table 5: Regression Analysis 2006-2011 - Dependent Variable: *crclta* - net models

	2006		2007		2008		2009		2010		2011	
inbanen	0,0009	***	0,0009	***	0,0010	***	0,0012	***	0,0012	***	0,0011	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0193	***	-0,0162	*	-0,0404	**	-0,0568	***	-0,0339	***	-0,0257	***
	0,0038		0,0521		0,0156		0,0000		0,0086		0,0007	
inalen	-0,0317	***	-0,0014		-0,0041		0,0451	*	-0,0001		0,0318	**
	0,0010		0,9814		0,8658		0,0969		0,9931		0,0308	
inalol	-0,0202		-0,0100		0,0018		-0,0039		0,0547		0,0737	
	0,6192		0,6734		0,8982		0,8275		0,1482		0,4379	
cosden	-0,0041	**	-0,0038	**	0,0008		-0,0057	***	-0,0078	***	-0,0078	***
	0,0295		0,0415		0,6695		0,0057		0,0001		0,0001	
ros	-0,0007		-0,0010		-0,0009		0,0003		0,0002		-0,0015	
	0,6413		0,4595		0,4361		0,7985		0,8796		0,2287	
roe	0,0007		0,0011	**	0,0021	***	0,0012	**	0,0009		0,0017	***
	0,1728		0,0418		0,0001		0,0217		0,1674		0,0009	
curr	0,0475	***	0,0456	***	0,0387	***	0,0349	***	0,0467	***	0,0406	***
	0,0003		0,0003		0,0000		0,0000		0,0000		0,0001	
solven	-0,1952	***	-0,1747	***	-0,2833	***	-0,3373	***	-0,2978	***	-0,3134	***
	0,0010		0,0046		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0002		0,0075		-0,0023		-0,0159		-0,0108		-0,0125	
	0,9859		0,3806		0,7875		0,1042		0,2601		0,1686	
logeta	0,0042		0,0053		-0,0022		-0,0096		-0,0106		-0,0056	
	0,7018		0,6493		0,8411		0,3991		0,3560		0,6359	
darea	0,1052	***	0,1115	***	0,0807	***	0,0754	***	0,0766	***	0,0556	**
	0,0000		0,0000		0,0012		0,0016		0,0036		0,0315	
deforta	0,4670	***	0,5023	***	0,4972	***	0,4722	***	0,5369	***	0,5254	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
crclta												
Cons	0,1592		0,0631		0,2146	**	0,4449	***	0,3466	***	0,3846	***
	0,1104		0,4978		0,0236		0,0000		0,0013		0,0003	
N	707		711		702		707		704		720	
R^2	0,2394		0,2656		0,3254		0,3377		0,3529		0,3659	
F	21,1921		27,1594		27,8388		33,3822		34,1973		39,6877	

Level of significance: (***)1%; (**)5%; (*)10%

The verification of the second research hypothesis takes into account the results of the gross models (Tables no. 4 and 6) and is related to the coexistence of substitutability and complementarity conditions between trade credit and debts with third parties or banks. The importance of financial motivations is evident in the relationship between the dependent variables *crclta, deforta* and *crmerta* and the incidence of debt towards banks and third parties, both for short and medium and long term.

Table 6: Regression Analysis 2006-2011 - Dependent Variable: *deforta* - gross models

	2006		**2007**		**2008**		**2009**		**2010**		**2011**	
inbanen	-0,0002	***	-0,0002	***	-0,0003	***	-0,0003	***	-0,0002	***	-0,0003	***
	0,0000		0,0005		0,0000		0,0000		0,0002		0,0000	
inbanol	-0,0188	***	-0,0120	**	-0,0291	*	-0,0364	***	-0,0305	***	-0,0180	**
	0,0008		0,0138		0,0521		0,0010		0,0094		0,0209	
inalen	0,0223	***	0,0188		-0,0253		-0,0270		-0,0184	***	-0,0193	***
	0,0000		0,6722		0,1612		0,4384		0,0000		0,0033	
inalol	-0,0451	**	-0,0266		0,0137		0,0025		-0,0390		-0,0915	**
	0,0406		0,1136		0,1282		0,8780		0,1882		0,0133	
cosden	0,0035	***	0,0021	*	-0,0004		0,0021		0,0000		0,0007	
	0,0087		0,0984		0,7663		0,1200		0,9899		0,6685	
ros	-0,0066	***	-0,0061	***	-0,0038	***	-0,0013		-0,0011		-0,0024	**
	0,0000		0,0000		0,0012		0,1332		0,2951		0,0158	
roe	0,0021	***	0,0019	***	0,0021	***	0,0014	***	0,0016	***	0,0012	***
	0,0000		0,0000		0,0001		0,0047		0,0005		0,0047	
curr	-0,0121		-0,0089		0,0012		0,0046		-0,0002		0,0078	
	0,1441		0,2422		0,8237		0,2972		0,9767		0,1704	
solven	-0,3634	***	-0,3398	***	-0,4225	***	-0,4444	***	-0,4419	***	-0,4432	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0154	**	-0,0173	***	-0,0158	***	-0,0242	***	-0,0154	**	-0,0123	**
	0,0123		0,0045		0,0094		0,0000		0,0167		0,0447	
logeta	0,0105		0,0124		0,0119		0,0109		0,0062		0,0095	
	0,2213		0,1694		0,1665		0,2081		0,5049		0,3137	
darea	0,0158		0,0089		-0,0215		-0,0212		-0,0127		-0,0264	
	0,3873		0,6635		0,2397		0,2147		0,5043		0,1794	
deforta												
crclta												
Cons	0,5095	***	0,5095	***	0,5284	***	0,5886	***	0,5357	***	0,4959	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
N	707		711		702		708		705		720	
R^2	0,3212		0,2927		0,3416		0,3583		0,3325		0,3174	
F	29,4879		24,0806		26,7834		34,1884		35,4781		26,1487	

Level of significance: (***)1%; (**)5%; (*)10%

Table 7: Regression Analysis 2006-2011 - Dependent Variable: *deforta* - net models

	2006		**2007**		**2008**		**2009**		**2010**		**2011**	
inbanen	-0,0004	***	-0,0004	***	-0,0005	***	-0,0005	***	-0,0005	***	-0,0005	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0125	***	-0,0066	**	-0,0167		-0,0211	**	-0,0179	**	-0,0092	
	0,0042		0,0225		0,1253		0,0438		0,0301		0,1227	
inalen	0,0271	***	0,0168		-0,0215	*	-0,0337		-0,0159	***	-0,0247	***
	0,0000		0,7188		0,0722		0,2565		0,0000		0,0000	
inalol	-0,0357	*	-0,0209		0,0118		0,0031		-0,0474	*	-0,0978	***
	0,0583		0,1989		0,1470		0,8170		0,0904		0,0079	
cosden	0,0041	***	0,0028	**	-0,0005		0,0030	**	0,0020		0,0025	*
	0,0026		0,0321		0,6809		0,0252		0,1996		0,0952	
ros	-0,0058	***	-0,0051	***	-0,0032	***	-0,0012	*	-0,0010		-0,0017	**
	0,0000		0,0000		0,0013		0,0881		0,2335		0,0185	
roe	0,0017	***	0,0014	***	0,0014	***	0,0010	**	0,0012	***	0,0006	
	0,0001		0,0001		0,0030		0,0342		0,0084		0,1044	
curr	-0,0215	***	-0,0189	***	-0,0077	*	-0,0028		-0,0118	***	-0,0034	
	0,0028		0,0023		0,0824		0,4607		0,0086		0,4529	
solven	-0,2810	***	-0,2559	***	-0,3105	***	-0,3308	***	-0,3084	***	-0,3070	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0138	**	-0,0170	***	-0,0135	**	-0,0189	***	-0,0107	*	-0,0076	
	0,0171		0,0028		0,0184		0,0009		0,0853		0,1825	
logeta	0,0084		0,0096		0,0110		0,0120		0,0081		0,0096	
	0,3011		0,2613		0,1768		0,1357		0,3385		0,2613	
darea	-0,0097		-0,0193		-0,0374	**	-0,0347	**	-0,0301	*	-0,0368	**
	0,5839		0,3103		0,0408		0,0393		0,0955		0,0460	
deforta												
crclta	0,2259	***	0,2431	***	0,2270	***	0,2071	***	0,2493	***	0,2492	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
Cons	0,4198	***	0,4319	***	0,4200	***	0,4413	***	0,3783	***	0,3351	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
N	707		711		702		707		704		720	
R^2	0,3928		0,3791		0,4159		0,4206		0,4217		0,4068	
F	37,1387		32,9192		36,6864		38,3653		43,9904		36,4651	

Level of significance: (***)1%; (**)5%; (*)10%

There is a statistically significant relationship between all dependent variables and the variables which show the incidence of debt towards banks for a short term (*inbanel*) and a medium and long term (*inbanol*). In the six years, it is possible to observe a statistically significant negative relationship between the incidence of trade payables (*deforta*) and the incidence of short-term bank debt (*inbanen*) and medium and long-term bank debt (*inbanol*). The presence of an inverse dependent relationship highlights substitution conditions in the use of different sources of financing: a greater recourse in bank financing results in a lower recourse in trade credits.
Regarding the incidence of trade receivables (*crclta*) instead, the relationship is positive and direct with the incidence of short-term bank debt (*inbanel*) and negative with the incidence of medium and long-term bank debt (*inbanol*). The presence of a significant positive dependent relationship between the incidence of trade credits and the incidence of bank loans or third parties is a symptom of double intermediary conditions, therefore of complementarity between credit from third parties and trade credit. The presence of a direct relationship between the variable *crclta* and the short-term bank financing states that there are conditions of complementarity and emphasizes the importance of transactional motivations other than solely financial in the granting of trade credit. The coexistence of complementarity and substitutability conditions between intercompany credit and financing from banks or third parties is also confirmed by the results of the regression model (Table no. 8) which considers the dependent variable *crmerta* (incidence of mercantile credit on total assets). The existence of a significant and positive dependent relationship between *crmerta* and external financing sources sustains the hypothesis of complementary use of trade credit compared to financing from banks: enterprises try to minimize the amount of financial needs in situations of credit restrictions and increase it in times of greater availability of bank financing. Conversely, a negative dependent relationship highlights an alternative use of trade credit compared to financing from banks, showing a minimization of financial needs in situations of credit expansion.

The empirical analysis confirms the coexistence of complementarity and substitutability conditions, as the *crmerta* and *crclta* variables present a significant positive relationship with short-term bank financing (*inbanel*) and a significant and negative relationship with medium and long-term bank financing (*inbanol*), in the six years. It is interesting to consider the relationship between the dependent variables and the regressor *cosden* (the ratio of financial charges on total bank debt): the relationship is not consistently significant for every year studied. The relationship is statistically significant and positive in the years 2006 and 2007 between *deforta* and *cosden* (Table no. 6): when the cost of borrowing increases the incidence of trade payables also increases, showing conditions of substitutability between bank loans and inter-company loans. The relationship is statistically significant and negative in the years 2009-2011 between *crclta* and *cosden* (Table no. 4): during crisis years, if the cost of money increases the cost of borrowing increases and double intermediary conditions may be too expensive, so credits granted to customers decrease. It is also possible to observe statistically significant relationships between the *deforta* variable with other predictive finance variables (Table no. 6). In particular, we can observe a significant and negative relationship with the *inalen* and *inalol* variables, but not in all years under observation. The relationship with the predictor variable *inalen* is statistically significant in 2006 and 2010 -2011; the relationship with the incidence of medium and long-term loans from third parties (*inanol*) is statistically significant only in 2006 and 2011. The presence of a negative dependent relationship in the years 2010 and 2011 highlights substitution conditions: a greater recourse in third party financing results in a lower recourse in trade credits. The medium and long-term financial predictive variables show a greater importance following an increase in the financial and credit crisis. Regarding firm's characteristics, we can see the impact of the *darea* variable (dummy which has a value 1 for firms located in the central and northern areas of Italy and 0 for firms located in the southern regions and islands) on *crclta* and *crmerta* (Tables no. 4 and 8).

Table 8: Regression Analysis 2006-2011 - Dependent Variable: *crmerta*

	2006		2007		2008		2009		2010		2011	
inbanen	0,0010	***	0,0010	***	0,0012	***	0,0013	***	0,0013	***	0,0012	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0092	*	-0,0102		-0,0258	**	-0,0376	***	-0,0198	**	-0,0171	***
	0,0753		0,1064		0,0136		0,0024		0,0190		0,0020	
inalen	-0,0436	***	-0,0107		0,0087		0,0593	**	0,0085		0,0410	***
	0,0000		0,8807		0,6102		0,0234		0,2140		0,0022	
inalol	0,0038		0,0032		-0,0051		-0,0052		0,0727	*	0,1171	
	0,9206		0,9014		0,7071		0,7438		0,0772		0,2113	
cosden	-0,0060	***	-0,0048	**	0,0010		-0,0068	***	-0,0078	***	-0,0081	***
	0,0047		0,0189		0,6302		0,0030		0,0007		0,0002	
ros	0,0028	**	0,0020		0,0010		0,0010		0,0007		-0,0004	
	0,0463		0,1233		0,3577		0,3065		0,4969		0,7178	
roe	-0,0004		0,0001		0,0011	*	0,0005		0,0002		0,0012	**
	0,4338		0,8173		0,0556		0,4201		0,7970		0,0225	
curr	0,0539	***	0,0500	***	0,0381	***	0,0323	***	0,0468	***	0,0370	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0001	
solven	-0,0015		-0,0055		-0,0708		-0,1029	**	-0,0932	**	-0,1031	**
	0,9777		0,9210		0,1255		0,0281		0,0428		0,0220	
ldim	0,0081		0,0161	*	0,0057		-0,0029		-0,0037		-0,0066	
	0,3970		0,0738		0,5276		0,7752		0,7201		0,4799	
logeta	-0,0014		-0,0009		-0,0082		-0,0154		-0,0135		-0,0101	
	0,9060		0,9444		0,4938		0,1989		0,2642		0,4206	
darea	0,0968	***	0,1070	***	0,0915	***	0,0866	***	0,0825	***	0,0681	**
	0,0005		0,0000		0,0016		0,0015		0,0044		0,0163	
deforta												
crclta												
Cons	-0,1124		-0,1905	*	-0,0511		0,1328		0,0981		0,1492	
	0,2758		0,0567		0,6022		0,2050		0,3777		0,1599	
N	707		711		702		707		704		720	
R^2	0,1255		0,1185		0,1013		0,1121		0,1164		0,1297	
F	15,1912		13,7945		10,9150		11,8667		95,4559		15,6929	

Level of significance: (***)1%; (**)5%; (*)10%

In all years under observation the relationship is positive and highlights the greater intensity of credit offers by firms in the central and northern regions of Italy. For the dependent variable *crclta* (Table no. 4) there are also statistically significant negative relationships with the predictor *ldim*, which represent the size of the firms, but only in 2009-2011: during the crisis years the smaller-sized firms grant extended payment deferrals, probably with the aim to strengthen client relationships. For the dependent variable *deforta* (Table no. 6), there are statistically significant negative relationships only with the predictor *ldim*, in all years under observation. The negative relationship between *ldim* and the incidence of trade payables shows a greater recourse in trade payables for smaller firms, confirming the hypotheses supported in literature, that trade payables are a substitute for credit from banks or third parties for small and opaque firms. To verify the third research hypothesis we replicate the analysis considering separately firms that belong to the industry sector (Tables no. 9-11) and firms that perform services (Tables no. 12-14). The linear regression models are statistically

significant in the six years of study for all dependent variables *crclta, deforta* and *cremerta*, considered alternatingly. The results of the collinearity tests allow to exclude problems of collinearity: the values of the *Variance Inflation Factor* (VIF) are always inferior to the critical threshold of literature (Fox 1997). The results of the *White heteroskedasticity test* demonstrate heteroskedasticity problems. Therefore robust standard errors analyses are conducted.

Table 9: Regression Analysis 2006-2011 - Dependent Variable: *crclta* - Industry

	2006		**2007**		**2008**		**2009**		**2010**		**2011**	
inbanen	0,0059		0,0038		0,0192	***	0,0327	***	0,0243	***	0,0143	*
	0,1927		0,3956		0,0036		0,0000		0,0001		0,0836	
inbanol	-0,0541	***	-0,0692	***	-0,0535	***	-0,0911	***	-0,0653	***	-0,0300	***
	0,0000		0,0000		0,0001		0,0000		0,0007		0,0074	
inalen	0,2152	***	0,1268	***	-0,0062		0,0525		-0,0049		0,0075	
	0,0023		0,0000		0,8485		0,1404		0,5781		0,7451	
inalol	-0,0861	**	-0,0562	***	-0,0168		-0,0257		0,0449		0,0515	
	0,0275		0,0060		0,6114		0,1735		0,3835		0,6664	
cosden	-0,0024		-0,0012		0,0003		-0,0038	*	-0,0064	***	-0,0048	*
	0,2287		0,5604		0,9072		0,0738		0,0043		0,0637	
ros	-0,0037	**	-0,0015		-0,0013		0,0005		0,0013		-0,0012	
	0,0493		0,3579		0,4799		0,6991		0,3315		0,5278	
roe	0,0016	***	0,0012	**	0,0027	***	0,0015	**	0,0012		0,0022	***
	0,0029		0,0287		0,0008		0,0325		0,1032		0,0003	
curr	0,0381	***	0,0139		0,0117		0,0153	**	0,0131		0,0072	
	0,0052		0,3048		0,1586		0,0379		0,1759		0,5091	
solven	-0,3625	***	-0,3489	***	-0,3431	***	-0,3947	***	-0,3656	***	-0,3366	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0085		-0,0029		-0,0135		-0,0326	***	-0,0228	*	-0,0179	
	0,4842		0,8023		0,2600		0,0099		0,0711		0,1736	
logeta	-0,0147		-0,0242	**	-0,0174		-0,0265	*	-0,0261	*	-0,0265	*
	0,1988		0,0444		0,1678		0,0522		0,0629		0,0813	
darea	0,1182	***	0,1300	***	0,0804	***	0,0616	**	0,0857	***	0,0569	
	0,0003		0,0000		0,0065		0,0268		0,0056		0,1102	
deforta												
crclta												
Cons	0,4839	***	0,4749	***	0,5407	***	0,8141	***	0,6889	***	0,6674	***
	0,0002		0,0001		0,0000		0,0000		0,0000		0,0000	
N	455		453		452		449		455		469	
R^2	0,1977		0,1979		0,2657		0,3461		0,2888		0,2526	
F	9,1282		8,0677		11,3662		20,0118		17,7318		11,5366	

Level of significance: (***)1%; (**)5%; (*)10%

Table 10: Regression Analysis 2006-2011 - Dependent Variable: *deforta* – Industry

	2006		2007		2008		2009		2010		2011	
inbanen	-0,0018		-0,0014		-0,0060		-0,0093		-0,0105		-0,0096	*
	0,6059		0,3237		0,2361		0,1800		0,1277		0,0870	
inbanol	-0,0453	***	-0,0410	***	-0,0095		-0,0415	***	-0,0420	***	-0,0201	**
	0,0001		0,0000		0,4883		0,0060		0,0019		0,0144	
inalen	-0,0164		0,0039		-0,0101		-0,0230		-0,0179	***	-0,0035	
	0,7724		0,9292		0,5386		0,5811		0,0000		0,6979	
inalol	-0,0200		-0,0090		0,0010		-0,0189	**	-0,0021		-0,0529	
	0,3919		0,5188		0,9398		0,0148		0,9505		0,1743	
cosden	0,0032	**	0,0025	*	0,0002		0,0017		-0,0016		0,0006	
	0,0341		0,0870		0,8699		0,2397		0,3700		0,7590	
ros	-0,0050	***	-0,0029	**	-0,0018		0,0008		-0,0001		0,0011	
	0,0005		0,0161		0,1957		0,3041		0,9403		0,2952	
roe	0,0017	***	0,0010	**	0,0016	**	0,0001		0,0008		0,0000	
	0,0010		0,0267		0,0152		0,9057		0,1627		0,9828	
curr	-0,0208	**	-0,0236	***	-0,0174	***	-0,0063		-0,0123	**	-0,0096	
	0,0242		0,0016		0,0007		0,1853		0,0347		0,1333	
solven	-0,3670	***	-0,3193	***	-0,3159	***	-0,3966	***	-0,4152	***	-0,3700	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0145	*	-0,0196	**	-0,0138	*	-0,0219	***	-0,0070		-0,0066	
	0,0719		0,0121		0,0715		0,0028		0,3668		0,3742	
logeta	0,0030		0,0062		0,0111		0,0061		0,0002		0,0053	
	0,7453		0,5008		0,2544		0,5417		0,9849		0,6360	
darea	0,0732	***	0,0689	***	0,0361		0,0106		0,0238		0,0016	
	0,0026		0,0078		0,1587		0,6573		0,3911		0,9587	
deforta												
crclta												
Cons	0,4910	***	0,5041	***	0,4339	***	0,5549	***	0,4658	***	0,4266	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
N	455		453		452		450		456		469	
R^2	0,3344		0,3175		0,3184		0,3311		0,3303		0,2755	
F	19,3527		18,5569		21,3798		21,7892		23,0577		16,8934	

Level of significance: (***)1%; (**)5%; (*)10%

	2006		**2007**		**2008**		**2009**		**2010**		**2011**	
inbanen	0,0077		0,0052		0,0252	***	0,0420	***	0,0348	***	0,0239	***
	0,2962		0,2864		0,0000		0,0000		0,0000		0,0026	
inbanol	-0,0088		-0,0282	**	-0,0440	***	-0,0496	***	-0,0233	**	-0,0099	
	0,5247		0,0309		0,0000		0,0008		0,0300		0,1419	
inalen	0,2316	**	0,1229	**	0,0039		0,0757	**	0,0129	*	0,0110	
	0,0261		0,0160		0,8237		0,0150		0,0515		0,6105	
inalol	-0,0661	*	-0,0471	**	-0,0178		-0,0068		0,0470		0,1043	
	0,0542		0,0364		0,5932		0,7477		0,4777		0,3661	
cosden	-0,0056	***	-0,0037	*	0,0000		-0,0055	**	-0,0047	**	-0,0054	*
	0,0077		0,0978		0,9904		0,0178		0,0500		0,0503	
ros	0,0013		0,0013		0,0005		-0,0003		0,0014		-0,0024	
	0,3753		0,3394		0,6740		0,8078		0,2633		0,1067	
roe	-0,0001		0,0002		0,0011	*	0,0014	*	0,0004		0,0021	***
	0,8945		0,6830		0,0984		0,0860		0,6777		0,0019	
curr	0,0589	***	0,0374	***	0,0291	***	0,0214	***	0,0254	***	0,0169	*
	0,0000		0,0042		0,0001		0,0014		0,0010		0,0544	
solven	0,0045		-0,0297		-0,0272		0,0012		0,0495		0,0334	
	0,9503		0,6867		0,5238		0,9845		0,4568		0,5929	
ldim	0,0060		0,0167		0,0003		-0,0102		-0,0158		-0,0114	
	0,6278		0,1660		0,9775		0,4222		0,2044		0,3721	
logeta	-0,0177		-0,0304	**	-0,0285	**	-0,0329	**	-0,0263	*	-0,0318	**
	0,1365		0,0152		0,0319		0,0140		0,0506		0,0316	
darea	0,0450		0,0611	**	0,0443		0,0508	*	0,0619	*	0,0553	
	0,1363		0,0359		0,1580		0,0897		0,0696		0,1411	
deforta												
crclta												
Cons	-0,0072		-0,0292		0,1069		0,2553	**	0,2225	*	0,2408	
	0,9551		0,8119		0,3834		0,0439		0,0927		0,0903	
N	455		453		452		449		455		469	
R^2	0,1195		0,1027		0,1287		0,1915		0,1375		0,1382	
F	4,7360		3,6429		4,8731		7,5728		7,7393		5,9691	

Level of significance: (***)1%; (**)5%; (*)10%

Interdependence between management policies of trade receivables and payables is considered through the comparison between gross and net models, noting that the choices of recourse to trade receivables and payables are closely interrelated since the net models have constantly greater predictive power than gross models.

Moving on to observe the results relate to the third research hypothesis, for the industrial sector (Tables no. 9-11) we find the absence of a constant relationship of dependency between the dependent variables and predictors of a financial nature in all years under observation. In particular, the incidence of trade payables (*deforta*) has statistically significant relationships with the incidence of short-term bank debt (*inbanel*) only in 2011 (Table no. 10). The incidence of trade receivables (*crclta*) has statistically significant positive relationships with the incidence of short-term bank debt (*inbanel*) only since 2008 (Table no. 9): this suggests that transactional motivation in the use of trade credit are relevant to industrial firms especially in the years following the outbreak of the crisis.

Significant and negative relationships are observed between the dependent variables and the incidence of medium and long term bank debt (*inbanol*), except for the years 2006 and 2008 with respect to the variable *deforta* (Table no. 10) and 2011 for the variable *crmerta* (Table no. 11). These reports emphasize the importance of substitutability between trade credit and bank loans also for the industrial firms. Statistically significant relationships with other predictors of a financial nature do not show a similar constancy in the results, highlighting the importance of real type motivations for industrial sector. With respect to the impact of financial charges *cosden*, dependency relationships are present but not constant over the years. For the dependent variable *deforta* there is a positive and statistically significant relationship only in the first two years of observation (Table no. 10): the higher cost of money leads to an increased use of trade payables by firms operating in the industry and agriculture.

For variables *crclta* and *cremerta* (Tables no. 9 and 11) significance is observed especially in the last three years (2009-2011) and it is a negative relationship The higher cost of money in the years of crisis causes lower deferred payment and a minimization of the financial needs determined by the incidence of net mercantile credit.

Moving on to the analysis of the results attributable to companies that operate in the services sector (Tables no. 12 - 14), statistically, significant dependency relationships of the three dependent variables with the incidence of short-term bank debt (*inbanen*) are observed in all the six years. For *crclta* and *crmerta* the relationships are positive and reiterate the importance of motivation of transactional type in the use of trade credit (Tables no. 12 and 14); for *deforta* the relationships are negative manifesting conditions of substitutability that coexist with conditions of complementarity (Table no. 13). For the variables *crclta* and *deforta* there are also negative dependency relationships with the incidence of medium and long term bank debt (*inbanol*) and for the variable *deforta* there are negative dependency relationships with the incidence of debt to other financiers, indicating conditions of substitutability.

Table 12: Regression Analysis 2006-2011 - Dependent Variable: *crclta* - Services

	2006		2007		2008		2009		2010		2011	
inbanen	0,0008	***	0,0006	***	0,0007	***	0,0010	***	0,0010	***	0,0007	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0217	***	-0,0126		-0,1037	***	-0,0587	***	-0,0318		-0,0401	**
	0,0019		0,1146		0,0000		0,0055		0,1153		0,0406	
inalen	-0,0224		-0,0999	***	-0,1223	*	-0,1959		-0,0604		-0,0072	
	0,1237		0,0045		0,0682		0,2490		0,7506		0,9674	
inalol	-0,0242		0,0104		0,0544	***	0,0946		-0,0249		-0,0133	
	0,8168		0,8517		0,0028		0,1520		0,9054		0,9525	
cosden	-0,0030		-0,0062	*	-0,0005		-0,0040		-0,0080	**	-0,0102	***
	0,3768		0,0570		0,8984		0,2866		0,0440		0,0021	
ros	-0,0050		-0,0092	***	-0,0047	*	-0,0011		-0,0019		-0,0035	
	0,1839		0,0007		0,0759		0,6509		0,5527		0,1165	
roe	0,0017	*	0,0033	***	0,0023	***	0,0025	***	0,0021	**	0,0022	**
	0,0815		0,0003		0,0072		0,0095		0,0341		0,0204	
curr	0,0418		0,1009	***	0,1455	***	0,1148	***	0,1564	***	0,1292	***
	0,1630		0,0002		0,0000		0,0000		0,0000		0,0000	
solven	-0,3260	***	-0,3982	***	-0,6930	***	-0,6317	***	-0,6788	***	-0,7527	***
	0,0059		0,0002		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0002		0,0081		-0,0037		-0,0263	*	-0,0093		-0,0189	
	0,9879		0,5727		0,7937		0,0827		0,5452		0,1759	
logeta	0,0589	**	0,0676	***	0,0431	**	0,0351		0,0287		0,0272	
	0,0230		0,0056		0,0392		0,1055		0,2134		0,2590	
darea	0,1149	***	0,1234	***	0,1169	***	0,0858	**	0,0592		0,0520	
	0,0058		0,0009		0,0033		0,0272		0,1633		0,2081	
deforta												
crclta												
Cons	0,1611		0,0177		0,2070		0,4627	***	0,3313	*	0,5097	***
	0,3510		0,9043		0,1751		0,0058		0,0683		0,0028	
N	252		258		250		258		249		251	
R^2	0,1634		0,2830		0,3616		0,3051		0,3500		0,3906	
F	20,0939		79,3962		33,6142		27,9318		23,9239		32,7222	

Level of significance: (***)1%; (**)5%; (*)10%

Table 14: Regression Analysis 2006-2011 - Dependent Variable: *deforta* – Services

	2006		2007		2008		2009		2010		2011	
inbanen	-0,0002	***	-0,0003	***	-0,0004	***	-0,0004	***	-0,0003	***	-0,0005	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0142	***	-0,0074	**	-0,0645	***	-0,0457	***	-0,0208	*	-0,0232	**
	0,0008		0,0460		0,0000		0,0006		0,0732		0,0212	
inalen	0,0222	***	0,0312		-0,1129	**	-0,0647		-0,0065		0,0787	
	0,0002		0,6685		0,0485		0,2783		0,9256		0,4919	
inalol	-0,0589		-0,1152	**	0,0434	***	0,0505	**	-0,1146	*	-0,2630	***
	0,1999		0,0428		0,0010		0,0414		0,0839		0,0062	
cosden	0,0039	*	0,0004		-0,0025		0,0032		0,0015		-0,0010	
	0,0995		0,8791		0,3006		0,1820		0,5056		0,6835	
ros	-0,0081	***	-0,0102	***	-0,0070	***	-0,0024		-0,0012		-0,0061	***
	0,0037		0,0000		0,0009		0,2193		0,5635		0,0018	
roe	0,0022	***	0,0030	***	0,0024	***	0,0028	***	0,0018	**	0,0023	***
	0,0075		0,0000		0,0006		0,0001		0,0120		0,0012	
curr	-0,0013		0,0204		0,0401	***	0,0321	**	0,0406	***	0,0212	
	0,9322		0,1895		0,0094		0,0121		0,0053		0,1893	
solven	-0,4506	***	-0,4857	***	-0,6494	***	-0,5848	***	-0,5871	***	-0,6061	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
ldim	-0,0120		-0,0062		-0,0164	*	-0,0261	***	-0,0203	**	-0,0174	*
	0,2145		0,5120		0,0844		0,0069		0,0320		0,0768	
logeta	0,0199		0,0171		0,0062		0,0162		0,0095		0,0115	
	0,2500		0,3299		0,6973		0,2829		0,5441		0,5142	
darea	-0,0348		-0,0473	*	-0,0379		-0,0382		-0,0462	*	-0,0397	*
	0,1743		0,0912		0,1182		0,1109		0,0514		0,0832	
deforta												
crclta												
Cons	0,5066	***	0,4783	***	0,6357	***	0,6171	***	0,5903	***	0,6089	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
N	252		258		250		258		249		251	
R^2	0,3537		0,3691		0,4729		0,4487		0,4071		0,4511	
F	15,7842		14,8011		17,1104		18,6308		17,1678		17,5950	

Level of significance: (***)1%; (**)5%; (*)10%

	2006		**2007**		**2008**		**2009**		**2010**		**2011**	
inbanen	0,0010	***	0,0010	***	0,0011	***	0,0014	***	0,0013	***	0,0012	***
	0,0000		0,0000		0,0000		0,0000		0,0000		0,0000	
inbanol	-0,0074		-0,0053		-0,0391		-0,0130		-0,0110		-0,0169	
	0,1782		0,3329		0,1281		0,5706		0,3653		0,2255	
inalen	-0,0447	***	-0,1312	**	-0,0094		-0,1312		-0,0539		-0,0859	
	0,0002		0,0163		0,8727		0,4430		0,7578		0,4899	
inalol	0,0346		0,1256		0,0110		0,0442		0,0896		0,2497	
	0,7651		0,1643		0,5316		0,4587		0,6568		0,2322	
cosden	-0,0069	*	-0,0066	*	0,0020		-0,0071	*	-0,0096	**	-0,0091	***
	0,0762		0,0860		0,6672		0,0631		0,0274		0,0097	
ros	0,0031		0,0009		0,0023		0,0013		-0,0008		0,0026	
	0,2501		0,6883		0,4370		0,3696		0,6847		0,2195	
roe	-0,0005		0,0004		0,0000		-0,0002		0,0003		0,0000	
	0,6473		0,7080		0,9832		0,8059		0,7873		0,9890	
curr	0,0430	*	0,0804	***	0,1054	***	0,0827	***	0,1158	***	0,1080	***
	0,0715		0,0002		0,0000		0,0001		0,0000		0,0000	
solven	0,1245		0,0875		-0,0436		-0,0470		-0,0917		-0,1466	*
	0,2641		0,3938		0,6457		0,5735		0,2411		0,0697	
ldim	0,0118		0,0142		0,0127		-0,0002		0,0110		-0,0015	
	0,4241		0,3257		0,4183		0,9906		0,5060		0,9162	
logeta	0,0390		0,0505	**	0,0369		0,0189		0,0192		0,0157	
	0,1502		0,0412		0,1238		0,3887		0,4140		0,5144	
darea	0,1497	***	0,1706	***	0,1548	***	0,1241	***	0,1054	**	0,0917	**
	0,0015		0,0001		0,0006		0,0043		0,0211		0,0349	
deforta												
crclta												
Cons	-0,3455	*	-0,4606	***	-0,4288	**	-0,1543		-0,2590		-0,0993	
	0,0567		0,0066		0,0107		0,3885		0,1832		0,5614	
N	252		258		250		258		249		251	
R^2	0,1791		0,2303		0,1975		0,1655		0,2034		0,2130	
F	25,2224		22,3329		19,2845		14,4897		12,0782		24,6782	

Level of significance: (***)1%; (**)5%; (*)10%

Finally, it is interesting to note that for the variable *deforta* is absent a statistically significant relationship with the impact of financial charges (*cosden*) in most years under analysis. The cost of money does not affect the recourse to trade payables, even in this case also underlying the importance of motivations of real type in the use of trade payables for service firms.

5. CONCLUSION

For many Italian firms during the crisis, financial needs increased because of the growth of the working capital. Payment deadlines were extended for commercial transactions and this generated greater difficulty in maintaining a financial equilibrium, especially in SMEs with less bargaining power (Banca d'Italia 2010, 2011, 2012, 2013), confirming the importance of trade credits with real motivations, but also transactional reasons and financial reasons. Firms that have reduced access to bank debt may be forced to use trade credit more frequently than firms which are not subject to credit rationing. On the other hand, trade credit improves the visibility and reputation of the borrowing firms, making the banks more open to granting finance to healthy

projects that they would have otherwise refused. A dynamic and complementary relationship exists between trade credit and bank financing, which results in partial substitutability. Enterprises use trade credit because they are exposed to credit rationing – in this a substitution effect is formed –and at the same time trade credit signalises and reveals information to the banks about the reliability of the firms receiving payment deferrals, facilitating access to bank debt.

The results of the paper highlight the existence of an interdependent relationship between trade credit policy and trade debt policy in SMEs (first hypothesis), and the coexistence of conditions of complementarity and substitutability between trade credit and other financing sources (second and third hypothesis). The results of the analysis referring to the incidence of trade payables signal a substitutability relationship between intercompany debt and financing from banks or third parties. The hypotheses of the coexistence of conditions of complementarity and substitutability is verified by observing the results referring to the incidence of trade credit. We can see a direct functional relationship between the incidence of trade credit and the incidence of short-term bank financing, testifying double intermediary conditions and a complementarity between the two variables. The importance of transactional motivations has been highlighted.

Regarding the variable which represents the incidence of net mercantile credit, we can also confirm the coexistence of complementarity and substitutability conditions. The empirical analysis shows a significant direct relationship between the dependent variable and short-term bank financing and an inverse relationship with the incidence of medium and long-term bank financing and short-term financing from third parties.

The direct relationship between the incidence of trade payables and the incidence of financial charges reiterates the importance of substitutability in the years preceding the crisis. While during the crisis (2008-2011) the inverse relationship between the incidence of trade receivables and the incidence of financial charges reduces the convenience of double intermediation. Conditions of substitutability and complementarity can also be observed by considering separately the sample firms involved in agricultural or industrial activities and the sample firms that perform services. For both categories, we observe the coexistence of complementarity and substitutability, but in the case of industrial firm complementarity conditions and the relief of the transactional reasons are observed over the crisis years, from 2008 onwards, and not in the early years of the analysis. Significant relationships with other predictors of a financial nature do not show a similar constancy in the results, highlighting the importance of real type motivations for the industrial sector.

In the case of service companies, however, relations with the predictors of financial nature are weakened during the crisis years, reaffirming the importance of the motivations of real type in the use of trade credit. In keeping with reference literature (*inter alia*: Alphonse Ducret and Severin 2004), the results of the study allow us to state that substitutability and complementarity between trade credit, bank financing and financing from third parties can be verified in the same financial-economic system, without having to exclude each other. The results of the study also allow to state that the substitutability and/or complementarity conditions can operate together with the prevailing of real motivations of recourse in trade credit. In financial systems characterized by the presence of SMEs and in situations of economic and financial crisis the close interconnection between real and financial motivations for recourse in intercompany credit is therefore reiterated.

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Journal of Business, Economics and Finance
Year: 2016 Volume: 5 Issue: 3

MODELING DAILY AMMAN STOCK EXCHANGE VOLATILITY FOR SERVICES SECTOR

DOI: 10.17261/Pressacademia.2016321976

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ABSTRACT

There are many forecasting techniques that can be used to help the investment community in building their policies in the future, which lead to an appropriate choices of the assets involved in the portfolios, managing it , and pricing these assets accurately. In this paper we are trying to afford one of these methods recognized as ARIMA model, which is used in analyzing financial time series data. The target of this paper is forecasting services sector volatility in Amman Stock Exchange . As a result investment community can rely on this type of analysis to make the future prospects of selling and buying financial securities. Using historical indices data accumulated daily from the web site of Amman Stock Exchange for period 3/1/2010-10/5/2015. Stationarity achieved at level for services sector , and then use a minimum mean square error, t-statistics value and p-statistics value to choose the best ARIMA models at 95% confidence interval. The resulted models for this study for services sector is ARIMA(0,0,1), lastly, the best ARIMA model was formed and tabulated in the entire paper.

Keywords: Volatility, ARIMA Model, Financial Time Series, Forecasting.
JEL Classification: G17, G19

1. INTRODUCTION

Forecasting volatility has a very important role in the investment community in recent days because the decision of portfolio management, risk management, and pricing of assets depend on this forecasting to achieve the goals of investors in order to make their investments, or to reduce losses that they may meet in the future, that is because any wrong decision investors take maybe cause a cost for all the members of investment community, which leads to a confused situation in the whole country economy, as a result of this, the confidence of improvements in the near future will be hard to get. Huge changes of securities prices put investors and decision makers in a confused situation when they plan to buy or sell a set of financial securities in ASE or in any other financial market whether in emerging or developed markets. The rest of this paper is organized as follows. Section 2 provides a review of literature on modeling volatility. Section 3 discusses the data used in this study and the methodology. Empirical findings are provided in section 4. The final section concludes.

2. LITERATURE REVIEW

Al-Zeaud (2011) studied ARIMA model in modeling and forecasting the banks sector volatility for the Amman stock Exchange (ASE). The result proved that the tentative appropriate ARIMA models at 95% confidence interval is ARIMA (2,0,2) model. Ritab S., et al ,(2007) The main features of this study are the utilization of the ARIMA model and the employment of the co-integration and unit root tests to distinguish the stationary of the time series for the volatility ASE. Alshiab ,(2006)studied Autocorrelation function and partial autocorrelation functions analysis tests employed to determine whether the data set stationary or not stationary.The resulted

model was studied the predictability of Amman stock exchange (ASE) Performance **,** also he studied the expectedness of ASE Performance: then, he used a Univariate Autoregressive Integrated Moving Average (ARIMA) model; he examined the univariate ARIMA forecasting model, by means of the ASE general daily index

within the period 4/1/2004 and 10/8/2008. Furthermore, he found the forecast was not consistent with actual performance during the same period of the prediction. Alfaki and Mustafa (2015) introduced a short review about Box-Jenkins models as acknowledged ARIMA models(Autoregressive Integrated Moving Average). It is a good technique to anticipate for stationary and non-stationary time series. According to the data which obtained from the monthly sales for Naphtha product in (Azzawiya Oil Refining Company – Libya), then they specify a tentative proper model for the monthly sales. The consequences of this study showed that the suitable and efficient model to correspond to the data of the time series according to AIC, SIC, and MSE criteria with the minimum values as well as the Box-ljung test is the ARIMA(1,1,1). A model that can be used in volatility must have the ability of forecasting it. In general a volatility model is engaged with predicting the magnitude of returns in absolute, Such forecasts work an essential mission in risk management,derivative pricing and hedging, market making, market timing, portfolio selection and many financial actions.Stephen.S and John.K.(2007). Juncal C., et al (2006) studied the cause of change in volatility dynamic behavior of emerging market Volatility. They investigated whether the dynamic behavior of stock market volatility in six emerging economies (Argentina, Brazil, Chile, Korea, Mexico, and Thailand) has changed over the period 1976:01-2004:12. This period corresponds to years of profound development of both financial and the productive sides in these emerging countries, but also to the years of the major financial crises. They suggested in their analysis that changes in volatility behavior, while indeed present, may have been overstated in the past: simple specifications account for most of the dynamics of stock market volatility and therefore become powerful tools for volatility analysis. Additionally, they showed that the financial liberalization of emerging markets has generally reduced the level of market volatility and its sensitivity to news. High frequency data that used in volatility forecasting can mainly be separated into two major approaches; the first one is the reduced-form approach which has included the cases where the realized measures are patterned with a time series model (e.g. ARIMA) and the estimated model is used to generate volatility forecasts. Andersen et al. (2003) built and investigated long-memory Gaussian vector (VAR) models for a vector of realized variances. A consistent kind of reduced-form volatility predictions are the regression that depends on forecasts; while the second approach is the model-based approach for volatility forecasting which is constructed from a model for returns, such as a GARCH type model that identifies the whole

3. DATA AND METHODOLOGY

The value of financial properties relies on the expected volatility of returns. Volatility can be defined as:

$$r_t = |log(x_t) - log(x_{t-1})| \quad (1)$$

where:r_t is the returns, x_t is the observation at time t, x_{t-1} is the observation time t-1, log is the logarithm and |.| is the absolute value.

In the case of low-volatility state, the square root of variance of returns is diminutive and determining whether the economy has interchanged to the high-volatility or not. It is very difficult to achieve a huge amounts of gains in this case , so their incidence rapidly shows to investors that the economy is in the high-volatility situation. In the large-volatility situation, petite returns do not immediately show that the economy has interchanged situations since a reasonable possibility of getting a small return exists even though the standard deviation of returns is high. A financial time series declares two important features; nonstationary and time varying volatility. There is no doubt that fluctuations of the stocks in the financial markets have a huge effects on the economic policymakers decisions particularly when it differs from what they expected. The improbability of future cash flows resulted comparatively from a privileged ranks of volatility, as a result it will be reflected on the economic conditions which cause and form a signs of large amount of volatility, that is called a high volatility channel (pending crisis also) . on the other hand the other type is known as a low volatility channel which may also cause a crisis. Danielsson et al. (2012) suggest a theoretical settings, low risk level persuades economic decision managers to raise levels of uncertainty, which then endogenously affects the probability of future surprises. These arguments suggest that the high volatility channel is most important closer to a crisis, while the low channel is most important further than from a crisis. Low volatility encourage risk-taking, only appears at some stage in a crisis, while high volatility is an indicator of a pending crisis.

Many predicting methods are employed in statistics (Random Walk Model, Moving Average Model, Weighted Moving Average Model, Regression Model, Autoregressive Conditional Heteroskedastic model, Exponential Generalized Autoregressive conditional heteroskedasticity model, Autoregressive Integrated Moving Average model).In this paper, Box-Jenkins method introduced. The Univariate Box -Jenkins models resulted from employing conventional probability theory and mathematics and statistics. Secondly, ARIMA models are a family unit of models, not just a single model. Box and Jenkins have developed an approach that guides the analyst in choosing one or more appropriate models out of this larger family of models. Thirdly, it can be shown that a tentative ARIMA model creates a best possible univariate forecasts. In other words, there is no standard single-series model be able to provide prediction with a minimum mean-squared forecast error (i.e., forecast error variance) (Pankratz , 1983).. The steps of Box and Jenkins for getting a superior model are as the following: Identification: through employing graphics of both autocorrelation and partial autocorrelation functions which will lead us to pick a category of simple ARIMA models in order to determine the values of p,q, and d. Estimation: The phis and thetas of the picked model are estimated according to maximum likelihood practice as determined in BOX-Jenkins 1976. Diagnostic checking The fitted model is tested for inadequacies by regarding the autocorrelations of the residual or error or values.

The most common ARIMA model included three parameters: p, d, and q where p is the number of autoregressive parameters, d is the number of differencing parameters and q is the number of moving average parameters. A general ARIMA model is in the form (Bruce et al, 2005; and John and David, 2003):

$$z_t = C + \varphi_1 z_{t-1} + \varphi_2 z_{t-2} + \ldots + \varphi_p z_{t-p} + a_t - \theta_1 a_{t-1} - \theta_2 a_{t-2} - \ldots - \theta_p a_{t-q} \quad (2)$$

Where; t : is the periodic time, z_t : is the numerical value of an observation, φ_i : for $i = 1,2,\ldots,p$ are the autoregressive parameters, θ_j : for $j = 1,2,\ldots,q$ are the moving average parameters, a_t : is the shock element at time t . The linear multiple regression performed to estimate the parameters φ_i and θ_j for a fixed *p* and *q*, as follows

$$\hat{z}_t = \mu + \varphi_1 z_{t-1} + \varphi_2 z_{t-2} + \ldots + \varphi_p z_{t-pt} - \theta_1 a_{t-1} - \theta_2 a_{t-2} - \ldots - \theta_p a_{t-q} \quad (3)$$

There are two phases to the identification of an appropriate Box - Jenkins model: changing the data if necessary into a stationary time series and determining the tentative model by observing the behavior of the autocorrelation and partial autocorrelation function. Box and Jenkins suggested the number of Lag to be no more than $n/4$ autocorrelations; the autocorrelation coefficient measures the correlation between a set of observations and a lagged set of observation in a time series. The autocorrelation measures the correlation between a set of observations and a lagged set of observations in a time series The sample autocorrelation coefficients r_k is an estimate of ρ_k where

$$r_k = \frac{\sum (z_t - \bar{z})(z_{t+k} - \bar{z})}{\sum (z_t - \bar{z})^2} \quad (4)$$

Where z_t represent the data from the stationary time series. z_{t+k} : The data from k time period ahead of *t*. $\bar{z}$:The mean of the stationary time series. The ideas of partial autocorrelation analysis are used to measure the relationship between two variables when the effect of other variables has been uninvolved or seized fixed. The equation that gives a good estimate of the partial autocorrelation is

$$\hat{\varphi}_{kk} = \frac{r_k - \sum_{j=1}^{k-1} \hat{\varphi}_{k-1,j} r_{k-j}}{1 - \sum_{j=1}^{k-1} \hat{\varphi}_{k-1,j} r_j} \qquad k = 2,3,\ldots \quad (5)$$

Where: $\hat{\varphi}_{kj} = \hat{\varphi}_{k-1,j} - \hat{\varphi}_{kk}\hat{\varphi}_{k-1,k-j}$ and $k = 3,4,\ldots; j = 1,2,\ldots,k-1$.

If a time series is stationary then the mean of any major subset of the series does not differ significantly from the mean of any other major subset of the series. Also if a data series is stationary then the variance of any major subset of the series will differ from the variance of any other major subset only by chance. However, most nonstationary series that arise in practice can be transformed into stationary series through relatively simple operations.Pankratz (1983)

4. FINDINGS AND DISCUSSION

There are many tests used to prepare the services sector for ASE using Univariate Box-Jenkins model. Firstly, the volatilities for services sector were computed according to Equation (1). Then, unit root test is used to check whether stationarity for this sector achieved or not. Lastly, the autocorrelation(ACF) and partial autocorrelation(PACF) were tested for services sector by testing the correlation between the index lags, they used to pick the appropriate tentative models.

4.1 Descriptive Statistics of the Services Sector

The first step of analyzing is built on the description statistics of the services sector. Table 1 showed the descriptive statistics for services sector. The original values of the services sector showed in Figure 1, and Figure 2 showed the plot of the volatilities for the services sector. Correspondingly, the minimum value is 1031.6 which is the least value regarding to the whole sectors in ASE, and the maximum value is 1835 which is also the least one. We noticed that the range of this sector is small. Similarly, the median is less than the mean that means the data is skewed to the right side. Also, the SE means which is equal to 4.78. There is a positive kurtosis in this sector which means that the distribution has an approximately normality feature since it is closed to three.

Figure 1: Original Time Series Plot of the Services Sector

Table 1: Summary Descriptive Statistics for Services Sector of ASE

Descriptive Statistics for the banks sector		
Estimators	**Raw banks**	**Banks Volatility**
Mean	1321.873	0.002317
Median	1282.200	0.001633
Maximum	1835	0.117854
Minimum	1031.600	0.000000
Std. Dev.	174.24	0.004866
Skewness	0.884	19.70459
Kurtosis	2.82	461.1355
Variance	30359.58	0.0000237
SE mean	4.78	0.002317
Total count	1328	1327

4.2 Unit Root Test

A unit root test determine whether a time series variable is non-stationary using an autoregressive model. One of the most famous tests is the augmented Dickey- Fuller test. This test used the existence of a unit root as the null hypothesis. It appears to be necessary to check the stationary in levels or at differences. The more negative ADF is the stronger the rejection of the hypothesis that said there is a unit roots at some level of confidence. The non-stationary time series could produce a weak result. In order to avoid the spurious correlation problem that resulted from a non-stationary variable it is essential to test for unit root of the services sector for ASE. In this study, the Augmented Dicky-Fuller (ADF) test is proposed to examine the stationarity (unit root) of the stock market index for services Ender (2004). Tables 2 showed the ADF test for stock market indices for services sector at levels 1%, 5% and 10% respectively. The results of this work out, strongly confirm at the standard 5% significance level that the stock index series are stationary in levels for services sector, so that no need to use any transformation on it.

Figure 2: Plot of the Volatility for Services Sector

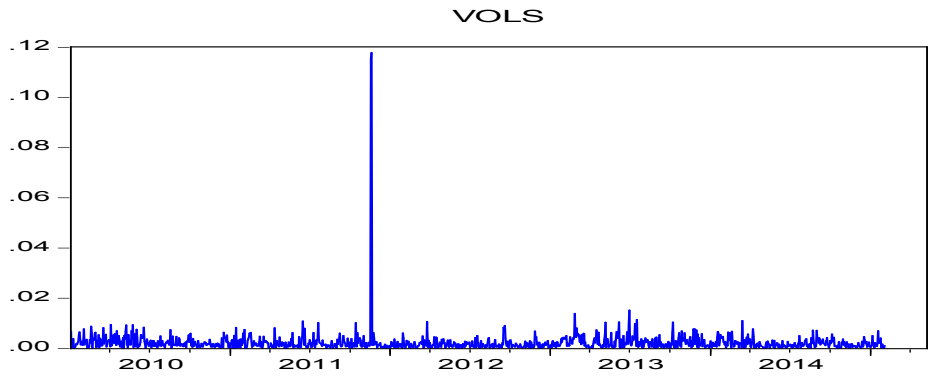


Table 2: Unit Root Test (stationary test) of Variable (services) at levels 1%, 5% and 10%.

ADF Test Statistic	-16.51403	1% Critical Value*		-3.435082
level		5% Critical Value		-2.863517
services		10% Critical Value		-2.567872
*MacKinnon critical values for rejection of hypothesis of a unit root.				
stationary				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(SERVICES)				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
VOLS(-1)	-0.599176	0.036283	-16.51403	0.0000
D(VOLS(-1))	0.219352	0.035085	6.252007	0.1972
D(VOLS(-2))	-0.144960	0.029118	-4.978380	0.3456
D(VOLS(-3))	0.077005	0.027439	2.806398	0.3334
C	0.001389	0.000142	9.816849	0.0114
R-squared	0.338884	Mean dependent var		5.81E-07
Adjusted R-squared	0.336877	S.D. dependent var		0.005082
S.E. of regression	0.004138	Akaike info criterion		-8.133213
Sum squared resid	0.022573	Schwarz criterion		-8.113607
Log likelihood	5385.120	F-statistic		168.8993
Durbin-Watson stat	1.991088	Prob(F-statistic)		0.000000

4.3. Autocorrelation and Partial Autocorrelation

The autocorrelation function (ACF) is the plot of autocorrelations and is very useful when checking also stationarity and when picking from among various nonstationary models. Autocorrelation is one of the vital instruments used in time series modeling . The partial autocorrelation function (PACF) is the plot of partial autocorrelations, and it is also one of the major tools in time series modeling , so the role of both (ACF and PACF) is to guide when choosing terms that should be included in an ARIMA model. Figure 3 showed the ACF for the indices of services volatility data in which it shows a large positive significant spike at lag 1 (this means that the autocorrelation of the successive pairs of observations within 1 time period is not within sampling error of zero). All of the other autocorrelations (for lags 2 to 15) are within the 95% confidence limits. While, Figure 4 showed the PACF for the services volatility data which imply to a large positive significant spike at lag 1 (this means that the partial autocorrelation of the successive pairs of observations within 1 time period is not within sampling error of zero). All the other partial autocorrelations (for lags 2 to 15) are within the 95% confidence limits.

Figure 3: Autocorrelation Function for Services Volatility

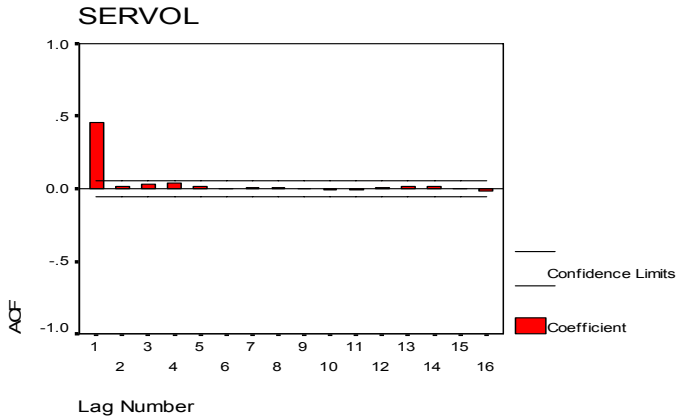
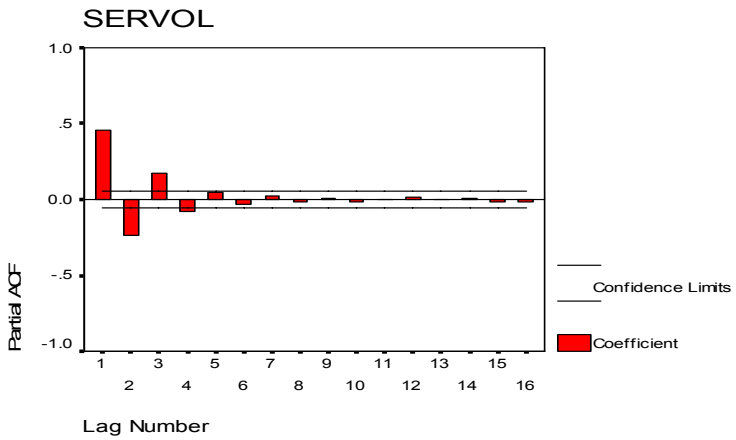


Figure 4: Partial Autocorrelation Function for Services Volatility



4.4.ARIMA Model Analysis

ARIMA models are one of the most general set of techniques used in a short time series predicting. We have used Equation 3.2.The most important general features of theoretical AR and MA depend on the behavior of autocorrelation and partial autocorrelation functions. Autoregressive as a part of ARIMA approaches to zero theoretically. But, after a small number of spikes cut off sharply to zero . the order of autoregressive function equals to the length of the last PACF spike. On the other hand Moving-average part of ARIMA model have an autocorrelation function that approaches to zero after a number of spikes. The lag length of the last ACF spike equals the MA order of the whole process. Mean square error can be computed as the average of the squared errors for all forecasts as an appraise of exactness of the appropriate model. Also it can be used to compare fits of different ARIMA models to pick the better one of them.

Suppose that θ denote any particular parameter in a Box-Jenkins model, let θ' denote the point estimate of θ, let $S_{\theta'}$ denote the standard error of the point estimate θ'. Then the t-value associated with θ' is the result of point estimate of θ divided by the standard error of the point estimate θ' . If we reject the null hypothesis that said the value of θ equal to zero in favor of the alternative hypothesis that said the value of θ does not equal to zero with a significance level $\alpha = 0.05$, then we have fulfilled that θ is important in the model by using a test that allows only a 0.05 probability of concluding that θ is important when it is not. That is usually regarded as strong evidence that θ is important. A large absolute value of t implies a large θ' which means that the value of θ is not zero, as a result we should reject the null hypothesis θ=0, so, compulsory ARIMA model should contain θ . Additionally, p-value defined to be tested regarding to the level of significant α.

Table 3 showed the all varieties of ARIMA models choices between the model(0,0,0) to (2,2,2) for the services volatility sector. The best model for services sector is ARIMA (0,0,1), since this model gives the minimum mean square error which is 1×10^{-4}, then ARIMA (1,1,1). Despite some of these proposed models have a minimum MSE but their coefficients are not significant, as a result of this, the general formula for the ARIMA(0,0,1) is defined as follows:

$$Z_t = \mu + a_t - \theta_1 a_{t-1} \tag{6}$$

Moreover, Table 4 showed the final estimate of the parameters for the services volatility sector data.

Table 3: The Result of the Best ARIMA Model for Services Volatility

Model (ARIMA)	MSE	Model (ARIMA)	MSE
(1,0,0)	0.000018758	(2,0,2) with ar(1), ar(2), ma(1), ma(2)	0.000016971
(1,0,1)	0.000016971	(2,0,2) with ar(2),ma(1),ma(2)	0.000016975
(1,0,2) with ar(1),ma(2)	0.000016987	(2,0,2) with ar(1),ar(2),ma(2)	0.000016971
(1,0,2)with ar(1),ma(1),ma(2)	0.000016949	(2,0,2) with ar(2),ma(2)	0.000023649
(2,0,0)with ar(2)	0.000023669	(2,0,1)with ar(2),ma(1)	0.000016975
(2,0,0)with ,ar(1),ar(2)	0.00001769	(2,0,1)with ar(1) ar(2),ma(1)	0.000016975
(0,0,1) with ma(1)	0.0000169826	(0,0,2) with ma(2)	0.000023651

Table 4: Final Estimate of Parameters of the Services Volatility for ASE

Final Estimates of Parameters				
Type	Coef	SE Coef	T	P
MA 1	0.622466	0.021443	29.02852	0.0000
Constant	0.002317	0.000184	12.61553	0.0000

Based on the Table 3 the ARIMA(0,0,1) model can be derived. In order to check the adequacy of a Box-Jenkins model is to analyze the residuals $(Y_t - \hat{Y}_t)$. Figures 5 and 6 showed the residuals of ACF and PACF respectively for the volatility services sector. The residuals ACF and PACF for volatility services sector are indicated significant. Thus, the residuals are random and the model is a good fit to the data. More ever, the spikes lie inside the confidence limits.

Figure 5: Autocorrelation of Residuals: Services Volatility Sector

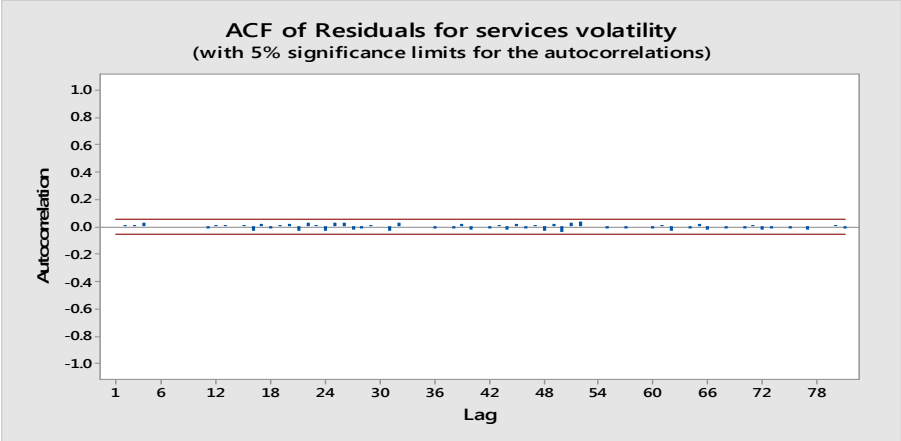
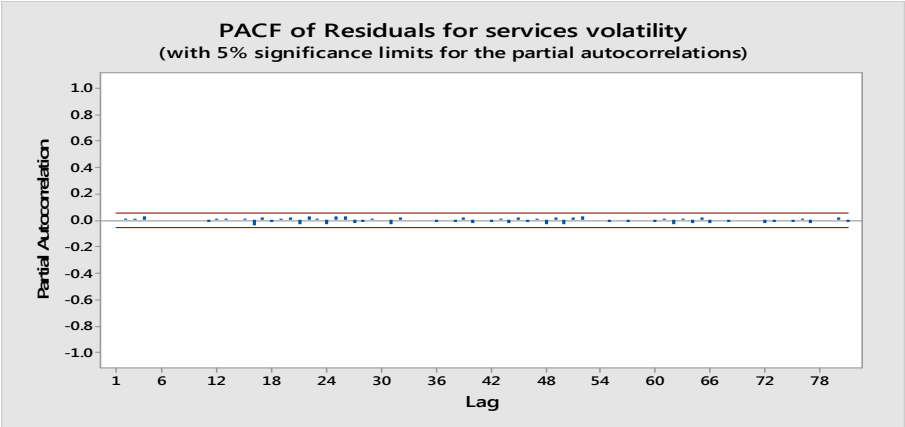


Figure 6: Partial Autocorrelation of Residuals: Services Volatility



The four-in-one residual plot is showed in Figure 7. The normal probability plot indicated the residuals are normally distributed. Moreover, the fit regression line showed the residuals are closed to the straight line. The histogram indicated approximately the whole data centered on the mean of data. The residuals versus fitted values indicated the variance is approximately constant. The last graph showed the residuals versus order observations which are daily for services volatility sector, it is clear the whole residuals centered on and near to the x- axis.

At forecasting stage, the fitted model has been selected; it can be employed to construct forecasts for future time periods for the services volatility sector. The final model for the volatility services sector is demonstrated in equation 8. Whereas, Figure 8 showed the plot of the actual and predicted values for the volatility services sector, the 95% percent prediction interval for the forecasts also are computed. Since, the values of the lower interval are negative sign, we can ignore these boundaries.

Figure 7: Residuals Plots: Services Volatility

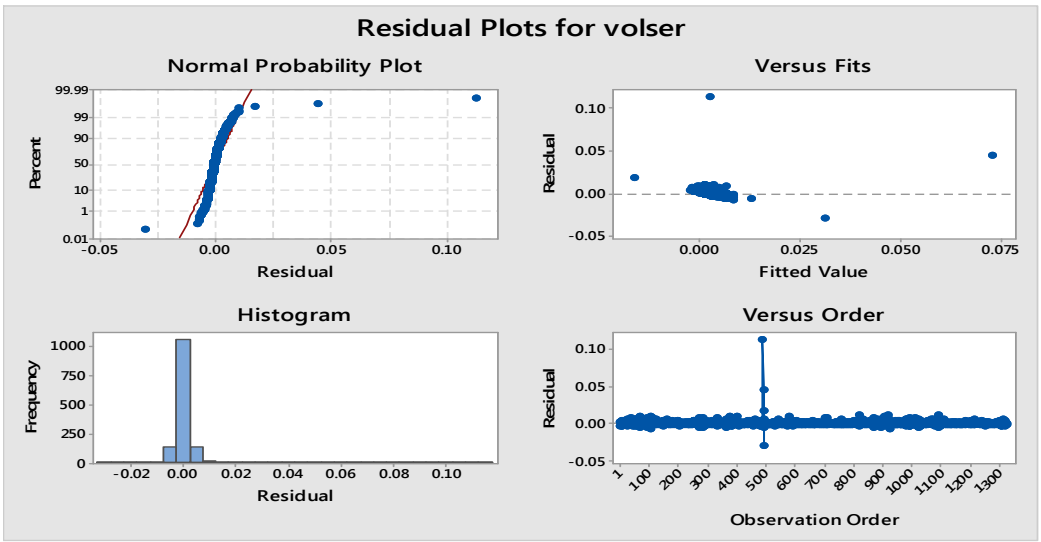
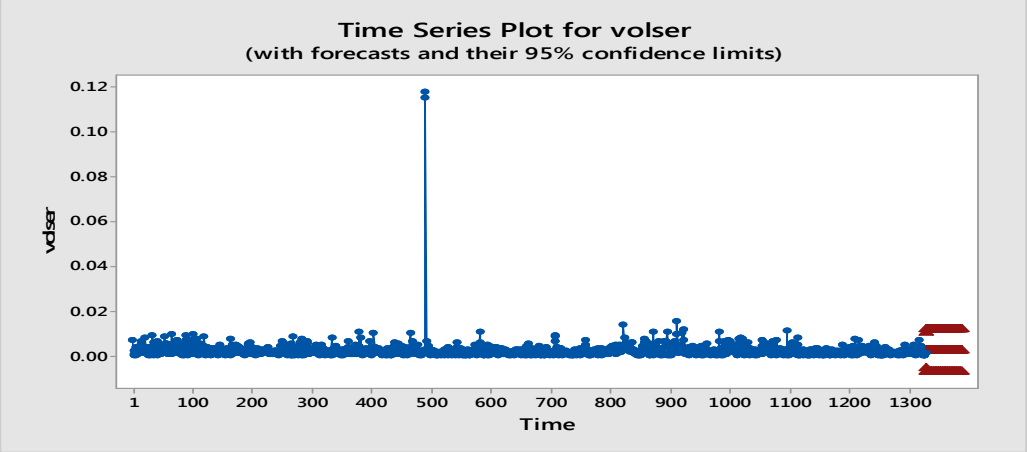


Figure 8: Actual and Forecasts Volatility Services for ASE



5. CONCLUSION

When we can get the petite the forecasting errors, the finest statistical model is said to be generated. There are many factors taken in consideration in the picking of appropriate model. These comprise the accessibility of data and the cost of gathering the data, computer software existed to run the tentative models, the time outline concerned, the nature of forecast preferred(on value or a range of values), and, most important, the diverse mathematical postulations that must be convened with each model. Picking a forecast way to be employed in a particular situation includes finding a technique that, along with practical exactness, poises the factors just scheduled. We concentrate in this sector in ASE because, it is very clear that trade balance of services shows a surplus, indicating that Jordan is successful in services, that implies creating many jobs, most of them more qualified and earning high salaries. Services do not need huge amounts of capital, for example the cost of generating a job opportunity in services does not exceed one third of the cost of generating a job in industry sector. In other words, investment in services is more feasible, with higher return relative to the capital involved.

ARIMA model present a preferred method for many researchers in predicting any oscillated variables. Its control stretch out in the fact that the technique is very suitable for any time series with any outline of change and it does not require the forecaster to select any one of parameters as a move forward. Nevertheless the model has some limitations. One of the limitations is the model necessitate a long time series. Like any other models, this method also does not insure a most advantageous forecasting process. From the other side, it can be effectively employed in predicting long time series data. It has shown that the ARIMA(0,0,1) found to be the best appropriate model for predicting the volatility of services sector data with the equation $Z_t = 0.002317 + 0.622466 a_{t-1}$.

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