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CONTENT

PERFORMANCE ANALYSIS OF THE RESTAURANT AND HOTEL INDUSTRY: EVIDENCE FROM BORSA ISTANBUL

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ABSTRACT
Purpose - The aim of this study is to apply factor analysis to financial ratios of companies in Restaurant and Hotel industry by showing up the best ratio among each factor group and to detect the performance differences between restaurants and hotels.
Methodology - The sample data cover between the years 2009 and 2018 of 13 observed companies at Borsa Istanbul. This study works on the financial ratios of the companies as performance variables. Factor analysis and the discriminant analysis is applied.
Findings - The results reveal that cash, return on equity, accounts receivable and inventory turnover are the key ratios. Moreover, hotels are differentiated by their high liquidity, receivables, and turnover ratios, where restaurants are differentiated by their profitability and solvency ratios.
Conclusion -, the restaurants are more capable to satisfy their long-term debts. They have equal or even better performance when compared with their profit-oriented counterparts.

Keywords: Ratio analysis, discriminant analysis, performance analysis, Borsa Istanbul, restaurant and hotel industry
JEL Codes: M40, M41, M49

1. INTRODUCTION

The tourism industry can be classified as travel, hospitality, transportation, food and beverage, recreation and leisure. Hospitality is the most important sector and takes the first place in tourism industry. On the other hand, restaurants or Food and Beverage (F&B) is an important element that complements hospitality. Restaurant sector is the second most important sector in tourism industry (MEGEP, 2011).

The Restaurant and Hotel industry was always an inseparable part of the Turkish economy. It is one of the most crucial industries in Turkey, except for the crisis years and "non-planned period (1923-1963)". The industry showed unbelievable growth after 1980. Turkey's amazing nature and convenient prices attract tourists, especially who are coming from Central Europe and Post- Soviet states. However, in recent years' terror attacks and political conflicts caused significant damages to the industry. Nevertheless, Turkey is still an important player in the world tourism. Therefore, the Turkish Restaurant and Hotel industry has been studied in this paper as an example of a developing country. This study can be used as a guide for the investors in other developing countries who are planning to invest in the industry (Turizmin, 2011).

Tourism activity mainly covers travel and temporary accommodation. In the whole process, there is a more compulsory need for people to resolve, which is food and beverage. Although the two sectors are intrinsically different, they are very closely connected to each other. Thus, hospitality and restaurants are considered as one industry in stock exchange markets. There are performance analysis studies regarding to this industry, however there is a gap in comparing the performances of hotels and restaurants separately in literature.

Therefore, the aim of this study is to fill the existing research gap in Turkey, to analyze and compare the performance of restaurants and hotels in the industry. The sample data cover between the years 2009 and 2018 of 13 observed companies.

In total, there are 130 firm-years. This study work on the financial ratios of the companies as performance variables. Factor analysis is conducted to summarize the performance variables and then discriminant analysis is applied to detect performance differences between groups. SPSS 22.0 has been used for the statistical part of the study.

The present study provides evidence that hotels are differentiated by their high liquidity (cash, quick, current), receivables, and turnover ratios. Restaurants are differentiated by their profitability and solvency ratios (ROE, Debt to Equity, ROS). The restaurants can have equal or even better performance when compared with their profit-oriented counterparts. These results are important for numerous stakeholders like internal and external decision makers, accountants and auditors.

The rest of the paper is organised along these lines. Part 2 provides the literature review on performance and factor analysis for hospitality and F&B industry. Part 3 explains the ratios used in the study. Part 4 displays the structure and methodoloy. Part 5 specifies data collection. Part 6 presents analysis and results. Finally, Part 7 presents the study's conclusions.

2. LITERATURE REVIEW

Performance analysis has been a subject area which has been receiving sufficient interest of numerous researchers in recent years (Feng, & Wang, 2000; De et al., 2011; Delen et al., 2013). The authors are drawn to the study of performance analysis to understand how the recent financial ratios has influenced it (Kim, & Ayoun, 2005; Kim & Kim, 2005; Chen, 2010).

There are various studies conducted in this framework for hospitality and F&B industry, for instance, the recent ones conducted by Mardahleni, 2018; Lai, 2018; Vatalis, 2018; Pudjisuryadi et al., 2018; Tan, 2018; Naumik-Gladkaya, & Devon, 2018; Tamallo, 2018. However, all of these studies are allied to different countries or regions. Therefore, this study deepens this research by using restaurant and hotel firms in Turkey, which have different features with respect to the level of external impact in business operations and economic changes.

The aim of this study is to fill the existing research gap in Turkey and to apply factor analysis to financial ratios by showing up the best ratio among each factor group and to detect the performance differences between Hotels and restaurants. Pinches et al. were the first to apply factor analysis to financial ratios in 1973, in a study of U.S. industrial firms (Pinches et al., 1973). After 1973, many studies applied this practice to minimize the number of ratios selected and redundancy among them. Most of the studies are in the manufacturing and retailing industries. The focal point of this study is directed to the Restaurant and Hotel industry to group factors whose financial features vary from manufacturing and retailing.

There are several works on applying factor analysis to financial ratios in Turkey. In the study of "*Performance of direct foreign investments in Turkey*" the author used a factor analysis to financial ratios of foreign-owned firms with domestically owned firms. Then the author applied discriminant analysis and logistic regression (Karataş, 2002).

In the study of "*Prediction of corporate financial distress in an emerging market: The case of Turkey*", the authors used factor analysis to financial ratios and conducted discriminant analysis to predict the failures (Uğurlu, & Aksoy, 2006).

In the study of "*Industry financial ratios-application of factor analysis in Turkish construction industry*", the authors applied factor analysis to financial ratios for Turkish construction companies (Ocal et al., 2007).

In the study of "*Applying Factor Analysis on the Financial Ratios of Turkey's Top 500 Industrial Enterprises*", the author applied factor analysis to financial ratios for 500 industrial companies in Turkey (Erdoğan, 2014).

There are also studies that apply ratio analysis to restaurants and hospitality industry without computing factor analysis. The international studies can be counted as Damitio et al., 1995; Singh & Schmidgall, 2001; Singh & Schmidgall, 2002; Böcskei, 2014; Arif et al., 2016; Bala et al., 2016; Abdul Aziz & Rahman, 2017, Vaško, 2018 and Ziskos, 2019. The studies that are conducted in Turkey can be counted as Karadeniz & İskenderoğlu, 2014; Karadeniz et al., 2014; Ecer & Günay 2014; Özçelik & Kandemir, 2015; Şen et al., 2015; Bilici & Aydın, 2018, and Aslan & Yılmaz, 2018.

Thus, extends the literature by focusing on an emerging economy and to the best of our knowledge, this is the first study that detect performance differences restaurants and hotels with the case of listed firms in the Turkish setting. Moreover, the Turkish data represents an example for similar practices of other emerging economies. The present study attempts to bridge the gap in the literature by providing the performance differences between restaurants and hotels in the context of the economy of Turkey that is a study area which was previously unexplored.

3. RATIO ANALYSIS

Ratio analysis plays a huge role in terms of analyzing financial statements, comparison of performance, making plans, detecting positive and negative sides, opportunities and threats. Being able to analyze investor ratios might signify the distinction between devoting the resources into a decent promising and potentially successful company or an awful one.

Therefore, having access and interpreting these numbers are important for an investor. It creates advantages in terms of investments' comparison, and also mediate the right strategies from the aspect of trade and minimizes failing to meet

expectations on stocks. Comparing the figure of the balance sheet, income statement and cash flow create a scale to measure the likelihood of the financial safety of corporations.

In this study, this paper focuses on applying factor analysis to the financial ratios of the restaurants and hotels, which are quoted on Borsa Istanbul. This study uses current, quick, cash, return on assets, return on equity, return on sales, earnings per share, debt to equity, debt to assets, interest coverage, accounts receivable turnover, inventory turnover, and total assets turnover ratios.

Current, quick, and cash ratios are selected for this study since they are especially valuable for corporate officials. Return on assets, return on equity, return on sales, and earnings per share are selected since they are especially valuable for finance executives. Debt to equity, debt to assets, and interest coverage ratios are selected since they are especially valuable for brokers. Accounts receivable turnover, inventory turnover, and total assets turnover ratios are selected since they are especially valuable for managers (Kim, & Ayoun, 2005). Table 1 shows the summary table for ratios.

Table 1: Summary Table for Ratios

Ratio	Formula	Indicates
Current	Current Assets / Current Liabilities	whether a company's current assets are adequate to pay back its current liabilities and estimates its short-term financial health
Quick	Current Assets - Inventories / Current Liabilities	the ability of a company to pay its current liabilities with its quick assets
Cash	Cash / Current Liabilities	company's ability to pay back its current liabilities with its cash and cash equivalents
Return on Assets	Net Income / Total Assets	how effectively companies turn their assets to generate profit
Return on Equity	Net Income / Owner's Equity	how much gain a corporation made on the money that investors paid
Return on Sales	Net Income / Total Sales Revenue	company's operating performance, and its ability to generate profits on sales
Earnings per Share	Net Income / Common Shares Outstanding	how many dollars of net income earned by each share of common stock
Debt to Equity	Total Liabilities / Owner's Equity	proportion of equity and debt a company is using to finance its assets
Debt to Assets	Total Debt / Total Assets	the financial leverage, shows the rate of total assets which financed with debt
Interest Coverage	Earnings Before Interest & Taxes / Interest Expense	the ability of a company to meet its interest payments
Acc. Rec. Turnover	Net Credit Sales / Average Accounts Receivable	how many times a company collects its receivables
Inventory Turnover	Cost of Goods Sold / Inventory	the efficiency of managing and selling of inventories
T. Assets Turnover	Net Sales / Total Assets	how efficiently a company can use its assets to generate sales

4. STRUCTURE AND METHODOLOGY

The following indicates the brief of all the objectives this research will provide to:

- reveal the ratios in terms of liquidity, profitability, solvency and activity performances of the restaurants and hotels quoted on Borsa Istanbul.
- analyze and compare the performance of the restaurants and the hotels in the industry.
- summarize the performance variables.
- detect performance differences between groups.

The structure of this study is based on factor and discriminant analysis. Factor analysis is a multiple variable statistic that aimed to discover a few conceptually significant variables with bringing together many variables which are connected with each other. By applying factor analysis to financial ratios of the restaurants and hotels quoted on Borsa Istanbul, this study examined covariance structure of some group variables and explained relations between each other in point of unobservable hidden variables which are much less than others. Discriminant analysis is a statistical technique that helps to comprehend the differences between the two groups. By applying discriminant analysis to restaurants and hotels, this study aims to detect performance differences between those groups.

Ratios which belong to certain groups measure the same parameter and give the same results with using same denominators. In order to understand the best ratio to measure one parameter, we need to use factor analysis. So, it is possible to find the best ratios to measure parameters by reducing a large number of the same ratios to a minimum. Also, it helps to arrange background for further detailed statistical studies. In other words, the structure of this study will be created by using analytic technic that aimed to reach a few explanatory factors which explain maximum variance and have calculation logic which to base relation between expected variables.

The main purpose of this study to reveal the ratios in terms of liquidity, profitability, solvency and activity performances of the restaurants and hotels quoted on Borsa Istanbul. Moreover, to analyze and compare the performance of the restaurants and the hotels in the industry. This study work on the financial ratios of the companies as performance variables. Factor analysis is conducted to summarize the performance variables and then discriminant analysis is applied to detect performance differences between groups.

5. DATA COLLECTION

In this research, the publicly traded restaurant and hotel companies quoted on Borsa Istanbul are examined for 10 years of reporting period between 2009 and 2018. The reason for using this period is that the last five years of investigation is the most essential average year number for investors to make decisions. There are only 13 firms in total quoted in Borsa Istanbul for the Hospitality and F&B industry. The required data of the hotels and restaurants quoted on Borsa İstanbul between the years 2009 and 2018 have obtained from "Public Disclosure Platform".

SPSS© 22.0 program is used for the analysis of the data. The sample data is covered between 2009 and 2018 with 13 observations. In total, there are 130 firm-years. The unit of measurement is the Turkish Lira (TL).

6. ANALYSIS AND RESULTS

The raw data collected from 13 companies are transferred to the SPSS program. The outputs of descriptive statistics and explanatory factor analysis are generated. In total, there are 130 firm-years with a sample size of 1690. The analysis has done for all of the 13 ratios, however the total assets turnover, return on assets, interest coverage and earnings per share were excluded respectively due to invalid results. The analysis has rerun after each change.

Table 2 shows the descriptive statistics for the ratios from the final analysis. According to Table 1, the mean for the current ratio is 2,9. It means a company's current asset of 2,9 dollars for every 1 dollar of current liability. The common acceptable value is 2 for the current ratio and having a higher ratio is good for the Restaurant and Hotel industry. This industry relies heavily on short-term liabilities in the form of salaries and wages and equipment leasing. However, restaurants have lower current ratio than hotels. This high ratio indicates that companies can easily pay their short-term liabilities.

Table 2: Descriptive Statistics

Ratio	Mean	Std. Deviation	Analysis N
Current	2,90960	3,510500	130
Quick	2,52083	3,346807	130
Cash	1,44758	3,278934	130
ROE	,298293	,6536663	130
ROS	,859145	1,6704056	130
Debt to Equity	1,10285	3,263789	130
AccRecTurn	30,652354	110,5459597	130
Inv Turn	-20,269688	69,5202020	130

The mean for the quick ratio is 2,5. The commonly acceptable ratio is 1, but this may differ from industry to industry. A value that is greater than 2 is considered as good. A high quick ratio or a value with an increasing trend indicates the revenue growth. Moreover, it means a company is collecting its receivables, turning over its inventories and converting them into cash. Meaning the hotels are selling their rooms and the restaurant are selling their dishes. However, restaurants have lower quick ratio values than hotels.

The mean for the cash ratio is 1,4. The commonly acceptable proportion is 0.50 to 1. The high level of cash ratio indicates low short-term leverage and indebtedness. The mean for return on equity (ROE) is 0,29. or 29%. 15% and higher values are considered as good. This high ROE value indicates a high value for the stock prices.

The mean for return on sales (ROS) is 0,85 or 85%. The ROS shows the profit from a company's sales. This is a high return which indicates that the Restaurant and Hotel industry is selling their products well and their profits are high.

The mean for the debt to equity ratio is 1.10. A commonly acceptable ratio is 1.5 and less. This value indicates that the Restaurant and Hotel industry have no problem to meet its long-term liabilities and have lower risk since the debt holders have fewer rights on the company's assets.

The mean for the accounts receivable turnover is 30. This means the accounts receivable turned over 30 times. The Restaurant and Hotel industry rely heavily on short-term debt and the short-term debt should be paid back less than 60 days. The value of this ratio indicates that companies operate on a cash basis and their accounts receivable collection is efficient.

The mean for the inventory turnover ratio is -20. This means strong sales and no excess of inventory. This negative number indicates that hotels are selling their rooms before the accommodation.

The convenience of ratio variables for factor analysis was tested via Barlett Test of Sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy Test (KMO). The end result value of KMO is 0.783, and Bartlett is 0.000 that is smaller than 0.05, which means the observed variables are suitable for factor analysis.

Figure 1: Summarized Factor Analysis
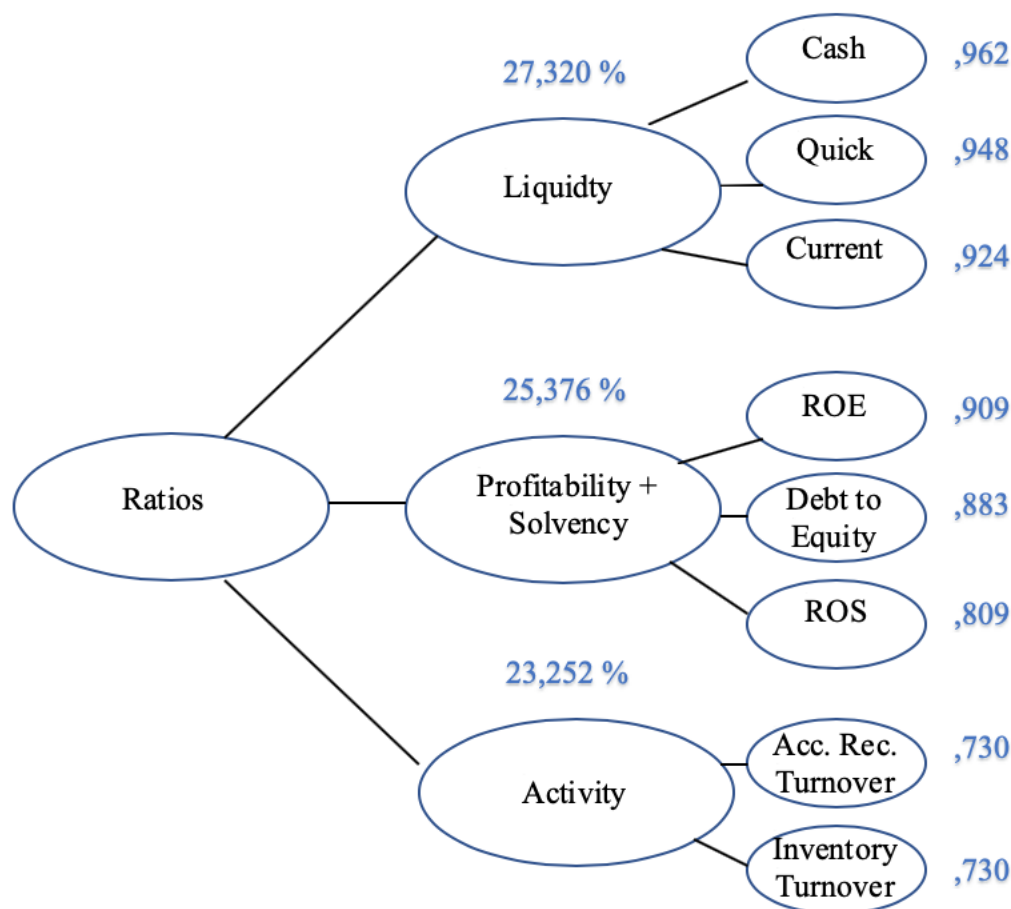
Figure 1 displays a whole picture of the analysis results. Each of the ratios has a correlation with a value higher than 0,5 at the anti-image correlation matrix. According to the figure three components are extracted. The names are given to the components according to the ratio types. Three components are liquidity, profitability + solvency, and activity. total variances explained for the liquidity is 27,320%, profitability + solvency is 25,376% and activity is 23,252%.

The liquidity component has three ratios, which are cash, quick and current ratios. The factor loadings for cash ratio is 0,962, quick is 0,948 and current is 0,924. The profitability + solvency component has three ratios, which are ROE, debt to equity and ROS. The factor loadings for ROE is 0,909, debt to equity is 0,883 and ROS is 0,809. The activity component has two ratios, which are accounts receivable turnover and inventory turnover. The factor loadings for accounts receivable turnover is 0,730 and inventory turnover is 0,730. The results indicate four important ratios according to their factor loadings for investors, which are cash, ROE, accounts receivable turnover and inventory turnover. Instead of examining all liquidity, profitability, solvency and activity ratios, investors can base their decision on these four ratios.

The case processing summary, which is necessary for reliability analysis, shows that all the variables are valid. Reliability analysis is necessary to find the numerical reliability of every dimension after factor analysis. When analyzing reliability, the Alpha model should be used. Cronbach's Alpha is a value of concordance depends on a correlation between variables. This value is accepted if it is higher than 0.70. Cronbach's Alpha value is 0,939 for the liquidity component, 0,779 for the profitability + solvency component and 0,711 for the activity component, which means our model is reliable. Each of the ratio values is lower than Cronbach's Alpha value if the item is deleted.

After extracting the components, the discriminant analysis is performed. According to the analysis, the Box's M test is significant with a value of 0,055, 0,053 and 0,052 for liquidity, profitability + solvency, and activity dimensions respectively. According to the pooled within-group matrices, each of the variable's correlation for each of the dimensions are under 0,70.

The canonical correlation is 0,884, 0,847, 0,820 and % of variance are 78%, 75%, 73% for the liquidity dimension, profitability + solvency and activity dimensions respectively. According to the Wilk's lambda 22%, 25% and 27% cannot be explained by the differences between the groups for the liquidity dimension, profitability + solvency, and activity dimensions respectively.

Figure 2: Industry's Differentiated Ratios
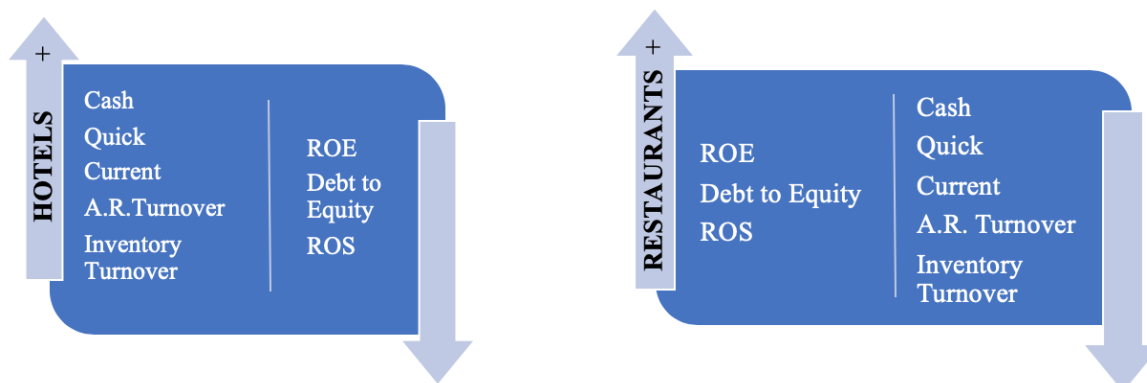
Figure 2 shows the industry's differentiated ratios. The differentiated ratios are given on the left sides of the figures and they are sorted from the highest to lowest order in terms of differentiation. The findings suggest that hotels are differentiated by their high liquidity ratios (cash, quick, current), high receivables and turnover ratios. Restaurants are differentiated by their profitability and solvency ratios (ROE, Debt to Equity, ROS).

7. CONCLUSION

This study acts as a bridge for expanding the understanding of performance analysis and provides real-world implications for firms with regard to satisfying stockholders and attracting potential investors. This study can be used as a guide for the investors in other developing countries who are planning to invest in the industry.

The Restaurant and Hotel industry in Turkey relies heavily on short-term liabilities in the form of salaries and wages and equipment leasing, but the companies in the industry can easily pay their short-term liabilities. Likewise, they operate on a cash basis, collect their receivables efficiently, turn over their inventories and convert them into cash quickly. Moreover, they have low short-term leverage. They have strong sales. Their profits and the value for the stock prices are high. They have no problem to meet its long-term liabilities and have lower risk since the debt holders have fewer rights on the company's assets.

It is very important to outline a set of financial ratios of the Restaurant and Hotel industry to be used in the comparative analysis and to make deductions depend on performances of the companies. The findings identified four important ratios for the investors in the hospitality industry. These ratios are cash, ROE, accounts receivable turnover and inventory turnover. Instead of examining all liquidity, profitability, solvency and activity ratios, investors can base their decisions on these four ratios. By evaluating these four resources, investors can comment on the return and risk of their investments with greater accuracy.

The results of this study show that the hotels have higher liquidity and activity ratios compared to the restaurants. Furthermore, the restaurants have higher profitability and solvency ratios, which means they are more capable to satisfy their long-term debts. It can be concluded that restaurants can have equal or even better performance when compared with their profit-oriented counterparts.

This study detects likely future studies by underlining the performance analysis on restaurants and hotels. There is a lack of studies enabling generalization of the results of one economy to another. Therefore, taking inputs from this research along with other research works done relevant to the emerging economies, the researchers can try to establish a trend between these economies concerning the performance analysis on Restaurant and Hotel industry. Such a trend can also be determined for the advanced economies which will allow generalization of results to all other economies that lack study within this research area. Therefore, researchers can use this research gap to further develop studies that test the same variables in other countries based on categorical classification of the economies.

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AN EVALUATION ON INFLATION IN TURKEY AFTER 1980 AND THE ANALYSIS OF RELATIONSHIP BETWEEN INFLATION, INTEREST RATES AND EXCHANGE RATES

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ABSTRACT

Purpose - Interest and exchange rates were determined by market dynamics after adaption of export-oriented industrialization model and liberalization of capital movements in Turkey after 1980s. Important steps have been taken by the Central Bank of Turkey to improve the effectiveness of monetary policy and the execution of monetary and exchange rate policies compatible with free market conditions. However, Turkey experienced chronically high inflation due to the crisis and political imbalances. In this study, the causality relationship between inflation, interest rate and exchange rate is evaluated.
Methodology - The relationship between inflation, interest rates and exchange rate are investigated by VAR Method for 2003: 01-2015: 02. The causality relationship between the variables are investigated by Granger causality analysis. Then, by impulse response analysis the responses of the variables to one-unit shocks and by variance decomposition analysis the explanatory of the variables on each other are investigated.
Findings- After 2008 global crisis, by 2010, the Central Bank adopted financial stability as well as price stability in monetary policy implementations. It is necessary to re-analyze the relationship between inflation, exchange rate and interest rate due to the changes in implementations against inflation during this period. The causality relationship between variables are examined by Granger causality test. As a result, a causality relationship from the interest rate to inflation is determined.
Conclusion- In this study the relationship between inflation, interest rate and exchange rate is examined in Turkey for 2005-2016 period. Findings of analysis result that interest rate is an effective variable on inflation and inflation rate is mostly affected by fluctuations in interest rates. Interest rates can be used as a policy tool against inflation which was the case for Turkey in the near past.

Keywords: Inflation, interest rates, exchange rates, VAR analysis.
JEL Codes: E40, E50, E31

1.INTRODUCTION

Inflation is one of the most important problems especially in developing countries. Inflation, which stands for continuous increases in the general level of prices, reduces the domestic purchasing power of goods and services and has a detrimental effect on income distribution in the economy. Therefore, inflation increases economic instability and also negatively affects economic performance (Doğan and et al. 2016: 406).

Inflation, interest rates and exchange rates act as pricing mechanism of a country and have impact on that country's macro-economic conditions. A negative trend in any of these three variables leads to instability in a country's economy. Therefore, it is necessary to analyze the relation between them in order to identify and solve the root of the problem and to make appropriate adjustments in the applied economic policies (İşcan and Kaygısız, 2019: 583). The collaboration of financial markets with the goods market and the services market is essential for economic growth. In this context, the national income generated as a result of production is transferred to the goods market through consumption and savings. The realization of such transition without significant deviations ensures sustainability of production. In order to maintain a steady economic

growth, the fluctuations in general price levels, exchange rates and interest rates should occur in a manner balancing each other (Özel, 2000: 7).

The economic structure is adversely affected because the deterioration of such parameters influences the balance of other domestic and foreign factors vis-à-vis each other as well as the alternative costs. However, the increases in exchange rates, inflation and interest do not indicate an absolute economic crisis, but unexpected fluctuations in these variables have a negative impact on distribution of social income and welfare (Sever and Mızrak, 2007: 266-267). A decrease in exchange rates leads to an increase in imports and a decrease in exports. As a result, the current account deficit increases. A decline in the exchange rates causes a decline in the price of imported intermediate goods, thus may lead to a decline in prices at general level. On the other hand, an increase in the exchange rates increases the prices of imported products and leads to inflation (İşcan and Kaygısız, 2019: 583-584).

The relation between inflation, exchange rates and interest rates is depicted in Figure 1. All three variables are affected by the conditions or changes in different industries. These three variables also interact with each other. Economic fluctuations could be either due to changes in exchange rates or inflation rates (Sever and Mızrak, 2007: 267). As the increases in exchange rates raise the prices of products produced through imported input, this causes a rise in the domestic prices of products. These increases are known to lead to high inflation and abandonment of domestic currency, especially in countries with high inflation rates. In addition, demand for foreign currency may lead to a further increase in exchange rates. Especially in countries where inflation is consistently high, savings are kept in foreign currency due to distrust to domestic currency. This circumstance increases the effect of exchange rates on prices and makes the economy quite unstable against changes in exchange rates (Figure 1)

Figure 1: Relation Between Inflation, Interest Rates and Exchange Rates
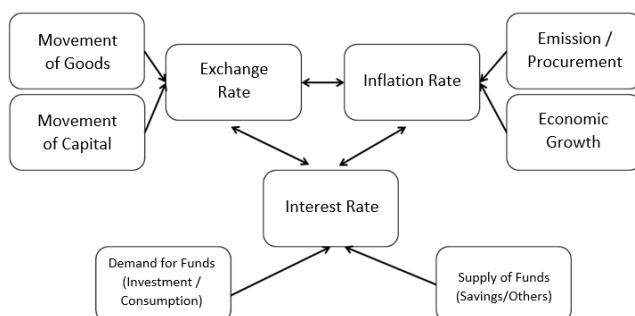
Source: Sever, E. and Mızrak, Z. (2007:267).

Fluctuations in supply-demand balance of foreign exchange can lead to inflation and devaluation (Central Bank of the Republic of Turkey, 2002). The global economic changes' impact on a country's economy depends on that country's macro-economic performance. Countries use interest rates to minimize negative consequences of such impacts. Changes in interest rates may lead to various changes in exchange rates based on country's exchange rate regime (İşcan and Kaygısız, 2019: 584). The Central Bank influences inflation through various channels. The interest rates are often used as a basic tool for ensuring price stability. The monetary policies of countries are generated according to the inflation target within the scope of programs aiming to control inflation (Bernanke and Mishkin, 1997: 99). Future inflation targets are determined in order to reduce uncertainties and to create a positive expectation independent of previous or instantaneous rates. Interest is an important tool to achieve targeted inflation. In this context, operational autonomy and transparency of Central Banks are of significance. Besides the monetary policies adopted for the inflation target, fiscal and structural policies also have important implications for achieving that target (Carare and et al, 2002: 4-16).

Turkey started to deploy outward-oriented economic policies directed towards liberalization after 1980. Importation was liberalized within the framework of the economic stabilization program entered into force on January 24th, 1980, pursuant to which the Turkish Lira was devalued; a flexible exchange rate regime was adopted; practices to encourage foreign capital and exportation were applied; price controls were ended; and a tight fiscal policy was initiated (Oktayer, 2010: 434). In connection with the export-based growth policy, the value of TRL was kept at low levels to encourage exports and eventually to increase export of goods and services (Yeldan, 2003: 48-49). Consequently, the inflation rate that was around 115.6% in 1980 lowered to 21.9%, following which it started to increase again and raised to 73.7% in 1988 (Graph 1).

Graph 1: Inflation in Turkey after 1980 (CPI %)
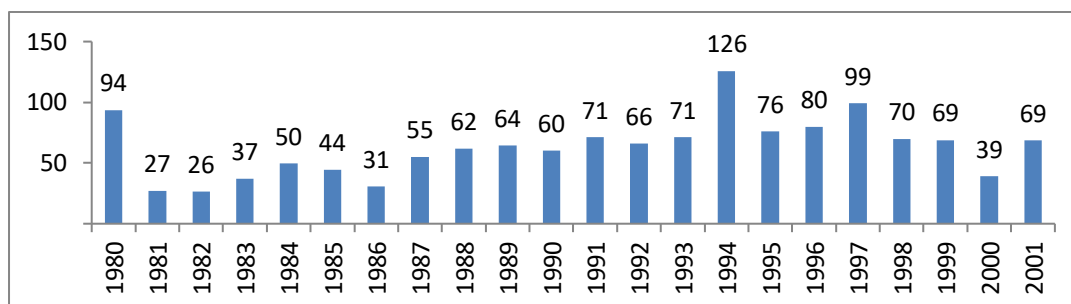
Source: Ministry of Finance; CPI: Consumer Price Index

In 1989, movement of capital was completely liberalized and there was a significant increase in foreign capital inflow to the country. The real exchange rate increased in value at a rate around 15-20% in the period between 1989 and 1990. During the Gulf Crisis, the uncertainty in exchange rates mounted and the Central Bank focused on some practices in order to minimize this uncertainty (Berument, 2002: 4). However, financing policy applied after 1989 and based on high interest rates, exorbitant exchange rates, and the short-term capital inflow exposed the economy to a major crisis accompanied by uncertainty in exchange rates and financial markets in 1993. In 1994, the Turkish economy dived into that crisis with a high current account deficit and serious public deficits (Ülgen, 2005:84). The consumer price index, which was always below 20% until 1977 in the pre-1980 period, increased to 115% in 1980 and then up to 125% in 1994 when a crisis erupted (Kalaycı, 2002: 273). During this period, the Central Bank attempted to maintain stability in foreign exchange markets by using the foreign exchange reserves, and providing funds for the Treasury. Furthermore, the Economic Measures Implementation Plan was put into force in April 5th, 1994 in order to ensure economic stability. Within the scope of this plan, it was aimed to reduce the inflation rate, which had reached to 120%, down to reasonable levels in the short term; and to redress the balance in financial markets and exchange rates; and to achieve sustainable growth through providing a permanent solution for public deficit and current account deficit in the medium term.

In 1995, instead of direct monetary policy instruments, indirect monetary policy instruments were introduced in line with modern central banking practices. Within the framework of the agreement signed with IMF, it was aimed to increase the foreign currency basket by predicted monthly inflation rates (Central Bank of the Republic of Turkey, 2013). As a result of such measures, some positive developments were achieved in 1994 and 1995. During this period, the ratio of exports against imports was improved thanks to devaluation; public deficit was decreased and short-term capital inflow followed a downward trend due to lower current expenditures (Yentürk, 2005: 67). However, a lasting success could not be achieved with the stabilization program introduced in 1994, and the country's economy went through a new shrinkage due to negative effects of the Asian and Russian crisis in 1998 (Yeldan, 2003: 159). A new crisis environment emerged with the effect of reasons such as shrinkage in domestic demand after 1998; decrease in Russia-based demand for our exports; and discontinuance of hot money inflow due to increasingly insecure environment and political uncertainties.

In 1999, a stand-by agreement was signed with IMF aiming to secure a solution. Additionally, with the "Inflation reduction program" covering a period of three years, the objective of fighting against inflation in the economy was brought into prominence (Oktayer, 2010: 435-436). This program was a continuation of the agreement signed with IMF, and covered the strategic targets and structural reforms identified for monetary and fiscal policy. The exchange rate was linked to a nominal anchor in the implementation of a monetary policy in line with the inflation reduction program (Kutlar and Gündoğan, 2012). The inflation reduction program based on the exchange rate anchor aimed to reduce the inflation rate by 25% by the end of 2000; 12% by the end of 2001; and 7% by the end of 2002. Decreasing the real interest rates; increasing the capacity of economic growth; and ensuring a fairer allocation of resources were declared as primary objectives (Oktayer, 2010: 435-436).

The Inflation Reduction Program was implemented successfully until November 2000 in the Turkish economy. In this period, domestic demand exhibited an upward trend in the country; production volume increased; fiscal discipline was ensured in the field of public finance; and consequently the target of non-interest surplus was overachieved. However, despite such positive developments, the program did not reach its final targets of inflation. In 2000, CPI decreased from 67% to 38% however still above the target. As a result, the exchange rate, which was adjusted to the inflation target, caused an excessive increase in the value of TRL and thus a decrease in exports (Oktayer, 2010: 436). Moreover, the increased interest rates as well as the increase in demand for imported goods due to overvalued TRY caused the current account deficit rise to 6.7 billion

$ in this period (Kutlar and Gündoğan, 2012). In addition to these imbalances encountered in the macro-economy, the negative developments in the banking sector impaired the trust to the financial sector, the government and the program and thus led the country's economy to the brink of two new crisis in November 2000 and February 2001 (Oktayer, 2010: 436).

After the crisis of 2001 outburst and loss of credibility, the exchange rate-based stabilization program was halted. The Central Bank left the exchange rates to fluctuate in February 22nd, 2001 (Central Bank of the Republic of Turkey, 2013). After this period, a new era begun in the Turkish economy and a new program called "Transition to a Strong Economy Program" was adopted in 2001. The main objectives of the new program were specified as preventing the instability occurred due to abandonment of fixed exchange rate system; and reducing the public debt within the scope of establishing an infrastructure directed towards restructuring the public administration (Aydoğan, 2004: 103). Program intended the restructuring of the economy and controlling the inflation. The Central Bank switched the inflation targeting strategy inflation to implicit inflation targeting as of 2002 and subsequently to open inflation targeting practice (Kalaycı, 2002: 273).

During this period, inflation was below targets respectively as 5.3% in 2002; 1.6% in 2003; and 2.7% in 2004 (Yükseler, 2005: 33). At the end of 2005, which was defined as a preparation period for transition to open inflation targeting, it was reduced to a reasonable level of 7.7%. The economic growth was also recorded as an average of 7%. At the end of 2005, the Central Bank switched to open inflation targeting regime. Global economic developments had a negative impact on Turkey in the period after 2006. Especially, the change of international capital conditions to the disadvantage of developing countries caused capital outflows from Turkey. If the period between 2006, when the open inflation targeting was adapted, and 2018 is analyzed, it can be seen that the targets have not been achieved, except for the years 2009 and 2010. Especially in 2018, the significant increase in the inflation rate is noteworthy.

Graph 2 shows the targeted and actual inflation rates since 2006. The targets of the first 3 years, in which the open inflation targeting was implemented, were exceeded. Global fluctuations and the increase in global inflation rates incurred following the transition to open inflation targeting is the primary cause (Takım, 2011: 31). At the end of this period, the Central Bank went through a revision in the targeted figures for the first time. The targets fixed to 4% were later announced as 7.5% for 2009; 6.5% for 2010; and 5.5% for 2011 (Kutlar and Gündoğan, 2012).

The global economic crisis in 2008 caused an economic shrinkage. Accordingly, the increase in the energy and commodity prices and the imposed additional taxes caused pressure on inflation. In 2009, especially with the increasing effects of crisis, the inflation was realized as 6.53%, a figure below the specified target arising from the decrease in the energy prices and levels of general demand. The production started to rise when the effects of crisis started to decline in 2010. The inflation rates mounted up to 10% in the first months of the year, but resulted as 6.4% by the end of the year due to the Central Bank's intervention in liquidity (Central Bank of the Republic of Turkey, 2013).

Graph 2: Targeted and Actual Inflation Rates between 2006 – 2018 in Turkey
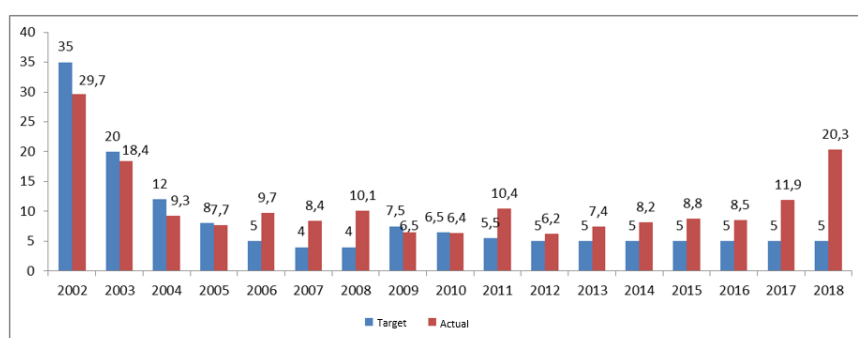
Source: Central Bank of Republic of Turkey

After the crisis, the Central Bank has started to employ new tools in order to keep inflation under control. The new approach was defined as implementation of an interest rate corridor. Central Bank aimed price and financial stability through loans and exchange rate transfer and by using monetary policy instruments such as interest rate corridor, weekly repo rates, liquidity management, and reserve requirements and reserve option mechanism (Central Bank of the Republic of Turkey, 2013).

In 2011, inflation reached to a level of 10.45%, well above the targeted level of 5.5%. The deviations in forecasts were mainly due to increase in unprocessed food prices over the estimations and the ongoing devaluation in Turkish Lira. The inflation rate was realized as 6.2%, the closest level to the 5% target. This decline was mainly due to the abundance in food items and

the decline in unprocessed food prices. With the effect of domestic and foreign political fluctuations, socio-political and global economic factors encountered after this period, the inflation reached up to 11.9% in 2017 and to 20.3% in 2018, which is the highest level of the last 15 years (Fenira, 2014).

In this study, the relation between inflation, interest rates and exchange rates are described and development process of inflation in Turkey after 1980 is assessed. Also, the transition to the inflation-targeting regime in Turkey and describe the studies conducted in this context will be detailed in the literature section. In the final section, there will be an empirical analysis aiming to test the relation between inflation, interest rates and exchange rates.

2. LITERATURE REVIEW

Many studies were carried out examining the relationships between exchange rate, inflation and interest rate in Turkey for different periods. Some main studies carried out for Turkey and their findings are as follows:

İşcan and Durgun Kaygısız (2019) analyzed the relationship between exchange rate, inflation and interest rate by using VAR model. Augmented Dickey-Fuller unit root test, Granger causality test, impulse response analysis and variance decomposition analysis are performed for Turkish economy in between 2009:01-2017:12 period. According to Granger test results causality relationship is found from exchange rate to both inflation and interest rate and also a causality relationship from inflation to interest rate are determined. While interest rate react negative to one unit exchange rate shock for 12 period, interest rate also gives negative reaction starting from the sixth period. Interest rate reacts positive for 2 terms to one-unit inflation shock. The most important factor on inflation and interest rate is found as exchange rate.

Dereli (2018) investigated the relationship between exchange rate and inflation in Turkey for 2005- 2017 period by VAR technique. A bi-directional causality relationship and a long-term relationship between inflation and exchange is found. According to study results exchange rate pass-through is high in Turkey.

Işıl and Özdemir (2018) investigated the relationship between inflation, interest rate and exchange rate in Turkey for 2003-2016 by dividing the period to two different terms and found causality from exchange rate to inflation after 2008.

Öner (2018) examined the relationships between nominal exchange rates, CPI and PPI inflation rates in Turkey for 2007:1-2017:12 period and performed Augmented Dickey-Fuller unit root test and Granger causality test. As a result, a one-way causality relationship from PPI to CPI is found, and it is determined that nominal exchange rate and the PPI are not affected by other independent variables.

By using VAR method, Bozdağlıoğlu and Yılmaz (2017) examined Turkish economy for 1994-2014 period and reached a one-way causality relationship from nominal interest rate to inflation.

Okur (2017) examined the effect of interest rate and exchange rate on inflation in Turkey for 2008:1-2016:4 period and found causality relationship between exchange rate, interest rate and inflation.

Bulut (2017) found one way causality from exchange rate to inflation in long term for Turkish economy between 2001: Q2-2017: Q3 period by conducting Cointegration test and Vector Error Connection Granger Causality test.

Doğan, Eroğlu and Değer (2016) investigated the causality relationship between interest rate and inflation by using data series of the inflation and interest rate in between 2003:01-2015:02. Augmented Dickey-Fuller and Phillips-Perron unit root tests, Granger causality test and Johansen Cointegration test are performed respectively. As a result of study, a single causality relationship is found from inflation to interest rate.

Torun and Karanfil (2016) investigated the relationship between inflation and interest rate for Turkish economy for 1980-2013 period. Model is established with inflation as dependent variable and interest rate, exchange rate and GDI as independent variables. Johansen cointegration, Granger causality and variance decomposition methodology applied. A long-term relationship is found between variables and unidirectional causality is found from interest rate and GDP to inflation. Additionally, bidirectional causality between interest rate and GDP has been found.

Atgür and Altay (2015) examined the relationship between the inflation and interest rate in Turkey for the period 2004-2013. The results obtained in the study have pointed to the existence of Fisher Effect in Turkey during the period 2004-2013. According to the Johansen, Lütkepohl-Saikkonen Cointegration Tests and Dynamic Least Squares (DOLS) method, a long-run relationship has been found between the inflation and nominal interest rates.

Sever and Mızrak (2007) investigated the relationship between exchange rate and inflation in Turkey for 1987: 01-2006:06 period by VAR method. As a result of study, it is found that the changes in exchange rate effects both inflation and interest rate.

Güven and Uysal (2013) conducted Cointegration test and Granger causality test for Turkish economy for 1983-2012 period and found mutual causality relationship between exchange rate and inflation.

Güneş (2013) investigated the relationship between prices in Turkey, US Dollar and Euro with Cointegration analysis and Vector Error Correction Model (VECM) analysis. According to the study results, long-run relationship exist between prices in Turkey and the two exchange rates and the direction of relation is from both exchange rate to prices in Turkey.

Peker and Görmüş (2008) investigated the relationship between exchange rate and inflation by VAR method and found that changes in exchange rate is effective on prices in Turkish economy for 1987:1-2006:3 period.

Gül and Ekinci (2006), found a long term relationship between nominal exchange rate and inflation for 1984-2003 period in Turkey and also a causality relationship is reached from exchange rate to inflation

Işık, Acar and Işık (2004) examined Turkish economy for 1982:Q1-2003:Q4 and found long term relationship between inflation and exchange rate by conducting Johansen Cointegration test.

3. DATA AND METHODOLOGY

In this study, monthly data is used for the period between 2005-2016 in order to examine the relationship between exchange rate, inflation and interest rate. Series are seasonally adjusted. All variables are provided from Turkish Statistical Institution and are expressed in logarithmic form. Augmented Dickey-Fuller (ADF) test, VAR Granger Causality test, impulse response analysis and variance decomposition analysis are conducted. Serial Correlation LM test and White test, serial correlation and constant variance are checked. The analysis are carried out with Eviews 10.0. EXR, CPI and IR represent exchange rate, inflation and interest rate respectively.

4. FINDINGS AND DISCUSSION

By ADF test, stability of series are investigated and it is determined that variables are non-stationary at level form, but first differences of the series are stable. Calculated t-statistic values are bigger than McKinnon critical values which are 3.47, 2.88 and 2.54 at %1, %5 and %10 alpha levels respectively. The ADF test results are presented in Table 1.

Table 1: ADF Test Results

Variable		Constant		Constant, Linear Trend	
		t-statistics	Probability	t-statistics	Probability
Level	EXR	-1.565.628	0.4975	-3780853	0.0204
	CPI	-0.436449	0.8986	-3.408.145	0.0543
	IR	-1.470.463	0.5458	-1.840.500	0.6798
First Difference	DEXR	-9.127.137	0.0000	-9.172.918	0.0000
	DCPI	-1.044.353	0.0000	-1.041.492	0.0000
	DIR	-9.394.289	0.0000	-9.369.534	0.0000

Figure 2 shows that all of the characteristic roots of the model are contained within the unit circle that confirms the stability of the VAR model. In addition, it is necessary to determine the appropriate lag length to establish VAR Model for the causality test, impulse response analysis and variance decomposition analysis. The appropriate lag length for VAR model is selected as 2 at final predicting error (FPE), Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) values.

Figure 2: Characteristic Roots

Inverse Roots of AR Characteristic Polynomial
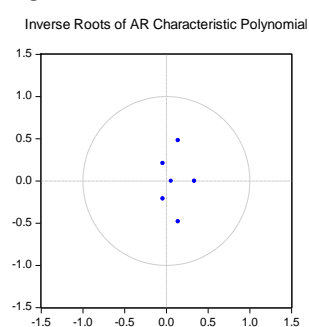
Prior to the VAR analysis, Granger causality test is performed and the causality relationship between variables is checked. As a result, a causality relationship from the interest rate to inflation is determined (Table 2).

Table 2: VAR Granger Causality/Block Exogeneity Wald Tests Results

Dependent Variable: DEXR		
Independent Variable	Chi-sq	Probability
DCPI	4.035342	0.1330
DIR	0.569828	0.7521
Dependent Variable: DCPI		
Independent Variable	Chi-sq	Probability
DEXR	2.186273	0.3352
DIR	7.081155	0.0290
Dependent Variable: DIR		
Independent Variable	Chi-sq	Probability
DEXR	3.250070	0.1969
DCPI	0.808886	0.6673

Autocorrelation between series and existence of constant variance are investigated by LM test and White test. Since probability value of White test is > 0.05, no constant variance has been found. In addition, there is no autocorrelation between series. White test and Serial Correlation LM test results are presented at Table 3 and Table 4.

Table 3: White Test Results

Chi-sq	Prob.
80.70329	0.2257

Table 4: Serial Correlation LM Test Results

Lag	LM Statistics	Probability
1	0.580285	0.8132
2	0.656642	0.7479
3	0.439301	0.9132
4	1.568145	0.1238
5	1.370628	0.2005
6	0.996909	0.4424
7	0.234132	0.9894
8	0.166395	0.9971
9	1.096399	0.3650
10	1.061135	0.3914

The effect of one-unit standard error shock at exchange rate on inflation is negative in the first period, followed by a positive course after the third period. When the effect on interest rate is evaluated, it is seen that there is a negative effect until the fifth period and the effect decreases after this period. The exchange rate reaction to one unit change in inflation is positive and decreases with a negative course after the fourth period. The reaction of interest is positive and decreases gradually after the fourth period. The exchange rate reacts positively to the one-unit standard error shock at interest rate, inflation reacts positive at second period, negative at third period and continues with a decrease over time.

Graph 3: Impulse-Response Results

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.
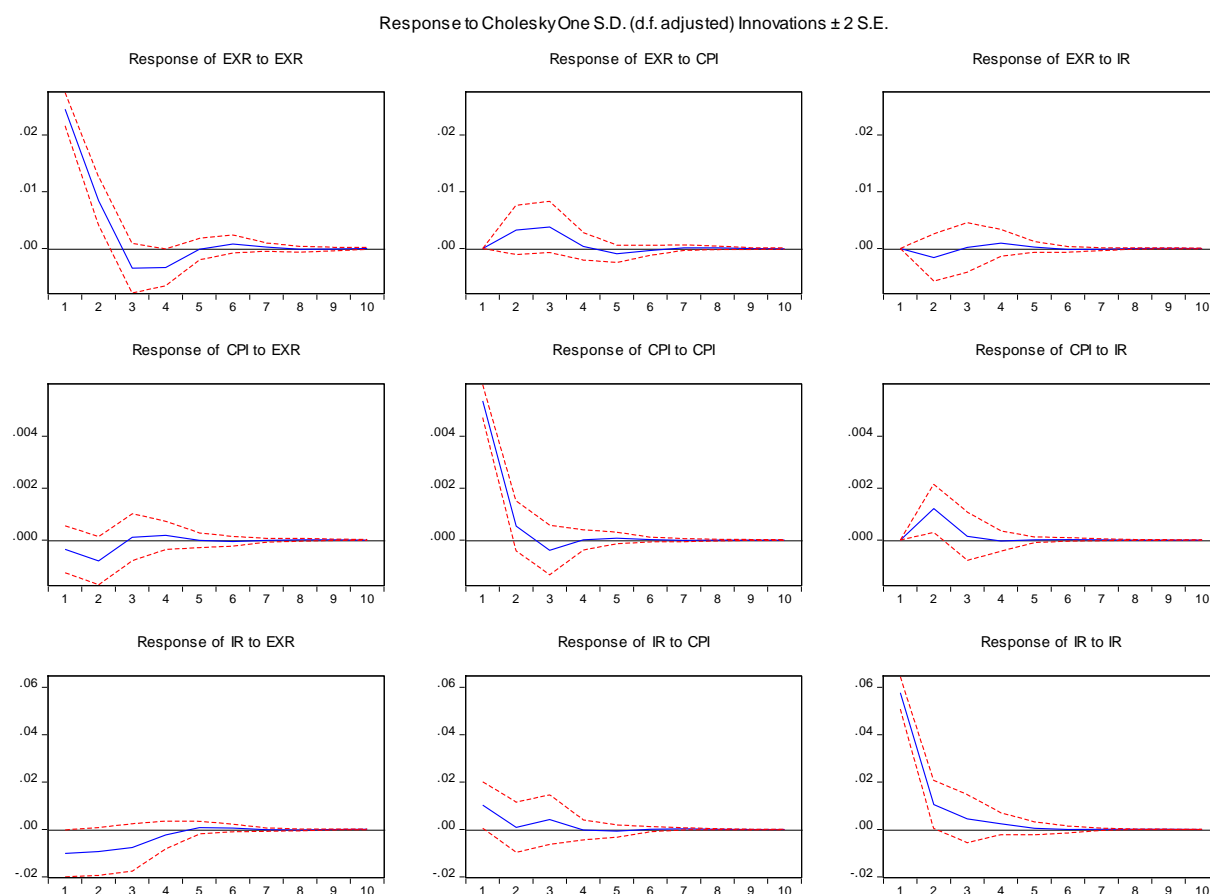
According to the results of variance decomposition analysis, changes in exchange rate is mainly explained by itself. In the following periods, it is seen that the inflation rate explains the changes in exchange rate by 3%. The disclosure level of interest rate on the exchange rate is weak. On the other hand, inflation has a high level of self disclosure, while inflation explains the changes in interest rate by approximately 4% and the changes in exchange rate by 2.5%. The real exchange rate is effective in explaining the changes in interest rates, and it is seen that this ratio has increased gradually after the first period and real exchange rate explains %6 of the changes in interest rate on average (Table 5).

Table 5: Variance Decomposition Results

EXR Term	Standard Error	EXR	CPI	IR
1	0.024548	100.0000	0.000000	0.000000
2	0.026210	98.08517	1.552798	0.362032
3	0.026709	96.14299	3.502383	0.354623

4	0.026934	96.05456	3.463160	0.482279
5	0.026952	95.93200	3.575988	0.492015
6	0.026966	95.91746	3.587580	0.494964
7	0.026967	95.91361	3.590034	0.496356
8	0.026968	95.91164	3.591996	0.496361
9	0.026968	95.91157	3.591944	0.496482
10	0.026968	95.91144	3.592075	0.496485
CPI Term	**Standard Error**	**EXR**	**CPI**	**IR**
1	0.005366	0.451405	99.54859	0.000000
2	0.005587	2.497140	92.77026	4.732597
3	0.005604	2.517329	92.71007	4.772605
4	0.005606	2.613238	92.61341	4.773356
5	0.005607	2.613349	92.61408	4.772574
6	0.005607	2.621929	92.60502	4.773046
7	0.005607	2.622419	92.60441	4.773169
8	0.005607	2.622657	92.60419	4.773151
9	0.005607	2.622746	92.60410	4.773155
10	0.005607	2.622748	92.60410	4.773154
IR Term	**Standard Error**	**EXR**	**CPI**	**IR**
1	0.059429	2.908078	2.986701	94.10522
2	0.061079	5.093496	2.848619	92.05788
3	0.061856	6.481249	3.225549	90.29320
4	0.061947	6.607295	3.217001	90.17570
5	0.061957	6.618893	3.230505	90.15060
6	0.061960	6.627494	3.230401	90.14210
7	0.061961	6.627611	3.232011	90.14038
8	0.061961	6.628578	3.232064	90.13936
9	0.061961	6.628612	3.232104	90.13928
10	0.061961	6.628644	3.232117	90.13924

5. CONCLUSION

The relationship between inflation, exchange rate and interest rate is extremely important for developing countries. Especially prices are heavily affected by the changes in exchange rate. The changes in exchange rate effects both the costs and the prices of consumption goods as production in Turkey is dependent on imports. In high inflation periods, it is also difficult to control price changes. Investors demand high returns against risks and real interest rates increase. The rises in interest rate cause both cost inflation and demand inflation accordingly. The harmony between inflation, exchange rate and interest rate and low levels in these indicators are important for growth and realization of economic balances.

In Turkey, a significant shift in monetary policy has been realized by 2000s. In this context, the Central Bank, which aims to achieve price stability, has switched to explicit inflation targeting since 2002, and an open inflation targeting regime since 2006 and lowered the inflation expectations after 2008 global crisis, by 2010, the Central Bank adopted financial stability as well as price stability in monetary policy implementations. It is necessary to re-analyze the relationship between inflation, exchange rate and interest rate due to the changes in implementations against inflation during this period.

In this study the relationship between inflation, interest rate and exchange rate is examined in Turkey for 2005-2016 period. Augmented Dickey-Fuller unit root test, Granger causality test, impulse response analysis and variance decomposition analysis are performed. ADF test resulted that series do not contain unit root after first difference. The causality relationship between variables are examined by Granger causality test. The reactions of variables to the changes at other variable are analyzed by impulse response analysis. The disclosure levels of variables on each other are evaluated by variance decomposition test. As a result, it is seen that interest rate is an effective variable on inflation and inflation rate is mostly affected by fluctuations in interest rates. In this context, the result shows that interest rates can be used as a policy tool against inflation. As a matter of fact, the Central Bank used interest rate as a policy tool in the post-2002 period for price

stability and a decline was observed in inflation rates. The determined explanatory nature of inflation on exchange rates reveals that exchange rates can be used effectively as a policy tool against inflation.

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ENERGY PRICE SHOCKS AND DYNAMICS OF CURRENT ACCOUNT IN TURKEY: A FAVAR APPROACH

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ABSTRACT

Purpose- In this article, we examine the linkages between current account and energy prices, namely crude oil, coal and natural gas in Turkey the years between 2005 and 2016.
Methodology- This article investigates how the changes in the energy prices affect the current account in Turkey. For this purpose, a Factor-Augmented Vector Auto Regression (FAVAR) model is used with economic data from the Turkish economy and world commodity price indexes to obtain empirical results for current account dynamics in the Turkish economy. The impact of various factors that include crude oil prices, coal prices, natural gas prices and fuel (Energy) index (Crude oil, natural gas, and coal price indices) data have been studied by obtaining impulse response functions.
Findings- Natural gas prices gradually affect the current account. The impact is permanent after a period indicating a very limited elasticity. Oil prices have an immediate The current on the current account. Cycles, in the long run, indicate some degree of elasticity. The negative effect of coal price on the current account deficit occurs with a significant delay. Crude oil price index shocks graphs and fuel index, which includes oil price, coal price and natural gas, and crude oil price shocks graphs are very similar.
Conclusion- In this comprehensive study, we can conclude that crude oil prices, coal prices, natural gas prices deteriorate current account balance. From all of the energy indices, the crude oil price is the most effective on the current account.

Keywords: Current account, oil prices, FAVAR model, Turkish economy.
JEL Codes: C30, E30, F32, Q43

1. INTRODUCTION

Turkey has effected with oil prices heavily. Efforts to raise the growth rates of developing countries as well as developed countries have increased energy demand. Despite improvements in renewable energy sources, the largest share in energy consumption is 80% of the fossil fuels in the World (World Bank data). With the increase in demand for fossil fuels and political risks in oil-producing countries have led to fluctuations in energy prices since 1973. The impact of rising oil prices on economies has attracted the interest of economists especially after 1980 (Hamilton 1983, 1988, 1996, 2003, 2009; Hamilton and Herrera, 2004; Mork, 1989; Barsky and Kilian, 2004). Rises in oil prices affect new investments, trade, and output negatively by increasing production costs. After 1990, the world faced rapid economic growth, especially in China and India. According to the U.S. Energy Information Agency, China became the world largest net importer of oil and also became the largest primary energy consumer in 2016. Under the influence of the Iraq war, oil prices started to increase in 2003. Rising oil prices and price shocks in the 2007-2008 period hits current accounts in oil importer developing countries. In contrast, lower oil prices limit the current account deficit in developing countries as well as in Turkey after 2015.

Current Account as the primary account of the balance of payments shows the financial needs or savings in a country. Turkey, like many other developing countries, generates a current account deficit generally. In a current account deficit, the economy borrows from other countries and invests more than its savings. Turkey has current account deficit mostly except for a couple of crisis years. We can see clearly the relationship between crude oil prices and current account in Figure 1. Higher oil prices pushed Turkey's current account deficit in 2011 to its widest in over sixteen years.

Figure 1: Current Account and Oil Prices in Turkey
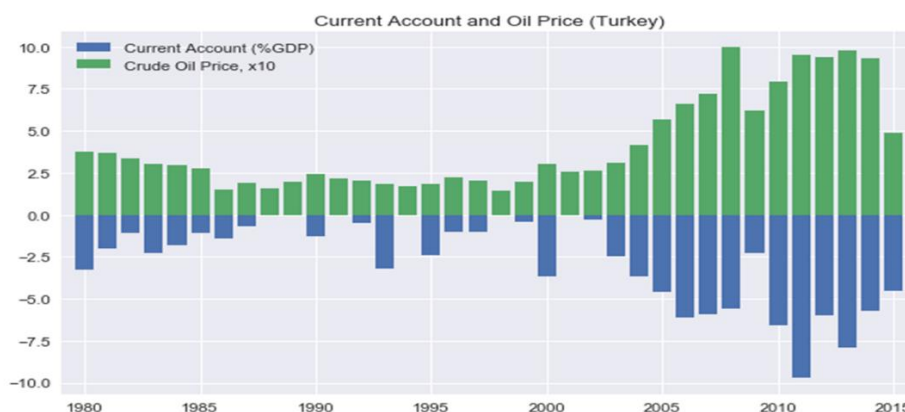
Turkey has long been oil importer country dealing with of current account deficit and so that Turkey is a good "Small Open Economy" example for investigating oil prices and current account. For this reason, this topic has recently attracted the interest of researchers. To the knowledge of the author, it is the first time that a FAVAR model used for investigating oil, coal, natural gas prices, fuel (Energy) index (Crude oil, natural gas, and coal price indices) and current account relationship.

2. LITERATURE REVIEW

Despite the importance of developing countries, there is a limited study that analyzed the relationship between current account and oil price for developing countries. Vidal and Ruiz (2016) use panel data to estimate the effect of oil price slump after 2014 on structural and cyclical current account in 98 countries. According to this study, Turkey is one of the most benefited countries regarding cyclical effects. Oil exporter countries structurally damaged with this oil price decrease. Barnett and Straub (2008) used the structural VAR approach to identify the impact of monetary policy, private absorption, technology, and oil price shocks on the current account fluctuations in the United States. According to the study, monetary policy shocks and private absorption shocks had a much more important role than oil prices on the deterioration in Current Account in the USA over time. Ang and Sek (2011) used Generalized methods of moments analyzing the determinants of current account dynamics in ten economies from 1973 to 2010. Besides world oil prices, interest rate, the exchange rate and consumer price index are the major determinants of the current account deficit. Qurat-ul-Ain and Tufail (2013), aims to research dynamic relationship between current account and exchange rate for D-8 countries for 1981-2010 years. They used Vector Autoregression for their research. Longe, Adelokun and Omitogun (2018) used a time series to find a nexus between current account and oil prices in Nigeria.

Erdogan and Bozkurt (2009) carried out MGARCH methodology for estimating the determinants of the current account deficit in Turkey. In this study, oil prices are still very decisive. M2, export/import coverage ratio, inflation, inflation uncertainty, exchange rate, exchange rate uncertainty, and share of foreign direct investment in GDP are the other determinants of the current account deficit. Özlale and Pekkurnaz (2010) identified net effect of oil prices on the current account balances for the Turkish economy using a structural vector autoregression model. Kayikci (2012) using VAR analysis, examined the linkages between inflation, growth, openness, oil prices, and appreciation of the real exchange rate and the current account deficit in Turkey in 1987–2009. Ozata (2014), examined sustainability of current account deficit with high oil prices using Structural Vector-Autoregression (SVAR) in Turkey. Uysal, Yılmaz and Tas (2015) used VAR analysis to explain energy import and current account deficit in Turkey. Basarır and Ercakar (2016) also used VAR analysis to investigate the effect of crude oil prices and exchange rates on the current account. Bayraktar, Taha and Yıldız (2016) determined the impact of oil prices in the Fragile-Five countries (Brazil, Indonesia, South Africa, India, and Turkey) on current account deficit and growth using the method of panel data analysis. They also found a meaningful relationship in oil prices with both GDP and the current account deficit. Besel (2017) used Gregory-Hansen Cointegration Test and Toda-Yamamoto Causality Test to investigate oil prices and current account deficit dynamics. Yalta and Yalta (2017) used a maximum entropy bootstrap method to calculate dependency on imported oil and its effects on the current account. Berk and Cin (2018) investigated a relation ship between energy consumption, population and current account deficit is analyzed by using Granger causality analysis, Augmented Dickey Fuller (ADF) Unit Roots Test", Vector Autoregression (VAR) and Vector Error Correction Models (VECM).

3. DATA AND METHODOLOGY

3.1. FAVAR Method

The Factor-Augmented VAR (FAVAR) method, developed by Bernanke, Boivin and Eliasz (2005), has distinct advantages over the standard VAR. The FAVAR method is based on the Dynamic Factor Models (DFM), developed by Geweke (1977). With FAVAR, large macroeconomic time series can be summarized by a relatively small number of prediction 'factors'. FAVAR can predict the macroeconomic factors that occur in large data sets systematically and consistently. In this respect, the FAVAR method is a natural solution to the degrees-of-freedom problem in the VAR analysis (Bagzibagli, 2012). Also, impulse response functions for a large number of variables can be obtained by the FAVAR method, and factors that cannot be represented by a single time series (such as economic activity) can also be included in the model. FAVAR method is widely used in many economic types of research today. If a small number of forecasting factors can effectively summarize large amounts of information about an economy, with the help of increasing the number of standard VAR using forecasting factors could be a solution to the degrees-of-freedom problem in VAR analysis.

To explain the FAVAR method, let us assume is an observable economic variables vector with size Mx1 and these variables has a widespread influence on the economy. In this stage, the aim may be to reveal or predict the structural relationship between variables. If our aim is only to uncover structural relationships between variables, we can follow standard methods and continue with a VAR approach, structural VAR (SVAR) or other multivariate time series estimation models using. However, in many applications, there may be additional unobservable but important economic information that is not included in. Let us suppose that we can summarize this additional information with Kx1 vector, , For example, "economic activity" or "credit conditions" are factors that cannot be observed. These factors, which we cannot easily represent with one or two series, affect the overall economy.

Assume that the joint dynamics of (Ft , Yt) are defined by:

$$\begin{bmatrix} F_t \\ Y_t \end{bmatrix} = \Phi(L) \begin{bmatrix} F_{t-1} \\ Y_{t-1} \end{bmatrix} + v_t \qquad\qquad (1)$$

where $\Phi(L)$ is a lag polynomial of order d, which may contain a priori restrictions as in the structural VAR studies. v_t is the zero-mean error term with covariance matrix Q.

Equation (1) is a factor-augmented vector autoregression (FAVAR) and therefore, there is a direct mapping into the existing VAR results and provides a way of assessing the marginal contribution of the information included in F_t . Besides, Equation (1) will, in general lead to biased estimates of the VAR coefficients and impulse response coefficients if the true system is a FAVAR. Because the factors F_t are not observable, Equation (1) cannot be directly estimated. On the other hand, if the factors representing forces that potentially affect many economic variables are interpreted, it is possible to infer something about the factors from observations on a range of economic time series data. For example, suppose that we have a number of informational time series, denoted by vector x_t with size *N*. The number of informational time series (*N*) is greater than *T*, the number of time periods and much greater than the number of factors ($K + M \ll N$).

Assume that the informational time series (X_t) are related to the unobservable factors (F_t) and observable factors (Y_t) by:

$$X'_t = \Delta^f F'_t + \Delta^y Y'_t + e_t{}' \qquad\qquad (2)$$

where Δ^f is a *N* x *K* matrix of factor loadings, Δ^y is a *N* x *M* matrix and $e_t{}'$ is the error vector of length *N* with zero mean and will be assumed either uncorrelated or weakly correlated, depending on the estimation method (principal components or likelihood methods). Equation (2) employs the idea that both Y_t and F_t can be generally correlated and represent pervasive forces driving the common dynamics of X_t which are thus noisy measures of the underlying unobserved factors F_t conditional on the Y_t. We estimate (1) and (2) with the help of the two-step principal component approach.

3.2. Data

The dataset in this study consists of 50 items and is provided from the IMF, World Bank, CBRT, www.tradingeconomics.com website and TURKSTAT (Turkish Statistical Institute) data sources. The data set consists of monthly data covering the period January 2005 - December 2016 and given in Appendix-1. In addition to Turkish economy data such as the TUFE index, CBRT interest rate, CBRT foreign reserves, unemployment rate and current account, consumer price index, BIST XU100 (USD,EUR), production of otomotive, world commodity price indexes such as oil, natural gas and cotton, 1 ons gold sales price, are included in the dataset.

We implemented the Augmented Dickey-Fuller Test (ADF) to the dataset in MATLAB. Level difference and logarithmic difference transformations are applied to make the dataset stationary. ADF test results and p-values after the applied transformations. Since the items in the data set are in different sizes and units, the standardization process is used before they are used in the model. After the arithmetic means is subtracted from the time series value and the difference is divided by the standard deviation, the new series average is zero and the standard deviation is one.

4.FINDINGS

In this section, crude oil prices, coal prices, natural gas prices are used to investigate the main factors affecting the current account. We present impulse response functions to examine the effects of these variables on the current balance. The magnitude of the shock value is the standard deviation of the selected variable. Plus or minus sign of the shock value determines the direction of the impulse response function according to the equilibrium point, but these responses are symmetrical to the equilibrium position. In other words, the absolute value of the reactions is the same.

4.1. International Crude Oil Prices

The IMF crude oil index POILAPSP is calculated by taking simple averages of the three spot prices (Brent, West Texas Intermediate and Dubai Fateh). Figure-2 shows the current account changes following an increase in oil prices in the FAVAR model. For Turkey, where oil is a primary import commodity, an increase in oil prices has an impact on the current balance minus. It is evident from Figure-2 that oil prices are inversely proportional to the current account deficit in Turkey. The magnitude of the effect increases for approximately 20 periods, decreases after reaching its maximum value and oscillates around an average of -0.04.

Figure 2: The Impact of One Standard Deviation Increase in International Oil Price Index on the Current Account Balance

The spread of effect size over time may be due to two factors. The first is the time lag between the spot price of petroleum and the price on the date of import (2-3 months), and the other is the time for price adjustments of imported goods, which are partly dependent on oil prices, such as natural gas. Moreover, the decrease in demand after the increase in the price of petroleum products may explain the upward movement after the 20th period.

4.2. Coal Prices

Coal Price Index data is taken from www.tradingeconomics.com website. An increase in international coal price will not affect current account deficit in the first ten periods as shown in Figure 3. One explanation for this is that local coal resources can substitute the imported coal. We see clearly from the graph that there is a time lag between an increase in international coal price and its effect the on current account. On the other hand, current account deficit grows significantly after the tenth period.

Figure 3: The Impact of One Standard Deviation Increase in Coal Prices on the Current Account Balance

Current Account after price shock (Coal Index)

4.3. Natural Gas Price

Natural gas price (Russian Natural Gas border price in Germany) data is taken from www.tradingeconomics.com website. An increase in international natural gas price will affect the current account in minus direction and after ten periods this change becomes permanent as shown in Figure 4.

Figure 4: The Impact of One Standard Deviation Increase in International Natural Gas Price on the Current Account Balance

Current Account after price shock (Natural Gas Index)
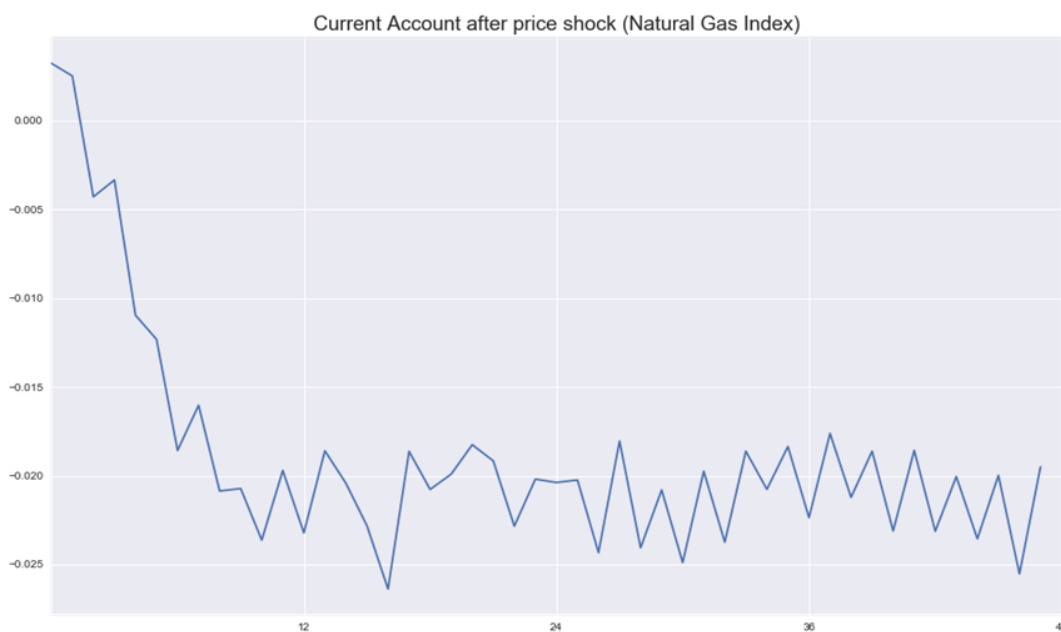
4.4. Fuel (Energy) Index, (2005 = 100), Crude oil, natural gas, and coal price indices

Fuel (Energy) index, Crude oil, natural gas, and coal price indices data is taken from www.tradingeconomics.com website. This fuel index includes primary energy resources used in Turkey. Figure 5 depicts the current balance following an increase in fuel prices in the FAVAR model. An increase in international fuel price will affect current account in minus direction as expected. There is a reversal after the period 20 followed by another reversal at 36th period indicating preference adjustments by consumers.

**Figure 5: The Impact of One Standard Deviation Increase in Fuel (Energy) Index
          (crude oil, natural gas, and coal price indices) on the Current Account Balance**
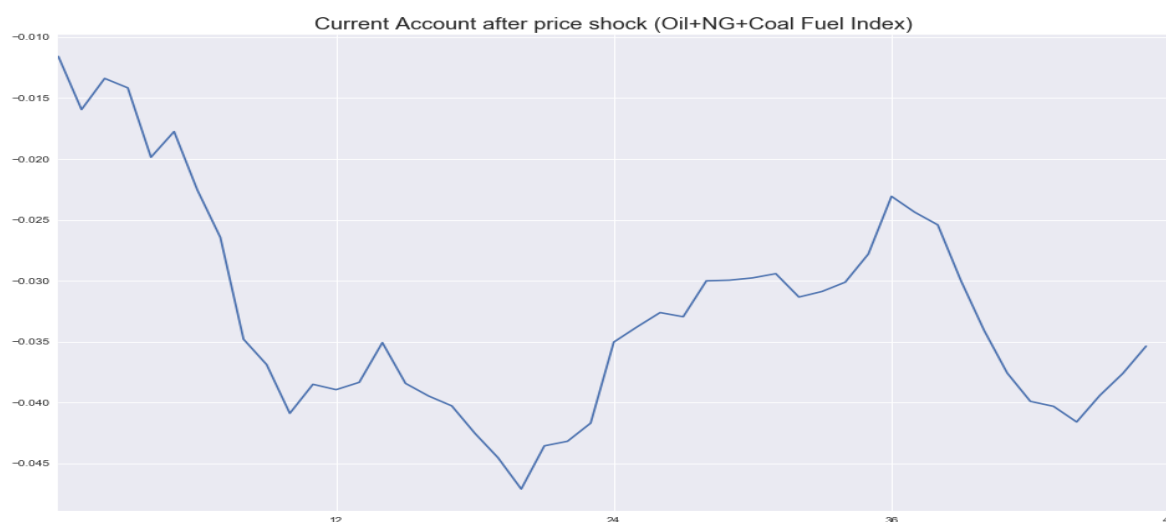
5. CONCLUSION

In this study, we investigate the impact of the crude oil prices, coal prices, natural gas prices on current account dynamics of the Turkish economy. For this purpose, a FAVAR model was used. The dataset included in the FAVAR model covers the period from January 2005 to December 2016 and consists of 50 items. In addition to data such as the consumer price index, unemployment rate and industrial production index of the Turkish economy, world commodity price indices such as crude oil, natural gas and cotton are also included in the dataset. Impulse response functions were obtained to examine different fuel prices affecting the current account dynamics. In this comprehensive study crude oil prices, coal prices, natural gas prices deteriorate current account balance. Natural gas prices gradually affect the current account. The impact is permanent after a period indicating a very limited elasticity. Oil prices have an immediate impact on the current account. Cycles, in the long run, indicate some degree of elasticity. The negative effect of coal price on the current account deficit occurs with a significant delay. We can conclude that, from all of the energy indices, the crude oil price is the most effective on the current account.

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THE EFFECT OF CORPORATE GOVERNANCE REGULATIONS IN STOCK MARKETS ON BOARD AND CAPITAL STRUCTURES OF COMPANIES: AN APPLICATION ON BORSA ISTANBUL

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ABSTRACT
Purpose- Regulators seek to intervene directly or indirectly in the management styles and financial structures of companies in order to ensure the transparent and efficient functioning of the market, as well as to protect investors. The aim of the study is to determine the effect of corporate governance regulations in stock markets on board and capital structures of the industrial companies listed on Borsa Istanbul (BIST).
Methodology- The study covers the period 2010-2014, including the period during which policy changes took place in Turkey. The sample consists of 134 companies listed in BIST Industry Index and traded continuously during this period. Non-parametric statistical tests are used for the effect of regulations on management structure, while the effect on capital structure is analyzed by panel regression analysis.
Findings- The results show that the regulations have a significant effect on establishment of an internal audit system, the inclusion of independent directors on board and board size. However, there is no statistically significant effect of the regulations on capital structures (leverage) on both pooled model and fixed effect models.
Conclusion- The evidence presented in the study suggests the necessity of the regulations and enforcements for public companies in the field of corporate governance. The results of the study are expected to shed light on not only researchers but also policy makers and regulatory bodies.

Keywords: Financial markets, financing policy, corporate governance, regulations, board size.
JEL Codes: G30, G32, G38

1. INTRODUCTION

Deepening of globalization of financial markets, trade wars and competition between countries and companies, merge and acquisitions, particularly require publicly traded companies to be more aware of the risks in this environment. Regional and global crises and corporate collapses, which have been running on since the end of the 90s, have made the necessity of the concept of corporate governance indisputable. Since stakeholders such as companies, shareholders, investors, creditors, suppliers, customers, states are more closely connected to each other than in the past, the solution of the problems is not to seek another approach to replace corporate governance. Regulatory bodies have to play a leading role and make reforms that will ensure the survival and development of an effective and transparent market by analyzing the shortcomings of corporate governance and being aware of the balance between stakeholders.

Dealing with corporate governance regulations, the issue should not be viewed only from the legal or just from financial perspective. The relationship between law and finance (La Porta et al., 1998) is multidimensional, in contrast to the traditional finance model (Modigliani & Miller, 1958) that deals with the cash flow dimension of securities. Equity securities provides its shareholders not only with capital gain or dividend, but also the right to elect board of directors and auditors and remove them and to vote on critical matters (Anderson & Gupta, 1999). Addressing this aspect, Kose & Senbet (1998) defined corporate governance as the control of various legal stakeholders over a company by making use of certain rights specified in the existing legal and regulatory frameworks as well as corporate bylaws.

There is no universally agreed-upon definition of corporate governance and excellent model that could be applied for all countries. Thus, corporate governance regulations should also be realized by taking into account factors such as the economic

structure of the country, the business culture, the structure of the financial markets and the characteristics of the labour force.

The launch of the OECD Corporate Governance Principles and the entry into force of the Sarbanes-Oxley Act in the United States have influenced many countries to establish their own corporate governance codes or principles. But, after the 2008 Global Economic Crisis, in many countries the principles generally hardened and some turned into mandates. In this way, the regulators aimed to change the corporate governance culture by including concepts such as independent members, non-executive members, committees, continuous disclosure and early detection of risk in the management styles of the companies.

The aim of this study is to determine the effect of corporate governance regulations in stock markets on board and capital structures of industrial companies listed on Borsa Istanbul. In line with trends in developed and developing countries, especially after the year 2011, major regulations were realized in the field of corporate governance in Turkey. Corporate governance principles were redefined, policy changes were made and some principles were mandated. This study analyzes the reaction of companies to these changes by examining pre and post-regulation.

While there have been numerous studies on the effects of policy changes, particularly in the economic literature, there have been not enough studies on emerging markets concerning the consequences of corporate governance arrangements. In addition, a multidisciplinary approach to the effects of legal regulations on both management and board as well as financial studies have not been found. This study aims to fill the gap in the literature in this respect.

The study is structured as follows: In the second section following this introduction part of the study, literature review and hypothesis development are presented. Section 3 includes data and methodology. In the section, before introducing the data set used in the research, information about the corporate governance environment and regulations in Turkey is described and the relationship of these regulations with established models is explained. In addition, since the research involves multiple different methods and tests, brief information about these tests is given. Section 4 presents empirical results and discussion. Section 5 concludes the study with a discussion of the contribution, limitations and recommendations for future research.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

This section consists of five sub-sections: corporate governance quality, internal audit, independent members, board structure and capital structure. Firstly, in each subsection, the related studies are reviewed the literature. Then, the issue is discussed in the context of corporate governance regulations and finally the hypotheses to be tested are presented.

2.1. Corporate Governance Quality

There is no consensus on the definition of corporate governance, so the literature contains many studies that try to define the quality of corporate governance with different approaches. The issue was discussed with the phrase "good corporate governance" in the Cadbury Report (Cadbury Commitee, 1992), which is regarded as the first set of principles on corporate governance. In the literature, the term of "well-governed" in various studies are assessed with different dimensions of corporate governance such as corporate governance rating, board effectiveness, transparency and disclosure (Bauer, Guenster, & Otten, 2004; Solomon & Solomon, 2004; Wang & Hussainey, 2013; Grosman, 2015; Abdallah & Ismail, 2017).

However, it is obvious that a firm which is effective, able to make decisions quickly and that is taking care of the rights of investors but does not have independent members on the board should not be judged as "poor quality" according to a single criteria. Or a firm that has independent members and creates the committees only because of the mandates but does not actually implement them, should not be considered as a "quality" firm in terms of corporate governance. For these reasons, it would not be right to approach corporate governance and corporate governance quality with a single dimension and a single mechanism.

In the light of these considerations it can be argued that measuring corporate governance quality at company level with well-designed indices is a good practice. There are numerous studies in the literature that attempt to measure the quality of corporate governance with indices. However, there are different approaches to this issue. The first of these are the indices conducted by researchers based on universal corporate governance principles (Black, de Carvalho, & Gorga, 2012). In the second approach, the indices are prepared by taking into account the legislation of the country where the research is conducted (Gompers, Ishii, & Metrick, 2003; Garay & González, 2008; Achim & Borlea, 2014). The third approach is to use open source indices developed by various rating agencies (such as S & P) and to follow their methodology (Khanna, Palepu, & Srinivasan, 2004; Durnev & Kim, 2005; Aksu & Kösedağ, 2006; Grosman, 2015; Arsov & Bucevska, 2017). Finally, it is seen that some researchers prefer to use the corporate governance ratings in the indices (whose content is generally known only by these institutions) created by various institutions or investment banks (Klapper & Love, 2004).

Regulatory authorities, one of the determinants of a country's corporate governance environment, are responsible for ensuring that financial markets operate transparently and effectively. Improving corporate governance quality cannot only be achieved by the efforts of the companies, but regulators allocate a trustable area for both companies and investors. In order for this to happen, the framework of corporate governance under the leadership of the state and regulatory bodies in a country needs to be established. This framework should encourage transparent and efficient markets, be consistent with the law and clearly demonstrate the division of responsibilities among the various supervisory, regulatory and enforcement authorities (OECD, 2004). In this respect, regulations may affect the quality of corporate governance (Larcker, Ormazabal, & Taylor, 2011; Martynova & Renneboog, 2011). Hence the following hypothesis is therefore tested:

Hypothesis 1: Corporate governance regulations is related with the corporate govervance quality.

2.2. Internal Audit

Having an effective internal audit system is considered as one of the most important elements of good corporate governance practice. The financial statements and annual reports of public companies are audited by independent external auditors and the results of the audits are disclosed to the public. Auditing is performed by independent auditors, why is internal audit needed? To find the answer to this question, it would be useful to review the definition of internal audit. According to the IIA's (The Institute of Internal Auditors) International Professional Practices Framework;

"*Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes*" (THEIAA, n.d.).

This definition reveals that internal audit also has functions which can not be performed by external audit such as adding value to the activities of the company, improving its activities and helping the company to achieve its objectives. Eulerich, Kremin and Wood (2019) examined the issue within the framework of agency theory, emphasized that the internal audit function is an agent of both executive management and audit committee. According to the authors, internal audit provides assurance and consultancy to these two stakeholders while providing their information needs.

Because of these functions, regulatory bodies recommend companies to establish an internal audit system (Mahzan & Yan, 2014). It has been emphasized that internal audit activity should be involved in improving the corporate governance process and contribute to ensuring accountability. Therefore, the concept of internal audit is included in international corporate governance principles (OECD, 1999, 2004, 2015) and corporate governance codes of various countries (Ntim, Opong, & Danbolt, 2012). Although the regulations do not generally require an internal audit system, the obligation of the audit committee and the fact that this committee is also responsible for the internal audit unit can be considered as a factor that will indirectly force public companies in this respect. Thus:

Hypothesis 2: Corporate governance regulations are effective for companies to establish internal audit systems.

2.3. Independent Board Members

One of the most emphasized issues regarding corporate governance at firm level in both literature and practices is the presence of independent members on boards. The need for independent members stems from the fact that the executive members are involved in the daily activities of the firm and are considered unable to protect the interests of stakeholders because they are regarded as related party. The Cadbury Report highlighted that independent members who were not exposed to less direct influence could help resolve situations such as conflict of interest (Cadbury Commitee, 1992).

In addition to preventing conflicts of interest, independent members are expected to provide companies with vision, different perspectives and support in strategy and risk management with their knowledge and experience. Corporate governance literature provides numerous studies about whether independent directors improve firm performance. Some studies concluded that the presence of independent members improves firm performance (Choi, Park, & Yo, 2007; Mura, 2007; Zhu, Ye, Tucker, & Chan, 2016). Bhagat and Bolton (2013) found a significant and positive relationship between board independence and operational performance after the Sarbanes Oxley Act. However, some studies did not find any statistical evidence that the independence of the board affects firm performance (Ferris & Yan, 2007; Johl, Kaur, & Cooper, 2015).

The debate about the need for independent members to be included in the regulations has actually been discussed for a long time. Baysinger and Butler (1985) mentioned the importance of independent board members in the board composition and emphasized that the proportion of independent managers in corporate governance reform should be a potential performance variable. Wintoki and Xi (2019) stated in their research on the cost of compliance with the regulators after the Sarbanes Oxley Act that the main purpose of the law was to directly change and regulate the board structure of the firms. The authors emphasized that this change was achieved by mandating independent board committees and by tightening the definition of independence rather than stricter listing rules. Especially in the aftermath of the 2008 Global Financial Crisis, it has become mandatory to have independent board members on boards of public companies in many countries. Hence:

Hypothesis 3: Corporate governance regulations are effective for companies to inclusion independent directors on boards.

2.4. Board Structure

Board structure has been a topic of interest not only in the field of management but also in economic theory (Fama & Jensen, 1983). The main reason for this is that the board of directors is at the central of corporate governance mechanisms in the market economies and is viewed as the primary way for shareholders to exercise control over top management (Kose & Senbet, 1998).

Different approaches can be seen in the literature regarding the board size. Monks and Minow (2004), Arora and Sharma, (2016) emphasized that more board members could provide more information, more experience and more effectiveness. There are also empirical studies supporting this approach. Acaravcı, Kandır and Zelka (2015), Johl, Kaur and Cooper (2015), Tulung and Ramdani (2018) found that board size was positively correlated with firm performance. Nevertheless, in some studies, it was found that the composition of the board is not associated with the firm value (Hermalin & Weisbach, 1991). On the other hand, there are empirical results in the literature, which found a negative and significant relationship between board size and firm value (Yermack, 1996; Kumar & Singh, 2013; Azeez, 2015)

In general, both in the corporate governance principles and regulations for listed companies, there is no recommendation or obligation regarding the size of the board of directors. The matters related to the firm's board of directors are generally regulated by the corporate laws. Corporate governance reforms, however, impose a number of requirements such as establishment of committees, board independence. All these factors may affect the structure of the board of directors of companies. Thus:

Hypothesis 4: Corporate governance regulations have an impact on the size of the board of directors.

2.5. Capital Structure

One of the most important features that differentiates the corporate governance approach from some other management theories is that it is directly related to financial issues. The fairness principle of corporate governance includes issues such as facilitating voting for all shareholders (Klapper & Love, 2004). These shareholders are the persons or groups that make up the equity in the firm's balance sheet and have rights to the assets of the firm. The transparency principle also includes accurate and timely disclosure of matters relating to the financial position of the company (including debt structure), its ownership structure and its operating results (OECD, 2004). Board accountability in the general meeting, independent audit, internal audit and internal control are the requirements of the accountability principle, where financial elements are dominant. The principle of responsibility implies that companies should take into account the interests of parties involved in the company's activities when making decisions and planning (West, 2009). These parties (stakeholders) include lenders, creditors and suppliers as well as shareholders.

When examining the relationship between corporate governance and capital structure, it is useful to consider these issues mentioned above. Board size, board independence, the presence of the internal audit system, are in fact linked to the protection of the company's assets, the avoidance of unnecessary risks of the company, and the protection of the "Balance between Debt and Total Assets" (leverage). Consequently, the quality of corporate governance mentioned in the previous subsections can be considered as a factor that carries the potential to affect the leverage.

There are different research results in the literature on the impact of corporate governance on leverage. Jiraporn et al. (2012) stated that the overall quality of corporate governance has a significant impact on critical financial decisions such as capital structure choices. The authors examined the firms reported in Institutional Shareholder Services (ISS) and found a strong inverse relationship between corporate governance and leverage. This indicates that firms with poor governance are significantly more leveraged. Nadarajah et al. (2018) examining the companies listed in the Australian Securities Exchange (ASX) also found a significant and negative relationship between corporate governance quality and leverage. This shows that having high corporate governance quality significantly reduces the leverage of firms. Detthamrong et al. (2017) who examined Thai companies investigated the relationship between corporate governance, capital structure and firm performance. The authors found that corporate governance is not associated with financial leverage and firm performance.

Corporate governance regulations for public companies are likely to have an impact not only on their board structures but also on their financing policies. Arping and Sautner (2010) investigated the impact of the Corporate Governance Code on financing policy in the Netherlands in 2004. The authors argued that reform would improve the monitoring of managers and that this would reduce the value of debt as a means of discipline. The results supported this hypothesis and showed that after the reform, the leverage ratios of Dutch firms decreased significantly. Consequently, although regulations do not foresee what the leverage of firms should be, the necessity of certain principles (risk committee, audit committee, independent member, etc.) has the potential to affect the capital structure of companies. Hence:

Hypothesis 5: Corporate governance regulations have an impact on the capital structure of companies.

3. DATA AND METHODOLOGY

This section provides information about the research examining the effects of corporate governance regulations in Turkey on the board and capital structure of public companies. Since the research covers Turkey, in the first instance the environment of corporate governance in Turkey, corporate governance codes and requirements are mentioned. Then, the scope of the research, data and methodology designed according to this legal framework are emphasized.

3.1. Corporate Governance in Turkey and Scope of the Research

After the Cadbury Report (Cadbury Commitee, 1992) and the OECD Principles of Corporate Governance (OECD, 1999), the concept of corporate governance started to be discussed in the academic and business environment in Turkey as well as in the world. However, in Turkey, the fact that the issue came up on the basis of "principle" under the name of "corporate governance" reached the end of 2002. In 2001, biggest crisis in the Turkish financial history occurred and many companies, especially banks and financial institutions, went bankrupt or collapsed. The results of this crisis revealed Turkey's need for structural reform, stricter regulations were introduced in many areas, especially banking, new regulation bodies were established or were increased the powers of the existing regulators. As for corporate governance, the first Corporate Governance Code was proposed in 2002 by the Turkish Industry and Business Association, a business non-governmental organization (TUSIAD, 2002). Based on OECD principles, this code focused more on board-related issues of publicly traded or large companies such as the board structure, board operation, CEO Duality. Although not mandating, this code laid the base for the publication of the "CMB Corporate Governance Principles" in 2003 by a regulatory body, the Capital Markets Board (CMB).

The Corporate Governance Principles, published by CMB in 2003 and updated in 2005, included not only the issues related to the board members, but also the rights of shareholders, disclosure and transparency, the function of independent audit and the rights of stakeholders (CMB, 2003, 2005). Public companies did not have to comply with these principles until 2011. However, all companies except the companies excluded from the regulations were obliged to disclose whether they comply with these published corporate governance principles. if not, they are obliged to state the reasons to the public in the annual report as "Corporate Governance Compliance Report".

Prior to the 2011 reform, Borsa Istanbul (formerly the Istanbul Stock Exchange), the regulatory body responsible for stock exchanges in Turkey, created the Corporate Governance Index (XKURY) in 2007 to encourage the managing of public companies within the framework of corporate governance principles (BIST, 2019). In order to be included in the Corporate Governance Index, public companies were required to have a Corporate Governance Report prepared by authorized and independent rating agencies and to disclose these corporate governance ratings to the public. Today, this regulation is valid, and the reports of the companies with corporate governance ratings have been announced at KAP (Public Disclosure Platform), another regulatory body.

In 2011, important reforms were made in the field of corporate governance. The Corporate Governance Communiqué, which was in force since 2005, repealed and Corporate Governance Codes were redefined. Some basic corporate governance principles were become compulsory for the listed companies. Companies were given time to make these arrangements in their articles of association at their general meetings until June 30, 2012. In 2012, 2013 and 2014, the CMB clarified certain provisions with its communiqués (CMB, 2019).

These regulations in the field of corporate governance constitute the main motivation of this study. Therefore, the study covers the period between 2010-2014 including pre-regulation and post-regulation as time periods.

To create a balanced data set and to test the hypotheses mentioned in the previous section, public companies listed continuously between 2010 and 2014 on Borsa Istanbul (BIST) are identified as the main population of the study. In order to minimize the impact of the sectoral difference, the data of listed companies in the BIST Industrial Index (XUSIN) on Borsa Istanbul are used in the research.

More detailed information about the data set and methodology is provided below.

3.2. The Data Set

In spite of the fact that the chronology of principles associated with public companies in Turkey began in 2003, the most important regulations affecting the management and financial structures of companies began in 2011 and lasted until 2014. As mentioned above, the data set is built to cover the period between 2010 and 2014. Between 2010 and 2014, there were 146 companies in the industrial sector in BIST. However, according to the BIST rules, 134 of these companies were included in the XUSIN index during this period. Therefore, the data set of this study consists of these 134 companies. The distribution of the companies covered by the research (in the XUSIN index) by sub-sectors is reported in Table 1. Accordingly, Non-Metal Mineral Product and Metal Product, Machinery sub-sectors take the first two places with 19,40%.

Table 1: Distribution of Companies by Sub-Sectors

Sub-Sectors	Number of Firms	%
Food and Beverage	18	13.43%
Textile, Leather	17	12.69%
Wood, Paper, Printing	13	9.70%
Chem, Petrol, Plastic	19	14.18%
Non-Metal Mineral Product	26	19.40%
Basic Metal	13	9.70%
Metal Products, Machinery	26	19.40%
Mining	2	1.49%
Total	**134**	**100.00%**

Note: The sub-sector classification was taken from the Public Disclosure Platform (KAP, 2019)

The total market value of the companies covered by the research is 110.7 billion TL (approximately 71.5 billion USD). Table 2 presents the frequencies of the market values. Market values are calculated based on the year-end closing values and financial statements. According to this table, 53.73% of the companies' market value is below 250 million TL (approximately 161.6 million USD).

Table 2: Distribution of Companies by Market Values

Market Value (millions of Turkish Lira)	Number of Firms	%
Less than 25	6	4.48%
25 - 50	13	9.70%
50 - 100	22	16.42%
100 - 250	31	23.13%
250 - 500	13	9.70%
500 - 750	18	13.43%
750 - 1,000	7	5.22%
1,000 - 2,500	13	9.70%
2,500 - 5,000	6	4.48%
More than 5,000	5	3.73%
Total	**134**	**100.00%**

Note: In the frequency table, the lower value represents an integer value and the upper value represents a decimal value (such as 2,499.99).This type of frequency presentation is preferred for understanding the table.

In the study two types of data are collected as financial and non-financial data. The data set consists of both cross-sectional and time series data. Financial data are obtained from Borsa Istanbul (BIST) and Public Disclosure Platform (KAP). Non-financial data are collected from official sources such as annual reports, independent audit reports and corporate governance compliance reports disclosed in KAP. In addition, disclosures (such as information on the board structure) that companies have to submit periodically to regulatory bodies and announced to the public have been utilized. Since the data set covers the years 2010-2014, this type of data collection method, which is used in many corporate governance researches in literature (Achim & Borlea, 2014; Germain, Galy, & Lee, 2014) are preferred instead of survey method.

3.3. Methodology

As mentioned earlier, the aim of this study is to determine the effects of corporate governance regulations for public companies on the management and financial structures of the companies and the methodology has been determined to serve this purpose. The effects of the regulations on the different dimensions of the management structures of the companies are examined with Cochran's Q Test, McNemar Test and Friedman Test. The determination of the impact on capital structures is analyzed by Difference-in-Differences method and panel regression analysis. SPSS and Stata programs are used in the analyzes.

The variables used in the research are listed as follows:

Corporate Governance Quality (CGQ): In Turkey, according to the regulations which is being implemented since 2007, it has been not mandatory for public companies to have a corporate governance rating. The corporate governance rating is determined only by rating companies authorized by the CMB and their compliance with corporate governance is assessed with more than 300 criteria (Saha, 2019). At the end of the rating process, the company's rating is announced to the public at KAP. This process helps both to determine the corporate governance level of the company and to address its shortcomings in the future. Therefore, in this study, the company's rating is considered as an indicator of corporate governance quality. In the study, CGQ is considered as a binary variable, the company gets 1 value (CGQ=1) if it gets a corporate governance rating, and 0 (CGQ=0) if it doesn't.

Presence of Internal Audit System (IAUD): According to the Corporate Governance Principles published in 2011 and 2012, it was mandatory for public companies to establish audit committees in their boards of directors. However, according to the legislation valid between 2010 and 2014, companies did not have to establish internal audit systems unlike the audit committee. However, the regulations indirectly recommended that companies establish internal audit systems. Therefore, in this study, establishing internal audit systems is considered as a factor that can affect the board structures of companies. In this study, IAUD is considered as a binary variable. If the company establishes an internal audit system, it gets 1 value (IAUD = 1) and if it does not, it gets 0 (IAUD = 0).

Presence of Independent Directors on the Board (IND): According to the Corporate Governance Principles published by CMB in 2003 and 2005, companies were recommended to have independent members on their boards of directors. This recommendation became mandatory in 2011 and the companies were given time until June 30, 2012 to fulfill this requirement. While some companies included independent directors on the board of directors before the obligaton, others made changes towards the end of the period. In the study, IND is considered as a binary variable, the company gets 1 value (IND=1) if the company includes independent directors on the board, and 0 (IND=0) if it doesn't.

Board Size (BSIZE): Making certain corporate governance principles mandatory for public companies is likely to change the board structures of companies that are not ready for regulation. On those grounds, in the study the companies' board size before and after the regulation are compared and they are analyzed whether there is a significant difference. BSIZE variable represents the number of board members.

Capital Structure (BLEV): The capital structure is represented by book leverage and is expressed in the following equation (1):

$$BLEV = \frac{Short\ term\ debt + Long\ term\ debt}{Total\ assets} \qquad (1)$$

POST: Post is dummy variable indicating whether the period is post-reform. In the pre-reform period (2010 and 2011), the value of 0 is taken as 1 in the post-reform period.

TREAT: Treat is a dummy variable used in the Diffrence-in-Differences method to separate the control and treatment groups. The variable gets 1 if the company is in the treatment group and 0 when it is in the control group.

TREATXPOST: This dummy variable is used in Diffrence-in-Differences estimation. It expresses the product of TREAT variable and POST variable (TREAT x POST).

Firm Size (LNSIZE): Control variable. Firm size is represented by the natural logarithm of total assets. Firm size, as in this study, is included in the analysis as control variable in many studies in the literature (Yermack, 1996; Larcker, Ormazabal, & Taylor, 2011; Tulung & Ramdani, 2018).

Liquidity (LIQD): Control variable. Liquidity is represented by the ratio of current assets to current liabilities and is expressed by the following equation (2):

$$LIQD = \frac{Current\ Assets}{Current\ Liabilities} \qquad (2)$$

Fixed Assets to Total Assets (FIXED): Control variable that is represented by the ratio of fixed assets to total assets and is expressed by the following equation (3):

$$FIXED = \frac{Fixed\ Assets}{Total\ Assets} \qquad (3)$$

In the study, the hypotheses mentioned in Section 2 are tested with the following tests:

Cochran's Q Test: Cochran's Q test is used to test Hypothesis 1, Hypothesis 2 and Hypothesis 3 in this study. Cochran's Q test is a non-parametric test used to determine whether there are differences in frequency or proportions between more than two dependent groups. Dependence may be the same individual's views on different issues, or the same individual's responses at different times. The most important characteristic that distinguishes this test from other paired group tests is that the result of each variable must be only 1 or 0 (dichotomous variable).

The matrix form of Cochran's Q test can be expressed as: (Lou & Fu, 2007):

$$X = \begin{pmatrix} X_{11} & X_{12} & \cdots & X_{1b} \\ X_{21} & X_{22} & \cdots & X_{2b} \\ \vdots & \vdots & X_{ij} & \vdots \\ X_{K1} & X_{K2} & \cdots & X_{Kb} \end{pmatrix}$$

where $X_{ij} \in \{0,1\}$ is the dichotomous response for the i_{th} treatment in the j_{th} block .

For dichotomous responses in k matched group, the Cochran's Q test statistic is computed. Cochran (1950) found that for large samples, Q statistic is distributed as chi-square with k–1 degrees of freedom.

The null hypothesis of Cochran's Q test is developed as follows:

H_o: The proportion (Π) of "successes (1)" is the same in all k groups

H_o: $\Pi_0 = \Pi_1 = ... = \Pi_k$

versus the alternative is that the proportion is different in at least one of k groups

H_A: $\Pi_a \neq \Pi_b$, a ≠ b and a ≥ 1, b ≤ k

McNemar Test: In this study, the McNemar test is used to find significant differences between the paired groups if the null hypothesis of Cochran's Q test in Hypothesis 1, Hypothesis 2 and Hypothesis 3 is rejected ($\Pi a \neq \Pi b$). The McNemar test is a non-parametric test comparing the distributions of two related groups when the dependent variable is dichotomous (Fleiss, Levin, & Paik, 2003). This test consists of just two groups, as before-after or as success-failure, as in Cochran's Q test.

McNemar test statistic is calculated by the following formula (4): (Sheskin, 2000; Fleiss, Levin, & Paik, 2003)

$$\chi^2 = \frac{(n_{12} - n_{21})^2}{n_{12} + n_{21}} \tag{4}$$

where $n_{ij} \in \{0,1\}$ is the dichotomous response for the i_{th} treatment in the j_{th} block .

The null hypothesis of McNemar test is developed as follows:

H_o: The proportion (Π) of "successes (1)" is the same in all two groups

H_o: $\Pi_0 = \Pi_1$

versus the alternative is that the proportion is different in two groups

H_A: $\Pi_0 \neq \Pi_1$

Friedman Test (Friedman two-way analysis of variance by ranks): In the study, Friedman test is used to test Hypothesis 4. Friedman test is used to test whether there is a significant difference between distributions by comparing the distributions of two or more related (dependent) variables. Friedman test has a similar matrix structure as given in Cochran's Q test above. However, unlike the Cochran's Q test, the Friedman test is used when the results are not dichotomous.

Friedman test statistic is calculated by the following formula (5) (Sheskin, 2000):

$$\chi_r^2 = \frac{12}{nk(k+1)} \left[\sum_{j=1}^{k} (\Sigma R_j)^2 \right] - 3n(k+1) \tag{5}$$

Where

k = number of groups (conditions)

n = number of subjects

R = sum of the ranks

The null hypothesis of Friedman test is developed as follows:

H_o: There no difference between the k groups medians

H_o: $\theta_1 = \theta_2 = ... \theta_k$

versus the alternative is that the median is different in at least one of k groups

H_A: $\theta_a \neq \theta_b$, a ≠ b and a ≥ 1, b ≤ k

Wilcoxon Test (Wilcoxon signed-rank test): In this study, Wilcoxon test is used to find significant differences between the paired groups in case the null hypothesis of Friedman test is rejected in Hypothesis 4. Since the Wilcoxon test is widely used, it is not mentioned in details.

Difference-in-Difference Estimation (DID): DID estimation is used to test Hypothesis 5 in the study. Differences-in-differences is simple panel-data method applied to sets of group means in cases when certain groups are exposed to the causing variable of interest and others are not and this approach is well-suited to estimating the effect of sharp changes in the economic environment or changes in government policy (Angrist & Krueger, 1999). Since this study also examines the effect of corporate governance regulations on capital structures of companies, the DID method is suitable for testing Hypothesis 5 in this respect.

The main regression model used in the research is formed as follows as used in the study by Arping and Sautner (2010):

$$BLEV_{it} = \alpha + \beta_1 x\, POST + \beta_2\, x\, TREAT_i\, x\, POST_i + Controls + \vartheta_i + u_{it} \tag{6}$$

The capital structure is represented by the book leverage (BLEV) as dependent variable. POST variable covers the post-reform period as mentioned above, taking the value "1" for 2012 and 2013 and "0" for 2010 and 2011. TREAT variable is used to separate companies in control and treatment groups. However, unlike in the study Arping and Sautner (2010) , the IAUD variable is used here when determining treatment group companies. In other words, , the companies that have the internal audit system in 2010 are taken into the treatment group and those that do not have it into the control group.

In econometric analysis, the time dimension (T) remains short as a consequence of the difference-in-differences method (pre-post). Therefore, considering the solutions proposed by Torres-Reyna (2007), standard errors are heteroskedasticity robusted.

In the next section, the findings are presented and discussed.

4. FINDINGS AND DISCUSSIONS

As stated before, there wasn't any obligation about that listed companies in Turkey comply with the corporate governance codes issued by the CMB in the period 2003-2011. On the other hand, companies were mandated to disclose whether or not to comply with these codes in the Corporate Governance Compliance Report. Table 3 displays the number of companies which disclosed the Report between 2010 and 2014. The results indicate that most of the companies disclosed the Report to the public.

Table 3: Corporate Governance Compliance Report Disclosure Frequency Distribution

Years	N	Report Disclosed	Report not Disclosed	%
2010	134	125	9	93.28%
2011	134	127	7	94.78%
2012	134	132	2	98.51%
2013	134	131	3	97.76%
2014	134	131	3	97.76%

Cochran's Q test results for the impact of regulations on general corporate governance quality are reported in Table 4. CGQ_0 refers to the quality of corporate governance pre-regulation, and CGQ_1-CGQ_4 refers to the post-regulation. Cochran's Q test results indicate that Hypothesis 1 is supported. The results show that the impact of corporate governance regulations in Turkey on general corporate governance quality is statistically significant between 2010 and 2014. McNemar test reported in Table 5 is used to test the periods in which this effect is significant. McNemar test results show that the effect is only statistically significant between CGQ_0-CGQ_3, CGQ_0-CGQ_4 and CGQ_1-CGQ_4, but is insignificant between other periods. It can be concluded that the positive impact of the policy change on the corporate governance quality will not be in such a short period of 1 or 2 years.

Table 4: Cochran's Q Test Results (CGQ)

Variables	N	Cochran's Q	df	Asymp. Sig.
CGQ_0, CGQ_1, CGQ_2, CGQ_3, CGQ_4	134	16.7500	4	**0.0022 *****

Note: *, **, and *** indicate significance at 10%, 5%, and 1% levels

Table 5: McNemar Test Results (CGQ)

Variables	N	McNemar's $Chi^2(1)$	Exact Sig. (2 tailed)
CGQ_0 - CGQ_1	134	1.00	1.0000
CGQ_0 - CGQ_2	134	2.00	0.5000
CGQ_0 - CGQ_3	134	5.00	**0.0630 ***
CGQ_0 - CGQ_4	134	6.00	**0.0310 ****
CGQ_1 - CGQ_2	134	1.00	1.0000
CGQ_1 - CGQ_3	134	4.00	0.1250
CGQ_1 - CGQ_4	134	5.00	**0.0630 ***
CGQ_2 - CGQ_3	134	3.00	0.2500
CGQ_2 - CGQ_4	134	4.00	0.1250
CGQ_3 - CGQ_4	134	1.00	1.0000

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

Table 6 presents Cochran's Q test results for the impact of regulations on companies' establishing an internal audit system (IAUD). The results show that the null hypothesis that the regulations has no effect on establishing an internal audit system was strongly rejected. In Table 7, analyzing by McNemar Test it is determined between which two periods this effect are statistically significant. Unlike the results in Table 5, the results are statistically significant in all 9 remaining periods except for the period between 2010-2011. The reason for this can be explained as:

Under legislation in force in 2010-2014, companies were not required to establish internal audit systems. However, with the 2011 communiqué, it was made mandatory for public companies to establish audit committees in their boards of directors. Among the duties of the Audit Committee were to monitor the internal audit and internal control system. Although the regulations did not make the internal audit system mandatory, the requirement to establish an Audit Committee could prompt companies to establish an internal audit system. This can also explaine by the fact that $IAUD_0$-$IAUD_1$ are not statistically significant. In summary, both the Cochran's Q test and the subsequent McNemar test show that Hypothesis 2 is supported.

Table 6: Cochran's Q Test Results (IAUD)

Variables	N	Cochran's Q	df	Asymp. Sig.
$IAUD_0$, $IAUD_1$, $IAUD_2$, $IAUD_3$, $IAUD_4$	134	68.7540	4	**0.0000 *****

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

Table 7: McNemar Test Results (IAUD)

Variables	N	McNemar's Chi^2(1)	Exact Sig. (2 tailed)
$IAUD_0$ - $IAUD_1$	134	1.00	0.5078
$IAUD_0$ - $IAUD_2$	134	10.80	0.0014 ***
$IAUD_0$ - $IAUD_3$	134	19.70	0.0000 ***
$IAUD_0$ - $IAUD_4$	134	26.56	0.0000 ***
$IAUD_1$ - $IAUD_2$	134	9.78	0.0026 ***
$IAUD_1$ - $IAUD_3$	134	18.00	0.0000 ***
$IAUD_1$ - $IAUD_4$	134	23.68	0.0000 ***
$IAUD_2$ - $IAUD_3$	134	7.36	0.0117 **
$IAUD_2$ - $IAUD_4$	134	13.24	0.0003 ***
$IAUD_3$ - $IAUD_4$	134	6.00	0.0313 **

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

The third hypothesis of this research is the effect of regulations on the presence of independent members in the boards of directors of companies. Table 8 shows presence of independent directors between 2010 and 2014. In 2010 only 14.18% of companies had independent members on their boards. This rate increased to 18.66% in 2011. At the end of 2011, two regulations were made. These regulations were about that public companies had to include independent members on their boards. For this reason, 98.51% of the companies in 2012 and in 2013 and 2014 all had independent members on the board of directors.

Table 8: Presence of Independent Directors on the Board

Variables	N	Frequencies		%	
		Value = 0	Value = 1	Value = 0	Value = 1
IND0	134	115	19	85.82%	14.18%
IND1	134	109	25	81.34%	18.66%
IND2	134	2	132	1.49%	98.51%
IND3	134	0	134	0.00%	100.00%
IND4	134	0	134	0.00%	100.00%

Table 9 reports the results of Cochran's Q test for the effect of the regulations on having independent members on board of directors (IND). Due to the requirement of independent members in 2012, the time period is taken as 3 years to cover 2010-2012 instead of 5 years. It is not surprising that hypothesis 3 is supported, but the more striking result is given in the McNemar test in Table 10, which shows paired comparisons. The table indicates that statistically significant results are obtained in all three periods examined. Examining Table 8 and Table 10 together, it is seen that the majority of companies wait the requirement date (June 30, 2012) to include independent members on their boards of directors.

Table 9: Cochran's Q Test Results (IND)

Variables	N	Cochran's Q	df	Asymp. Sig.
IND_0, IND_1, IND_2	134	214.6370	2	0.0000 ***

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

Table 10: McNemar Test Results (IND)

Variables	N	McNemar's Chi^2(1)	Exact Sig. (2 tailed)
IND_0 - IND_1	134	6.00	0.0313 **
IND_0 - IND_2	134	113.00	0.0000 ***
IND_1 - IND_2	134	107.00	0.0000 ***

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

The regulations require companies to have independent members on their boards of directors (Table 9 and Table 10), as well as to form an Audit Committee. This,- though not required-, leads companies to establish an internal audit system (Table 6 and Table 7). Do these requirements have an impact on the structure of the board of directors? Did the companies change the number of board members as they have to include independent board members on the board of directors? Or did they exclude some of the existing members from the board and choose independent members instead? In Hypothesis 4, the answer to these questions is actually sought. Table 11 shows the results of Friedman Test for this hypothesis.

Table 11: Friedman Test Results (BSIZE)

	Model 1			Model 2			Model 3		
Variables	N	Chi²	Asmp.Sig	N	Chi²	Asmp.Sig	N	Chi²	Asmp.Sig
$BSIZE_0$, $BSIZE_1$, $BSIZE_2$	134	75.6944	**0.0000 *****	34	23.2340	**0.0000 *****	34	14.0000	**0.0009 *****

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

In Table 11, three different models are formed. In Model 1, all companies are included in the model. The Friedman test rejects the null hypothesis that regulations do not have an impact on board size. Therefore, the effect of corporate governance regulations on the structure of the board is statistically significant. In Model 2, Hypothesis 4 is tested on 34 companies with the highest market value (Quartile 1) and on Model 3 with 34 companies with the lowest market value (Quartile 3). The results are statistically significant in both models.

Table 12 reports the results of the Wilcoxon test, which compares the results in pairs. The results were statistically significant in all three models with $BSIZE_2$ variable. When Table 11 and Table 12 are examined together, it is seen that public companies took action not in the year in which the regulations were made, but in the year in which the regulations came into force. The results in Table 12 show that large companies (with market value) are more affected by regulations than small firms (Model 2). That is; the regulation (mandate) for independent directors, especially in 2012, resulted in increasing the number of board members in the majority of large companies. 22 of the 34 companies expanded their board of directors when compared to the pre-regulation period. It is noteworthy that in companies with low market value (Model 3), there was almost no action ($BSIZE_1$-$BSIZE_0$) until the date when the regulation came into force.

Table 12: Wilcoxon Test Results (BSIZE)

Model 1						
Variables	N	Negative Ranks	Positive Ranks	Ties	Z statistics	Asymp. Sig. (2-tailed)
$BSIZE_1$ - $BSIZE_0$	134	12	7	115	-0,972	0.3311
$BSIZE_2$ - $BSIZE_0$	134	16	71	47	-6,974	**0.0000 *****
$BSIZE_2$ - $BSIZE_1$	134	12	77	45	-7,354	**0.0000 *****

Model 2						
$BSIZE_1$ - $BSIZE_0$	34	5	3	26	-0,073	0.9416
$BSIZE_2$ - $BSIZE_0$	34	4	22	8	-3,985	**0.0001 *****
$BSIZE_2$ - $BSIZE_1$	34	5	25	4	-3,816	**0.0001 *****

Model 3						
$BSIZE_1$ - $BSIZE_0$	34	1	0	33	-1,000	0.3173
$BSIZE_2$ - $BSIZE_0$	34	4	15	15	-3,272	**0.0011 *****
$BSIZE_2$ - $BSIZE_1$	34	3	15	16	-3,370	**0.0008 *****

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

Table 13: Univariate Analysis (BLEV)

BLEV	Treatment Group (Mean)	Control Group (Mean)	Difference (Treatment - Control)
Pre Mandatory	0.4398	0.4659	-0.0261
Post Mandatory	0.4794	0.4645	0.0149
			Difference-in-differences
Difference (Post - Pre)	0.0396	-0.0014	0.0410

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels

In this study, the effect of corporate governance regulations on financial leverage of companies is analyzed by Difference-in-Difference method. The financial leverage of the companies are examined in two separate periods, before the regulations came into force (2010-2011) and after (2012-2013). In addition, companies are divided into two groups as treatment and control group on the basis of the difference-in-difference method. Prior to the regulation, the companies that established an internal audit system in 2010 (46 companies) constitute the treatment group and the companies that did not (88 companies) constitute the control group. Table 13 shows the results of univariate analysis. Before the regulation, the average leverage of the treatment group companies increased from 0.4398 to 0.4794 after the regulation. In the control group, the leverage was 0.4659 before the regulation and decreased to 0.4645 after the regulation. There were no statistically significant differences in both pre-post (regulation) and treatment-control differences.

Table 14 shows the regression results. In econometric analysis, the time dimension T is short due to the application of the difference-in-differences method (pre-post). Therefore, taking into consideration the solutions proposed by (Torres-Reyna, 2007), heteroskedasticity robusted standard errors is performed. Following the approach by Arping and Sautner (2010) both pooled and fixed effect regressions are applied. Model 4, Model 5 and Model 6 provide pooled regression results. Model 7, Model 8 and Model 9 indicate the fixed effect panel regression analysis. In all models, the dependent variable is BLEV (Book Leverage), covering the period 2010-2013 (536 firm-year data). Prob. (F-statistic) values indicate that all models are significant.

In Model 4 and Model 7, only control variables are included in the regression equation. In both models, the LIQD variable is significant and negative with BLEV. LNSIZE (natural logarithm of total assets) is not significant in Model 4 (pooled regression) and significant and positive in Model 7 (fixed effect). The FIXED variable (Fixed Assets/Total Assets) is significant and negative in Model 4 and statistically insignificant in Model 7.

Table 14: Difference-in-Differences Regression Results

Dependent Variable: BLEV

Independent Variables	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
TREATXPOST			0.2630			0.0110 **
			(1.12)			(2.56)
POST		0.7010	0.7850		0.5500	0.1720
		(0.38)	(-0.27)		(-0.60)	(-1.72)
LNSIZE	0.1560	0.1520	0.1910	0.0230 **	0.0450 **	0.0420 **
	(-1.42)	(-1.44)	(-1.31)	(2.31)	(2.02)	(2.05)
LIQD	0.0000 ***	0.0000 ***	0.0000 ***	0.0810 *	0.0780 *	0.0660 *
	(-3.87)	(-3.87)	(-3.87)	(-1.76)	(-1.78)	(-1.86)
FIXED	0.0000 ***	0.0000 ***	0.0000 ***	0.9770	0.9680	0.8040
	(-4.22)	(-4.21)	(-4.17)	(0.03)	(0.04)	(-0.25)
TREAT			0.3630			
			(-0.91)			
Obs.	536	536	536	536	536	536
R-sq	0.3324	0.3326	0.3339	0.0926	0.0946	0.1114
Prob (F-statistic)	0.0000 ***	0.0000 ***	0.0000***	0.0349 **	0.0660 *	0.0011***

Note: *, **, and *** indicate significance levels at 10%, 5%, and 1% levels. T-statistics are reported in paranthesis.

In Model 5, POST variable is added to pooled regression equation. The POST variable is 0 for pre-regulation period and 1 for post-regulation period. The addition of the POST variable in this model is not lead to a significant relationship on BLEV. Adding the POST variable in the fixed effect method in Model 8 gives similar results.

In Model 6, the Difference-in-Difference Method is applied in pooled regression, and all independent and control variables are added to the equation. It is observed that the POST variable does not have a significant effect on BLEV.

According to the results of analysis which are summarized in Tablo 14, the Model 9 is determined as having the best explanatory variables for explaining relationship between regulations and capital structure. In this context Difference-in-Differences panel regression equation is as follows (7):

$$BLEV_{it} = \alpha + \beta_1 \; x \; POST + \beta_2 \; x \; TREAT_i \; x \; POST_i + \beta_3 \; x \; LNSIZE_{it} + \beta_4 \; x \; LIQD_{it} + \beta_5 \; x \; FIXED_{it} + \vartheta_i + u_{it} \qquad (7)$$

In this model, although the TREATXPOST variable has a significant and positive relationship with BLEV, it is seen that the POST variable does not have a significant relationship with BLEV. It can be concluded from here that the leverages of the companies in the treatment group tend to increase after the regulations. However, what is sought in this regression equation is that the regulations will affect the leverage of the companies, which is not supported. Therefore Hypothesis 5 is rejected. This result is consistent with the results of the univariate analysis in Table 13, but does not support the results found by Arping and Sautner (2010).

Model 9 also provides important results in terms of control variables. Regression results show that larger companies can have more debt in capital structures and have the ability to regulate their capital structures accordingly. This result in the context of firm size is consistent with the result found by Arping and Sautner (2010). However, this study reveals that liquidity of companies has a negative impact on leverages.

5. CONCLUSION

In financial markets, regulatory bodies are responsible for the safe, effective and stable functioning and development of markets. In the context of corporate governance, the establishment of a transparent and accountable environment and the protection of the rights and interests of investors are added. As an important actor of the corporate governance environment, regulators are taking precautions to prevent the dominating shareholders, investors and creditors from seizing their rights and interests.

It is expected that the management of companies in a holistic approach within the framework of corporate governance, being fair, transparent, accountable and responsible will provide financial and non-financial benefits not only to their stakeholders but also to the company itself. However, this theoretical point of view does not always occur in practice, and may cause that those who control or manage the company may use the company's resources to their interests. Practices such as presence of independent and non-executive members, committees, increasing transparency, and electronic general meeting systems stem from the consequences of potential conflict of interest. Corporate governance regulations try to intervene indirectly in companies and their management. However, the effect of these interventions is not always clear. All these uncertainties formed the main motivation for this study.

The purpose of this study is to determine whether corporate governance regulations have an impact on the board and capital structures of companies listed on Borsa Istanbul (BIST). The study consists of 134 companies listed in BIST Industry Index between 2010-2014. After 2011, Turkey changed its governance policy and made structural reforms in the field of corporate governance. Some basic principles such as independence criteria, independent members, audit, risk and board committees were mandatory. The study analyzes whether these regulations are effective in general.

All data used in the study were obtained from publicly available sources such as annual report, corporate governance compliance report, independent audit report and financial statements submitted by the companies to regulatory bodies. Tests for non-financial variables are analyzed using non-parametric statistical methods (Cochran's Q, McNemar, Friedman and Wilcoxon tests). The effect of regulations on capital structure is analyzed by creating an econometric model.

In the study, starting with the effect of regulations on general corporate governance quality is investigated. The quality of corporate governance is considered as an element that may affect the management structure. Cochran's Q test results indicate a statistically significant difference on general corporate governance quality after regulation compared to before. The McNemar test after this test points out that the effect of the regulations is reflected minimum after three years. This result can be interpreted as the positive effect of the policy change on the quality of corporate governance will not be as short as 1 or 2 years.

Legislation in Turkey does not require companies to establish an internal audit system. However, the reform in 2011 mandated companies to establish an audit committee until June 2012. Second, this study investigate whether reform could

affect companies in establishing internal audit systems. Both Cochran's Q test and McNemar test indicate that corporate governance regulations have an impact on public companies establish internal audit systems. These results point out that the requirement of the audit committee to drive companies to set up an internal audit system.

Thirdly, it is examined whether the requirement for independent members has been fulfilled. The expected result was that companies comply with the regulations, which is also statistically proven by Cochran's Q test. Besides, the main objective is to examine the pre-regulatory actions of the companies. The principle that companies had independent members on their boards had been included to the CMD Corporate Governance Code since 2003, but compliance was voluntary. Analysis results indicate that a significant proportion of companies (about 81 %) waited to elect independent members until 2012 when the regulation would enter into force.

Fourth, in this study, effect of corporate governance regulations on board structures of companies are investigated by three models. The number of members of the board represents the management structure. Friedman test results show that the effect of corporate governance regulations on the structure of the board is statistically significant in all three models. After the Wilcoxon test, this significance is confirmed, but it is seen that the companies acted not in the year of the regulations, but in the year in which the regulations regarding the independent member came into force. This finding, together with the previous result, is actually the key point of the study and shows why mandates are essential.

Finally, the effect of the regulations on the capital structures of the companies is investigated with panel data analysis. Book leverage is a dependent variable representing the capital structure. In both the pooled regression method and fixed effect method, it is determined that the corporate governance regulations entered into force in 2012 did not affect the leverage of the companies. This analysis also provides important results in terms of control variables. The results of the regression show that larger companies can use more credit and have the opportunity to regulate their capital structures accordingly. This result is consistent with the result founded by Arping and Sautner (2010). On the other hand, the study shows that liquidity reduces book leverage of public companies.

When the study is examined as a whole, it points to the necessity of the regulations and enforcements for public companies in the field of corporate governance. In the years when regulations are loose and in countries with weak legal protection, investors are at risk of being exploited by dominant shareholders. However, as much as enacting laws, their enforcement, monitoring and sanctions are also important. It is recommended to regulatory bodies to concentrate more on these critical issues.

This study has important contributions to both literature and policy makers. In spite of the fact that many studies in the literature are reported on the effects of regulations in developed countries (such as SOX), there are not enough studies on the results of corporate governance regulations for emerging markets. Furthermore, no study has found in the literature that examines the effect of regulations on both management and board and financial aspects. This study is expected to fill the gap in the literature in this respect. Nonetheless, the most important limitation is that the study only covers Turkey and the industrial companies in Turkey. Thus, the results should not be generalized. It is recommended that those who study on this issue in the future should be extended to more developing countries.

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A DIFFERENT APPROACH TO THE RELATION BETWEEN IMPORTS AND INFLATION FOR TURKEY: DUTCH DISEASE ILLUSTRATION

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ABSTRACT
Purpose - The adverse circumstances which have been experienced in Turkey's economy recently are attributed to different justifications. One of these is the case defined as 'Dutch Disease' in literature. Dutch disease is an economic term for the negative consequences that can arise from a spike in the value of a nation's currency. Within this context, it has been desired to test the validity of 'Dutch Disease' in Turkey's economy for the 2002-2018 period. The case that there is no research which is put forward recently or made with a similar method makes the study different from the others.
Methodology - In the study, it is used the annual data belonging to the variables of Consumer Price Inflation (CPI) and Imports between the years 2003-2018. Empirical analysis has been executed by using SPSS (22) Pearson's Test technique and Regression Analysis.
Findings- According to the obtained findings, contrary to what is alleged, there is no connection of the adverse circumstances which have been experienced in Turkey's economy recently to 'Dutch Disease'.
Conclusion- For the Dutch Disease to be able to occur, the currency used as medium of exchange is required to be convertible. Because the national currencies of the developing countries such as Turkey are not convertible, the national currency appreciates only within the boundaries of the country. The decrease of the production in Turkey is associated with imports not becoming cheaper but on the contrary becoming more expensive.

Keywords: Turkey, Dutch disease, SPSS Pearson's test, regression analysis.
JEL Codes: C18, E20, E40

1. INTRODUCTION

When the national currency loses in value, the prices of exports cheap and imports become more expensive. If the national currency increases in value, the reverse situation. Namely, imports become cheaper and exports become more expensive. Imports becoming cheaper in that way can especially attract the attention of domestic manufacturers. In such cases, the manufacturers tend towards purchasing cheaper ready stock from abroad rather than taking the risk of production. It is a fact known by almost everyone that importers need foreign currency to be able to import. In an economy where the national currency increases in value, the entrepreneurs who can obtain the opportunity to be able to buy more foreign currency at every turn with the savings in their hands make contribution to nation's money supply on one hand and restrict foreign exchange supply on.

Besides, this also means that the exportation incomes will decrease after exports becoming more expensive. The foreign exchange bottle-neck can occur by the importer's hand on one side and the exporter's hand on the other side. In other

words, this situation which means the loss in value of national currency might be a cause for the phenomenon of inflation (Altınok and Çetinkaya, 2003:55).

The notion 'Dutch Disease' was used for the first time in 1960s after Holland discovered such huge natural gas sources in the North Sea that the competition was affected negatively (Yiğit, 2001:2). After the discovery of natural gas sources, Holland's national currency gained value (Weijermars and Luthi, 2011:3-14). Therefore, Holland lost its competitive power; while public sector develops, the profitability of secondary sector decreases and the production resources are directed to service sector. All these cause the industrialization to regress (Adenauer and Vagassky, 1998:177-185). Similar conditions were experienced in 1970s when the crude oil price increased significantly in Great Britain. The effect of this progress led to England becoming a clear petroleum exporter and therefore British Pound gained value. The argument whether 'Dutch Disease' is a notion which is required to be taken into consideration just by countries or a form of progress is still ongoing (Nchor, et al. 2015:2035).

We can identify the three paradigmatic conditions of the prevalence of Dutch Disease: the discovery of natural sources which benefits from Ricardian rentals taking place in a poor country and damages to the industrialisation of this country; the same discovery which causes to the period of industrialisation and leads to not to be neutralized in a rich country; and eventually, both commercial and financial radical liberalization of country's external accounts; and this leads to leave the policies which neutralise Dutch Disease and early industrialisation (Brahmbhatt, et al. 2010: 1-7). The first case is the situation of Arabia, Venezuela and other poor countries; the second is the situation of Holland and the United Kingdom; the third one is seen in Brazil, Argentine and Mexico. The first case exists every time and Indus prevents (Pereira, 2013:378).

There were lots of precautions to be implemented for some structural reforms as part of Transition to the Strong Economy Program recommended by IMF after 2001 crisis in Turkey (Değirmen, 2008:134). Among these precautions were principles such as restructuring of the banks and general finance sector, establishing of BRSA (Banking Regulation and Establishing Supervision Agency) and renewing the financial sector's place at the top (Kesebir, 2018: 1-19). Thereafter, the expenses have decreased and the issue of taxable losses was solved and therefore, the budget deficit has been reduced with the purpose of providing the fiscal discipline of public sector (Okutan, 2015:1162). When the budget deficits reduced, public borrowing reduced and inflation and interest rates started to decrease. In this period, the value of TL has increased (Karagöl and Erdoğan, 2017: 367). Afterwards, the negotiations of full membership with the European Union have been started and six zero from the currency unit has been removed. Therefore, the entrance of foreign exchanges to Turkey has accelerated by increasing the trust on TL. As a result of these developments, TL has extremely gained value in comparison to foreign currency units. The extreme value of TL has encouraged imports and restricted exports. A great deal of industrialists has left the manufacturing and become importer. Everywhere has gotten full with cheap imported goods (Eğilmez, 2019).

The developments which have been seen in Turkey's economy in this period are likened to 'Dutch Disease'. The improvements which were realized in the economy previously and the revaluation of national currency and thereafter the rise of the inflation to double-digits and the increase of imports have been effective for this metaphor. *In the light of all these facts mentioned, a study is made with the purpose of replying to the question "Is there Dutch Disease in Turkey's economy?"* For this, the annual data belonging to the variables of Consumer Price Index (CPI) and Imports between the years 2003-2018 is used. Empirical analysis has been executed by using SPSS (22) Pearson's Test technique. The data belonging to the study are taken from the sources Turkish Statistical Institute (TSI) and the Central Bank of the Republic of Turkey (CBRT).

The article main parts are the abstract, introduction, method, results, discussion, and references. The introduction consists of an opening that presents the research question, a literature review that describes previous research on the topic, and a closing that restates the research question and comments on the method.

2. THEORETICAL FRAMEWORK OF THE RELATION BETWEEN THE VALUE OF NATIONAL CURRENCY AND INFLATION IN TURKEY

Inflation rates are an indicator whether the national currency increases in value, because there is an inverse proportion between these two variables. According to this, rising of the inflation rates means the depreciation of national currency; declining of the inflation rates means the appreciation of national currency (Rojas-Suarez, 1992; Savastano, 1996; Ramirez-Rojas, 1985:629). Considering this fact, in the study, the value of Turkish Lira is evaluated based on the inflation rates. The depreciation of national currency means the purchase of fewer goods and services with more amount of money; so, this situation is stated as the phenomenon of inflation in literature.

In literature, Irving Fisher, the famous economist, explains the relation between the inflation and the value of national currency with the equation of Quantity Theory of Money. Irving Fisher, American economist, gives place to his theory in his book named "The Purchasing Power of Money" (Fisher,1911).

The equation expressed as Fisher's Quantity Theory is as follows;

$M.V + M'.V = P.T$

Here;
M: The amount of money in circulation,
V: the circulation speed of the money, M ': the amount of the bank money,
V: Circulation rate of the bank money, P: General level of prices,
T: Indicates the process volume.

According to Fisher, the variables V and T in his equation are fixed and don't change during a certain period. Nevertheless, the amount of M (Money Supply) which takes place in equation might change. Depending on the change of M, P which is on the right side of the equation and is defined as general level of prices will change in the same direction. In such a case, the increases in the amount of money will directly lead to rise of the general level of prices and the depreciation of money (Fisher, 1911:87-88).

The inflation which became chronic in Turkey's economy till 2000s has gradually declined to one-digit numbers after 2002 with the "Transition to the Strong Economy Program" after the crises of November 2000 and February 2001 (Taşar, 2010:94-95). It is surely beyond doubt that the contribution of both internal and external factors in the success of this program is significant. Including this period, domestically, the country which was ruled by coalitions for many years has attained a single-power stability in the sense of ruling. In the same period, abroad, the positive economic conditions which have been seen globally have a significant contribution in the stability attained.

The strategy of "inflation targeting" has been used as the tool of monetary policy in fighting against inflation since 2002. Within this framework, the implicit inflation targeting was executed between the years 2002-2005, and the open economy inflation targeting has been executed since 2006 (Durmuş, 2018:181). In the first four years of inflation targeting, inflation realizations stayed under the determined inflation targeting. However, together with the transition to the open economy inflation targeting, the inflation rate which realized during three years after 2006 exceeded the target rates (Uğurlu and Saraçoğlu, 2010: 70). The inflation rates which stayed under the target in the period of 2009-2010, have been exceeding the target since 2011. Although the inflation target was determined as 5,5 % in 2011, the inflation in 2011 was realized in excess as 10,4 %. 7,5 % is the maximum rate. The inflation target which was determined as 5% in the period of 2012-2013-2014 couldn't be realized with the rates 6,2 % in 2012, 7,4% in 2013 and 8,2% in 2014 (Sungur, 2015:253-254).

Both the implicit inflation and the open economy inflation targeting strategy were execeuted between the years 2002-2016 in Turkey. The realizations in inflation were only under the target between the years 2009 and 2010 and between the range of the target in 2012 (Güney and Ceylan, 2014: 153-154). The realizations which occurred in other years stayed out of the range of the target. It can be stated that the inflation was about 10% between the years 2006-2016 in Turkey (Öztürk and Usanmaz, 2018: 98).

The consumer price inflation which exhibited a gradual slowdown trend, realized 7 percent in November 2016 and near to the lower limit of October Inflation Report estimates. However, inflation in December completed the year above the estimates with 8,53 percent by increasing significantly with the effect of the fluctuation in unprocessed product prices and tobacco price adjustments (CBRT, 2017).

Similarly, the consumer price inflation was realized above the upper limit of estimates with 11,29 percent in March, 2017. The effect of the increase in food prices was felt, as well as the depreciation in Turkish Liras and the increase in the import prices in upper- directional course of inflation. Especially the effects of the depreciation in Turkish Liras spread to the whole index. 2017 Consumer Price Inflation was realized as 11,20 percent in September and above the estimates of July Inflation Report. Annual inflation went beyond the estimations in the core indicators with the effect of the depreciation in Turkish Lira versus Euro and the strong course in economic activity in the energy group as well as the increase in the prices of petroleum and other inputs in this period (CBRT, 2018).

Consumer price inflation was realized in accord with the estimates of January Inflation Report with 10,23 percent by decreasing 1,69 points in comparison to the end of the previous quarter, in the first quarter of 2018. Consumer price inflation went beyond estimations with 15,4 percent and 24,5 percent respectively in the second and third quarters of 2018. Consumer price inflation realized under the estimates of October Inflation Report with 20,30 percent by decreasing

4,2 points in comparison with the end of the previous quarter in the last quarter of 2018. In the occurrence of this situation, together with the other variables, the weak course of depreciation in Turkish Liras became effective (CBRT, 2019).

3. THE RELATION BETWEEN THE VALUE OF NATIONAL CURRENCY AND IMPORTS

In the case of depreciation of national currency, while the import prices become cheaper, the export prices increase. In the case of appreciation of national currency, a reverse situation is valid, as well (Ordu, 2013:65). Briefly, the appreciation of national currency is defined as increasing the amount of foreign currency at every turn that a unit of national currency can purchase. Assuming that the prices of goods subject to import trade don't change, importers obtain the opportunity of being supplied more foreign exchange in exchange for the national currency in hand at every turn. (Coşkun and Taylan, 2009: 160). This also implies increasing the amount of goods that the importer can purchase. In such a situation, by taking into consideration the hypothesis that the domestic demand will also increase, the amount of goods which is subject to import will increase much more. Surely, this is not a sustainable situation in the long run. Likewise, the currency loss increasing in that way will lead to the collapse of the country's balance of international payments. Certainly, this is valid assuming that exports and other foreign exchange earning items don't increase.

In literature, the relation between the value of national currency and foreign trade is stated by "Foreign Trade Movements Approach". According to this, the value of a country's national currency changes depending on this country's exports and imports. In case that imports are more than exports, the national currency will depreciate. In the reverse situation, the national currency will appreciate (Karaçor and Gerçekler, 2012: 293; Ünsal, 2005: 543-548). Therefore, all factors affecting the exports and the imports of the country also affect the exchange rate appreciation or depreciation (Tapşın and Karabulut, 2013:190). Among these, the factors such as the relative prices of domestic and foreign items, the real income increases in internal and external economies, consumers' preferences and technological progress can be regarded (Hyder and Shah, 2004). Although, according to this approach, while it is required that the national currencies of the countries whose balance of international payments has a deficit depreciate, there is mostly no depreciation seen but an appreciation in the national currencies of countries in that case. This situation results from the fact that "Foreign Trade Movements Approach" ignores the effect of capital flows in exchange rate adjustments (Seyidoglu, 2007:418).

While the current account deficits enter into the growth process as a result of extreme appreciation of national currency; the cost of closing public deficit as a result of the increase in interest rates also increases (Orhan and Nergiz, 2014: 158). By decreasing investment and manufacturing, this situation leads economies to turn into a structure where financial transactions are predominant (Wicksell, 1962:7-15). With the unrestrained liberalization of national finance markets within this context, national economic policies turn into a structure which controls just the capital flows instead of providing macroeconomic stability and growth. This also decreases the output and employment capacity of the country (Başoğlu, 2000: 95-97).

The extreme difference in the value of national currency unit against foreign currency units for different purposes in Turkey caused a significant effect on its economy. With the transition to flexible exchange rate system in 2001, the increase in real exchange rates has become evident (Okur, 2002:43). For this reason, structural transformations have been implemented in the manufacturing and foreign trade sectors. While the dependency ratios of manufacturing and exportation to importation increase, it is ascertained that the output growths are realized in the sectors which have relatively high technology and depend on imports (Taymaz and Voyvoda, 2015: 25-62). Similarly, the capitalisation per employee in the manufacturing industry has increased and therefore the labour-capital ratio decreases in favour of capital (Şimşek, 2017: 79). It is ascertained that the business corporations which operate in manufacturing industry supply their financial need by the way of foreign currency-denominated borrowing predominantly and this also increases the dependency of imported inputs (Kundak and Aydoğuş, 2017:264). These developments which prepare high real exchange rates weaken the relation between the current output and employment in manufacturing industry (Balaylar, 2011:117).

4. LITERATURE RESEARCH

Standford (2012) – In his study, he points to the symptoms of 'Dutch Disease' for Canada's economy recently. These symptoms are such: by increasing the petroleum production especially, exports and oil sands expand significantly. Thereafter, manufacturing and employment decreased drastically. From the beginning of the century, approximately 600.000 Canadian manufacturing works have disappeared. Canada's currency unit has dramatically appreciated 60% against the US dollar denomination. The general trade balance of Canada has collapsed. Standford has mentioned the mandatory precautions to be taken about investing to progressive and modernist industries to address this unfavorable situation.

Pereira (2013) has made a study which states the importance of exchange rate within the context of Dutch Disease for the economies of Mexico, Chile and Norway. She has revealed that the depreciation of national currency to get rid of this

negative situation is difficult. Instead, a powerful progress coalition is required to carry the exchange rate to the level of industrial balance and to keep it at this level.

Brahmbhatt et al. (2010) – He has made a research regarding solutions to a possible Dutch Disease problem across the world. Within this context, it is suggested to revise the spending policies, giving priority to the investments such as transportation, logistics and substructure with the purpose of directly attracting foreign investors, building rural roads to decline the poverty especially in low income countries and prioritizing public projects.

Nchor et al. (2015) – He has made a study testing Dutch Disease for Ghana's economy. Given the criteria stipulated for measuring the presence of the Dutch Disease, the analysis shows that the real eff ective exchange rate in Ghana depreciated generally. At the same time, the study points that a permanent effect doesn't occur in real effective foreign exchange rate since the beginning of commercial petroleum production which is an indicator of existing the phenomenon 'Dutch Disease'.

Botta et al. (2015) – He has made a study for Colombia's economy. According to this, he has stated that there have been downsizings especially in the manufacturing industry after a while in Colombia which has rapidly entered into the growth process. This situation which is characterised as Dutch Disease has distinguished itself with the massive increase in mining exports firstly and then the appreciation of national currency. He has suggested that it is required for the government of Colombia to encourage domestic manufacturers and to implement policies which vary the exports base to a great extent regarding the solution of the problem.

Sy and Tabarraei (2010) – It's theoretically and empirically revised the connection between capital inflow and real exchange rates movements in developed countries. According to this, while Balassa-Samuelson effect constitutes 57% of the change of real exchange rates by itself, capital inflow constitutes just 19% of. Theory of Dutch Disease isn't denied, however, its effect on external debts and real exchange rates movements is weak.

Kenell (2008) – In his study, Kenell points out that the tourism industry in Thailand draws the resources into tourism sector from the other sectors of economy, and in this way, leads to industrialization by damaging Thailand's international competitiveness. An empirical study has been analysed according to the theory of Dutch Disease. The theory envisages that real exchange rate will appreciate as a result of foreign capital inflow in massive amounts. Accordingly, tourism sector has also a significant share for total Gross Domestic Product (GDP). Nevertheless, according to the researches which are done for this thesis, it's seen that it doesn't lead to Dutch Disease.

Mercan and Göçer (2014) – Hypothesis of Dutch Disease is tested by using the method of Panel Data Analysis with the data of the period 1990-2011 for Central Asian Turkish Republics. In the result of analysis, it is defined that the increase in the prices of petroleum in these countries affects the real exchange rate negatively and the hypothesis is not valid.

Akça and Bal (2017) – A study is made with the purpose to ascertain whether workers' remittances lead to a real appreciation in the home country's currency by using panel data for the period of 1990-2014 belonging to 9 countries selected among the countries receiving Workers' Remittance. Findings obtained from the analysis with the two-way random effects estimation suggest that, as a Dutch Disease Symptom, Workers' Remittances lead to a real appreciation of the home countries' currencies.

Destek et al. (2017) He has made a study for Azerbaijan, Kazakhstan, Kyrgyzstan and Uzbekistan economy for the period 1991-2013. The concluded that Dutchdisease is valid in Azerbaijan. It is inferred that the prosperities obtained from the natural resources are efficiently used in Kazakhstan and Kyrgyzstan, but there is no relationship between oil rents and agricultural added value in Uzbekistan.

Arı and Özcan (2012) – It is investigated whether workers' remittances cause Dutch Disease problem or not. As a result of the study where the methods of fixed effect and instrumental variable from Panel Data Models are utilised, the proof is reached which affirms the existence of Dutch Disease.

Akçacı and Karaata (2014) – An empirical study is made of the causality relationship among the portfolio investments of the period of 2006-2013 and industrial production index and exports regarding the existence of Dutch Disease for Turkey's economy. The obtained findings points that the portfolio investments cannot be evaluated as a variable which leads to Dutch Disease in Turkey's economy.

5. DATA AND METHODOLOGY

In the study, the annual data belonging to the variables of Consumer Price Inflation (CPI) and Imports between the years 2003-2018 is used. Empirical analysis has been executed by using SPSS (22) Pearson's Test technique and Regression

Analysis. Whether there is a relationship between two or more variables, the direction and strength if the relationship exists is found by "correlation analysis". If one of the variables changes and the other shows a change, "regression analysis" is performed.

5.1. Correlation Analysis

The hypothesis '0' and one or two-way alternative hypotheses in correlation analyses of SPSS are as follows.

H_0: p = 0 (correlation coefficient between two variables is zero)

H_1: p < 0 (there is negative correlation between two variables) (one-way)

H_1: p > 0 (there is positive correlation between two variables) (one-way)

H_1: p ≠ 0 (correlation coefficient between two variables is different from zero) (two-way)

SPSS, Correlation Significance (Sig.) values are as follows;

If Sig.>,05 , H_0 is agreed. There isn't significant correlation between the variables.

If Sig.<,05 , H_0 is rejected. There is significant correlation between the variables (Bursal, 2017:108).

Before Pearson's Test, we should research whether the variables provide the normal distribution hypothesis in significance level of 0,05 and the existence of extreme values.

Table 1: Test of Normality and Hypothesis of Normality

Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Statistic	df	Sig.	Statistic	df	Sig.
,178	16	,186	,927	16	,221

Note: a. Lilliefors Significance Correction

If n < 50, the result of Shapiro-Wilk Test is evaluated. Table Sig.:(p = 0,221). According to this, since p >0,05, the distribution of variables provides the normal distribution condition in significance level of 0,05.

5.2. Extreme Value Analysis

The other condition to be tested assuming the validity of the hypothesis of normal distribution is to ascertain the extreme values which distort the normal distribution of variable.
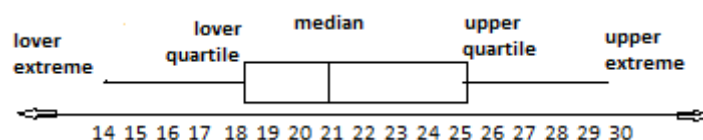
A box and whisker plot is a way of summarizing a set of data measured on an interval scale. It is often used in explanatory data analysis. This type of graph is used to show the shape of the distribution, its central value, and its variability.

In a box and whisker plot:

- the ends of the box are the upper and lower quartiles, so the box spans the interquartile range

- the median is marked by a vertical line inside the box

- the whiskers are the two lines outside the box that extend to the highest and lowest observations (Statistics Canada, 2019)

Figure 1: Box Plot
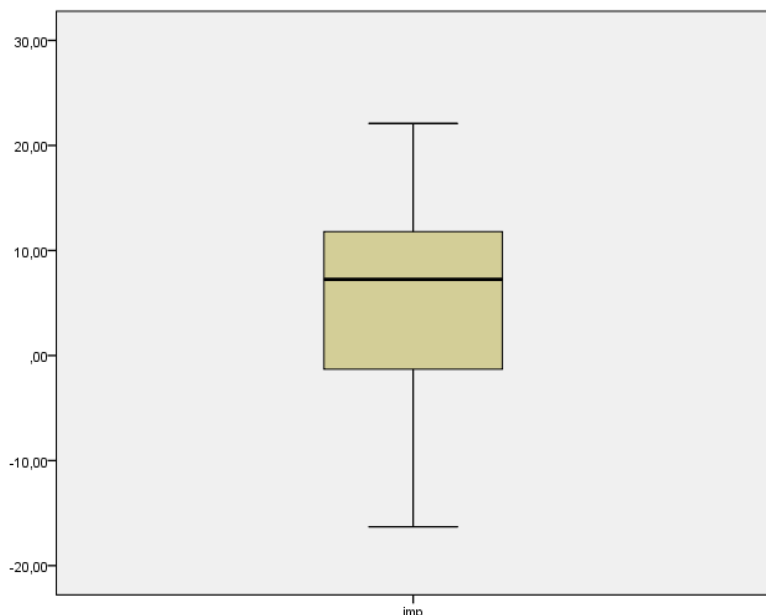
It is seen that there isn't any outliner in data distribution when Box Plot is examined.

5.3. Calculating Pearson's Correlation Coefficient and Regression Analysis

The word correlation is used in everyday life to denote some form of association. We might say that we have noticed a correlation between foggy days and attacks of wheeziness. However, in statistical terms we use correlation to denote association between two quantitative variables. We also assume that the association is linear, that one variable increases or decreases a fixed amount for a unit increase or decrease in the other. The other technique that is often used in these circumstances is regression, which involves estimating the best straight line to summarise the association (The BMJ, 2019).

Table 2: Correlation between Inflation and Imports for the years 2003-2018 (Pearson)

		imp	Tufe
	Pearson Correlation	1	,634**
imp	**Sig. (2-tailed)**		,008
	N	16	16
	Pearson Correlation	,634**	1
tufe	**Sig. (2-tailed)**	,008	
	N	16	16

**. Correlation is significant at the 0.01 level (2-tailed).

In Table 2, Pearson's Correlation Coefficient of imports (imp) and inflation (CPI) becomes (r=,634, p=,008). According to the coefficient values which is calculated, because significance value is $p<,01$, H_0 hypothesis for two variables is rejected and it can be stated that there is a significant correlation between imports (imp) and inflation (CPI).

Accordingly, Pearson's Correlation Coefficient is reported in this way;

r= ,634; n=16; p = ,008

With the purpose of testing the correlation between the variables with a different method, Scatter Plot and regression line are drawn with SPSS. Accordingly, the figure below is obtained.

Figure 2: Scatter Plot and Regression Line
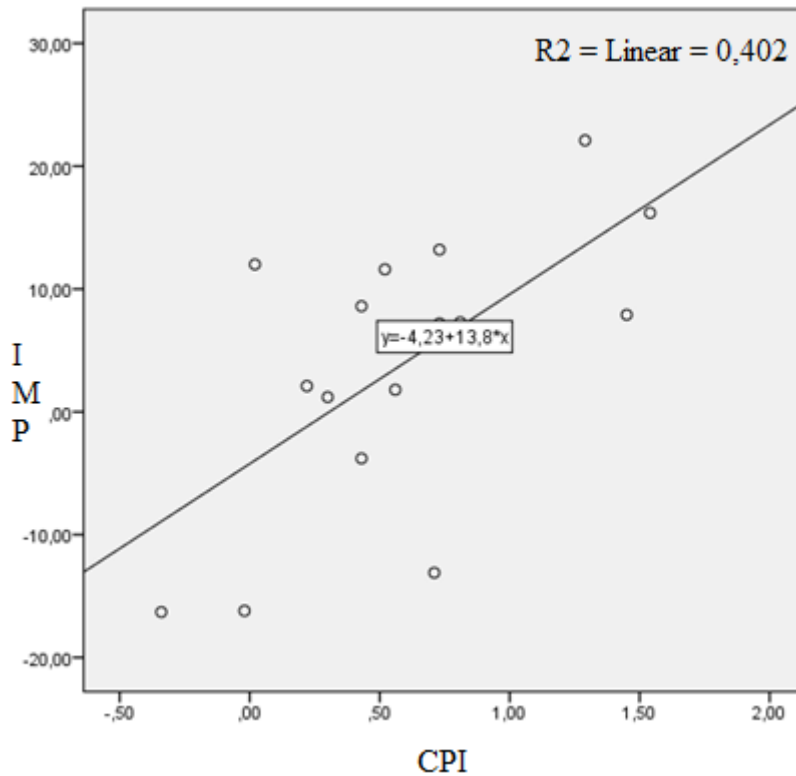
In Figure 2, regression equation of our model becomes *y= 4,23 + 13,8*X*. Accordingly, it is possible to say that there is a weak but positive correlation between the variables. Thereby, according to the results of both correlation and regression line analyses; in both situations, there is a positive linear relationship between the variables. Namely, while one of them increases, the other one increases; while one of them decreases, the other one also decreases. If we investigate this situation through the value of money, the inverse relationship between the two variables will be confirmed. In another saying, the increase of inflation means that the national currency depreciates; so that, according to the results obtained from our model, in such a situation (in case of increasing the inflation) imports increase as well. Similarly, the decrease of inflation means that the national currency appreciates; so that, according to the results of our analysis, in case of appreciation of national currency (in case of the decrease of inflation) imports decrease as well. This too proves that "Dutch Disease" is out of the question for Turkey's economy in the specified period.

The Figure below which is formed in accordance with the data of Imports and Consumer Price Index taken from the resources of Turkish Statistical Institute and the Central Bank of the Republic of Turkey supports this situation. If we take them into consideration, the difference between the two variables has gradually gotten larger especially since 2010. In this period, the depreciation of TL has become much higher in comparison with the increase in imports. Whereas, by the definition of Dutch Disease, we anticipated the increase of imports with the condition of the appreciation of national currency. This, too, reveals that the speculative approaches in this issue are unfair.

Figure 3: 2003-2018 Import and CPI in Turkey CPI (Consumer Price Index)
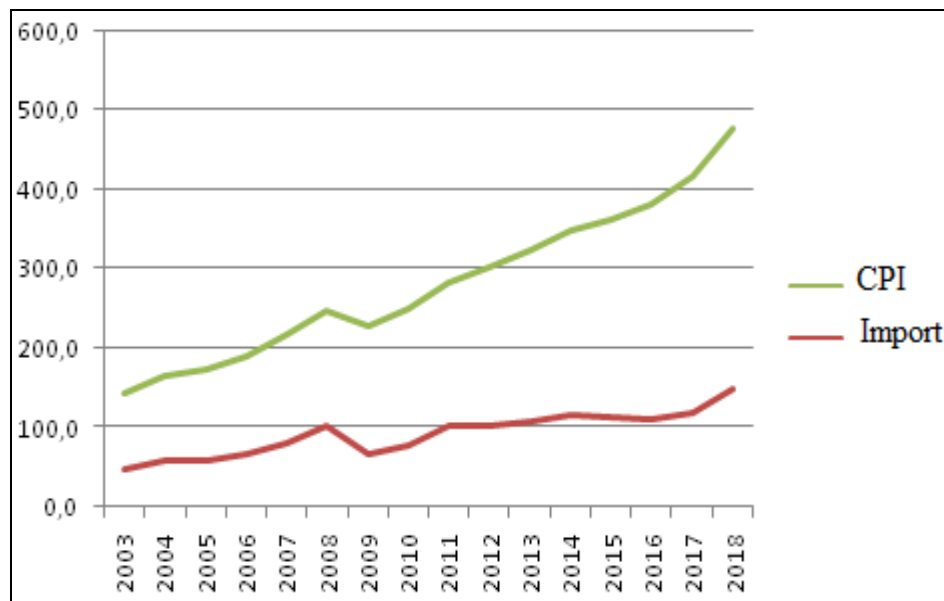
6. CONCLUSION

In 1960s, Holland's economy gained acceleration by means of the natural gas reserves in Holland and a positive atmosphere is obtained. With the increase of production and exportation of natural gas, Dutch Florin appreciates. With the national currency appreciation, imports become cheaper and domestic production becomes more expensive in the course of time. With the increase of domestic production costs, imports become more attractive for Dutch producers, therefore imports increase. With the decrease of production on one hand and the increase of external dependence on the other hand, the positive atmosphere which is caught by the discovery of natural gas sources soon becomes reversed.

The adverse circumstances which have been experienced in Turkey's economy recently are attributed to 'Dutch Disease'. The positive atmosphere which was experienced in the economy and the appreciation of national currency previously and then the rise of the inflation to double-digits and the increase of imports have been effective for this metaphor. Within this context, it has been desired to test the availability of 'Dutch Disease' in Turkey's economy for the specified period. For this, we used the annual data belonging to the variables of Consumer Price Inflation (CPI) and Imports between the years 2003-2018. According to the findings obtained by using SPSS (22) Pearson's Test technique for Empirical Analysis, contrary to what is alleged, there is no connection of the adverse circumstances which have been experienced in Turkey's economy recently to 'Dutch Disease'.

For the Dutch Disease to be able to occur, the currency used as medium of exchange is required to be convertible. Because the national currencies of the developing countries such as Turkey are not convertible, the national currency appreciates only within the boundaries of the country. Whereas the appreciation of the national currencies of countries whose currency is convertible like Holland can stand out both internally and externally. Within this context, the adversity which has been experienced in Holland's economy derives from the decrease of production. This isn't directly associated with the value of Florin. However, the decrease of the production in Turkey is associated with imports not becoming cheaper but on the contrary becoming more expensive. Namely, while TL depreciates on one hand, imports become more expensive on the other hand. Imports becoming more expensive derives from abroad to a great extent. The primary reason is that the increase in the prices of notably petroleum, natural gas and other imported energies in the world markets increases the input costs.

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GENDER DIFFERENCES IN THE RETIREMENT BEHAVIOUR OF THE ELDERLY USING NON-LINEAR DECOMPOSITION METHODS

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ABSTRACT

Purpose- This paper examines factors of the gender disparity among British people on their retirement decisions using nonlinear decomposition methods and which factors cause gender differentials in retirement decisions between 1991 and 2013. In this respect, both the British Household Panel Survey and Understanding Society are utilised.
Methodology- Both Fairlie (1999) and Yun (2004) methods are used to examine the impacts of observed demographic and income factors on gender differentials of retirement decisions.
Findings- Age, hourly earnings, non-labour income and pension eligibility increase the gender gap, whereas education, good health conditions and being a homeowner act to reduce the gender gap.
Conclusion- Even though the labour force participation of older women has consistently been increasing over the past two decades, the gender disparity influenced by demographic and financial factors has not been significantly reduced over time. The demographic and financial factors mostly explained the gender gap; however, their effects significantly change due to the explained and unexplained parts during the 20-year period.

Keywords: Oaxaca decomposition, nonlinear models, binary choice, retirement, UK.
JEL Codes: J14, J16, J26

1. INTRODUCTION

The labour force attachment of older women has increased at a fast rate over the past 20 years, functioning as a decisive push factor that has affected the employment rates of older people since the mid-1990s in the United Kingdom (UK). DWP (2015) highlights that the employment gap between men aged 50–64 and women of the same age declined from approximately 28 % three decades ago to almost 11 % in 2015. Using methods to decompose the gender gap in retirement decisions, this study investigates to what extent differences between the British women and men can be explained by differences in characteristics such as health, education and income level, and by differences in behavioural responses associated with those coefficients. In this study, both the British Household Panel Survey (BHPS) and the Understanding Society (UKHLS)[1] are utilised. In this context, the research questions focus on the main factors that causing gender differences in retirement behaviours, how these differences change over time, and how variations between genders can be explained by disparities in observable characteristics.

The prevalent decomposition model proposed by Oaxaca (1973) and Blinder (1973) is used to decompose the labour force decision by measuring the mean differentials between males and females from the differences in observable and unobservable characteristics. Under some conditions, these unexplained differentials can be attributed to the discriminatory behaviour of male-female groups. Therefore, the Oaxaca–Blinder decomposition model has often been applied to analyse the impact of discrimination in the literature. The original Oaxaca–Blinder decomposition can be applied to linear models. However, some extensions of Oaxaca and Blinder decomposition can be applied to non-linear models as well. Both Fairlie

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[1] It is also known as the UK Household Longitudinal Survey.

(1999) and Yun (2004) methods are used to examine the impacts of observed demographic and income factors on gender differentials of retirement decisions. The reason for using multiple decomposition models is that each may have some drawbacks. Thus, the findings obtained from both methodologies allow us to compare the results of the detailed decomposition techniques to determine which factors have the highest impact on the gender gap. Moreover, it allows us to observe changes in their effects over a 22-year period by taking the first wave of the BHPS covering the period of 1991–1992, the last wave of the BHPS indicating 2008-2009 period covering the global financial crisis and the 2012–2013 period obtained from the UKHLS sample called as the post-crisis period.

The rest of this study is organised as follows: Section 2 summarises a background for studies using nonlinear decomposition methodology. Section 3 describes the non-linear decomposition methods in detail. The data and descriptive statistics are presented in the same section, and in Section 4, the estimation results are discussed. The last section provides the concluding remarks.

2. LITERATURE REVIEW

The literature can be divided into two groups: studies using linear methods (such as Gangl and Ziefle, 2009; Chiu and Chen, 2013; Gunalp et al., 2015) and studies using nonlinear decomposition methods (Fairlie, 1999; Yun, 2000, 2004; Kalb et al., 2012; Bazen et al., 2016)[2].

Among using nonlinear decomposition methodologies, Fairlie (1999) developed a decomposition method for binary choice models as an extension of the Oaxaca-Blinder decomposition model. Another application of nonlinear Oaxaca-Blinder decomposition based on first-order Taylor series expansion for modelling binary outcomes in probit model was proposed by Yun (2004) to analyse racial differences in labour market participation rates. According to Yun's results, the racial gap in women's participation rates is explained exclusively by the effects of differences in coefficients, especially age variables. Powers and Pullum (2006) added some extensions to the models developed by Nielson (1998) and Yun (2004) to reduce path dependency problems.

Labour market attachment in Australia was addressed by Kalb et al. (2012) using a nonlinear version of the Blinder-Oaxaca decomposition method by Bauer and Sinning (2008) and the method proposed by Powers, Yoshioka and Yun (2011) for detailed decomposition. They showed that at least two-thirds of the racial gap in the labour market attachment for women can be attributed to differences in the unobserved characteristics between the two populations, whereas 42.5 percent of the racial gap in labour force participation for men can be explained by differences in explanatory factors. Bazen et al. (2016) applied nonlinear decomposition methods based on mean value theorem to analyse the gender gap in earnings for France. The differences in observable factors are more important component in explaining the gender differential in earnings and the key factor derived from the detailed decomposition is the differences in education.

3. DATA AND METHODOLOGY

3.1. Methodology

In general, the Oaxaca-Blinder decomposition model aims to explain the distribution of the outcome variable by a set of factors that vary systematically with the socioeconomic status. The differences gathered from two groups can be decomposed into two parts. The first one contains both the part that is explained by observable characteristics (explained differentials or endowment effects), such as education, health or income, and the residual part that cannot be accounted for by such differences in determinants of retirement decisions (unexplained differentials or returns to risk). As emphasised by Jann (2008), this technique is easy to implement in linear regression models as it requires coefficient estimates from the linear regression for the outcome of interest and sample means of the independent variables in the regression. However, if the outcome is binary, it becomes more complicated since the coefficient estimates obtained from binary models cannot be used directly in the standard Oaxaca-Blinder decomposition equation. This leads inconsistent parameter estimates and misleading decomposition results.

For binary models, the differences in the probabilities between females and males can be decomposed by the effects of the differences in endowment effects and the effects of the differences in the coefficients. Formally, the decomposition of the differences in probabilities between females and males can be described as follows:

$$\overline{Y_M} - \overline{Y_F} = \hat{\Delta} = \left(\overline{\Phi(X_{iM}\widehat{\beta_{\ell M}})} - \overline{\Phi(X_{iF}\widehat{\beta_M})} \right) + \left(\overline{\Phi(X_{iF}\widehat{\beta_M})} - \overline{\Phi(X_{iF}\widehat{\beta_F})} \right) \tag{1}$$

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[2] Extensions of Oaxaca-Blinder methodology can be used in various models. See Fairlie, 1999, 2005; Yun 2000, 2004; Powers and Pullum, 2006; Prichette and Yun, 2009; Bowblis and Yun, 2010 for logit and probit models, Wagstaff and Nguyen, 2001; Powers and Yun, 2009; Bazen et al., 2016 for hazard rate models.

where Y_ℓ is the average of the computed probability of being retired, while $\widehat{\beta_\ell}$ is a $Kx1$ vector of probit coefficients and $X_{i\ell}$ acts as a vector of both individual and household characteristics as the average of the computed probability using a standard normal cumulative distribution (CDF), Φ. The decomposition equation used for probit models is divided into two parts: the first one captures differences in standard normal CDFs, which represent the effects of different individual characteristics between two groups (differences in observable characteristics), whereas the second one captures differences in standard normal CDFs, which represent the effects of different probit coefficients between two groups (differences in unobservable factors). Such measures are required as there is no unique way to find the effects of differences in each character and the effects of differences in each coefficient separately from the equation (1) owing to nonlinearity. Yun (2004) proposed a simple modification of equation (1) formed of a two-step approximation to obtain the effects of differences in each character and the effects of differences in each coefficient. In the first step, the sample average of the standard normal CDF is approximated by the standard normal CDF at the sample average of individual characteristics.

In the second step, the first-order Taylor approximation is used to linearize the characteristics and coefficient effects around $\bar{X}_{iF}\beta_F$ and $\bar{X}_{iM}\beta_M$, respectively. The final decomposition after the Taylor expansion are:

$$\overline{Y_M} - \overline{Y_F} = (\bar{X}_{iM} - \bar{X}_{iF})\widehat{\beta_M}\phi(\bar{X}_{iM}\widehat{\beta_M}) + \bar{X}_{iF}(\widehat{\beta_M} - \widehat{\beta_F})\phi(\bar{X}_{iF}\widehat{\beta_F}) + \widehat{U}_R + \widehat{U}_L \tag{2}$$

where $\phi(\bar{X}_{i\ell}\widehat{\beta_\ell}) = d(\Phi(\bar{X}_{i\ell}\widehat{\beta_\ell})/d(\bar{X}_{i\ell}\widehat{\beta_\ell})$, i.e $\phi(.)$ is the first-order derivative of the cumulative distribution function $\Phi(.)$ for $\ell = F, M$ and,

$$\widehat{U}_L = \left(\Phi(\bar{X}_{iM}\widehat{\beta_M}) - \Phi(\bar{X}_{iF}\widehat{\beta_F})\right) - [(\bar{X}_{iM} - \bar{X}_{iF})\widehat{\beta_M}\phi(\bar{X}_{iM}\widehat{\beta_M}) + \bar{X}_{iF}(\widehat{\beta_M} - \widehat{\beta_F})\phi(\bar{X}_{iF}\widehat{\beta_F})],$$

$\widehat{U}_R$, $\widehat{U}_L$ and $\phi(.)$ are all scalars. Both $\widehat{U}_{iR}$ and $\widehat{U}_{iL}$ are approximation residuals derived from evaluation of the CDF at the mean values and by using the first Taylor expansion, respectively.

There are some challenges in the computation of detailed decompositions for non-linear models. Because of nonlinearity, the detailed decomposition of the two components into the contribution of each variable, even if the decomposition is linearised using marginal effects, would not add up to the total. Fairlie (2005) proposes an alternative methodology based on a series of counterfactuals, where the coefficient of each variable is switched to reference group values in the sequence. In this method, the decomposition estimates obtained depend on the randomly chosen subsample of females. Ideally, the results achieved gender using this decomposition model should approximate the results obtained by matching the entire female and male samples. A simple method of approximating this hypothetical decomposition is to draw a large number of random subsamples from females, randomly match each of these randomly drawn subsamples of females to the full male sample, and then calculate separate decomposition estimates. The mean value of estimates from distinct decompositions is computed and used to approximate the results for the entire female sample. However, the decomposition is sensitive to the order of the decomposition leading to path dependency[3] (Fortin et al., 2011).

Following Fairlie (2005), non-linear version of the standard Blinder–Oaxaca decomposition for linear regression, $Y = F(X_{i\ell}\hat{\beta}_{i\ell})$ can be written as

$$\bar{Y}_M - \bar{Y}_F = [\sum_{i=1}^{N_M} \frac{F(X_{iM}\hat{\beta}_M)}{N_M} - \sum_{i=1}^{N_F} \frac{F(X_{iF}\hat{\beta}_M)}{N_F}] + [\sum_{i=1}^{N_F} \frac{F(X_{iF}\hat{\beta}_M)}{N_F} - \sum_{i=1}^{N_F} \frac{F(X_{iF}\hat{\beta}_F)}{N_F}] \tag{3}$$

where N_M and N_F are the sample sizes of both males and females. Fairlie (2005) used this above equation as $\bar{Y}_\ell$ does not necessarily equal $F(\bar{X}_\ell\hat{\beta}_\ell)$.[4] The first bracket in the equation (3) shows the part of the gender gap that is due to the group differences in distributions of *X*, which show observable factors while the second term represents the other differences in the coefficients (Fairlie, 2005:307). The second part also captures the discrimination effect due to the group differences in unobserved endowments.

3.2. Data and Summary Statistics

Both the BHPS and the UKHLS dataset are longitudinal surveys of households containing rich socio-demographic information. The BHPS was originally designed as an indefinite life panel; however, it was terminated at the end of 2008. It consists of 18 waves with annual interviews from the first survey year of 1991 to the last survey year of 2008. In 1997, an additional sample

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[3] Following Fairlie (2005), 1,000 random subsamples of females are used for deriving these means.
[4] Equation (3) is the generalized version of the Blinder–Oaxaca decomposition.

was integrated with the BHPS for European Community Household Panel (ECHP) survey, and further 'booster' samples were added in 1999 for Scotland and Wales, and for Northern Ireland in 2001.

It is currently incorporated into the UKHLS, enriched by a new set of respondents with whom interviewing began in 2009. The UKHLS is an indefinite life household panel survey designed as an extension and more comprehensive form of the BHPS from 2009. It has a larger sample size than the BHPS, having an over-sample of ethnic minorities, a health and biomarkers component, and a larger geographical spread (Longhi and Nandi, 2015).

Table 1: Summary Statistics of the Sample by Gender: Female Group

	1991-1992		2008-2009		2012-2013	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Labour Force Status	0.515	0.500	0.441	0.497	0.397	0.489
Age	57.2	4.684	57.4	4.498	57.2	4.695
Poor	0.106	0.308	0.120	0.325	0.095	0.294
Fair	0.214	0.410	0.222	0.416	0.166	0.373
Good	0.452	0.498	0.493	0.500	0.302	0.459
Excellent	0.228	0.420	0.164	0.371	0.436	0.496
Spouse/Partner	0.730	0.444	0.755	0.430	0.701	0.458
Owned House	0.435	0.496	0.501	0.500	0.445	0.497
Mortgage	0.305	0.461	0.326	0.469	0.334	0.472
Rented House	0.260	0.439	0.174	0.379	0.221	0.415
Caring Responsibility	0.071	0.256	0.090	0.287	0.085	0.279
Higher Degree+	0.031	0.173	0.140	0.347	0.359	0.480
HND/HNC or A Level	0.098	0.298	0.210	0.407	0.145	0.352
O/CSE Level	0.172	0.377	0.296	0.457	0.334	0.472
No Qualification	0.699	0.459	0.354	0.479	0.162	0.369
In (Hourly Earnings)	1.832	0.321	2.256	0.365	2.378	0.398
In (Non-Labour Inc.)	4.120	2.230	4.456	2.578	4.235	2.966
In (Other HH Income)	5.901	2.850	6.951	0.730	6.356	3.197
Having Child	0.037	0.188	0.062	0.241	0.065	0.247
No of Pens. Age	0.540	0.712	0.557	0.720	0.549	0.721
Pension	0.203	0.402	0.244	0.430	0.220	0.414
North East	0.052	0.222	0.031	0.173	0.043	0.204
North West	0.127	0.334	0.085	0.279	0.104	0.305
Yorkshire & Humber	0.084	0.277	0.069	0.253	0.081	0.273
East Midlands	0.074	0.262	0.054	0.226	0.079	0.269
West Midlands	0.092	0.289	0.055	0.228	0.083	0.275
East of England	0.082	0.275	0.068	0.251	0.091	0.287
London	0.101	0.302	0.052	0.223	0.107	0.309
South East	0.143	0.350	0.099	0.299	0.130	0.336
South West	0.088	0.283	0.071	0.257	0.095	0.294

Wales	0.064	0.244	0.204	0.403	0.083	0.275
Scotland	0.093	0.290	0.212	0.409	0.105	0.306
Number of Obs.	1036		1440		5733	

Table 2: Summary Statistics of the Sample by Gender: Male Group

	1991-1992		2008-2009		2012-2013	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Labour Force Status	0.262	0.440	0.242	0.429	0.278	0.448
Age	57.2	4.669	57.2	4.568	57.3	4.733
Poor	0.107	0.309	0.100	0.301	0.090	0.286
Fair	0.184	0.388	0.232	0.422	0.156	0.363
Good	0.417	0.493	0.466	0.499	0.320	0.467
Excellent	0.292	0.455	0.201	0.401	0.434	0.496
Spouse/Partner	0.841	0.365	0.830	0.376	0.772	0.419
Owned House	0.365	0.482	0.450	0.498	0.402	0.490
Mortgage	0.409	0.492	0.398	0.490	0.384	0.486
Rented House	0.225	0.418	0.153	0.360	0.213	0.410
Caring Responsibility	0.057	0.232	0.077	0.266	0.072	0.259
Higher Degree+	0.056	0.231	0.150	0.357	0.360	0.480
HND/HNC or A Level	0.154	0.361	0.318	0.466	0.210	0.407
O/CSE Level	0.176	0.381	0.234	0.424	0.307	0.461
No Qualification	0.614	0.487	0.298	0.457	0.123	0.329
In (Hourly Earnings)	2.196	0.356	2.506	0.389	2.611	0.436
In (Non-Labour Inc.)	4.269	2.381	3.889	2.908	4.091	3.125
In (Other HH Income)	6.311	2.364	6.967	0.842	6.415	3.192
Having Child	0.086	0.281	0.117	0.321	0.126	0.331
No of Pens. Age	0.255	0.516	0.285	0.520	0.313	0.571
Pension	0.270	0.444	0.306	0.461	0.255	0.436
North East	0.051	0.219	0.025	0.156	0.040	0.196
North West	0.119	0.323	0.086	0.280	0.107	0.310
Yorkshire & Humber	0.089	0.286	0.069	0.254	0.079	0.270
East Midlands	0.083	0.276	0.069	0.254	0.087	0.283
West Midlands	0.100	0.300	0.058	0.234	0.082	0.274
East of England	0.093	0.290	0.074	0.262	0.094	0.292
London	0.094	0.292	0.044	0.205	0.101	0.301
South East	0.131	0.338	0.097	0.295	0.127	0.333
South West	0.095	0.293	0.073	0.261	0.098	0.297
Wales	0.059	0.236	0.209	0.407	0.080	0.272

Scotland	0.086	0.281	0.196	0.397	0.105	0.307
Number of Obs.		928		1206		4667

Tables 1 and 2 present the summary statistics of the sample separately for men and women. The values for categorical variables represent the proportion of older people with those characteristics in both tables. Of the respondents, those aged between 50 and 65 are chosen in both the BHPS and UKHLS. The age variable is divided into three main groups: 50–54 (base category), 55–59 and 60–65. The average age of the respondents is around 57 years for both men and women. Of all the respondents, 1,036, 1,455 and 5,733 are female for the 1991–1992, 2008–2009 and 2012–2013 waves, respectively. On the other hand, the total number of men in each wave is 928, 1,206 and 4,667, respectively. From 1991 to 2013, the retirement rate has consistently decreased by 11 per cent for women.

A five-point scaled self-assessed health variable is included in the both BHPS and UKHLS. However, a continuity problem arises with this variable as the question that the respondents were asked about their health changed in the ninth wave of the BHPS and after that in the UKHLS. I follow the method of Hernandez-Quevedo et al. (2005) to achieve consistency in all waves and recode the self-rated health variable into a four-category scale; poor health (poor or very poor health), fair health, good health (good or very good health) and excellent health[5]. Poor health is considered as a base category.

Highest academic qualification is taken as the education variable and categorised into four main groups based on studies by Rice et al. (2007) and Jones and Wildman (2008). The higher degree includes all university degrees. The second group covers all college degrees including higher national diploma (HND) and higher national certificate (HNC) and further education including A-level diploma. The third category includes all primary and secondary education levels. The last group is no qualification taken as a base category. Older women are more likely to achieve higher educational qualifications than men, particularly after 2008. The number of older women with at least a university degree increases considerably from 3.1 per cent to 14 per cent between 1991-1992 and 2008-2009 periods. On the other hand, having no formal qualifications is also more common among women. A dummy is used to represent the spousal relationship, which covers both marriage and partnership. Measuring logarithm of hourly earnings[6] are derived from the last payment received dividing by the period of the last payment, and it is taken regarding real values based on 2005 Consumer Price Index[7].

Housing tenure, non-labour income, income of other household members and pension eligibility are used to control for wealth effects on the retirement decision. Housing wealth is categorised into three groups: people who own their house/flat outright, own with a mortgage or rent. The rent category includes people who live in either privately rented or local authority rented housing. The mortgage is taken as a base category. The non-labour income for the last month in real terms is taken in logarithm form. Income of other household members is calculated by subtracting the respondent's labour and non-labour income from the total household income, and its logarithm is used in the models. Many studies used pension eligibility to examine the effect of pension system on the retirement decision. This is a strong proxy leading to earlier retirement. This variable is taken as a dichotomous variable, with a value of 1 for those who are eligible for pension income. There are some differences in the financial situations of older men and women throughout the two decades studied. The mean logarithm earnings reveal that men earn more than women. On the other hand, the increase in the hourly earnings of women is higher than that of men. The main reason could be the marked improvement in the educational qualifications and thus the steady increase in the labour force participation of mature-aged women over the past two decades. The non-labour income of men is higher than the non-labour income of women in early 1990s, whereas this trend reversed by 2008-2009 period. Another important aspect of the financial situation is housing tenure. Women are more likely to own their home outright, whereas men are more likely to have their own home but be paying off mortgages.

Two other covariates that are used in the study are dummies for having a caring responsibility and having a dependent child under 16. Women are more likely to have caring responsibilities than men, as expected. However, opposite to the expectations, men are more likely to have children under the age of 16 that they are responsible for. The proportion of men with children under 16 years old is almost twice that of women for all waves in this study. Finally, to represent regional differences, eleven regions based on the Government Office Region in both the BHPS and UKHLS are used as regional dummies. These regions are North East, North West, Yorkshire and Humber, East Midlands, West Midlands, East of England, London, South East, South West, Wales, and Scotland. Northern Ireland is removed from the sample to establish a comparison between the waves since the first wave of the BHPS begins with the British sample, which consists of England, Wales and Scotland. As for the region of residence, a higher proportion of both males and females live in the South East compared to

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[5] Rice et al. (2007) and Garcia-Gomez et al. (2010) also used the same categorisation in their research.

[6] Selection bias is considered in estimating hour earnings by using Heckman 2-step procedure. See Heckman, 1974 for more details about Heckman procedure.

[7] All income and wealth variables in the study are taken in real terms based on 2005 Consumer Price Index.

those living in other areas. North East region is considered as a base category in this study. To deal with the over-representation problem, cross-sectional weights are used for the boost samples for Scotland, and Wales added in the 2008/2009 wave.

4. FINDINGS AND DISCUSSIONS

4.1 Estimation Results by Yun Models

The decomposition analysis allows us to examine the gender differences in retirement attitudes by distinguishing the differences sourced from observable characteristics and coefficient effects and how the gender gap changes over 20 years. Two non-linear models proposed by Yun (2004) and Fairlie (2005) are used to compare the consistency of results derived from two different models.

Table 3 reports the results of the more detailed decomposition analysis proposed by Yun (2004) to show the gender differences in retirement decisions[8]. The main advantage of this method is that it provides detailed decomposition for both characteristics and return to risk components and gives evidence of the contribution of each factor to explain the gender gap in the retirement decision.

Table 3: Yun Decomposition Results

	1991-1992		2008-2009		2012-2013	
	Coef.	%	Coef.	%	Coef.	%
E	0.043**	16.92	0.073***	35.57	0.020***	16.22
	(2.111)		(6.482)		(3.351)	
C	0.209***	83.08	0.131***	64.43	0.101***	83.78
	(8.177)		(7.685)		(11.080)	
N	1956		2586		10437	

	1991-1992		2008-2009		2012-2013	
	(E)	(C)	(E)	(C)	(E)	(C)
	%	%	%	%	%	%
Total Age Effect	**-1.315**	**-8.889**	**2.265**	**-14.954**	**-2.944**	**7.376**
55-59	1.056***	0.345	-0.080*	-6.786	0.724***	8.208
	(2.593)	(0.0746)	(-1.684)	(-0.915)	(5.318)	(1.645)
60-65	-2.371***	-9.234	2.345*	-8.168	-3.668***	-0.831
	(-2.843)	(-1.458)	(1.661)	(-0.792)	(-6.274)	(-0.113)
Total Health Effect	**15.117**	**15.187**	**10.079**	**37.244**	**13.776**	**20.399**
Fair	-16.573***	1.287	1.361***	6.626	-6.836***	-0.284
	(-3.478)	(0.366)	(4.584)	(0.972)	(-8.761)	(-0.0757)
Good	-27.934***	9.378	-7.007***	24.427*	31.275***	14.653**
	(-5.225)	(1.222)	(-6.734)	(1.837)	(9.959)	(2.293)
Excellent	59.624***	4.522	15.724***	6.191	-10.663***	6.030

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[8] The results are estimated in terms of the percentage of the gender gap attributable to differences in both endowment and coefficients.

	(5.429)	(0.799)	(6.947)	(0.942)	(-11.08)	(0.987)
Spouse/Partner	-51.174***	35.024**	-16.00***	47.557	-39.694***	13.960
	(-3.089)	(2.007)	(-3.961)	(1.553)	(-4.674)	(0.806)
Total Tenure Effect	**15.237**	**-2.043**	**14.290**	**-5.634**	**34.592**	**-4.588**
Own House	13.591**	2.483	9.352***	1.275	29.387***	0.372
	(2.251)	(0.531)	(4.997)	(0.134)	(8.807)	(0.064)
Rent	1.645	-4.526	4.938***	-6.908	5.204***	-4.960
	(0.432)	(-1.230)	(4.540)	(-1.619)	(5.906)	(-1.335)
Total Educ. Effect	**30.418**	**7.139**	**2.952**	**-13.092**	**39.184**	**-51.119**
Higher Degree+	17.676***	-0.565	1.752**	-0.680	36.122***	-22.475***
	(2.854)	(-0.356)	(1.970)	(-0.127)	(6.490)	(-4.242)
HND/HNC, A Level	12.418*	2.153	8.441*	-3.634	20.765***	-20.297***
	(1.666)	(0.800)	(1.749)	(-0.483)	(7.430)	(-3.838)
CSE/O Level	0.324	5.550**	-7.241***	-8.779*	-17.704***	-8.346***
	(0.623)	(2.077)	(-2.984)	(-1.698)	(-5.593)	(-2.637)
Care	2.291	0.804	1.558**	3.634	6.683***	0.220
	(1.099)	(0.717)	(2.289)	(1.543)	(4.412)	(0.152)
ln (Hourly Earnings)	107.981***	-127.751*	28.276*	-141.985*	-14.949	-56.732
	(2.647)	(-2.726)	(1.953)	(-1.679)	(-0.536)	(-1.243)
ln (Non-Lab. Inc.)	-20.892***	-131.579*	45.793***	-30.916*	38.061***	-50.891***
	(-5.299)	(-8.642)	(12.66)	(-1.725)	(15.32)	(-5.515)
ln (Other HH Inc.)	17.958**	-17.464	2.772***	0.547	1.382**	54.950***
	(2.093)	(-0.860)	(2.713)	(0.0166)	(2.178)	(2.833)
Children	-18.404*	2.124	0.259	-1.374	-0.139	6.970**
	(-1.898)	(1.027)	(0.089)	(-0.338)	(-0.018)	(2.439)
No of Pens. Age	26.526	0.842	15.310	-13.129**	46.173**	-6.297
	(0.996)	(0.285)	(1.540)	(-2.419)	(2.322)	(-1.559)
Pension	-19.671***	-0.253	-6.345***	-4.145	-23.061***	4.624
	(-2.832)	(-0.0699)	(-3.084)	(-0.651)	(-7.001)	(1.220)
Total Region Effect	**-3.751**	**13.833**	**-1.357**	**-3.840**	**1.036**	**10.749**
North West	-2.347	-2.172	0.181	-7.015	0.219	-2.099
	(-1.454)	(-0.701)	(0.798)	(-1.459)	(0.487)	(-0.598)
Yorkshire & Humber	0.742	4.746*	0.104	1.153	-0.040	2.574
	(0.665)	(1.928)	(0.395)	(0.293)	(-0.110)	(0.966)
East Midlands	1.239	1.971	-0.690	0.142	0.354	0.774

	(0.703)	(0.879)	(-0.421)	(0.035)	(0.227)	(0.264)
West Midlands	2.488	-0.522	0.013	0.771	-0.029	0.507
	(1.445)	(-0.195)	(0.053)	(0.218)	(-0.242)	(0.182)
East of England	-0.690	5.167**	0.179	-3.710	0.268	2.832
	(-0.354)	(1.983)	(0.319)	(-0.866)	(0.458)	(0.895)
London	-2.559*	3.962	-0.400	0.591	0.067	2.228
	(-1.731)	(1.513)	(-0.618)	(0.219)	(0.073)	(0.671)
South East	-3.427*	1.962	-0.183	-3.267	-0.363	0.331
	(-1.663)	(0.586)	(-0.949)	(-0.612)	(-0.647)	(0.081)
South West	2.237	0.560	0.056	2.031	0.546	1.257
	(1.580)	(0.213)	(0.589)	(0.475)	(1.569)	(0.388)
Wales	-0.488	-0.856	-0.298	3.725	0.028	1.673
	(-0.674)	(-0.492)	(-0.344)	(0.339)	(0.130)	(0.610)
Scotland	-0.946	-0.986	-0.319	1.740	-0.014	0.671
	(-0.572)	(-0.437)	(-0.186)	(0.170)	(-0.321)	(0.194)
Constant		312.919***		240.458***		150.495***
		(6.044)		(2.464)		(2.849)

Notes: The omitted variables are age group 50-54, no qualification, poor health, having own home with paying mortgage and North East; t-statistics in parentheses; ∗ significant at 10%-level; ∗∗ significant at 5%-level; ∗∗∗ significant at 1%-level; High outcome group: Female.

The results show that the gender differences in retirement are explained mostly by the differences in unobservable characteristics. There are no marked differences in either the explained or the unexplained parts of the gender disparity over 20 years. Taking account of the characteristics, 17 per cent of the actual gap is explained by differences in endowment effects, whereas almost 83 per cent of the gap is attributable to differences in unobservable factors in the early 1990s. Even though there is an improvement in the gender gap during the period, this has been reversed after the crisis period.

The specific decomposition method suggests that the gap in the outcome could be reduced by closing the gap in characteristics with positive contributions while widening the gap in characteristics with negative contributions[9]. Some changes that may be conducive to the higher retirement rate among females are dependent on the level of their education, deterioration in health status, their income and other household effects. When specific factor contributions are considered, the results from Yun's decomposition model show that the role of age changed over time. It imposes no fixed pattern on gender differentials.

Health affects the gender gap in the retirement patterns through the differences in characteristics as their coefficients are statistically significant. The positive effect of the excellent health dominates the negative effects of worse health groups compared to poor one due to the differences in observable factors except for the 2012-2013 period. The marital effect on the gender disparity in retirement probabilities produces different patterns. The salient point is that the effect of marital status enlarges the gender gap over the differences in observable factors, whereas it reduces the gender disparity based on differences in coefficients. Marital status is found to be one of the most significant contributing factors increasing the gender gap owing to the changes in endowment especially for the initial period, while this effect lowers the gender disparity based on the differences in coefficients that is mostly found as insignificant. As another household factor, the impact of caring responsibilities on the gender gap in the retirement is somewhat smaller than the other factors in the decomposition model except for its positive effects in reducing the gender disparity owing to the differences in the endowment part for both the

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[9] A positive coefficient in the endowment part indicates the expected reduction in gender differentials of being retired if females were equal to males. On the other hand, a negative coefficient associated with the differences in coefficients shows the expected increase in the gender gap if females had the same behavioural responses as males. See Yun (2004) and Kalb et al. (2012) for detailed explanations.

crisis and post-crisis periods. However, the other coefficients estimated for the contribution of caring responsibility in explaining gender gap are found to be insignificant.

Almost a third of the explained gap in the probability of retirement between women and men is attributed to educational attainments in the first wave. On the other hand, this effect based on the differences in the unexplained part notably reduces over time and turns out to be negative, increasing the gender gap during the crisis period. However, education has more impact on the gender gap owing to the changes in coefficients. Looking at the results in more details, attainment of at least a university degree contributes most to the decrease in the female-male disparity in retirement decisions. This effect is based on differences in observable characteristics. However, a lower level of education expands the gap more in favour of males by the crisis period.

The income variables make considerable contributions to explaining the gender gap in the retirement behaviours. Hourly earnings have a significant positive impact on the gender gap favouring women. However, this positive contribution declined during the 20-year period. It negatively affects the gender gap against females after the crisis owing to the differences in observable factors although the corresponding coefficient is found to be insignificant in 2012-2013. Another notable finding is that a highly remarkable adverse coefficient effect surpasses the positive composition effect leading to a considerable expansion in favour of men in the gender gap. Non-labour income also has a substantial impact on explaining the gender disparity in the retirement decisions of older people. Non-labour income widens the gender gap by nearly 21 per cent owing to the differences in observable characteristics. Further, it extends the gap by more than 100 per cent due to the differences in the coefficients at the beginning of the 1990s. Thus, non-labour income is found to be the most contributing factor affecting the gender gap for the period of 1991–1992. On the other hand, the positive contribution based on the gender gap owing to the differences in endowment effect is dominated by the negative contribution based on differences in coefficients in the last period. As for the income of other household members, the gender gap is reduced based on the differences in observable factors. However, this positive attribution reduces significantly over time. The other wealth effect, pension eligibility, also has a negative contribution, expanding the gap by 20 per cent in the first period and 23 per cent at the latest period. The coefficients based on differences in coefficients were found to be insignificant.

Housing tenure has a different impact on the gender gap in retirement decisions. The coefficient effects for the set of dummies, owning house and rent, were found to be insignificant. On the other hand, the endowment effects of both sets of dummies are found to be responsible for a more significant portion of the reduction in the gender gap for the exit decision of the elderly. It should be noted that owning a house is the main factor to contribute positively to the gender gap.

The household characteristics such as having children under the age of 16 and number of people at a pensionable age in the household induce different patterns on the gender differences in retirement decisions. The effect of having children under 16 increases the gender gap by almost 18 per cent in the first period when the significance of the endowment effect is taken into account. On the other hand, the positive impact stemming from the differences in coefficients increased the gap by 7 per cent in the most recent period. The number of pensionable-age people in the household is positively associated with narrowing the gender gap in the retirement of the elderly in the post-crisis period. Its effect is attributed to the decrease in gender differences by 13 per cent based on the changes in observable characteristics. However, its effect negatively contributes to the gender differences against women due to differences in the unobservable group in the crisis period. The other coefficients were found to be insignificant. Lastly, the endowment effects of regional dummies do not explain much of variation of the gender gap. Most coefficients are insignificant.

4.2. Estimation Results by Fairlie Models

The decomposition coefficients estimated in Table 4 are drawn from the pooled sample. Taking a pooled sample is advantageous since it incorporates the full market response and does not exclude rapidly growing sub-groups of the population (Fairlie and Robb, 2007). To average across possible ordering combinations and estimate the coefficients of decomposition, we use average decomposition results across 1000 randomly drawn replications while randomising the order of the variables. The percentages in the results are the contributions of the factors to explain gender differences in retirement based on differences in the endowment. By using female coefficients, a very small per cent of the gap is explained by the gender differences in all of the included variables in the first period, 1991–1992. The small contribution is mainly due to the higher negative contributions of some variables, such as non-labour income. In the 2008-2009 period, the gender variation in retirement behaviour has a remarkable increase, and 28 per cent of the gap is explained by the gender differences, whereas 17 per cent of the gap is explained by the gender differences in the latest period. The coefficient of the gender gap, which is given as male/female gap is negative. This result implies that women have disadvantages in the retirement process as they retire earlier than men. Table 4 also presents an estimation of attributions of gender differences in a specific subset of variables to the retirement decisions. The positive per cent (negative coefficient) indicate that gender differences in the

covariates decrease the gender gap in the retirement patterns. On the other hand, the negative per cent (positive coefficient) means a negative attribution to the gap.

Table 4: Fairlie Decomposition Results

	(1)	(2)	(3)
	1991-1992	2008-2009	2012-2013
Male mean	0.262	0.244	0.270
Female mean	0.514	0.439	0.381
M-F Differences	-0.252	-0.194	-0.112
Contributions from Gender Differences			
Age	-0.00134	-0.00513**	-0.00186***
	(-1.136)	(-2.204)	(-3.268)
%	0.53	2.64	1.66
Health	-0.00186	-0.00535***	-0.000543
	(-1.127)	(-3.733)	(-1.119)
%	0.74	2.75	0.49
Spouse/Partner	0.0169***	0.0117***	0.00457***
	(3.639)	(3.785)	(4.323)
%	-6.71	-6.02	-4.09
Housing Tenure	-0.00453**	-0.00789***	-0.00308***
	(-2.369)	(-4.504)	(-5.953)
%	1.80	4.06	2.76
Education	-0.00622***	-0.00106	-0.00456***
	(-2.790)	(-0.287)	(-4.886)
%	2.47	0.55	4.08
Care	-0.000341	-0.00104	-0.000549***
	(-1.067)	(-0.975)	(-3.179)
%	0.14	0.53	0.49
ln (Hourly E)	-0.0210**	-0.0139**	0.00185
	(-2.098)	(-1.976)	(0.677)
%	8.34	7.15	-1.66
ln (Non-Lab Inc.)	0.0123***	-0.0119***	-0.00287***
	(6.499)	(-5.503)	(-4.088)
%	-4.88	6.12	2.57
ln (Other HH Inc.)	-0.00569*	-0.00714***	-0.00230***
	(-1.652)	(-3.078)	(-4.076)

%	2.26	3.67	2.06
Children	0.00120	0.00122	-0.00137*
	(1.100)	(0.829)	(-1.960)
%	-0.48	-0.63	1.23
No of Pens Age	0.00131	-0.0226***	-0.0121***
	(0.194)	(-2.863)	(-4.330)
%	-0.52	11.62	10.83
Pension	0.0110***	0.00757***	0.00364***
	(5.266)	(3.401)	(7.395)
%	-4.37	-3.89	-3.26
Region	0.000168	0.000424	9.56e-06
	(0.434)	(0.923)	(0.106)
%	-0.07	-0.22	-0.01
All income variables	0.002	-0.055	-0.019
%	-0.75	28.33	17.15
N	1,956	2,586	9,414

Notes: (1) All specifications use coefficient estimates from the full sample of both genders. (2) Contribution estimates are mean values of the decomposition using 1000 subsamples of females. (3) T-statistics are reported in parentheses below contribution estimates.

The estimates indicating contributions to the gender disparity differ substantially in some covariates through periods. While age differences between females and males explain only a small part of the gap in the first BHPS wave, the effect of age on the gender gap slightly increases in both crisis and post-crisis periods. Another result found using Fairlie decomposition model is that gender differences in health have no significant effect and almost no contribution to the gap in the outcome for the older people in the first and last periods. One reason may be that the negative effect of one of the health levels is dominated by the positive effects of the other levels, so the net effect is almost none. The spousal effect is one of the most important effects on the gender gap in the Fairlie, decomposition model and it has a negative contribution to the gender gap in all waves.

The differences in housing tenure have a positive impact on the gender disparity in retirement, but the difference between males and females in tenure explains a small part of the gap. However, its explanatory power on the gender gap slightly increases over time, making all coefficients statistically significant. The gender differences in educational attainment also provide a substantial and positive contribution to the gap, except for the crisis period. The income variables remarkably contribute to the gender differences in retirement behaviour as well. The effect of hourly earnings is the strongest of the financial variables for older men and women for the initial period. Conversely, the differences in non-labour income provide a negative contribution to the gap, and only 5 per cent of the variation is explained by non-labour income in the first wave. For the latest crisis period, the contributions of the income variables to the explanation of the gender gap are substantially less than those to explanation of the gap in previous periods. Additionally, the income of other household members was found to be a significant financial factor explaining the gap. Regarding the other household characteristics, differences in caring and children responsibilities, have opposite impacts on the gender gap but explain only a small part of the gender disparity in retirement. Both are only significant for the latest period. The reason could be a weak relationship between these responsibilities and the probability of retirement. However, the number of pensionable aged people in the household explains the largest part of the gap, approximately 11.5 and 10.2 percentage points, respectively, for the periods 2008–2009 and 2012–2013. Regional differences were found to be insignificant and explain virtually none of the gender variation in the retirement behaviour of older people in the UK in all periods.

Finally, according to the results obtained by decomposing the factors affecting the retirement behaviours of the elderly, there are significant differences between the results obtained using the decomposition methods of Yun and Fairlie. While 17 per cent of the gender gap is attributable to the differences in the explained part in the Yun decomposition method, the explained

part of the first wave is much lower using Fairlie's method. However, the differences between these two methods in explaining the gender gap decline in the crisis period. After the crisis period, both models give similar results for the contribution of observable factors in the gender gap. Moreover, the results of the Fairlie decomposition method are based on the differences in characteristics (explained part) and provide evidence only about how much of the differences in the retirement behaviour between male and female groups can be explained by the differences in each variable used in the model. On the other hand, Yun decomposition analysis also provides detailed decomposition results to explain how the differences in the behavioural response are associated to each factor used in the model (coefficient effect) in addition to the results based on the characteristics effect (Yun, 2004). Therefore, the proportion of the covariates that explain the gender gap is different between the two methods. As for the differences in observable factors, both methods indicate the same direction regarding either a positive or a negative contribution of these factors to the gender disparity. However, the explanatory power of factors on the gender gap is much less in the Fairlie model than that found by the Yun method. Another major difference is that both models use different weight procedure for the contribution of each variable based on the differences in characteristics. While Yun (2004) uses a first-order Taylor expansion to linearize the characteristics and coefficient effects at their mean values in the decomposition model, the first term of decomposition component is weighted using coefficient estimates from a pooled sample of two groups suggested by Oaxaca and Ransom (1994) in the Fairlie decomposition method. Furthermore, each observation obtained by drawing a random subsample of females equal in size to the full male sample from the pooled sample is ranked according to the predicted probabilities and matched by their respective rankings (Fairlie, 2005). Hence, the coefficient estimations are sensitive to the order of the variables in the Fairlie model.

5. CONCLUSION

Over the past two decades, older women have made tremendous progress in labour-market participation, and this ongoing upward trend only slowed down during the recession period in the UK. Although more women have recently been staying in the workforce longer as a result of improvements in the working conditions and raising the female state pension age, findings suggest that there are still considerable gender differences in the labour market dependent on changes in both variables and coefficients. From the view of retirement decisions, the gender variation that is associated with both explained part and unexplained part of the gap have not significantly changed over time. However, the effects of both demographic and financial factors causing the gender gap have significantly changed over the 20-year period. The corresponding results derived from the Fairlie decomposition method are less than those found by using Yun decomposition techniques in explaining the gender disparity owing to differences in the endowment except the latest period. The post-crisis period is the only time interval for which both the Yun and Fairlie models converge in explaining the gender gap due to differences in characteristics. When the contribution of each factor to the gender gap is taken into account, the results obtained using the Yun model explain a larger part of the gender gap due to the differences in observable characteristics. One of the main reasons for these differences between the two techniques is the relevance of path dependence, which is attributed to the fact that Fairlie decomposition estimates could be sensitive to the ordering of variables because of the nonlinearity of the prediction equations (Fairlie, 2015). Secondly, the weights used for the contribution of each variable to the characteristics effect are different in both models. Hence, comparing these two models, the Yun model gives more precise results to determine the effects of both individual and household factors on the gender differences in the retirement process and how the contributions of these factors change through the given period.

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