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ABSTRACTING AND INDEXING

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MACROECONOMIC VARIABLES AND VARIATIONS IN DIASPORA REMITTANCES IN KENYA

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ABSTRACT

This paper investigates the effect of macroeconomic variables on variations in diaspora remittances in Kenya. Kenya has experienced a steady growth in the annual volume of diaspora remittances recorded over period. Remittances have become a major source of foreign exchange and a key driver of economic growth as underscored in the Kenya vision 2030. Quarterly trends on remittances show many variations. The analysis using OLS Model revealed that, exchange rates, interest rates, inflation rates and real GDP jointly were responsible for the variation in the value of diaspora remittances at R^2 of 63.36%. There is a direct relationship between exchange rates, interest rates and diaspora remittances, while indirect relationship between inflation rate and diaspora remittances. Real GDP rates have no significant relationship. Policies to limit foreign exchange market intervention would allow capital flows to stabilize by the exchange rate movements from medium to long-term periods, thus eliminating the effects on the interest rate structure.

Keywords: Macroeconomic Variables, Diaspora Remittances, Kenya
JEL Classification: P34, P43, 016

1. INTRODUCTION

Many individuals in developing countries, to cope with poverty and exploit international career opportunities, have adopted international migration. According to Kemegue & Owusu-Sekyere (2010), Kenya like any other sub-Saharan Africa country is prone to challenges such as political instability, economic instability, unemployment, inter-clan conflicts and religious conflicts. These factors singly or cooperatively have led many individuals to migrate to other countries that are considered more politically and economically stable, peaceful and with better living and working conditions. Kinuthia (2013) adds other factors such as a search for business opportunities and the pursuit of further education as influencing migration of Kenyans to other countries. According to Barajas et al (2010), the significant of these factors has been the search for employment opportunities abroad. This has resulted in an increase in international labor flow among countries, whose consequence has been an increase in inflows of worker remittances into the countries of origin of these migrants.

The term 'diaspora' has different uses and commonly to identify different phenomena. The International Organization for Migration (IOM) and Migration Policy Institute (MPI), (2012), define diaspora as emigrants and their descendants, who live outside the country of their birth or ancestry, either on temporary or permanent basis, yet still maintain affective and material ties to their countries of origin. According to IMF (2006), diaspora remittances are the aggregate diaspora remittances as the total sum of migrant workers' remittances, their compensation and transfers. Migrant worker's remittances include current private transfers from migrant workers who have resided in the host country for more than a year. Migrant compensation refers to the income of the migrants who have resided in the host country for less than twelve months whereas migrant transfers include the net worth of migrants anticipated staying in the host country for more than 12 months.

According to the World Bank report (2014), 232 million international migrants represented 3.2% percent of the total world population in the year 2013. Of these figure, 36% constituted migrants from developing nations living in other developing nations, a phenomenon dubbed south-south migration. The World Bank report (2014) also stated that remittances to sub Saharan Africa stood at USD32 billion in the year 2013, and that diaspora remittances were relatively stable, and could behave counter cyclically because migrants often send more when the recipient country is in an economic downturn or experiences a disaster. The sub-Saharan Africa remittances have been more stable than foreign direct investment, private debt, and equity flows. Nevertheless, even small fluctuations in remittance inflows can pose macroeconomic challenges to recipient countries, especially those with large inflows (Mohapatra, *et al*, 2009).

The World Bank Report, (2014), states that Kenya's diaspora remittances grew by an average of 10% in the year 2013 as compared to the year 2012. The reports presented by the central bank of Kenya (CBK) in March 2014 indicate that Kenya's received Diaspora remittances increased from US$ 103.4 million in March 2013 to US$ 119.6 million in March 2014. As at the beginning of 2014, remittances from Kenya's Diaspora were the fourth largest contributors of foreign exchange after revenue from tea, horticulture and tourism. The highest contribution came from North America, followed by Europe and the rest was from other areas of the world. According to central bank of Kenya, these remittances have led to higher savings, investments, and consumption. There is a growing trend in diaspora remittances to the Kenyan economy as evidenced by the upward growth in remittances reported over the recent past and the renewed vigor by the government and financial institutions to develop financial products targeted at the diaspora citizens (Kinuthia 2013).

2. LITERATURE REVIEW

There are many studies carried out to determine the various factors that affect diaspora remittances to their countries of origin. According to Ricketts (2011), these studies have mainly categorized them into microeconomic and macroeconomic factors. Studies carried out by Gupta & hedge (2009), Dustmann & Mestres (2010) and Agarwal & Horowitz (2002) investigated the microeconomic determinants of diaspora remittances. Higgins *et al* (2004), Buch & Kuckulenz (2004) and Ratha (2003) are among the many that have investigated the macroeconomic determinants of diaspora remittances. Bollard *et al* (2009) in their study of 11 major diaspora remittance destination countries, report that there is a positive effect of migrant education levels and the amount remitted, the higher income earned by highly educated migrants explains their higher remittance levels back home. They however report that there is a mixed relationship between education levels and the likelihood of remitting. Niimi *et al* (2008) reports that highly educated migrants remit less to their home countries. This is collaborated by Adams Jr (2008), who reports that the skill composition of a country's migrants influences diaspora remittances to that country. Countries with a larger share of educated migrants receive less per capita remittances as compared to countries with a larger share of less educated migrants. This is because high skilled migrants make lower remittances as they are less likely to return to their home countries, and most often bring along their family members to their resident countries. On the other hand, migrants with low education levels are likely to return home and do not bring along their family members hence the need to remit money to cater for their upkeep (Adams Jr, 2008).

Sing *et al* (2009), notes that migrants usually make decisions on how much to remit back home based on their own income and the income of their family at home. Where their income is higher than the income of the family members back at home, there is more remittance to cushion against economic hardships facing their family members. Higgins *et al* (2004) state that, the receiving country's income levels are reflective of the poverty levels and have negative relationship with remittance inflows. Chami *et al* (2003) note that income differentials between the home country and remitting country influences diaspora remittances.

McKinnon & Ohno (1997), explain that foreign exchange rates influence diaspora remittances across borders. They state that exchange rates affect Diaspora's investment in financial investment portfolio and other foreign investment facilities. Exchange rate fluctuations result in capital gains or losses (Ndungu 2000, Were *et al* 2013). Faini (1994) presents findings in favor of the fact that real exchange rate depreciation of the home country's currency had a significant effect on remittances. They report that in the end, Diaspora remittances increase when the exchange rate depreciates or devalues. Alleyne (2008) explains that this can be as a result of migrants desire to capitalize on the opportunity to acquire assets or to counter the negative effect of rising

domestic prices synonymous with a depreciating currency. This is also pointing to the prevalence of the 'wealth' effect as put forward by Bougha-Hagbe (2006).

According to Singh *et al* (2009), remittances may reflect a portfolio choice about investment opportunities in the receiving country. Consequently, the interest rate differential between the host and home country of the migrant would influence the likelihood of diaspora remittances. The higher the interest rates in the financial markets in the home country, the more likely it is that migrants will remit funds for investment to earn greater returns. According to Vargas-Silva & Huang (2005), the remitting country's macroeconomic conditions significantly influenced remittance levels and frequency than those in the receiving country. Their study reveals that migrants consider the prevailing economic conditions in the host country relative to those in their home country in determining whether to remit and when. Those of Ricketts (2011) reports that unemployment levels in the US influenced remittance inflows to Jamaica corroborate the study findings. Gupta (2005) also reports that diaspora remittances were greater when the economic conditions in the host countries were robust, noting that remittances were higher when employment levels in the US were higher. Lin (2011) states that diaspora remittances to the Tonga republic increased with decreasing unemployment levels in the migrant's host countries.

Ojapinwa (2012) reports that, factors that affect diaspora remittances among other factors are inflation rates in the host countries. According to El-Sakka & Mcnabb (1999), inflation affects remittances both directly and indirectly. They explain that high rates of inflation in the home country could cause increased migration because real income would be unstable in the home country. The high migration has the effect of increasing remittances as migrants send back money because of the altruism motive. They also explain that inflation may erode the domestic currency's purchasing power thus reducing the incentive to remit money to their home countries.

Alleyne, *et al* (2008) in their study of remittance inflows to the Caribbean, reveal that among other factors, real GDP is a significant determinant of the decision of the migrants to remit money back to their home country. Bougha-Hagbe (2006) also reports that real GDP in morocco inversely affect the amount of diaspora remittances to the country. Lueth & Ruiz-Arranz (2007) who found that diaspora remittances to Sri-lanka were positively related and pro-cyclical further corroborate the results. Lin (2011) also reports that, the real GDP in the remitting countries influenced remittances to the Tongan republic. A study by Elbadawi & Rocha (1992) reported that there is no significant relationship between the home country's GDP and remittance inflows to the country.

From the above review, there are different factors that influence diaspora remittance inflows to receiving countries. Despite the fact that diaspora remittances were the fourth largest contributors of foreign exchange after revenue from tea, horticulture and tourism (CBK report 2014), there is also expected upward growth in remittances due to the renewed vigor by the government and financial institutions to develop financial products targeted at the diaspora citizens of Kenya. There are seasonal variations in the diaspora remittances received in Kenya and there is need to explore the reason behind such variations. This study therefore looks at the determinants of diaspora remittance variations by evaluating the effects of macroeconomic variables, exchange rates, domestic interest rates, real GDP growth rates and inflation rates on diaspora remittances in Kenya.

3. DATA AND METHODOLOGY

The study used the explanatory research design with aim to evaluate the behavior of dependent variable in response to changes in the behavior of the independent variables. The study used **s**econdary, quarterly averages data from the Central Bank of Kenya and the Kenya National Bureau of Statistics, about inflation rates, domestic interest rates, nominal USD/KES exchange rates, and real GDP and diaspora remittances for 45 quarters for the period starting January 2004 to March 2015. Figures on diaspora remittances were for the first time published as from January 2004, hence the starting study period. Ordinary Least Squares (OLS), a time series linear regression model to analyze the effects of the independent variables on the observed values of diaspora remittances.

3.1. Model Specification

The predictive study model;

$DR_t = \beta_0 + \beta_1 EXR_t + \beta_2 INTR_t + \beta_3 INFR_t + \beta_4 RGDP_t + \varepsilon$ (1)

Where;

DR= Diaspora Remittances

β_0 = Constant Coefficient

$\beta_1, \beta_2, \beta_3, \beta_4$ = coefficient of independent variables

EXR = exchange rate

INTR= domestic interest rate (91-day Treasury bill)

RGDP = real GDP growth rate

INFR = inflation level.

ε = error term

t= time

The magnitude of the impact traced by log linear regression model;

$LN(DR_t) = \beta_0 + \beta_1 LN(EXR_t) + \beta_2 LN(INTR_t) + \beta_3 LN(INFR_t) + \beta_4 ln(RGDP_t) + \varepsilon$ (II)

LN = Log is the natural logarithm

4. FINDINGS AND DISCUSSIONS

4.1. Descriptive Statistics and Diagnostic Tests

The DR graph in Figure 1 shows that the Diaspora Remittances has been rising steadily over the study period. This may be because of the increase in number of Kenyan citizen in other foreign countries. The other variables depend on level of economic performance and management, which had many fluctuations during the study period.

Figure 1: Graphical Trend Movement in Variables

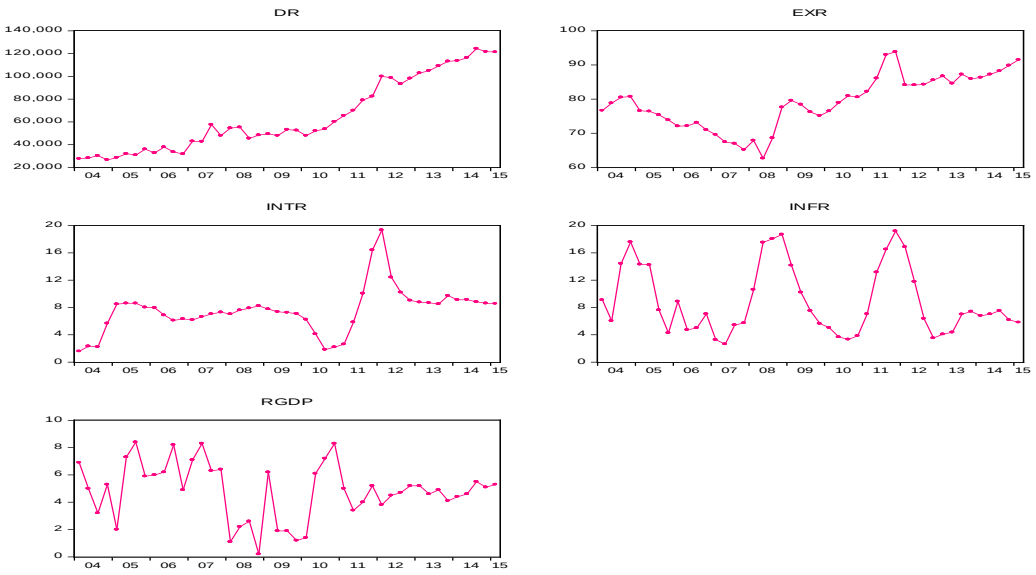

Table 1: Descriptive Statistics Diagnostic Test Results

Measures	LNDR	LNEXR	LNINTR	LNINFR	LNRGDP
Mean	10.95641	4.366279	1.910486	2.032731	1.419604
Median	10.88223	4.368659	2.050699	1.953028	1.609438
Maximum	11.73160	4.541907	2.962865	2.954216	2.128232
Minimum	10.18899	4.137500	0.457425	0.965716	-1.609438
Std. Dev.	0.492946	0.099364	0.530412	0.556117	0.689527
Skewness	0.127846	-0.315572	-1.193910	0.130149	-2.272046
Kurtosis	1.734735	2.379069	4.329244	1.955763	9.635156
Jarque-Bera	3.124266	1.469810	14.00357	2.171599	121.2639
Probability	0.209688	0.479551	0.000910	0.337632	0.000000
Sum	493.0386	196.4826	85.97185	91.47291	63.88218
Sum Sq. Dev.	10.69183	0.434423	12.37883	13.60769	20.91966
Observations	45	45	45	45	45

The descriptive statistics for each of the variables studied are represented in log linear showing various indicators of the kind of data collected as mean, median, standard deviation, maximum and minimum levels, skewness, a Jarque-Bera and kurtosis. The skewness coefficients for each log linear variable were less than zero or closer to zero indicating that the distributions of each variable are normal. the negative skewness coefficients indicate that the distribution of the returns is slightly left skewed, implying that appreciation in the exchange rate occur slightly more often than depreciation whereas interest rates and real GDP slightly rises than it falls. The kurtosis for model variables, LN (INTR) and LN (RGDP) are greater than the three (3) for a normal distribution indicating that the underlying distributions of the variables are leptokurtic, whereas the kurtosis of the variables LN (INFRD), LN (DR) and LN (EXR) are slightly less than three (3) Mesokurtic. The Jarque-Bera test for normality indicates that the distribution of the variables have a normal distribution, hence model fit.

Table 2: Correlation Matrix Table

	LNDR	LNEXR	LNINTR	LNINFR	LNRGDP
LNDR	1.000000				
LNEXR	0.646570	1.000000			
LNINTR	0.465680	0.184361	1.000000		
LNINFR	-0.110434	0.097593	0.280376	1.000000	
LNRGDP	0.005782	0.096642	-0.161076	-0.419672	1.000000

All variables have a coefficient of less than 0.8 hence there exists no multicollinearity between them**.**

Table 3. Final Output for Heteroscedasticity Test

Heteroscedasticity Test	F-Statistic	Prob. F (a.k.a P value)	Prob. Chi	R^2	Adjusted R^2
White Test	2.585358	0.0142	0.0387 (0.2691)	0.546794	0.335297
Breusch-Pagan-Godfrey Test	4.895869	0.0026	0.0052 (0.0392)	0.328673	0.261540
Arch Test	3.657435	0.0627	0.0605 (0.0047)	0.080106	0.058204

All the values from the white test and Breusch-pagan-Godfrey gives values that are less than 5% and greater than the 5% critical values for the arch test, meaning that the problem of Heteroscedasticity was corrected by transforming the data into log form. The observation for white test shows p value of 0.0142 less than 0.05. Breusch-Godfrey serial correlation lm test shows p value of 0.0026 less than 0.05 implying that in both cases, the null hypothesis is rejected meaning there is homoscedasticity when OLS is used in white test and Breusch-Godfrey serial correlation lm test as seen in the result. The adjusted r-square in both cases is positive meaning the relationship between the tested variables is positive. The Arch test shows p value of 0.0627 more than 0.05 implying the residual is not Heteroscedastic and the model is desirable.

Table 4. Unit Root Tests Summary for Log Variable

Variable	Test critical values (level)	ADF Test Statistic	Prob*	Coefficient of the variable (-1)	Lag length	INFERENCE
DR	-4.180911* -3.515523** -3.188259***	-3.292389	0.0808	-0.415813	0	I(0) Constant and trend
EXR	-4.180911* -3.515523** -3.188259***	-1.979435	0.5961	-0.158055	0	I(0) Constant and trend
INTR	-2.622585* -1.949097** -1.611824***	-0.256757	0.5875	-0.004266	3	I(0) None
INFR	-2.624057* -1.949319** -1.611711***	-0.842373	0.3448	-0.021137	4	I(0) None
RGDP	-2.619851* -1.948686** -1.612036***	-1.026659	0.2694	-0.074803	1	I(0) None

***Note*:** critical values

* denotes 1% significant level

**denotes 5% level

***denotes 10% level

The Augmented Dickey Fuller (ADF) test for unit root test used to test for stationarity for all the study variables. Further tests at level with intercept and trend shows that the variables are not stationary. In all the above cases, the computed ADF tau statistics are less negative than the MacKinnon critical tau statistics values at 0.05, which is a generalized significance level, therefore the null hypothesis of non-stationary in the time series data are acceptable. The ADF test for the variables in this study has a unit root when exogenous variable is at level with intercept meaning that it does have intercept and trend. The test has a Prob* value for linear model which is greater than 0.05. The ADF critical values compared have a more than test statistic absolute value considered. Therefore, in this case accept the null hypothesis at 5% significant level.

4.2. Regression Analysis

From the output table 5, there is a positive relationship between currency exchange rate and diaspora remittances as p-value is 0.000 < 0.05, a unit increase in exchange rate of KSH/USD leads to 3.0446 increase in diaspora remittances. This implies that when the local currency loses strength, a lot of diaspora remittances flow into the economy to help the shilling by raising the amount or supply of dollar and vice versa. There is a positive relationship between interest rates and diaspora remittances as p-value is 0.001< 0.05, a unit increase in interest rates leads to 0.398 increase in diaspora remittances. The above results imply that the increase in exchange rates and interest rates widens the investment demand at home causing increase in the supply of dollars into the economy. Higher interest rates attracts diaspora capital inflows causing an increase in the demand for local currency to exchange for foreign currency and hence a decrease in demand for foreign

currency. When there is a decrease in demand for foreign currency, the exchange rates would depreciate against the local currency, which eventually would lead to decrease in interest rates causing a decrease in diaspora remittance. The movement in the two variables may explain the seasonal variations in diaspora remittances in Kenya.

Table 5: Log-Linear Regression Output

Variables	Coefficient	t-value	p- value (0.05)
Constant(C)	-2.345845	-1.122293	0.2684
LN(EXR)	3.044641	6.210878	0.0000
LN(INTR)	0.398101	4.225237	0.0001
LN(INFR)	-0.305488	-3.155678	0.0030
LN(RGDP)	-0.092340	-1.207103	0.2345
R^2		0.633600	
F- Statistics		17.29258	
Prob(F-statistic)		0.000000	

The estimation equation of the log-linear model;

LNDR =C (1) + C (2)*LNEXR + C (3)*LNINTR + C (4)*LNINFR + C (5)*LNRGDP

This forms the long run model

LNDR=-2.346+3.045*LNEXR+0.398*LNINTR-0.306*LNINFR- 0.0923*LNRG

There is a negative relationship between inflation rates and diaspora remittances as p-value is 0.003 < 0.05, a unit increase in inflation rate leads to 0.305 decrease in diaspora remittances indicating a negative causality of inflation rate on diaspora remittances. There is insignificant relationship between the real GDP growth rate and diaspora remittances as p-value is 0.235 > 0.05, a unit increase in real GDP growth rate leads to 0.092 decrease in diaspora remittances. The inverse relationship between inflation rates, real GDP rates and diaspora remittances implies that, an increase in domestic inflation would cause the purchasing power of people to decrease and thereby more money sent home to cushion relatives for consumption purposes. However, the inflation may also be a sign of a weakening economy, causing the withheld of investment portion of the diaspora remittances. The withheld portion may be a bigger portion when compared to the consumption portion thereby causing the negative overall effect on the diaspora remittances. As real GDP rate of the economy increases, more people locally earn higher incomes thus reducing the demand for monetary support from relatives in the diaspora.

5. CONCLUSION

The R-square describes how much the independent variables in the model can jointly influence the dependent variable. In this case, the R^2 is 63.36% more than 60%, thus the overall model is a good fit at p-value = 0.000 < 0.05. The Adjusted R^2 = 59.7% of the linear model explain the extent to which the used independent macroeconomic variables determine the magnitude of flow of diaspora remittances into Kenya. Therefore, for Kenya to maintain a steady increase in diaspora remittances, then the Kenyan government has to adopt policies that would maintain the macroeconomic variables at reasonably manageable levels by reducing magnitude fluctuations in the exchange rates and domestic interest rates and constant reduction in inflation rates. The optimal possible approach would be to limit foreign exchange market intervention and thus allow capital flows to stabilize by the exchange rate movements from medium to long-term periods, thus eliminating

the effects on the interest rate structure. Further studies may include other variables that capture the political and environmental factors that may affect diaspora remittances in an economy.

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SUSTAINABILITY OF CURRENT ACCOUNT DEFICITS IN BRICS COUNTRIES

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ABSTRACT

In this article, sustainability of the current account deficit (CAD) for BRICS countries is analyzed in a nonlinear framework. In this respect, Harvey, Leybourne, and Xiao (2008) linearity test and the unit root tests of Sollis (2009) and Kruse (2011) are used. The analysis is based on the quarterly current account (CA) balances as percentages of gross domestic product. Results indicate that the CADs are unsustainable for Brazil and India. However, the sustainability hypothesis is valid for South Africa when considering size nonlinearity.

Keywords: Current account, sustainability, BRICS, unit root, nonlinearity

JEL Classification: C22, F32, H62

1. INTRODUCTION

In this study, we analyzed the mean reverting process of CA for the BRICS countries Brazil, India and South Africa, respectively. These countries have survived the CAD. If the CA of the country is stationary then it can be said that the account is reverting. Conversely, if the CA of the country is not stationary in the long-run then the situation can lead to economic defaults such as bankruptcy and capital outflows (Christopoulos and Le'on-Ledesma 2010, 445). CA adjustment is relative to whether the process is linear or non-linear. In the linear context, CA adjustment is symmetric above and below the long-run equilibrium level. Also, adjustment speed is uncommitted to the extent of displacement from the long-run equilibrium level. Conversely, if the stationary stochastic process that manages the CA adjustment to its long-run equilibrium is nonlinear, then size and sign of the CA imbalance affect the adjustment process (Clarida, Goretti, and Taylor 2007, 172). The sign (asymmetric adjustment) effect implies that the CA responds in a different manner, depending on the sign of the shock; with the size (asymmetric speed of adjustment) effect the movement of the CA to its core equilibrium level depends upon the deviation from it. If the CAD is bigger than the threshold value, market participants and policy makers perceive this as an economic crisis signal (Chen and Xie 2015, 14; Chen 2014, 542).

We have two main goals to achieve for the BRICS countries. One goal is to ensure that the larger CA imbalances are different from the smaller current imbalances (size matter). The other is to have CADs differ from the CA surpluses (sign matter). First, we verified nonlinear behavior of time series by using Harvey, Leybourne, and Xiao (2008) linearity test and then examined the sign and size nonlinearities via the unit root tests of Sollis (2009) and Kruse (2011).

2. LITERATURE REVIEW

2.1.Brazil

The Brazilian economy displayed reliable economic conditions through raw material revenues and capital inflows, from 2003-2008. During this period, average annual growth was sustained at +5% levels. However, this growth trend was supported primarily by consumption and fewer investments. The main economic problem

was that domestic demand couldn't keep up with local production. Thus, inflation and CADs occured. To improve the business environment and competitiveness and solve the deficient investment situation, protectionism, excessive bureaucracy, high labor costs and tax system have to be regulated (Euler Hermes 2015). Blanchard (1983) investigates the Brazilian external debt problem as a major economic problem. He wanted to determine whether the CAD occured when consumption or investment spending reached high levels since CAs are formed by income and spending conditions. He concluded that if the growth rate of Brazil continues at high levels, consumption will not cause economic problems because debt can be paid in future periods. Also, he determined that if Brazil wants to reduce the CAD, this reduction will be attributed mainly to consumption rather than investment (Blanchard 1983, 187-196).

Regarding savings and investments, Brazil's private and public savings remained at low levels compared to other developing economies. Therefore, increasing domestic savings is imperative for improving external balances and rising investments. To improve savings, reforming the pension system and constraining public consumption should be implemented (International Monetary Fund 2015, 44-45). Donoso and Martin (2014, 749) examined the CA sustainability of Latin American countries. They used linear and nonlinear unit root tests and found that the CAs of Argentina, Brazil, Chile and Paraguay have not been sustainable. Raybaudi, Sola, and Spagnolo (2004) investigated Brazil's long run budget constraint (LRBC) conditions by using Markov's switching ADF model to determine periods when the CA accumulates in a non-stationary occasion. They concluded that Brazil temporarily encountered debt problems. This short-run imbalance can be attributed to future distortions of the LRBC.

2.2. India

The CA of India became unsustainable due to low productivity of government expenditures in 1990 and 1991. In this situation, borrowing costs are rising against the returns of investments (Parikh and Rao 2006, 494). After the balance of payments crisis in 1991, India implemented several reforms in the context of liberalizing the trade policy. The main purpose of these trade policy reforms are to expand the volume of trade, to import capital and technology easily, to increase foreign exchange reserves and finally, to maintain the balance of payments in a sustainable manner (Kubendran 2013). Since the 1950s the CAD of India has been at around 1-2% of the GDP in the long term. However, in the early 1990s, the deficit reached 3.2% of GDP and the CA became unsustainable. This was followed by India's currency crisis. In the 2001-2004 period, CA surpluses occurred, averaging 1.4% of GDP. Conversely, CADs occured from the period of 2008-2010. Deficit level averaged 2.5% of GDP (Singh 2015, 4935).

Parikh and Rao (2006, 503) analyzed the twin deficits problem of India by using cointegration and error correction methods. Their main finding was that reducing the domestic budget deficit can be used as a policy option to sustain India's balance of payments problems. Ramakrishna (2011) investigated the affects of India's trade policy on economic growth, balance of payments and CAD by using co-integration analysis. He concluded that trade liberalization policies positively impacted economic growth, balance of payments and CA balances. Nag and Mukherjee (2012) examined the long-term relationship between exports and imports of India by using unit root test and cointegration methods. They concluded that macroeconomic policies are not sufficient to sustain the trade deficit. Kubendran (2013) analyzed the CA sustainability of India. He found that the CAD became unsustainable because of the negative conditions in merchandise trade. If the government implements restrictions on import, the trade deficit and CAD can be more manageable. Suresh and Tiwari (2014) examined the twin deficits for the Indian economy by using Structural VAR analysis. They found that the fiscal deficit positively affected the CAD and twin deficit problems remained. Singh (2015) investigated the CA sustainability of India. He found that there is a long-term relationship between imports and exports in India. He asserts that rising export earnings and accumulative foreign exchange reserves are important for sustaining the CAD in the short run.

2.3.South Africa

Before 2003, there was not a process in place that was used to manage the CADs and surpluses in South Africa. Conversely, after 2003, the deficit grew in a stable phase and reached peak levels in 2008 at 7.4% of GDP (Kearney and Odusola 2011, 22). The CAD of South Africa averaged 5.5% of GDP from 2012-2014. Net capital

inflows accesses to the South Africa were increased from $2.7 billion in 1993 to $50.7 billion in 2012.This capital accumulation was used to enhance the foreign exchange reserves and to finance CADs (Smit, Grobler, and Nel 2014, 616).

Strauss (2015) asserts that foreign direct investment inflows can be upgraded to support the CAD. An equilibrium of balance of payments over the long run could be a result of foreign direct investments (Strauss 2015, 13). Increasing savings rates and reducing consumption levels are important policy approaches for sustaining the CA in South Africa (Frankel and Sturzenegger 2008, 2). Searle and Mama (2010) investigated the sustainability of CADs in South Africa by using Engle and Granger ADF test in the period of 1994:1 to 2003:2. They concluded that the South African CAD is sustainable.

3. DATA AND METHODOLOGY

The quarterly CA balances of Brazil, India and South Africa as percentages of GDP have constituted the data set of this study. The data has been obtained from the website of the Organization for Economic Cooperation and Development (OECD). The sample periods, which vary based on available data, are 1996: 1-2014: 4 for Brazil, 2004: 2-2011: 2 for India and 1960: 1-2011: 1 for South Africa.

In this study, sustainability of the CA balance has been examined by using the approach of Trehan and Walsh (1991) and Hakkio and Rush (1991) for the intertemporal budget constraint. This approach implies that the CA balance can be sustainable if the long-term budget constraint is ensured by any important feedback on domestic savings and investments and any important variation on budget deficits. According to Trehan and Walsh (1991), the stationary CA is sufficient to provide the intertemporal budget constraint. International investors can be lent to an economy if they expect that the current value of the future stream of net exports surpluses equals the current stock of foreign debt. The present value of economy's net resource transfers to foreigners must equal the value of the economy's initial debt to them. A sufficient condition for that equality to hold is that the CA is stationary. When the growth rate of an economy is positive, CA sustainability can be ensured if the ratio $y_t = CA_t/Y_t$ is stationary. This condition indicates that CA sustainability is possible with permanently CADs as long as they do not grow faster than output in terms of expected value. Thus, the sustainability hypothesis indicates that the debt to GDP ratio is constant in the long-run.

The linearity test proposed by Harvey, Leybourne, and Xiao (2008) is called the W_λ test. It can be applied when the order of integration of the time series under investigation is unknown. The proposed test is calculated with the following augmented test regressions:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-1}^2 + \beta_3 y_{t-1}^3 + \sum_{j=1}^{p} \beta_{4,j} \Delta y_{t-j} + \epsilon_t \quad (1)$$

$$\Delta y_t = \lambda_1 \Delta y_{t-1} + \lambda_2 (\Delta y_{t-1})^2 + \lambda_3 (\Delta y_{t-1})^3 + \sum_{j=2}^{p} \lambda_{4,j} \Delta y_{t-j} + \epsilon_t \quad (2)$$

For the case of I(0) and I(1) the null hypotheses of linearity are expressed respectively as $H_{0,0}: \beta_2 = \beta_3 = 0$ and $H_{0,1}: \lambda_2 = \lambda_3 = 0$. The standard Wald statistic for testing of $H_{i,0}$ against the alternative of nonlinearity is:

$$W_i = T\left(\frac{RSS_i^r}{RSS_i^u} - 1\right) \quad i = 0,1$$

where T is sample size, RSS_i^u and RSS_i^r are, respectively, the residual sums of squares from the unrestricted and restricted form of the Equation 1 for i=0 and Equation 2 for i=1. The W_λ test statistic is calculated as a weighted average of W_0 and W_1:

$$W_\lambda = (1-\lambda)W_0 + \lambda W_1$$

where λ is a function defined from the standard Dickey-Fuller unit root statistic and the nonparametric stationary statistic of Harris, McCabe, and Leybourne (2003). W_λ follows an asymptotic $X^2(2)$ distribution.

Sollis (2009) has extended the unit root test of Kapetanios, Shin, and Snell (2003) by using an asymmetric exponential smooth transition autoregressive (AESTAR) model that deals with both symmetry and asymmetry

under the alternative hypothesis. The following auxiliary regression is used to test the null hypothesis of unit root against the alternative hypothesis of globally stationary symmetric or asymmetric ESTAR nonlinearity:

$$\Delta y_t = \phi_1 y_{t-1}^3 + \phi_2 y_{t-1}^4 + \sum_{i=1}^{k} \delta_i \Delta y_{t-i} + \eta_t \quad (3)$$

If the null hypothesis of unit root ($H_0: \phi_1 = \phi_2 = 0$) is rejected then $H_0: \phi_2 = 0$ should be tested to determine the type of ESTAR nonlinearity (i.e. symmetric or asymmetric).

Another extension for the unit root test of Kapetanios, Shin, and Snell (2003), which allows for a nonzero location parameter in the exponential transition function, is proposed by Kruse (2011). The author uses the modified Wald test statistic (τ) of Abadir and Distaso (2007) to test $H_0: \delta_1 = \delta_2 = 0$ against $H_1: \delta_1 < 0, \delta_2 \neq 0$ in the following auxiliary regression:

$$\Delta y_t = \delta_1 y_{t-1}^3 + \delta_2 y_{t-1}^2 + \sum_{i=1}^{k} \rho_i \Delta y_{t-i} + \eta_t \quad (4)$$

Using the τ test statistic the null hypothesis of unit root is tested against globally stationary ESTAR. Both Sollis' and Kruse's unit root tests can be applied to raw data, demeaned or detrended data.

4. FINDINGS AND DISCUSSIONS

We have applied the linearity test of Harvey, Leybourne, and Xiao (2008) to test for the presence of nonlinearity in the time series. According to the W_λ test statistics, the null hypothesis of linearity is rejected for Brazil and India at a significance level of 5% and at 1% for South Africa. Since all the series are nonlinear, the stationary of the CA can be examined in a nonlinear framework that considers different adjustment processes based on the size and sign of the CA imbalance. The ESTAR type unit root test of Kruse (2011) is used to test size nonlinearity alone, whereas the AESTAR unit root test of Sollis (2009) allows for the testing of sign and size nonlinearities simultaneously. We have applied the AESTAR and Kruse (2011) unit root tests to the raw, demeaned and detrended data. Unit root test results are reported along with the linearity test results in Table 1. As seen in Table 1, we cannot reject the null hypothesis of unit root even at the 10% significance level for Brazil and India except for the detrended data of India. On the other hand, the null hypothesis is rejected at the 1% significance level for South Africa according to both unit root tests. As pointed out in Cuestas (2013, 236), since the CA to GDP ratio is analyzed against convergence to an equilibrium value, the demeaned data should be focused. Therefore, we have concluded that only the CA to GDP ratio of South Africa is stationary and sustainable among analyzed countries. Furthermore, the CA to GDP ratio of South Africa exhibits symmetric ESTAR nonlinearity, namely that the adjustment towards equilibrium is symmetric.

Table 1: The W_λ Linearity, AESTAR and τ Unit Root Tests Results

		W_λ	$\phi_1 = \phi_2 = 0$	$\phi_2 = 0$	τ
Brazil	Raw data	7.98**	0.61	-	4.12
	Demeaned		1.18	-	2.56
	Detrended		0.85	-	1.89
India	Raw data	8.15**	0.09	-	3.46
	Demeaned		1.59	-	5.68
	Detrended		5.93*	4.38**	35.59***
South Africa	Raw data	12.03***	16.70***	5.11**	32.46***
	Demeaned		16.49***	0.45	32.55***
	Detrended		16.93***	1.22	33.08***

Note: *, ** and *** denote rejection at the 10%, 5% and 1% significance levels, respectively.

5. CONCLUSION

The results of our study indicate that the CAD is not sustainable in Brazil and India. For Brazil; unsustainable conditions can be explained by insufficient savings and investments conditions, deficient business environment and competitiveness, unrelated circumstances between domestic demand and local production. If political regulations are implemented to improve these economic conditions, sustainability of the CA for Brazil can be maintained. Unsustainable conditions for India can be defined to include a high domestic budget deficit, insufficient macroeconomic policies and negative conditions in merchandise trade. If the government wants to reduce the CAD in India, some economic policies can be implemented such as reducing budget deficits and regulations on imports to improve merchandise trade conditions. On the other hand, the CAD is sustainable for South Africa. It can be said that the main factor of the CAD sustainability is a result of capital inflows to South Africa. Our results support the notion that only size matters for the South African CAD sustainability. This implies that the mean reverting process does not depend on the sign of CA. The speed of mean reverting of the CA deficit or surpluses to the equilibrium level is related with the size of the CA deficit or surpluses. Our results for these countries are consistent with those of Donoso and Martin (2014), Raybaudi, Sola, and Spagnolo (2004) which of them find unsustainable CAD for Brazil. Kubendran (2013) result that unsustainable CAD for India. Searle and Mama (2010) results that sustainable CA for South Africa.

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THE EFFECTS OF USING THE CONCEPT MAPPING AND THE TRADITIONAL METHOD ON THE ACADEMIC ACHIEVEMENT OF STUDENTS IN LEARNING THE FUNDAMENTAL TOPICS OF COST ACCOUNTING

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ABSTRACT

This paper aims to compare the effects of using the concept mapping and the traditional method on the academic achievement of students in learning the fundamental topics of cost accounting. The study is based on a quasi-experimental pattern with a matched pretest-posttest control group. The sample group was distributed to the observation (concept mapping) group and the control (traditional method) group as twenty-eight students for each group. The differences between the pre and post tests' score averages revealed that the observation group performed better as the score averages of the observation group decreased less than that of the control group (0.68<3.00). The results show that the concept mapping is more effective on the academic achievement levels of the participating students.

Keywords: Concept mapping, cost accounting, education, meaningful learning.
JEL Classification : I21, M41, M49

1. INTRODUCTION

This study is based on the authors' efforts to reach meaningful learning rather than rote learning in cost accounting classes. During the lectures, the authors noticed that the students had a tendency towards memorizing instead of comprehending; when associated with Bloom's Taxanomy of Learning Domains (Bloom, Engelhart, Furst, Hill and Krathwohl, 1956), this tendency led the authors to pursue the means of promoting higher forms of thinking in education including the analyzing and evaluating concepts, processes, procedures, and principles. Concept mapping stood out as a conspicuous method in this context.

Concept maps are defined as "graphical tools for organizing and representing knowledge" (Novak and Cañas, 2008, p. 1). Based on the learning psychology of David Ausubel (1963; 1968; Ausubel, Novak and Hanesian, 1978), the fundamental idea in cognitive psychology evolved into concept maps in 1972 in the course of J. D. Novak's research program at Cornell University. Novak by himself (1977, 1990, 1991, 1993, 1998, 2002) and together with some other authors (Novak and Gowin, 1984; Novak and Musonda, 1991; Novak and Wandersee, 1991) developed concept mapping, over decades, as a matured method in teaching and learning.

Depending on this background, the aim of this paper is to compare the effects of using concept mapping and traditional method[1] on the academic achievement of students in learning the fundamental topics of cost accounting. To this end, a research was based on a quasi-experimental pattern with a matched pre test-post test control group. Fundamental topics of cost accounting including basic concepts, overall manufacturing costs, activity-based costing, job costing and process costing were incorporated.

[1] Traditional method: Lecturer presentation followed by question & answer sessions.

The paper consists of four sections including the introduction where the background of the study is explained. Then a literature review is revealed with two subsections as accounting and education-related studies. In the third section, the research methodology is exhibited with findings of the research and in the fourth section, the study is concluded with some recommendations for future studies.

2. LITERATURE REVIEW

Over decades, researchers gave an in-depth look to concept mapping through various subjects. Pointing to the goal of this study, relevant literature was reviewed under two subtitles; *accounting-related studies* and *education-related studies* incorporating topics such as learning improvement, decision making, developing curriculum, organizing knowledge, learning assessment and teaching process.

2.1. Accounting Related Studies

Some studies associated concept mapping with learning assessment in accounting education. Litherland, Carmichael and Martinez-Garcia (2013) studied upon an ontology-based e-assessment system in accounting. Their system was called OeLe and used a 'concept map' or 'ontology' of the domain knowledge expressed by subject specialists. Their paper described the potential affordances and demands of the ontology-based assessment. In his paper, Kirkham (2013) presented a theoretical model to address the design and assessment of the accounting practice sets that would enhance learning and provide clearer learning outcomes for first year accounting students, and he noted concept mapping as an enriching learning tool. Ku, Shih and Hung (2014) studied the integration of the idea of concept map into dynamic assessment model for accounting education in vocational high school. The results show that after the intervention of computerized dynamic assessment system, posttest scores were significantly higher than pretest scores. In addition, regardless of learning styles, when students were willing to commit time to follow the guidance, they could result in a good learning progress. Simon (2007) also assessed the usefulness of concept mapping within an accounting education context, but per contra, he did not find any significant differences in the usefulness of the method for students of different ages and genders, yet Asian students generally found the method to be more useful than did the UK students.

A group of researchers approached concept mapping through various aspects of learning such as learning level, learning enhancement and improvement. Chiou (2008) examined whether concept mapping could be used to help students improve their learning achievement and interests. The study indicated that, adopting a concept mapping strategy could significantly improve students' learning achievement compared with the use of a traditional expository teaching method. The study also revealed that most of the students were satisfied with using concept mapping in an advanced accounting course. Ertan, Yucel and Sarac (2014) measured the contribution of concept mapping technique to the effect on students learning level in accounting lessons. They found that concept maps increased the students' achievement. In their paper, Greenberg and Wilner (2015) provided a framework for integrating topics in the cost/managerial accounting course to enhance learning and a detailed discussion of how to proceed with the concept maps as building blocks in the course. Leauby, Szabat and Maas (2010) used concept mapping experimentally in an introductory financial accounting course and tested the hypothesis that student learning in an introductory financial accounting course increases, as measured by examination scores, when traditional methods of instruction are supplemented by concept mapping activities. Their results addressed no statistically significant evidence supporting the stated hypothesis.

Simon (2009, 2010, 2015) diversified his research as to concept mapping and accounting with matters like enriching the understanding, developing curriculum and student participation. Simon (2009) noted concept mapping as a method of making the dialogue between lecturer and student effective and explicit so both can fully participate in the construction of shared understanding. In another study, Simon (2010) described how curriculum concept mapping had been used to assist making changes to an accounting theory module. He concluded that curriculum concept mapping should be useful to support faculty, of all levels of experience, to consider and reconsider both accounting and non-accounting curricula. Simon (2015) also demonstrated how the tool can be used by students to construct their own concept maps and how educator-constructed concept maps can be used as quizzes to encourage more student participation in class.

2.2. Education Related Studies

Education related concept mapping studies display a variety of research topics. Some researchers dealt with assessment issues; Kandiko, Hay and Weller (2012) discussed how mapping techniques were used in university teaching in a humanities subject. They expanded the use of concept mapping as a pedagogical tool, with a focus on reflective learning processes and suggested ways of application of concept maps as a learning and assessment tool to assist the writing and reflection process in the humanities. In their study, Ruiz-Palomino and Martinez-Canas (2013) evaluated concept mapping as a learning tool for the assessment of business management degree students. Soika and Reiska (2014) searched for evidence as to whether the use of concept mapping as an assessment tool could be helpful in measuring meaningful concept acquisition. They concluded that concept mapping method is valid and reliable.

Some other researchers delved into learning issues in concept mapping; Hay, Kinchin and Lygo-Baker (2008) described how concept mapping could be used to transform abstract knowledge and understanding into concrete visual representations that were amenable to comparison and measurement. Their results demonstrated how the quality of learning could be significantly enhanced by the use of concept mapping. Chiou (2009) examined whether a concept mapping strategy could be useful in helping students to improve their learning performance in a business and economics statistics course. The experimental results suggested that adopting a concept mapping strategy can significantly improve student learning achievement in statistics, compared to using traditional textbook exercises, and adopting a collaborative concept mapping improves student achievement even more than using individual concept mapping. Katiliūtė and Daunorienė (2011) asked the opinions of students about the concept mapping task in quality management. The results appeared to indicate that the use of concept maps within a quality management course stimulated meaningful learning and promoted the development of students' learning strategies both individually and as a group. Wu, Hweng, Milrad, Ke and Huang (2012) proposed a computer-based concept map-oriented learning strategy with real-time assessment and feedback. They found their approach could be significantly beneficial to promote learning achievements as well as the learning attitudes of students. Surapaneni and Tekian (2012) introduced concept maps with clinical cases to improve learning of biochemistry course content. Their results revealed higher academic performance with concept mapping compared to the traditional course. Tseng, Chang, Lou, Tan and Chiu . (2012) investigated students' perception of concept maps as a learning tool where knowledge transfer was the goal. Their results revealed that positive concept-mapping perception was helpful for knowledge transfer in five learning stages: acquisition, communication, application, acceptance, and assimilation. Daugherty, Custer, and Dixon (2012) conducted a focus group study to better understand how technology/engineering educators could use concept mapping. They revealed that concept mapping could help technology and engineering teachers to facilitate learning and provide evidence of understanding throughout a learning experience. Elorriaga *et al.* (2013) aimed to test collaborative concept mapping activities using computers in a classroom scenario and to evaluate the possibilities that Elkar-CM[2] offers for collaboratively learning non-technical topics. Results revealed that students evaluated the collaborative concept mapping activities positively and Elkar-CM was evaluated as a suitable tool for collaborative concept mapping. In her paper, Smith (2014) recommended problem-based learning and concept mapping to promote student learning of basic and higher-order thinking skills. Von der Heidt (2015) explained the application of concept mapping to help foster a learning centered approach. She investigated how concept maps are used to measure the change in learning. Her results provided strong evidence for improvement in students' ability to externalize new learned concepts resulting from intensive instruction.

In some studies decision making and critical thinking were seen to be associated with concept mapping. Maas and Burgess-Wilkerson (2012) presented a student concept mapping guide as a template for use in an undergraduate management course, specifically in business communication. They noted that concept mapping is well-entrenched across a wide range of disciplines as an innovative learning tool to improve students' abilities to think in more holistic terms. Harris and Zha (2013) assessed the efficacy of concept mapping for facilitating critical thinking in four sections of an introductory psychology course. They found evidence supporting the construction of concept maps as a strategy for facilitating critical thinking. Kemer, Borders and

[2] Elkar-CM is a multi-lingual and multi-media software program designed for drawing concept maps (CMs) collaboratively.

Willse (2014) concentrated on cognitions of expert supervisors as to preparing, conducting and evaluating their supervision sessions through concept mapping, and found that concept mapping yielded remarkable results for expertise in counseling supervision. Van Bon-Martens *et al.* (2014) aimed to explore the suitability of concept mapping method as a tool to integrate practical knowledge with scientific knowledge in order to improve theory development as a sound basis for practical decision-making. They concluded that in four of the five studies, the resulting concept map was received as a sound basis for practical decision-making. Moattari, Soleimani, Moghaddam and Mehbodi (2014) aimed to determine the effect of clinical concept mapping on discipline-based critical thinking of nursing students. Results of their study revealed a significant difference between the experimental and control groups' critical and cognitive thinking skills and habits of mind regarding identification, justification, and quality of responses. Hassan, Al Somaili, Al Khathami, Al Ghobain and Bin Salih (2015) studied upon improving evidence implementation through cognitive interventions using concept maps which enhance analytical thinking and decision making. They concluded that generic concept maps improved trainees' diagnostic labeling, management and decision-making process.

If organizing knowledge is to be evaluated in the same context, Tseng, Chang, Lou and Hsu (2013) explored that using creative problem solving could promote students' performance of concept mapping. The results showed that meaningful high-level learners successfully applied creative problem solving in constructing concept maps and they presented better performance of concept mapping. In their study, Tanenbaum and Antle (2009) investigated the use of a tangible user interface to engage learners in concept map creation. They described a prototype implementation of the system, presented some preliminary analysis of its ease of use and effectiveness, and discussed how elements of tangible interaction supported concept mapping by helping users organize and structure their knowledge about a domain. They noted the role of physical engagement and embodiment in supporting the mental activity of creating the concept map.

Davies (2011) studied enriching the understanding and offered an outline of the various types of mapping tools available with their advantages and disadvantages. His study supported concept mapping as a tool to enrich understanding, and proposed the use of software to construct maps. Batdi (2014) focused on academic achievement aimed to determine the effect of using concept-mapping technique and traditional methods on the achievement, retention and attitudes of students through meta-analysis. His research showed that concept-mapping technique had a positive and large effect on academic achievement and retention.

Kaşlı, Aytaç and Erdur (2001) introduced concept mapping as a technique utilizing teaching process through information and application examples especially in group working-cooperation environment. Chen and Wang (2012) presented a student-centered teaching model based on concept mapping and problem-solving. They used concept maps as a tool for developing curriculum and evaluating teaching performance.

Rosas and Kane (2012) and Kinchin (2015) made an overview of the relevant literature. Kinchin (2015) aimed to reexamine conclusions drawn by recent analyses of the literature on concept mapping as an educational tool by considering the wider literature on curriculum development, and offered enhanced guidance on the contextualization of concept mapping. Rosas and Kane (2012) conducted a pooled analysis of 69 concept mapping studies to describe characteristics across study phases, generate specific indicators of validity and reliability, and examine the relationship between the selected study characteristics and quality indicators. Results suggested that concept mapping yielded strong internal representational validity and very strong sorting and rating reliability estimates.

3. DATA AND METHODOLOGY

In this section, the research methodology, participants and measurements and assessments of the study are interpreted.

3.1. Methodology

During the research, concept mapping and the traditional method were used, concept mapping studies were executed as after class sessions with the participation of observation group only. The plan, method, activities and materials prepared for the observation group were determined relative to the concept mapping method

while the plan, method, activities and materials prepared for the control group were determined relative to the traditional method. Independent variables had similar effects on the two groups.

The research was executed during the 2015 spring semester at Bandirma Onyedi Eylul University, Faculty of Economic and Administrative Sciences, Business Management Department. Learning and teaching techniques in accordance with concept mapping and the traditional method were used. Fundamental topics of cost accounting such as basic concepts, overall manufacturing costs, activity-based costing, job costing, process costing were incorporated.

The research was based on a quasi-experimental pattern with a matched pre test-post test control group. Pre and post tests were formed from the very same questions for the sake of consistency; however, the participants were not informed as to this connection. All participating observation and control group students attended to both pre and post tests. The pre test was executed with an aim to determine whether the academic achievement of students in both observation and control groups were well-matched, and to indicate the improvement level, if any had accrued. The post test was executed in order to demonstrate the effectiveness of the concept mapping method. Both tests consisted of three questions, each question was worth four points with twelve points overall. Table-1 below displays the research pattern.

Table 1: Research Pattern

Group	Before Working Group	Teaching-Learning Method	After Working Group
Observation Group	Pre test	Concept mapping	Post test
Control Group	Pre test	Traditional	Post test

3.2. The Participants

For the purpose of the research, the sophomore (third grade) class business management students from Bandirma Onyedi Eylul University, Faculty of Economic and Administrative Sciences were chosen as the study group. The observation and control groups were then formed out of the study group students.

Because extracting chance of the sample units from the universe was not equal, the Non-Random Sampling Method was preferred. In order to select the information–rich cases for in-depth study with regard to the aim of the research, the Purposeful Criterion Sampling was used.

The universe of the research was formed by the sophomore class business management students from Bandirma Onyedi Eylul University, Faculty of Economic and Administrative Sciences in Spring 2015 semester. The sample group included fifty-six students selected from this universe with respect to their grades of Cost Accounting-I Course at Fall 2015 semester on condition of being CB and better. The grade point averages and the GPAs of these students varied between 2.00 to 4.00. Because these fifty-six students were homogeneous as to their academic achievements, they were distributed to the observation and control groups equally as twenty-eight students for each group.

The study group students gained up to 10% credits for the Cost Accounting-II course according to their number of attendance over fourteen weeks as a promotion for participation.

3.3. Measurements and Assessments

Throughout the fourteen week spring semester, all the participating study group students attended to the usual cost accounting course over three hours a week. In the course of these regular lessons, the traditional method of teaching and learning was conducted. The observation group, more than that of the control group, attended to additional one and a half hours of concept mapping working group weekly. Working group schedule is given in Appendix 1.

Twenty-eight students participating to the observation group were distributed into four subgroups consisting seven students in each, and subgroups A, B, C and D were formed.

The observation group studies began with an introduction of concept mapping notion and method, the students were then introduced with the aim, limitations and methodology of the research, finally the instances of incorporating cost accounting topics with concept mapping were exemplified by the lecturers. Students in the observation group were given take-home working topics in order to prepare appropriate concept maps for each topic. The observation group students then presented the concept maps they had prepared to the study group on a weekly basis. Examples of the concept maps prepared by the observation group participants are given in Appendix 2.

Since pre and post tests were formed from the very same questions for the sake of consistency, both tests consisted of three questions, each question was worth four points with twelve points overall. While evaluating the post test, the points were given to the observation group students for the correct listings of the concepts and the objects/events, and for their reasonable allocations at the individual concept maps. Students participating to the observation group were asked to answer the post test questions using the concept maps, and the control group were asked to answer the questions in a multiple-choice form. The points were given to the control group students for every correct choice they made.

4. FINDINGS AND DISCUSSIONS

Table-2 displays the pre and post test scores, grades from the courses of Cost Accounting-I and Cost Accounting-II, and the GPAs of the students in the observation and control groups (See Table 2 in Appendix 1). Students' GPAs vary between 2.00 and 4.00. Twenty-eight of the participating fifty-six students' GPAs are between 2.00 and 3.00, while the remaining twenty-eight participants' GPAs are higher then 3.00. As for the grades from the courses of the Cost Accounting-I and Cost Accounting-II, the participants' grade line up between AA and CB; however, two participants seemed to fail in the Cost Accounting-II with FF grades. One of these two students participated to the observation group while the other to the control group. The failed student in the observation group scored eight of the twelve points given at the pre test and zero points at the post test. The other failed student in the control group scored four of the twelve points given at both pre and post tests.

Averages of pre and post test score evaluations and their differences are given at the Table-3 below, regarding this, average of pre test scores of observation group participants is 7.52 while average of pre test scores of the control group participants is 7.71. There is a 1.16% difference between the pre test scores of observation and control groups. These findings demonstrate that the control group is more successful as for the pre test evaluations.

Table 3: Averages of Pre and Post Test Score Evaluations and Their Differences

	Pre Test	Post Test	Differences
Observation Group	7.57	6.89	0.68
Control Group	7.71	4.71	3.0
Points Difference	0.14	2.18	2.14
% Difference	1.16%	18.16%	17%

When it comes to the post test scores, the difference between the observation and control groups seemed to increase to 18.16%. The observation group achieved an average of 6.89 points at the post test, while the control group had 4.71 points in average. These results displayed a 2.18 points difference between the post test scores of the observation and the control groups.

As of the differences of the pre and post tests' score averages; the control group achieved 7.71 points average at the pre test, and got only 4.71 points in average at the post test with 3.00 points difference where the observation group achieved 7.57 points in average at the pre test and got 6.89 points in average at the post test with 0.68 points difference. In other words, the score averages of the observation group decreased less than that of the control group (0.68<3.00) noting that the concept mapping studies which were executed with the observation group were effective.

Table-4 below shows the percentage differences among the pre and post test scores of the observation group participants. Regarding these results, the post test scores of the twelve of the twenty-eight students in the observation group increased in respect with the pre test scores while post test scores of the eleven students decreased related to their pre test scores. Five students' scores remained the same. The number of the students who increased pre test scores and percentage difference in their pre test scores can be stated as; 8.3% increase in five students, 33.3% increase in four students, and 16.6%, 25% and 66.6% increases in one student, respectively. The number of the students who decreased the pre test scores and the percentage difference in their pre test scores can be stated as; 66.6% decrease in three students, 50% and 16.6% decreases in two students, and 41.6%, 33.3%, 25% and 8.3% decreases in one student, respectively.

Table 4: Observation Group Test Results

Order No.	Participant No.	Pre Test	Post Test	% Change
1	4	4	12	(+) 66.6
2	5	4	8	(+) 33.3
3	8	8	10	(+) 16.6
4	10	8	8	0
5	12	8	8	0
6	15	4	8	(+) 33.3
7	16	8	2	(-) 50
8	18	8	9	(+) 8.3
9	19	8	6	(-) 16.6
10	24	8	2	(-) 50
11	25	8	0	(-) 66.6
12	29	8	6	(-) 16.6
13	30	8	8	0
14	31	8	3	(-) 41.6
15	32	8	9	(+) 8.3
16	34	8	0	(-) 66.6
17	35	8	9	(+) 8.3
18	38	12	9	(-) 25
19	41	12	8	(-) 33.3
20	43	4	7	(+) 25
21	44	8	9	(+) 8.3
22	47	4	8	(+) 33.3
23	49	8	0	(-) 66.6
24	50	8	7	(-) 8.3
25	51	8	9	(+) 8.3
26	53	8	12	(+) 33.3
27	55	8	8	0
28	56	8	8	0

Note:	
Increased	12 students
Decreased	11 students
Unchanged	5 students
TOTAL	28 students

Table-5 below shows the percentage differences among the pre and post test scores of the control group participants. Regarding these results, the post test scores of the four of the twenty-eight students in the control group increased in respect with the pre test scores while the post test scores of the seventeen students decreased related to their pre test scores. Seven students' scores remained the same. The number of the students who increased the pre test scores and the percentage difference in their pre test scores can be stated as; 33.3% increase in three students, and %66.6 increase in one student only. The number of the students who decreased the pre test scores and the percentage difference in their pre test scores can be stated as; 33.3% decrease in ten students, 66.6% decrease in five students, and 100% decrease in two students.

Table 5: Control Group Test Results

Order No.	Participant No.	Pre Test	Post Test	% Change
1	1	4	0	(-) 33.3
2	2	8	0	(-) 66.6
3	3	12	8	(-) 33.3
4	6	8	4	(-) 33.3
5	7	12	8	(-) 33.3
6	9	8	8	0
7	11	12	0	(-) 100
8	13	12	0	(-) 100
9	14	8	4	(-) 33.3
10	17	8	4	(-) 33.3
11	20	8	4	(-) 33.3
12	21	4	4	0
13	22	8	8	0
14	23	8	4	(-) 33.3
15	26	4	12	(+) 66.6
16	27	4	8	(+) 33.3
17	28	4	8	(+) 33.3
18	33	8	8	0
19	36	8	4	(-) 33.3
20	37	8	0	(-) 66.6
21	39	12	4	(-) 66.6
22	40	8	4	(-) 33.3
23	42	12	4	(-) 66.6
24	45	4	4	0
25	46	4	4	0
26	48	4	8	(+) 33.3
27	52	8	8	0
28	54	8	0	(-) 66.6

Note:

Increased	*4 students*
Decreased	*17 students*
Unchanged	*7 students*
TOTAL	*28 students*

In Table-6, a comparison of Cost Accounting-I and Cost Accounting-II grades of the participating students in both the observation and the control group is displayed (See Table 6 in Appendix 1). Twenty-four of the fifty-six participants increased their grades while nine of them decreased in the related courses. The grades of the twenty-three students remained the same.

Thirty-eight out of the fifty-six sample students were female while only eighteen were male, correspondingly in the observation group twenty out of twenty-eight sample students were female where only eight were male. Table-7 below demonstrates the change in the grades with respect to gender. Among the fifty-six participants,

sixteen female and eight male students increased their grades while seven female and two male students decreased theirs. Fifteen female and eight male students' grades remained the same.

Table 7: The Change in Grades with Respect to Gender

Gender	Number of Students Increasing Grade	Number of Students Decreasing Grade	Number of Students Remainig Grade	Total
Male	8	2	8	18
Female	16	7	15	38
Total	24	9	23	56

Table-8 below demonstrates the change in the test results of the observation group with respect to gender. Among the twenty-eight participants, nine female and three male students increased their grades while seven female and four male students decreased theirs. Four female and one male students' grades remained the same.

Table 8: The Change in Test Results of Observation Group with Respect to Gender

Gender	Number of Students Increasing Score	Number of Students Decreasing Score	Number of Students Remainig Score	Total
Male	3	4	1	8
Female	9	7	4	20
Total	12	11	5	28

In respect with the findings above, it is possible to conclude that the observation group achieved cognitive learning through after-class concept mapping studies and that concept mapping is more effective on the participating students' academic achievements than that of the traditional methods. The findings of the research are in accordance with the literature such as Kirkham (2013), Litherland, et al. (2013), Ku, et al.(2014), Chiou (2008) and Ertan, et al. (2014) indicating that using concept mapping method increases students' learning achievements and the level of meaningful learning. The findings of the research also coincide with Simon (2009) noting that concept mapping encourages more student participation in class, and with Simon (2015) showing that concept mapping is useful in making the in-class dialogue more effective and explicit to construct shared understanding between the lecturer and the students. On the contrary, the findings of the research are in contradiction with the literature such as Simon (2007) and Leaby et al. (2010) stating that concept mapping caused no significant differences in students' learning achievements.

5. CONCLUSION

Concept mapping is a technique that helps students perform meaningful learning. Integrity and expressiveness of the knowledge gained through concept mapping make students learn in an ambitious and consistent manner. By avoiding rote learning and determining the relations among the concepts, students can improve their problem solving abilities in such a way to assist them in their professional life and expertise after graduation.

Considering cost accounting practices, all activities from manufacturing to sales are being evaluated and assessed in terms of the cost, expenditure and income. Furthermore, periodic inspections are carried out to reduce the costs and to extract non-profit components from the business process. For the purposes of business management, integrity and expressiveness of the critical information such as cost accounting is expected to be more permanent and rewarding when gained through concept mapping.

In this study, the effects of using concept mapping and the traditional method on the academic achievement of students while learning the fundamental topics of cost accounting were investigated and it was seen that concept mapping had positive effects on students' learning skills. Before starting concept mapping studies with students, a pre-test was applied to determine their achievements in the cost accounting course. It was observed that the success of the students in the experimental group in which the concepts and subjects were

reinforced using concept maps had increased. Therefore, it is possible to conclude that the use of concept maps provided students to learn at cognitive level by integrating the relevant concepts and giving them the ability to analyze the information and knowledge.

This study is reinforcing the affirmative effects of using concept mapping as a method of teaching and learning cost accounting by emphasizing the increase in students' learning achievements and the level of meaningful learning. The authors recommend future studies as to the different and innovative ways and means of incorporating concept mapping in accounting classes may contribute to the literature.

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APPENDIX 1: Working Group Schedule and Tables

Weekly Concept Mapping Working Group Schedule	
Week 1	Introduction: Explanation of concept mapping and research methodology, topic assignment
Week 2	First presentations: Groups A and B
Week 3	First presentations: Groups C and D
Week 4	First presentations: Altering and adjusting
Week 5	Second presentations: Groups A and B
Week 6	Second presentations: Groups C and D
Week 7	Second presentations: Altering and adjusting
Week 8	Third presentations: Groups A and B
Week 9	Third presentations: Groups C and D
Week 10	Third presentations: Altering and adjusting
Week 11	Fourth presentations: Groups A and B
Week 12	Fourth presentations: Groups C and D
Week 13	Fourth presentations: Altering and adjusting
Week 14	Final week: Overall assessment, evaluation and conclusion

Table 2: Research Data Set

Order No.	Pre Test	Post Test		Grade of Cost Accounting I	Grade of Cost Accounting II	GPA
		Observation Group	Control Group			
1	4		0	BB	CB	2.29
2	8		0	CB	BA	2.62
3	12		8	CB	CC	2.00
4	4	12		CB	BA	2.74
5	4	8		CB	CB	2.22
6	8		4	BA	BA	2.50
7	12		8	BA	BA	3.09
8	8	10		AA	AA	3.04
9	8		8	CB	CC	2.45
10	8	8		CB	BB	2.50
11	12		0	BA	BA	3.34
12	8	8		AA	BA	3.52
13	12		0	AA	AA	3.47
14	8		4	AA	BA	3.00
15	4	8		BA	BA	2.33
16	8	2		AA	AA	3.57
17	8		4	CB	BB	2.72
18	8	9		BB	BA	2.50
19	8	6		CB	AA	2.33
20	8		4	BB	BB	2.24
21	4		4	BB	FF	2.31
22	8		8	AA	BA	3.01
23	8		4	CB	CB	2.60
24	8	2		BB	BA	2.79
25	8	0		BB	FF	2.01
26	4		12	CB	BB	2.50
27	4		8	BB	BA	3.33
28	4		8	CB	AA	3.10
29	8	6		CB	BB	2.59
30	8	8		BB	BA	2.37
31	8	3		AA	AA	3.38
32	8	9		BB	BB	2.50
33	8		8	CB	CB	2.38
34	8	0		CB	BA	3.25
35	8	9		CB	BA	3.22
36	8		4	BB	BB	2.37
37	8		0	BB	BA	2.11
38	12	9		AA	AA	3.62
39	12		4	BB	BB	3.00
40	8		4	BB	BB	3.02
41	12	8		CB	AA	2.00
42	12		4	BB	BB	2.75

Table 2: Research Data Set

Order No.	Pre Test	Post Test		Grade of Cost Accounting I	Grade of Cost Accounting II	GPA
		Observation Group	Control Group			
43	4	7		CB	BB	2.55
44	8	9		CB	CB	2.44
45	4		4	CB	BA	2.96
46	4		4	CB	BA	2.34
47	4	8		BB	BB	2.36
48	4		8	BB	BA	2.10
49	8	0		AA	BA	2.74
50	8	7		BB	BA	2.83
51	8	9		CB	BA	3.13
52	8		8	AA	AA	3.43
53	8	12		BB	BA	3.00
54	8		0	BA	BA	2.66
55	8	8		CB	CB	2.03
56	8	8		CB	BA	3.06

Note: Letter grades in the table are equivalent of numerical grades on 4.0 scale as mentioned below:
AA = 4.0
BA = 3.5
BB = 3.0
CB = 2.5
CC = 2.0

Table 6: Direction of Change in Grades of Observation and Control Groups

Order No.	Grade of Cost Accounting I	Grade of Cost Accounting II	Direction of Change in Grade
1	BB	CB	↓
2	CB	BA	↑
3	CB	CC	↓
4	CB	BA	↑
5	CB	CB	↔
6	BA	BA	↔
7	BA	BA	↔
8	AA	AA	↔
9	CB	CC	↓
10	CB	BB	↑
11	BA	BA	↔
12	AA	BA	↓
13	AA	AA	↔
14	AA	BA	↓
15	BA	BA	↔
16	AA	AA	↔
17	CB	BB	↑
18	BB	BA	↑
19	CB	AA	↑
20	BB	BB	↔
21	BB	FF	↓
22	AA	BA	↓
23	CB	CB	↔
24	BB	BA	↑
25	BB	FF	↓
26	CB	BB	↑
27	BB	BA	↑
28	CB	AA	↑
29	CB	BB	↑
30	BB	BA	↑
31	AA	AA	↔
32	BB	BB	↔
33	CB	CB	↔
34	CB	BA	↑
35	CB	BA	↑
36	BB	BB	↔
37	BB	BA	↑
38	AA	AA	↔
39	BB	BB	↔
40	BB	BB	↔
41	CB	AA	↑
42	BB	BB	↔
43	CB	BB	↑
44	CB	CB	↔
45	CB	BA	↑
46	CB	BA	↑

Table 6: Direction of Change in Grades of Observation and Control Groups

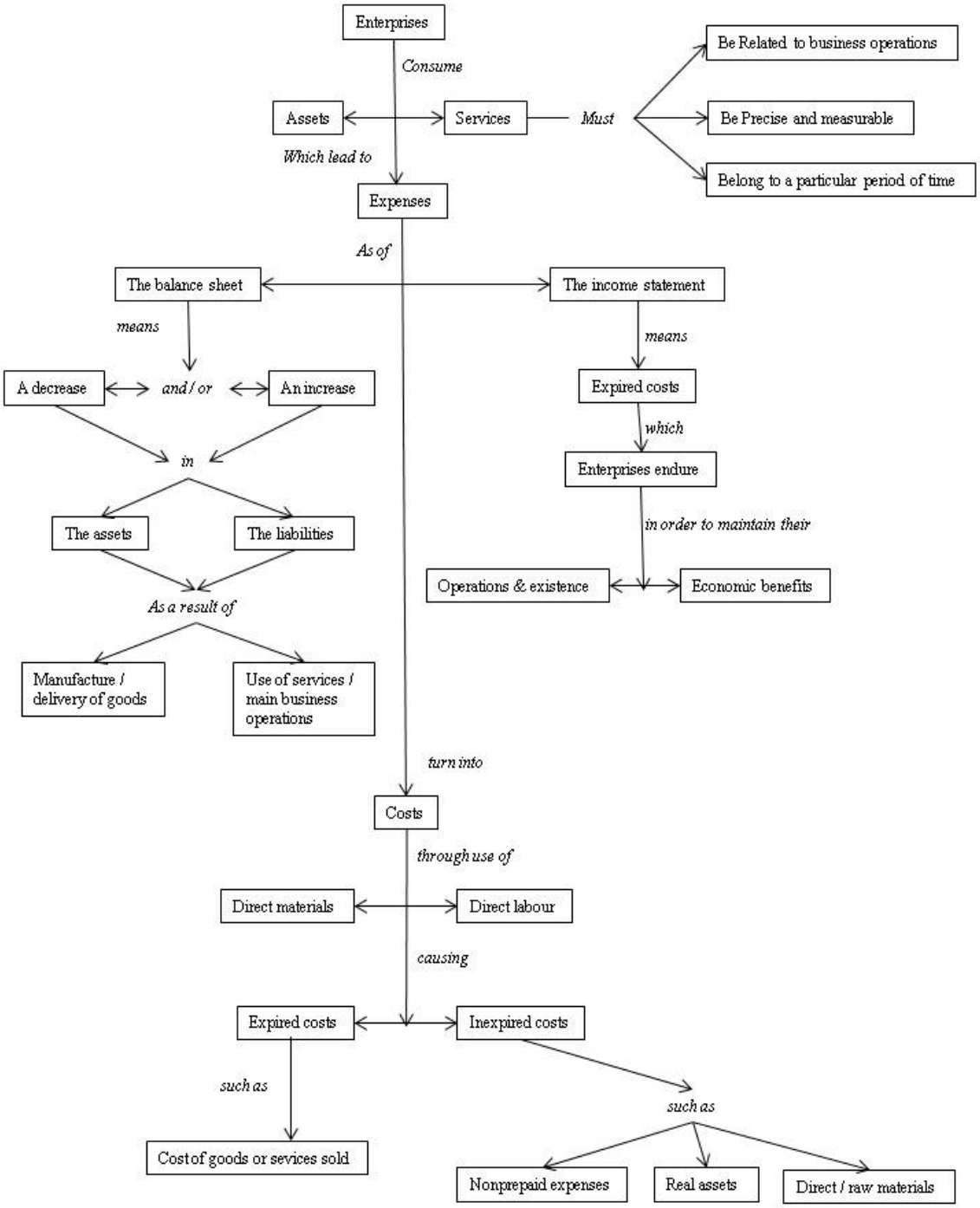
Order No.	Grade of Cost Accounting I	Grade of Cost Accounting II	Direction of Change in Grade
47	BB	BB	↔
48	BB	BA	↑
49	AA	BA	↓
50	BB	BA	↑
51	CB	BA	↑
52	AA	AA	↔
53	BB	BA	↑
54	BA	BA	↔
55	CB	CB	↔
56	CB	BA	↑

Note:

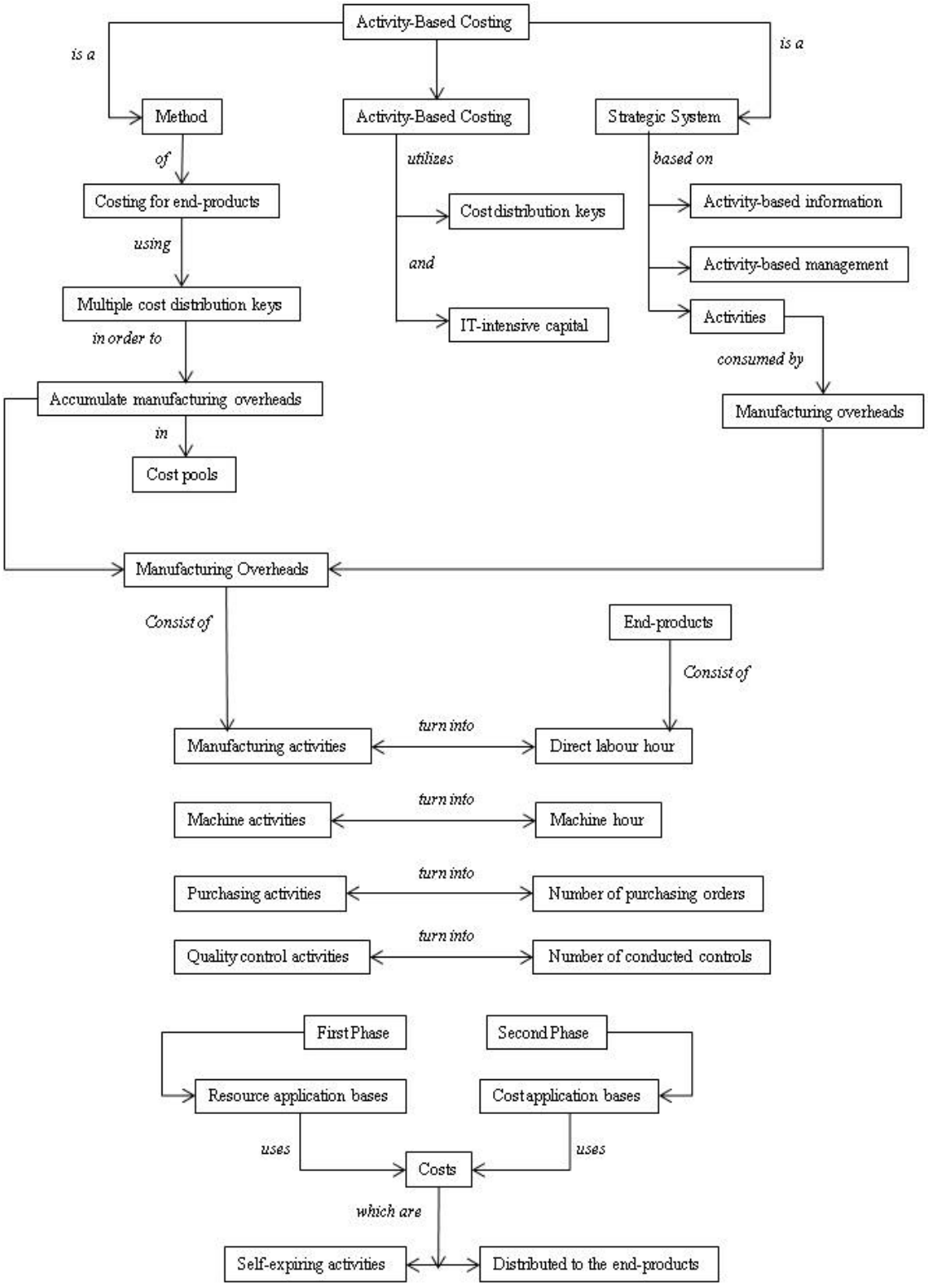
Increased ↑	*24 students*
Decreased ↓	*9 students*
Unchanged ↔	*23 students*
TOTAL	*56 students*

APPENDIX 2. Examples of the Concept Maps Prepared by Observation Group Participants

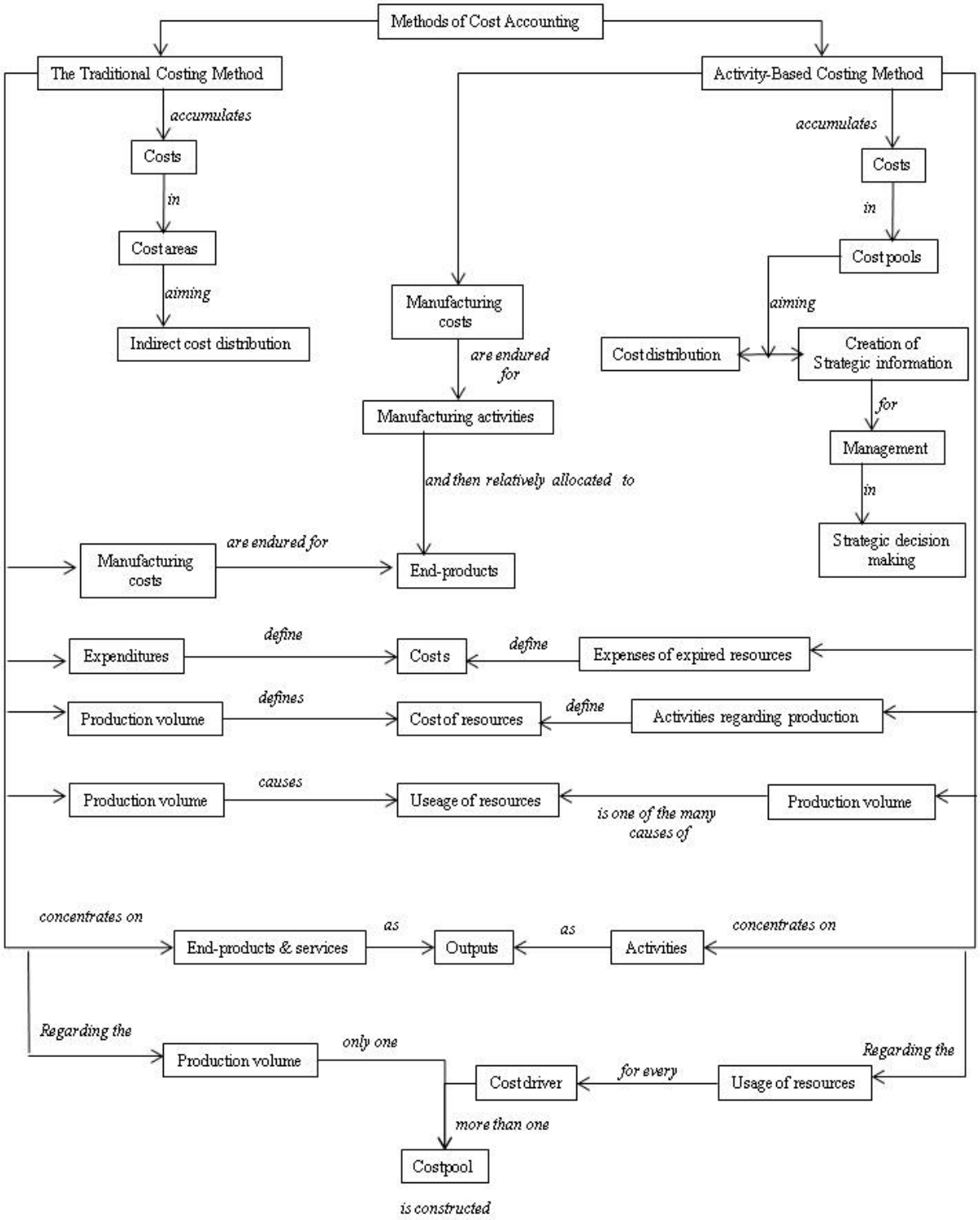
First Presentations:



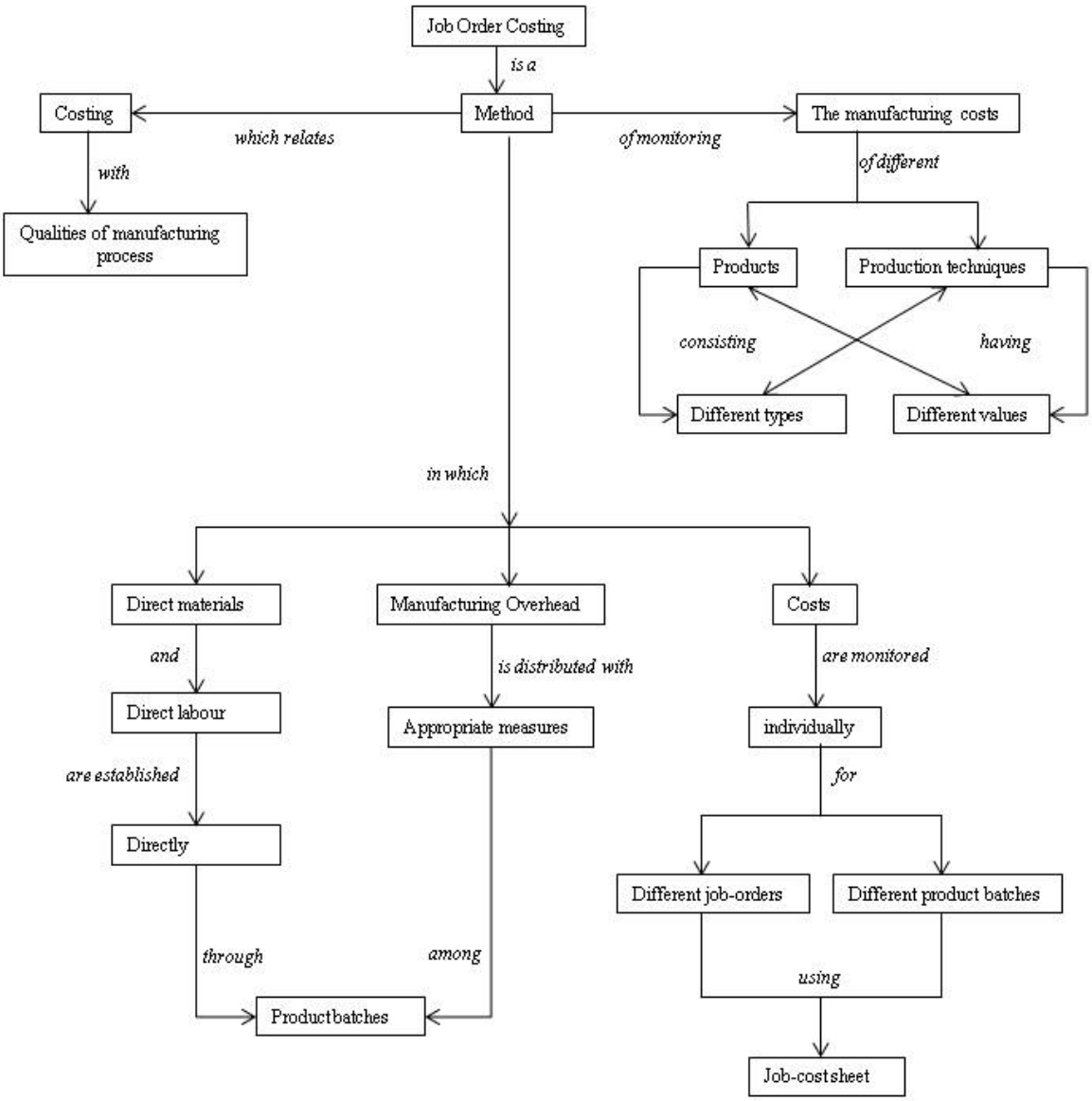
Second Presentations:



Third Presentations:



Fourth Presentations:



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EXPENDITURE OF FIRMS ON R&D IN DIFFERENT STRUCTURAL MARKETS

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ABSTRACT

The focus in this paper is on structural and cooperative reasons of a market contribute to maximizing the expenditure of firms on R&D. We conclude that decline intensity of competition and increase the density of cooperation are important matters in increasing the expenditure on R&D. This in turn has a role in enhancing the individual and social outcomes. Moreover, growth of the market size does not necessarily imply low investments. The results suggest that the competition intensity determines the investment rate acquired from increasing new firms.

Keywords: R&D expenditure; Market structure; Network size; Equilibrium outcome
JEL Classification: D21, D92, L11

1. INTRODUCTION

Research and development (R&D) is defined as activities that are achieved by one agent or a group of agents to create a new discovery or knowledge that may be used for new applications. It is an essential source of innovation, which is in turn an important factor in the growth of output in the economy as a whole. For firms, participating in R&D maintains their positions in a market through reducing the cost of the production (cost-reducing alliances), enhancing or developing existing products, finding new processes or producing new technologiesthat could open up new markets (Hagedoorn, 1993; Hagedoorn et al., 2000; Hagedoorn, 2002; Mowery e tal., 1998; Powell, 1998; Goyal and Moraga-Gonzalez, 2001; Brown and Petersen, 2009).

We consider the case when firms conduct R&D to reduce the cost of the production under a network game. The importance of introducing the network concept to R&D model appears through contributing tools from the former theme to understanding the effects of R&D agreements on expenditures by firms. In addition, the network approach exhibits several categories of R&D partnerships, so that different structures of collaborative networks can be described. From these networks there are individually and socially desirable networks that may consist with each other.

The R&D network model used in this paper is based on Goyal and Moraga-Gonzalez (2001), and it can be briefly described as follows. The structure that displays firms cooperate in R&D is described as an R&D network where the players (firms) are represented by nodes and the R&D partnerships (agreements) are represented by links. The model consists of three stages: network formation, R&D investment and market competition. The marginal cost of the production decreases with increasing the individual investment and investment of other firms in the network, depending on R&D spillovers. Specifically, if any two firms cooperate, they are linked in the network and the spillover between them is set one; otherwise there is a free spillover less than one (the ability totakeadvantage of partners' R&D investment).

In Goyal and Moraga-Gonzalez model, the cost of the cooperation is ignored and the spillover is set as a free parameter from the network structure. The authors considered Cournot competition for regular and irregular networks for independent and homogeneous goods. They found that if goods are independent, the equilibrium outcomes increase with growing R&D agreements. They also found that if goods are homogeneous, the individual profit increases with agreements, but the individual investment and social welfare are negatively affected by the R&D agreements.

The aim of this paper is to investigate theoretically the relationship between the financing of R&D by firms and the formation of the market and the network. In particular, we use a linear inverse demand function under Cournot competition for independent and homogeneous goods to answer the following questions:

1) What are the factors that affect the finance of R&D?
2) What are the impacts of the investment and cooperation of firms in R&D on the individual and social outcomes?
3) How does increase of the number of firms in a marketplace affect the financing of R&D?

The outcomes of this paper can be summarized as follows. Firstly, we study some factors affecting the investment of firms in R&D. The first factor is the market structure and this means the impact of possible relationships between products on investment in R&D. There is a reverse relationship between differentiation rate of the products and the expenditure of firms on R&D i.e., the increase of the differentiation rate causes a decline in the expenditure. Meaning that, the investment of firms in R&D for differentiated goods is higher than the investment for substituted goods. The second factor is the network structure and this means the impact of the R&D cooperative relationships and the spillover on the investment. If firms are in a highly differentiated market, developing the network structure encourages firms to invest in R&D. Also, the R&D spillover resulting from building the network always enhances the investment. In contrast, if firms are in a highly substituted market, the R&D agreements and spillovers reduce the investment. This suggests that the expenditure of large firms on R&D is massive in a differentiated market, but low in a substituted market.

Secondly, we examine the role of the investment and cooperation in R&D on the outcomes. The results emphasize the importance of investment in R&D, but the benefit behind the cooperation depends on the market structure. In a differentiated market, the relative increase in spending on R&D and forming new partnerships always lead to a rise in the individual and social outcomes. Also, the increase of the R&D spillover positively affects the equilibrium outcomes. However, in a substituted market, the increase of the R&D agreements of the individuals leads to (i) a large decline in the social outcomes for most values of the spillover, (ii)rise in the individual profit. The positive relation between the payoff and the R&D agreements in all market cases reflects the rising importance of the cooperation to remaining firms in the market. A consistent pattern of this result emerges from the empirical works. Most of the studies found that the distribution of the cooperative links (agreements) is irregular and the development of the network is based on the existence of the highly connected firms (Riccaboni and Pammolli , 2002; Powell et al., 2005; Tomasello et al., 2013).

Finally, we explore the impact of the growth of the market size on the R&D investment.[1] When the goods are independent, the investments remain constant in spite of the market growth. However, when the goods are homogeneous, the effect of growing the market depends on the R&D network structure. The growth of the market positively affects the R&D investment if the density of the network is high; otherwise the R&D investment declines with growing the market size. This is in line with the empirical findings where most studies found that the cooperation exhibit characteristic features of complex networks (Tomasello et al., 2013; Ahuja , 2000; Stuart, 2000; Verspagen and Duysters , 2004).

The paper proceeds as follows. In the next section, we review some economic and networks issues and introduce the R&D model. In the third section, we provide the main study. In the fourth section, we conclude our study.

[1] When we say size of the market or the network, we mean the number of firms.

2. LITERATURE REVIEW

2.1. R&D Network Model

A network is an ordered pair $G(N, E)$ where $N = \{i, j\ k, \dots\}$ is a set of nodes connected by links $E = \{ij, jk, \dots\}$ (Jackson, 2008). We consider undirected networks in the sense that each link between any two nodes runs in both directions. We also consider simple networks that have no parallel links (links that have the same end nodes) or loops (links where their start and end nodes are the same). For *n* nodes and *m* links, the density of the network is $D = 2m/(n(n-1))$. The set of nodes that are linked to node *i* is defined as a neighborset of node *i*: $N_i = \{j \in N : ij \in E\}$. The second order neighbors of node *i* is the set of all nodes sharing links with neighbors of node *i* such that those nodes are not linked to *i*: $N_i^{(2)} = \bigcup_{j \in N_i} N_j \{i \cup N_i\}$. The length of the first order neighbors' set of node i is a degree of that node (i.e., $|N_i| = \deg(i)$). The network is called *k*-regular if $\deg(i) = k$ for each $i \in N$.

In the R&D network, nodes represent firms and links represent R&D agreements. We consider the R&D network model by Goyal and Moraga-Gonzalez (2001) where the cooperation is modeled as a three-stage game. In the first stage, firms choose their partners and the cooperating firms are joining together via links to form a network. The R&D spillover occurs between any two non-cooperating firms. In the second stage, firms choose their level of cost reducing R&D investment. In the third stage, firms compete by setting their products (Cournot competition).

In Goyal and Moraga-Gonzalez, the effective R&D investment for each firm is described by the following equation:

$$X_i = x_i + \sum_{j \in N_i} x_j + \beta \sum_{k \notin N_i} x_k, \quad i = 1, \dots, n, \tag{1}$$

where $x_i > 0$ denotes R&D investment of firm *i*, N_i is the set of firms participating in R&D with firm *i* and $\beta \in [0,1)$ is the R&D spillover. The effective R&D investment reduces firm *i*'s marginal cost of production:

$$\mathrm{c_i} = \overline{\mathrm{c}} - \mathrm{x_i} - \sum_{\mathrm{j} \in \mathrm{N_i}} \mathrm{x_j} - \beta \sum_{\mathrm{k} \notin \mathrm{N_i}} \mathrm{x_k}, \quad \mathrm{i} = 1, \dots, \mathrm{n}, \tag{2}$$

where $\overline{c}$ is the marginal cost of the production.

2.2. Economic Model

We consider the inverse demand function given in the following equation:

$$\mathrm{D_i^{-1}} = \mathrm{p_i} = \mathrm{a} - \mathrm{q_i} - \lambda \sum_{\mathrm{j} \neq \mathrm{i}} \mathrm{q_j}, \quad \mathrm{i} = 1, \dots, \mathrm{n}, \tag{3}$$

where *a* > 0 denotes the willingness of consumers to pay and the parameters *pi* and *qi* are the price and quantity of good *i*, respectively. The parameter $\lambda \in [-1, 1]$ is the differentiation degree where if $\lambda < 0$ ($\lambda > 0$), goods are complements (substitutes). In this paper, we consider the case when the goods are independent ($\lambda = 0$) and homogeneous ($\lambda = 1$).

The effort is assumed to be costly and the function of the cost is quadratic, so that the cost of R&D is γx_i^2, where $\gamma > 0$ D'Aspremont and Jacquemin (1988). The profit *πi* for firm *i* is the difference between revenue and production cost minus the cost of R&D

$$\pi_{\mathrm{i}} = (\mathrm{p_i} - \mathrm{c_i})\mathrm{q_i} = (\mathrm{a} - \mathrm{q_i} - \lambda \sum_{\mathrm{j} \neq \mathrm{i}}^{\mathrm{n}} \mathrm{q_j} - \mathrm{c_i})\mathrm{q_i} - \gamma \mathrm{x_i^2}, \tag{4}$$

where c_i is the production cost given by equation 2.

The total Welfare (TW) is the total surplus of consumers plus the industry profit

$$\mathrm{TW} = \frac{(1-\lambda)}{2}\sum_{\mathrm{i}=1}^{\mathrm{n}} \mathrm{q}_{\mathrm{i}}^2 + \frac{\lambda}{2}\left(\sum_{\mathrm{i}=1}^{\mathrm{n}} \mathrm{q}_{\mathrm{i}}\right)^2 + \sum_{\mathrm{i}=1}^{\mathrm{n}} \pi_{\mathrm{i}} \ . \tag{5}$$

For the equilibrium, we assume that the marginal cost $\bar{c}$ is constant and equal for all firms. We identify the subgame perfect Nash equilibrium by using backwards induction. Here, we show the reader how to calculate the equilibria and the final list of the equilibria is provided in the Appendix.

Under Cournot competition, we solve $\frac{\partial \pi_i}{\partial q_i} = 0$ for any firm i. This yields the best response function of quantity of good *i*:

$$\mathrm{q}_{\mathrm{i}} = \frac{\mathrm{a}-\mathrm{c}_{\mathrm{i}}-\lambda\sum_{\mathrm{j}\neq\mathrm{i}} \mathrm{q}_{\mathrm{j}}}{2}. \tag{6}$$

Substituting the best response functions (equation 6 for each i) into each other yields the symmetric equilibrium that is Nash equilibrium for the production quantity:

$$q_i = \frac{(2-\lambda)a-(2+(n-2)\lambda)c_i+\lambda\sum_{j\neq i} c_j}{(2-\lambda)((n-1)\lambda+2)}\,. \tag{7}$$

By substituting (7) into the profit function (4), the equilibrium profit is[2]

$$\pi_i = \left[\frac{(2-\lambda)a-(2+(n-2)\lambda)c_i+\lambda\sum_{j\neq i} c_j}{(2-\lambda)\big((n-1)\lambda+2\big)}\right]^2 - \gamma x_i^2. \tag{8}$$

Calculating the equilibrium investment x_i depends on the structure of the R&D network. By knowing the structure, we find the cost function *ci* to substitute it into the profit function (8). Then, we calculate the best response function of R&D investment for each firm i ($\frac{\partial \pi_i}{\partial x_i} = 0$). By plugging them into each other, we have the symmetric equilibrium for the R&D investment.

Note that, the parameter $\gamma > 0$ should be high to avoid negative outcomes. To have suitable values of γ, the effort and cost functions should be non-negative and the second order condition for maximizing profit function ($\frac{\partial^2 \pi}{\partial x^2} > 0$) should be satisfied. According to Goyal and Moraga-Gonzalez, we have

$$\begin{cases} \gamma > \max\left\{\frac{an}{4\bar{c}}, \frac{n}{4}\right\} \ if\ \lambda = 0 \\ \gamma > \max\left\{\frac{a}{4\bar{c}}, \frac{n^2}{(n+1)^2}\right\} \ if\ \lambda = 0 \end{cases} \tag{9}$$

[2] Note that the equilibrium profit function can be expressed in a more convenient form for practical calculation: $\pi_i^* = (q_i^*)^2$.

Henceforth, $\gamma^*_{\lambda_0}$ and $\gamma^*_{\lambda_1}$ are suitable values for the equilibrium outcomes under independent and homogeneous goods, respectively.

3. THE OUTCOMES

The expenditure of firms on R&D is affected by several matters. Here, we consider some of these matters that can be divided into two major factors. The first factor is the market structure (i.e., the possible relationship between the products of firms). Therefore, as the substitution rate increases, the competition between firms increases and vice versa. The intensity of the competition between firms has an impact on the strategy of financing of R&D. The second factor is the R&D network structure. The growth of the R&D agreements leads to increase of the density of the network. This in turn affects the strategy of firms in investing in R&D.

3.1. Factors Affecting Expenditure on R&D

The expenditure of firms on R&D is affected by several matters. Here, we consider some of these matters that can be divided into two major factors. The first factor is the market structure (i.e., the possible relationship between the products of firms). Therefore, as the substitution rate increases, the competition between firms increases and vice versa. The intensity of the competition between firms has an impact on the strategy of financin of R&D. The second factor is the R&D network structure. The growth of the R&D agreements leads to increase of the density of the network. This in turn affects the strategy of firms in investing in R&D.

3.1.1. The Market Structure versus Financing Strategy

It is a matter for firms to know who is in a market, whether or not competitor. This does not only impact the strategic interaction of firms in the marketplace in terms of setting the product, but it also impacts the overall outcomes. Meaning that, the individual and social outcomes vary according to the product type of firms.

Comparing the expenditure of firms on R&D for different relationships of goods sheds light on the relation between the firms' position in the market and the R&D investment. In other words, the amount of the expenditure on R&D varies according to the market structure. When firms produce differentiated goods, the financing of R&D is massive compared to the case when they produce substitute goods. As a result of this, as the differentiation rate approaches the lowest (highest) value, the expenditure of firms on R&D reaches the maximum (minimum) amount.

The latter result can be proven for two firms in the industry. The following proposition states that there is a negative relationship between the expenditure of firms on R&D and the differentiation rate.

Proposition 1 *Suppose a duopoly market where firms compete by setting the quantity.*[3] *When the differentiation degree approaches its minimum value, the R&D investment reaches the maximum amount and vice versa.*

The proof is presented in the Appendix.

In the following, we show the impact of the differentiation degree on the investment of firms in R&D for an oligopoly market.[4] We do this by comparing the optimal investment for independent and homogeneous goods under the network concept in absence of the R&D spillover.

Proposition 2 *Suppose an oligopoly market where firms compete by setting the quantities and the R&D cooperation forms a regular network. The R&D investment of firms for independent goods is higher than for homogeneous*
goods.

The proof is presented in the Appendix.

[3] A duopoly market means the market that consists only of two firms.
[4] An oligopoly market means the market that consists of more than two firms.

Figure 1 illustrates the previous result for ten firms in a market. Regardless of the network structure, the figure shows that the expenditure on R&D is higher if firms produce independent goods.

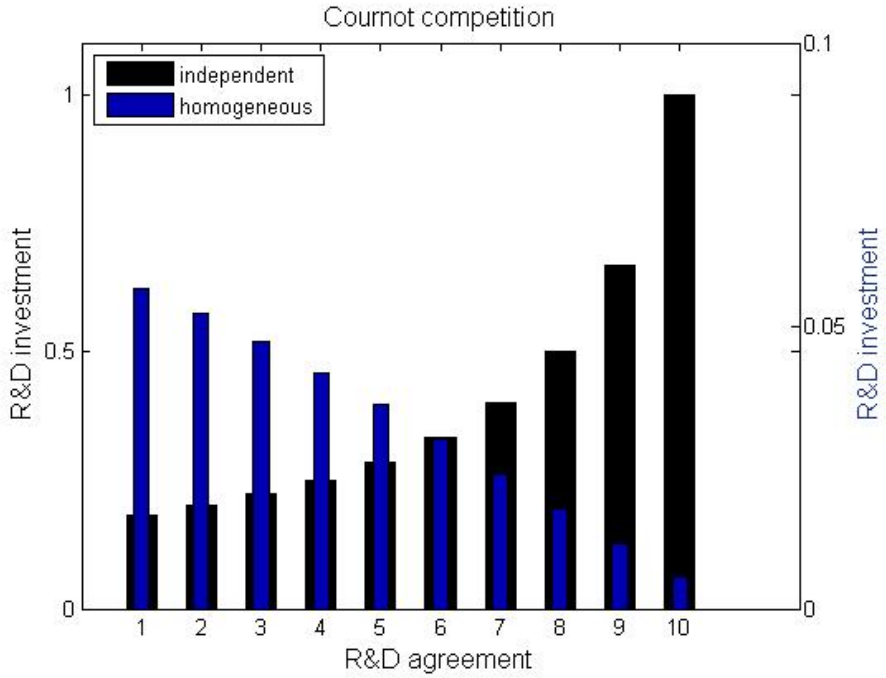
Example 1 *Suppose ten firms compete in a market by the quantities and the R&D cooperation forms a regular network. In the absence of the spillover, the equilibrium investment is plotted for* $a = 12$, $\overline{c} = 10$ *and* $\gamma = \max\{\gamma^*_{\lambda_0}, \gamma^*_{\lambda_1}\} = 3$.

3.1.2. The Network Structure versus Financing Strategy

This section discusses the impact of the density of the cooperation on the strategy of the expenditure on R&D. This includes R&D spillovers resulting from the network structure of the R&D cooperation. In the previous section, we find that the rate of the R&D investment varies according to the product type. In this section, we showthat the impact of the R&D agreements on the investment also varies according to the product type. The results presented in this section were stated by Goyal and Moraga-Gonzalez (2001).

On one hand, when firms produce differentiated goods, the investment of firms in R&D increases with the growing number of R&D agreements. Also, the spillover seems a positive factor in the R&D investment. In the sense that as the spillover increases, the expenditure of firms on R&D increases. On the other hand, when firms produce homogeneous goods, the R&D agreements negatively affect the R&D investment. Meaning that, when the R&D agreements increase, the expenditure on R&D decreases. The spillover in this case is not an encouraging factor for large firms to invest in R&D, but it appears especially important for small firms. Figures 2 and 3 illustrate these results related to the impact of the R&D agreements and the spillover on the strategy of the expenditure on R&D.

Figure 1: Comparison between the Investments in R&D for Independent and Homogeneous Goods.



Regardless of the number of R&D agreements, the expenditure of firms on R&D for independent goods is higher than for homogeneous goods. The outcomes are plotted for $a = 12$, $\overline{c} = 10$, and $\gamma^* = 3$.

In addition, there is an indirect effect of R&D agreements on expenditure. In other words, when any two firms cooperate, how other firms' expenditure affected? The effect varies according to the market structure. If firms are in a weak competitive market, growing the neighborhood of any order raises the investment. This can be

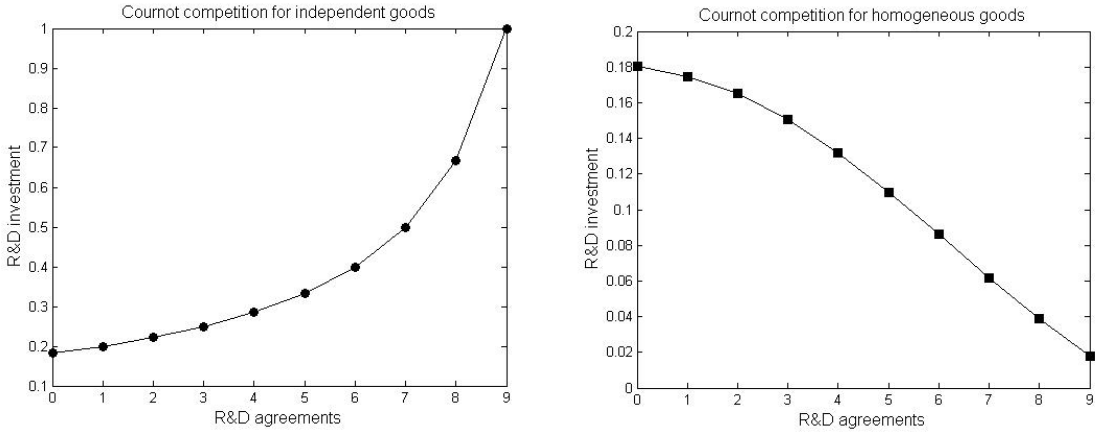
observed by comparing the expenditure of firm 1 in network G_3 with that in network G_1 after the other firms cooperate (see Example 2). However, in a competitive market, increasing the second order neighbors always reduces the investment in R&D.

Example 2 *Suppose an oligopoly market where firms compete by setting the quantities.*

1) Suppose there are ten firms in a market where the R&D cooperation forms a regular network. In the absence of the spillover, Figure 2 shows the impact of the R&D agreements on the strategy of the expenditure on R&D.

2) Suppose there are three firms in a market where the R&D cooperation forms an irregular network. Figure 3 shows the possible R&D relationships and the impact of the R&D spillover on the investment in R&D.

Figure 2: The Financing of R&D versus Growing the Agreements and Spillovers.



If the products are independent, the financing of R&D increases with growing the R&D agreements. In contrast, if the products are homogeneous, the opposite occurs with growing the R&D agreements. The equilibria are plotted for $a = 12$, $\overline{c} = 10$, and $\gamma^*_{\lambda_0} = 3$and $\gamma^*_{\lambda_1} = 1$.

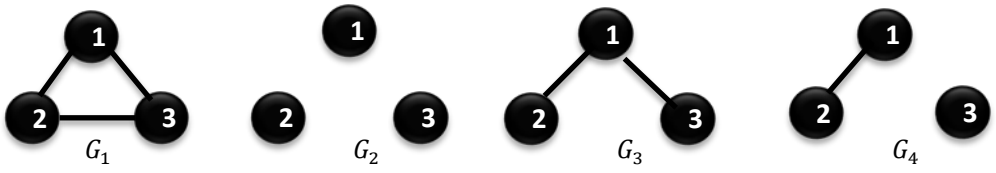
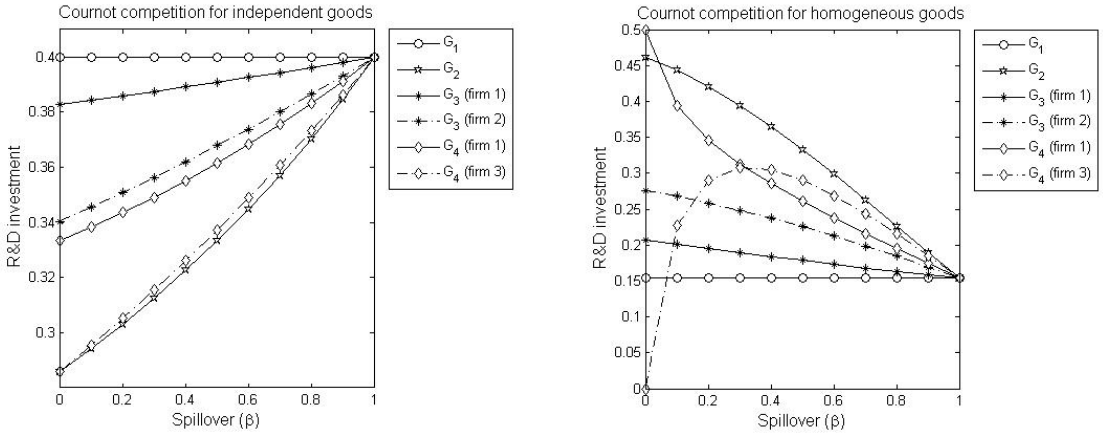


Figure 3: The Expenditure of Firms on R&D versus the R&D Spillover



Note that, in each of G_1 and G_2, there is one group of firms, but the other networks, there are two groups. In the network G_3, there is hub (firm 1) and peripheries (firms 2 and 3) and in the network G_4, there are linked firms (firms 1 and 2) and an isolated firm (firm 3). The outcomes are plotted for $a = 12$, $\overline{c} = 10$ and $\gamma^*_{\lambda_0} = 2$ and $\gamma^*_{\lambda_1} = 1$.

3.2. Motivation Behind Expenditure on R&D

From the R&D model (see Section 2.1), firms invest and cooperate in R&D to minimize the marginal cost of the production. This in turn maximizes the individual profit and enhance the social outcomes in somewhat. This implies that the change of the expenditure on R&D determined by the structure of the market and the network affects the economic variables.

Recall, the expenditure of firms on R&D is high when they produce very differentiated goods. Also, in this case, the expenditure is maximized when firms form a dense R&D network. We find that the significant increase in the investment positively reflects on other economic outcomes. The individual quantity and profit and the social welfare reach the maximum values when the dense R&D network consists of differentiated firms. In the case when firms produce homogeneous goods, the decrease of the expenditure on R&D with the number of the agreements does not generate low individual profits where there is always positive relation between the individual agreements and profits. For the overall outcomes, it seems that the positivity of the R&D agreements does not appear on the total welfare, particularly when R&D spillovers are high.

When comparing the equilibrium outcomes for independent and homogeneous goods, the results indicate that if goods are independent, the increase of the outcomes with the R&D agreements is high compared to the increase of the outcomes for the homogeneous goods.

Proposition 3 *Suppose an oligopoly market where firms compete by setting the quantities and the R&D cooperation forms a regular network. In the absence of the spillover, the equilibrium outcomes of the quantity, profit and total welfare for independent goods are higher than the equilibrium outcomes for homogeneous goods.*

The proof is presented in the Appendix.

Example 3 *Suppose ten firms compete in a market by the quantities and the R&D cooperation forms a regular network such that the spillover is set zero. Figure 4 shows the quantity, profit and the total welfare for* $a = 12,\ \overline{c} = 10, \beta = 0$ *and* $\gamma = \max\{\gamma^*_{\lambda_0}, \gamma^*_{\lambda_1}\} = 3$.

3.3. Growth of Investors versus Expenditure on R&D

Increasing firms in the market leads to changes in the mathematical properties of the network and hence in the economic outcomes. In terms of the network, many empirical works have investigated the patterns through which R&D cooperation networks of worldwide firms develop and grow. Most of these studies found that the cooperation exhibit characteristic features of complex networks that describe many of the social networks (Tomasello et al., 2013; Ahuja , 2000; Stuart, 2000; Verspagen and Duysters , 2004).

In terms of economics, we want to examine the impact of new entering firms into the R&D network on the expenditure on R&D. We expect that the results depend on the market structure as the case of when growing the R&D agreements (see Section 3.1.2).

In this section, we deal with regular networks since the equilibria cannot be generalized if the distribution of the R&D agreements is asymmetric. Therefore, let *G* be an R&D network consists of n firms and assume that there are new firms want to enter the network. For each new firm entering the network, we assume that the result of the cooperation is *k*-regular networks.

The following proposition states that if goods are independent, the increase of firms in the network such that number of R&D agreements stays constant does not have an impact on the expenditure of firms on R&D. Meaning that, the investment of firms in R&D under any two different regular networks that have the same number of agreements is identical. In contrast, if goods are homogeneous, the impact of increasing firms in the network on the R&D expenditure depends on the number of agreements built among them. In a low dense network, the increase of firms negatively affects the R&D expenditure; whereas in a dense network, the increase of firms positively affects the R&D expenditure.

Proposition 4 *Suppose an oligopoly market where firms compete by setting the quantities and the R&D cooperation forms a regular network. Assume the network size grows where the number of R&D agreements is fixed. In the absence of the spillover,*

1. if firms produce independent goods, the R&D expenditure stays constant.

2. if firms produce homogeneous goods and the density of the network is not low, the R&D expenditure increases.

The proof is presented in the Appendix.

Example 4 *Suppose an oligopoly market where firms compete by setting the quantities. Suppose that the threshold network consists of five firms and the network size is increased by one where with each new firm, the resulting network is regular. The graph shows the impact of the R&D agreements on the expenditure of firms on R&D for homogeneous goods where the spillovers between non-cooperating firms are zero.*

4. CONCLUSION

In this paper, we focused on the expenditure of firms on R&D. Firstly, we studied the impact of the market and network structure on the expenditure. The results suggested that the expenditure on R&D is significantly large if firms are in a highly differentiated market and in this case, forming a dense cooperation network improves the investment. Secondly, we discussed the role of the investment in R&D on the individual and social outcomes. Itseems that the increase of the expenditure on R&D improves the outcomes. Also, the cooperation always leads to higher profits, regardless of the market structure. Finally, we studied the impact of the growth of the market size on the investment in R&D. If the cooperation rate is constant, the increase of new firms does not change theinvestment rate for independent goods. However, for homogeneous goods, the growing market size enhances the investment if the network density is not low.

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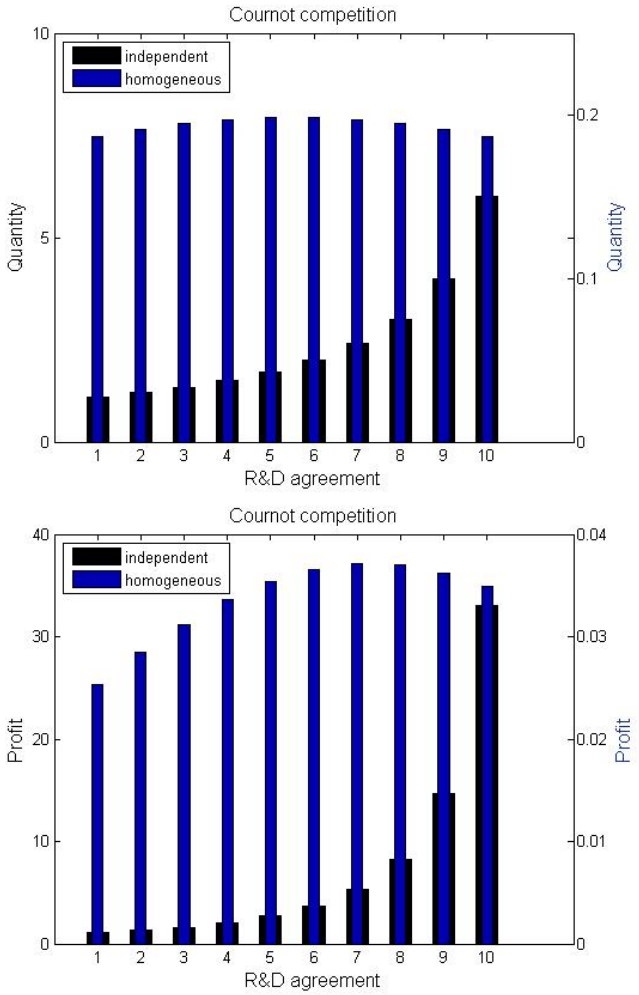
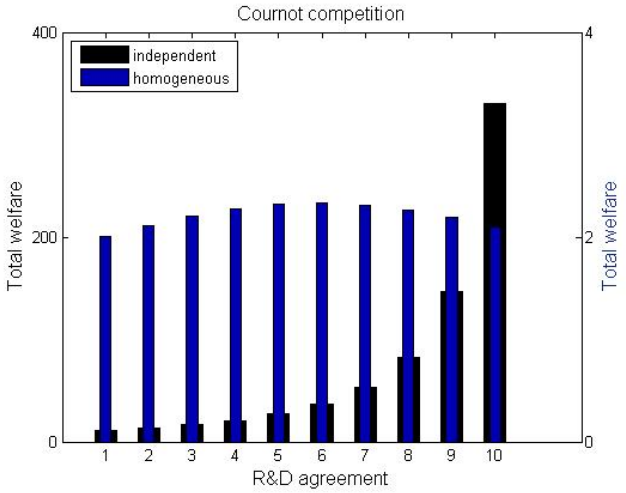
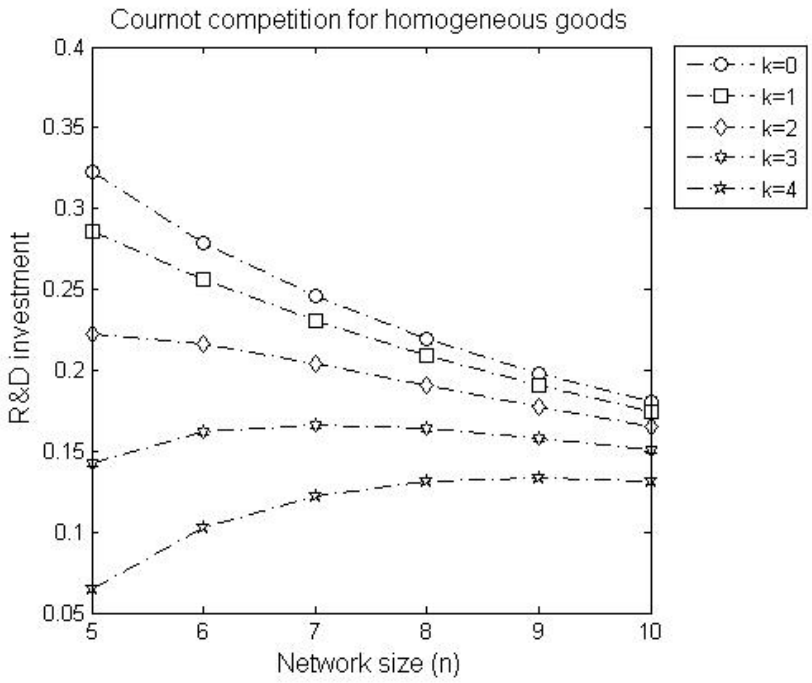
Figure 4: Comparison of the Outcomes for Independent and Homogeneous Goods.





The outcomes for independent goods are higher than for homogeneous goods, regardless of the number of R&D agreements. The outcomes are plotted for $a = 12,\ \bar{c} = 10$ and $\gamma = 3$.

Figure 5: Growth of Investors versus Expenditure on R&D for Homogeneous Goods



The parameters used to plot the graph are $a = 12,\ \bar{c} = 10$ and $\gamma^*_{\lambda_1}$=1.

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Appendix

(A) Nash equilibria

Symmetric network

$$x^*_{\lambda_1} = \frac{(a-\overline{c})(n-k)}{\gamma(n+1)^2-(n-k)(k+1)} \quad (10\text{ a})$$

$$q^*_{\lambda_1} = \frac{\gamma(a-\overline{c})(n+1)}{\gamma(n+1)^2-(n-k)(k+1)} \quad (10\text{ b})$$

$$x^*_{\lambda_0} = \frac{(a-\overline{c})}{4\gamma-k-1} \quad (10\text{ c})$$

$$q^*_{\lambda_0} = \frac{2\gamma(a-\overline{c})}{4\gamma-k-1} \quad (10\text{d})$$

Asymmetric network

$$x_{G_1} = \frac{(a-\overline{c})}{(4\lambda^2+8\lambda+4)\gamma-3} \quad (11\text{ a})$$

$$q_{G_1} = \frac{2\gamma(a-\overline{c})(\lambda+1)}{(4\lambda^2+8\lambda+4)\gamma-3} \quad (11\text{ b})$$

$$x_{G_2} = \frac{(a-\overline{c})(\lambda(2\beta-1)-2)}{2+4\beta-8\gamma+(1-12\gamma-4\beta^2)\lambda+4\gamma\lambda^3} \quad (12\text{ a})$$

$$q_{G_2} = \frac{2\gamma(a-\overline{c})(\lambda^2-\lambda-2)}{2+4\beta-8\gamma+(1-12\gamma-4\beta^2)\lambda+4\gamma\lambda^3} \quad (12\text{ b})$$

$$x_{G_3}(firm\ 1) = \frac{(a-\overline{c})(\beta^2\lambda-\beta\lambda-2\beta+2\gamma\lambda^3-6\gamma\lambda^2+8\gamma+2)}{8\gamma^2\lambda^5-8\gamma^2\lambda^4-S_1\lambda^3+S_2\lambda^2+S_3\lambda+2(12\gamma^2-4(\beta+2)\gamma+\beta-1)} \quad (13\text{ a})$$

$$q_{G_3}(firm\ 1) = \frac{2\gamma(a-\overline{c})(1+\lambda)(\beta^2\lambda-\beta\lambda-2\beta+2\gamma\lambda^3-6\gamma\lambda^2+8\gamma+2)}{8\gamma^2\lambda^5-8\gamma^2\lambda^4-S_1\lambda^3+S_2\lambda^2+S_3\lambda+2(12\gamma^2-4(\beta+2)\gamma+\beta-1)} \quad (13\text{ b})$$

$$x_{G_3}(firm\ 2) = \frac{2\gamma(a-\overline{c})((\beta\lambda-2)(1+\lambda)(\lambda-2))}{8\gamma^2\lambda^5-8\gamma^2\lambda^4-S_1\lambda^3+S_2\lambda^2+S_3\lambda+2(12\gamma^2-4(\beta+2)\gamma+\beta-1)} \quad (13\text{ c})$$

$$x_{G_3}(firm\ 2) = \frac{2\gamma^2(a-\overline{c})(\lambda-\lambda^2+2)^2}{8\gamma^2\lambda^5-8\gamma^2\lambda^4-S_1\lambda^3+S_2\lambda^2+S_3\lambda+2(12\gamma^2-4(\beta+2)\gamma+\beta-1)} \quad (13\text{ d})$$

$$x_{G_4}(firm\ 1) = \frac{(\beta\lambda-2)(a-\overline{c})(2\beta^2\lambda-3\beta\lambda-2\beta-2\gamma\lambda^3+6\gamma\lambda^2+\lambda-8\gamma+2\ )}{2(-4\gamma^2\lambda^6+12\gamma^2\lambda^6+12\gamma^2\lambda^5+S_4\lambda^4+S_5\lambda^3+S_6\lambda^2+S_7\lambda+4(8\gamma^2-6\gamma-\beta^2+1))} \quad (14\text{ a})$$

$$q_{G_4}(firm\ 1) = \frac{\gamma(a-\overline{c})(\lambda-\lambda^2+2\ )(3\beta\lambda-2\beta^2\lambda+2\beta+2\gamma\lambda^3-6\gamma\lambda^2-\lambda+8\gamma-2\ )}{2(-4\gamma^2\lambda^6+12\gamma^2\lambda^6+12\gamma^2\lambda^5+S_4\lambda^4+S_5\lambda^3+S_6\lambda^2+S_7\lambda+4(8\gamma^2-6\gamma-\beta^2+1))} \quad (14\text{ b})$$

$$x_{G_4}(firm\ 3) = \frac{(a-\overline{c})(\lambda-2\beta\lambda+2\ )(\beta\lambda-\beta^2\lambda+2\beta+\gamma\lambda^3-3\gamma\lambda^2+4\gamma-2\ )}{2(-4\gamma^2\lambda^6+12\gamma^2\lambda^6+12\gamma^2\lambda^5+S_4\lambda^4+S_5\lambda^3+S_6\lambda^2+S_7\lambda+4(8\gamma^2-6\gamma-\beta^2+1))} \quad (14\text{ c})$$

$$q_{G_4}(firm\ 3) = \frac{2\gamma(a-\overline{c})(\lambda-\lambda^2+2\ )(\beta\lambda-\beta^2\lambda+2\beta+\gamma\lambda^3-3\gamma\lambda^2+4\gamma-2\ )}{2(-4\gamma^2\lambda^6+12\gamma^2\lambda^6+12\gamma^2\lambda^5+S_4\lambda^4+S_5\lambda^3+S_6\lambda^2+S_7\lambda+4(8\gamma^2-6\gamma-\beta^2+1))} \quad (14\text{ d})$$

where $S_1 = 2(20\gamma^2 + (2\beta + 1)\gamma),\ S_2 = 2(4\gamma^2 + (2\beta^2 + 7)\gamma), S_3 = 64\gamma^2 + 4\beta(B-1)(4\gamma - 1), S_4 = 12\gamma^2 + (6\beta^2 - 4\beta + 1)\gamma, S_5 = -44\gamma^2 - (6\beta^2 + 12\beta - 3)\gamma, S_6 = (6 + 24\beta - 12\beta^2)\gamma - 24\gamma^2 - \beta(\beta^2 - 1)(2\beta - 1),\ S_7 = 2(\beta(2\beta^2 - \beta - 3) + 24\gamma^2 - (10 - 16\beta)\gamma + 1).$

(B) Proof of propositions

Proof of Proposition 1. For a duopoly market, the R&D investment of firms is given by the following equation

$$x^* = \frac{(a - \overline{c})(2 - \lambda\beta)}{\gamma(2 + \lambda)^2(2 - \lambda) - (1 + \beta)(2 - \lambda\beta)}.$$

The rate at which the value of the investment changes with respect to the change of the differentiation rate is

$$\frac{\partial x^*}{\partial \lambda} = \frac{-2\gamma(a - \overline{c})(2 + \lambda)((\lambda^2 - \lambda + 2)\beta + (2 - \lambda\beta))}{(\gamma(2 + \lambda)^2(2 - \lambda) - (1 + \beta)(2 - \lambda\beta))^2}.$$

Since $\lambda^2 - \lambda + 2 > 0$ for all values of $\lambda \in [-1, 1]$, then $\frac{\partial x^*}{\partial \lambda} < 0$. This implies that the R&D investment decreases with increasing the differentiation rate. ■

Proof of Proposition 2. Assume that $x^*_{\lambda_0}$ and $x^*_{\lambda_1}$ are the R&D investments for independent and homogeneous goods, respectively. Thus, we want to prove that $x^*_{\lambda_0} > x^*_{\lambda_1}$ where we choose $\gamma = \max\{\gamma^*_{\lambda_0}, \gamma^*_{\lambda_1}\}$.

$$x^*_{\lambda_0} - x^*_{\lambda_1} = \frac{\gamma(a - \overline{c})\big((n+1)^2 - 4(n-k)\big)}{(4\gamma - k - 1)\big(\gamma(n+1)^2 - (n-k)(k+1)\big)}.$$

Since $(n+1)^2 > 4(n-k)$ where $k \le n - 1$, then $x^*_{\lambda_0} > x^*_{\lambda_1}$. This means that the equilibrium investment for independent goods is larger than for homogeneous goods. ■

Proof of Proposition 3. Assume that $q^*_{\lambda_0}, \pi^*_{\lambda_0}$ and $TW^*_{\lambda_0}$ are the quantity, profit and the total welfare for independent goods. Similarly, assume $q^*_{\lambda_1}, \pi^*_{\lambda_1}$ and $TW^*_{\lambda_1}$ are equilibria for homogeneous goods. We want to prove that the equilibria for independent goods are larger than for homogeneous goods where $\gamma = \max\{\gamma^*_{\lambda_0}, \gamma^*_{\lambda_1}\}$.

For the equilibrium quantity, the required task is to show that $q^*_{\lambda_0} > q^*_{\lambda_1}$ for any n and k. We find the difference between the two equilibria

$$q^*_{\lambda_0} - q^*_{\lambda_1} = \frac{\gamma(a - \overline{c})\big(2\gamma(n+1)(n+3) + (k+1)(1 + 2k - n)\big)}{(4\gamma - k - 1)\big(\gamma(n+1)^2 - (n-k)(k+1)\big)}.$$

The expression $1 + 2k - n < 0$ if $k < (n-1)/2$, but in this case, we have $2\gamma(n+1)(n+3) + (k+1)(1 + 2k - n)$.This implies $q^*_{\lambda_0} > q^*_{\lambda_1}$ for any market size *n* and network structure k.

Now, we want to prove that $\pi^*_{\lambda_0} > \pi^*_{\lambda_1}$ for any n and k. We find that

$$sign\big(\pi^*_{\lambda_0} - \pi^*_{\lambda_1}\big) = sign\big(\gamma(n+1)^2\big(16\gamma^2 + (k+1)(8\gamma - k - 1) + (n+1)(4\gamma - 1)(2k - n + 1)\big) + (n-k)^2(k+1)^2(4\gamma - 1)\big).$$

Note that all expressions are positive except $(n+1)(4\gamma-1)(2k-n+1)<0$ if $n>2k+1$, but in this case γ is large (see the condition 9). This makes the expression on the right positive for any n and k. This implies$\pi^*_{\lambda_0}>\pi^*_{\lambda_1}$.

For the equilibrium total welfare, we are required to prove that for any n and k, $TW^*_{\lambda_0}>TW^*_{\lambda_1}$. The proof is straightforward since total welfare is a combination of the quantity and profit (equation 5). We have proven that the last two equilibria are higher for independent goods. This implies $TW^*_{\lambda_0}>TW^*_{\lambda_1}$ and then the result follows. ■

Proof of Proposition 4. We want to show that for independent goods, the R&D finance is affected by the industry size. For homogeneous goods, we show that the increase or decrease of the R&D finance with growing the industry size depends on the network structure.

For independent goods, the R&D finance is provided by the following equation:

$$x^*_{\lambda_0}=\frac{(a-\overline{c})}{4\gamma-k-1}.$$

Thus, $\frac{\partial x^*_{\lambda_0}}{\partial n}=0$ and this implies that the R&D finance remains a constant amount when the market increases. For homogeneous goods, the R&D investment is

$$x^*_{\lambda_1}=\frac{(a-\overline{c})(n-k)}{\gamma(n+1)^2-(n-k)(k+1)}.$$

To see the investment changes with respect to the change of the market size, we calculate $\frac{\partial x^*_{\lambda_1}}{\partial n}$. This yields

$$\frac{\partial x^*_{\lambda_1}}{\partial n}=\frac{\gamma(n+1)(a-\overline{c})(2k-n+1)}{(\gamma(n+1)^2-(n-k)(k+1)\,)^2}.$$

Now, the expression$2k-n+1<0$ if $k<(n-1)/2$ where $0\le k\le n-1$. This implies that in a low dense network, the increase of firms negatively affects the R&D finance; whereas in a dense network, the increase of firms positively affects the R&D finance. ■

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AN ANALYSIS ON THE EFFICIENCY OF BANK LENDING CHANNEL IN TURKEY*

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ABSTRACT

The aim of our study forms bank lending channel which defines the impacts of monetary policy on real economic activities by chancing loan supply of the banks. Changing loan supply by banks as a response to monetary shocks affects the accessibility of firms and household to the bank credit and this brings to important macroeconomic conclusions. In this study we conclude that Turkey's economy largely provided the conditions for the efficiency of bank lending channel. In the analysis of monthly data within the period 2002:1-2014:12 was used VAR model. The empirical results of the study show that monetary policy through the bank lending channel play an important role on the real economy in the short term. In this study it is confirmed that functioning of a bank lending channel for Turkey's economy.

Keywords: Monetary policy, monetary transmission mechanism, bank lending channel, VAR model.
JEL Classification: E52, E51, E44, C32.

1. INTRODUCTION

The discussions about the monetary transmission channels, through which monetary policy affects the real economy, are generally around the interest rate/money channel and credit channel. In interest rate channel which is based on the standard IS-LM model, it is assumed that non-monetary financial assets are perfect substitutes for each other. With the assumption that there is no financial market flaws; household, firms and banks are indifferent either bank loan or bond as representation of non-monetary financial assets. The fact that interest rate channel fails to takes the function of the banks to create loan into consideration caused the point of origin for credit channel which emphasizes the market flaws in the monetary transmission mechanism.

Bernanke and Blinder (1988) added a single assumption to the conventional IS-LM model. They assumed that besides "money" and "bonds" which appear in the money channel, there is a third asset called "bank loans" that is imperfectly substitutable with the other two assets (Bernanke, 1993). The point of departure of the credit view is the rejection of the assumption that bonds and bank loans are perfect substitutes. Based on the assumption of informational imperfections in financial markets, the credit channel assigns an active role to the supply of bank loans (Benkovskis, 2008).

Bank lending channel is the channel through which monetary policy actions are transferred into real economic activities over loan supply. Two conditions must be satisfied for bank lending channel to operate: (Cecchetti, 1995; Kashyap and Stein, 1994; Kashyap, Stein and Wilcox, 1992; Juks, 2004; Thornton, 1994; Jimborean, 2009; İnan, 2001; Oliner and Rudebusch, 1995; Oliner and Rudebusch, 1996b):

*This study is based on the unpublished PhD thesis which is called "The Real Effects of Monetary Policy through the Bank Lending Channel and Pass-Through of Monetary Policy to Loan Rates: The Case of Turkey" in Anadolu University.

1. Monetary policy must affect banks' credit supply. When central banks conduct an open market sale to dampen aggregate demand drains bank reserves from the system. Reducing of bank reserves causes bank liabilities (deposits) to reduce, it must also reduce bank assets. Assuming that banks treat the loans and securities that make up their portfolios as imperfect substitutes, the loss of deposits will induce them to try to reduce both categories of assets (Bernanke, 1993). Therefore, loans and securities have to be imperfect substitutes in banks' balance sheets so that monetary policies may affect banks' loan supply.

2. There must be borrowers depending on bank loans. Banks play a special role in the financial system, because they are exceptionally appropriate to overcome informational problems in the credit market. Due to this special role of the banks, some borrowers will not be able to reach credit markets unless they receive loan from the banks (Mishkin, 2010). Therefore, the reduction of credit volume created by banking system has to have significant macroeconomic results (Bernanke, 1993; Claus and Grimes, 2003). In order for this condition to be hold, there must not be a relation of perfect substitutes between bank loan and other financing means in firms' balance sheets. In other words, firms should not be indifferent between issuing securities and receiving loans to finance their investment project. The amount of external funds in the financial structure of firms and the share of bank loans in the overall external financing determines the importance of banks loans for firms (Juks, 2004). The amount of bank dependent borrowers is associated with the development level of financial markets of the countries. Namely, the countries where capital markets are less developed and the direct access to these markets is poor have more bank dependent borrowers (Cecchetti, 1999). An important result that can be obtained from credit view is that the monetary policy has a larger effect on the expenditures of small firms which are more bank dependent, rather than the expenditures of large firms which can directly access to capital markets (Mishkin, 2010).

Contractionary monetary policy, which decreases bank reserves and bank deposits, decreases the quantity of bank loans available. Due to the fact that most borrowers depend on bank loans in order to finance their activities, the fall in loans decreases the expenditures for investment (and possibly, the consumption). Schematically, the effect of monetary policy may be demonstrated as below (Mishkin, 2010): Contractionary monetary policy → bank deposits ↓ → bank loans ↓ → total expenditures ↓ → total output ↓

2. EVALUATION OF EFFICIENCY CONDITIONS OF CREDIT CHANNELS FOR TURKISH ECONOMY

Analyzing the existence of mentioned conditions for Turkish economy is important for both determining the main features of the banking system in Turkey and forming basis for empirical analysis of bank lending channel.

The position of banking sector in financial market has great importance on monetary policy actions creating real effects through banks' loan supply. The fact that banks have a great share in financial sector, along with central bank changing banks' loan supply, enable it to have an effect on total expenditures. By 2014, banks compose 86% of size of assets of financial sector in Turkey. The banking sector compose 1.994.159 million TL of total size of assets of financial sector, which is 2.330.923 million TL. (BAT, 2015). In this context, it is possible to say that banks, as a dominant factor in the sector, affect total credit volume to a great extent.

The response of banking system to a need of liquidity, emerging at the instant, though using what assets is very important for the credit channel to function (İnan, 2001). In this regard, the structure of size of assets of the banking sector, along with the share of banks in financial system, is very essential for the central bank to affect banks' loan supply.

As mentioned above, it is necessary that credit item in banks' balance sheets needs to be affected in accordance with monetary policy actions in order for bank credit channel to operate properly. In other words, banks must act by reducing their loans rather than reducing liquid assets and securities, as a response to decreasing deposits upon a tightening of monetary policy. Loans need to be high in asset items and low in securities so that loans and securities in banks' balance sheets can be imperfect substitutes.

Table 1: Development and Structure of Assets in Turkish Banking (Percentage)

Years	Liquid Assets	Financial Assets	Loans	Other *
2002	16	40	27	17
2003	15	43	28	14
2004	14	40	34	12
2005	16	36	39	9
2006	15	35	45	5
2007	13	31	50	6
2008	14	29	52	5
2009	13	35	48	4
2010	10	30	52	8
2011	12	24	56	8
2012	14	21	58	7
2013	15	17	61	7
2014	14	16	63	7

*Fixed Assets, Rediscounts and Other Assets.
Source: The Banks Association of Turkey.

The development and structure of assets in Turkish banking sector between 2002-2014 are demonstrated in Table 1. In the given years, liquid assets have 13%, securities have 28% and loans have 50% of share in assets on average. The percentage of loans in asset items has risen and the percentage of securities has fallen, especially since 2009. It can be observed that loans have an important share in asset items in recent years.

It will not be a rational action for banks to sell the securities they hold as a response to a contractionary monetary policy. Accordingly, banks are the major borrowers of government bonds and treasury bills. Owing to the fact that interest rates are high as a result of public borrowing in Turkey, it would be a more rational action for banks to reduce loan supply instead of selling high-yield and low-risk government securities (Cengiz, 2007).

For the credit channel to function, not only the banks shares in total finance system but also the total deposits in banks' sources need to be high (Inan, 2001). The fact that the supply of bank loans are affected by the monetary policy actions requires the percentage of deposits in liabilities of banks' balance sheets to be high and the percentage of non-deposit sources to be low. Otherwise, the effects on the asset items may be limited, since there will be compensation for deposits changing as a result of monetary policy actions.

Table 2 demonstrates the percentages of deposit and non-deposit sources in liabilities of banks' balance sheets in Turkey between 2002-2014. In Table 2, it can be observed that the access of banks to non-deposit sources has increased over the years in Turkish banking sector.

Table 2: Percentages of Deposit and Non-Deposit Sources in Turkish Banking Sector

Years	Deposit	Non-Deposit Source
2002	67	15
2003	64	16
2004	64	15
2005	64	17
2006	65	18
2007	64	16
2008	64	18
2009	64	17
2010	61	20

2011	57	25
2012	56	23
2013	54	27
2014	52	28

Source: The Banks Association of Turkey.

While total deposit volume was 253.579 million TL in 2005, non-deposit sources were 66.920 million TL; in 2007 total deposit volume was 356.984 million TL and non-deposit sources were 91.614 million TL; in 2009 total deposit volume was 507.258 million TL and non-deposit resources were 137.680 million TL; in 2011 total deposit volume was 656 billion TL and non-deposit sources were 289 billion TL; and in 2014 total deposit volume was 987 billion TL and non-deposit sources increased to 534 billion TL. (BAT, 2006; BAT, 2008; BAT, 2010; BAT, 2012; BAT, 2015). Despite the fact that the development of deposits and non-deposit is considered to weaken that power of monetary policy, it significant that deposits are dominant over non-deposit sources and they have increased just as the non-deposit sources over the years. In general, it is possible to say that monetary policy has the power to affect banks' loan supply for the effectiveness of bank lending channel in Turkey.

For the effectiveness of the credit channel, it is also necessary that borrowers are affected by the changing loan supply. In other words, it is necessary that the production and expenditures must be responsive towards the accessibility of bank loans. For this, bank loans and securities must not be perfect substitutes in the balance sheets of the private sector.

Table 3: Private Sector External Financing Types

Years	Securities Stocks (Million TL)	Bank Loans (Million TL)	Total (Million TL)	Securities Stocks (% Share)	Bank Loans (% Share)
2002	13.176	34.215	47.391	27.8	72.2
2003	18.008	51.349	69.357	26.0	74.0
2004	25.186	79.301	104.487	24.1	75.9
2005	31.929	121.762	153.691	20.8	79.2
2006	41.045	170.432	211.477	19.4	80.6
2007	52.055	216.516	268.571	19.4	80.6
2008	63.859	265.629	329.488	19.4	80.6
2009	70.576	292.083	362.659	19.5	80.5
2010	83.707	421.674	505.381	16.6	83.4
2011	103.898	571.022	674.920	15.4	84.6
2012	126.406	680.033	806.439	15.7	84.3
2013	142.702	912.031	1.054.733	13.5	86.5
2014	153.020	1.093.269	1.246.289	12.3	87.7

Source: CMBT (The Capital Market Board of Turkey), CBRT (Central Bank of Republic of Turkey).

Table 3 demonstrates the magnitude and share of security stocks and bank loans for the financial preferences of private sector. As seen in Table 3, the weight of bank loans among the external financing of the firms is quite a lot. Thereby, private sector in Turkey needs the intermediation of banks in order to meet their financing requirements and, accordingly, they are not irresponsive between issuing securities and providing bank loans. In brief, it is possible to say that the private sector in Turkey depends on bank loans to finance their investment projects and, therefore, the changes in loan conditions could be real effects.

3. LITERATURE REVIEW

The some studies in the literature that analyze on bank lending channel are presented in appendix part.

4. DATA AND METHODOLOGY

That's why Turkish economy has undergone since 2001 crisis which include the introduction of a flexible exchange rate regime, the recapitalization of the banking sector, and the shift towards an inflation-targeting framework, applying econometric techniques to the pre-crisis period is not very informative about how Turkey's monetary transmission works today (Brooks, 2007). Therefore, the monthly series which were obtained from Central Bank of Republic of Turkey (CBRT) include the period of 2002-2014. The series used in our analysis are presented in Table 4.

Table 4: The Series in VAR Model.

P	Consumer price index
KUR	Real exchange rate
SUE	Industrial production index
R	Overnight money market interest rate (monetary policy indicator)
KRD	Total volume of credit to private sector
D	Total volume of deposits
MK	Security stocks

In the empirical analysis, while total credit (KRD) and security stocks (MK) are used as a representative of asset side of bank's balance sheet, total deposit (D) is used as a liability side of bank's balance sheet. Industrial production index (SUE), consumer price index (P) and real exchange rate (KUR) is used as a representative of economic activity, general price level and open economy respectively. After Bernanke and Blinder (1992) used short term interest rate as a measure of monetary policy shock, most studies in the literature did the same choice. In this regard, the indicator of monetary policy is used overnight money market rate (R) in the empirical analysis.

Industrial production index, total deposits and total credit series were seasonally adjusted using the Tramo-Seats methodology. All series except for money market interest rate measured in natural logarithms and natural logarithms of P, KUR, SUE, KRD, D and MK were denoted as LP, LKUR, LSUE, LKRD, LD and LMK respectively. Nominal series which are D, KRD and MK converted to real series which were denoted as RD, RKRD and RMK respectively. Eventually the series are represented by LRD, LRKRD, LRMK, LKUR, LSUE, LP, and R.

5. FINDINGS AND DISCUSSIONS

5.1. Unit Root Test

All variables must be stationary in VAR model. Otherwise, it must be first differenced of the series (Gujarati and Porter, 2012). So, we firstly analyzed stationary properties of the series by employing ADF (Automatic Dickey-Fuller), PP (Phillips-Perron) and Ng-Perron test in the empirical analysis. The results of unit root tests are presented in Table 5 and in Table 6.

Table 5: ADF and PP Test Results

ADF Test Results		
Series	Level	First Differenced
LRD	-2.56	-12.25
LRKRD	-1.63	-5.76
LKUR	-3.30	-9.24
LP	-4.12	-6.05
LRMK	-2.14	-9.34
LSUE	-2.63	-14.34
R	-3.36	-6.14
Phillips-Perron Test Results		
Series	Level	First Differenced
LRD	-2.56	-12.25

LRKRD	-1.37	-5.73
LKUR	-2.57	-8.74
LP	-4.48	-8.32
LRMK	-1.81	-9.37
LSUE	-2.63	-14.32
R	-3.10	-6.07
	Critical Values (Level) %1= -4.01 %5= -3.43	Critical Values (First Differenced) %1= -3.47 %5= -2.88

For ADF and PP tests, the null hypothesis suggests that the series include unit root. For Ng-Peron test, according to MZ_a, MZ_t tests the null hypothesis indicates that the series have unit root and according to MSB and MPT tests the null hypothesis indicates that the series are stationary (Ertuğrul and Kenar, 2013).

Table 6: Ng-Perron Test Results

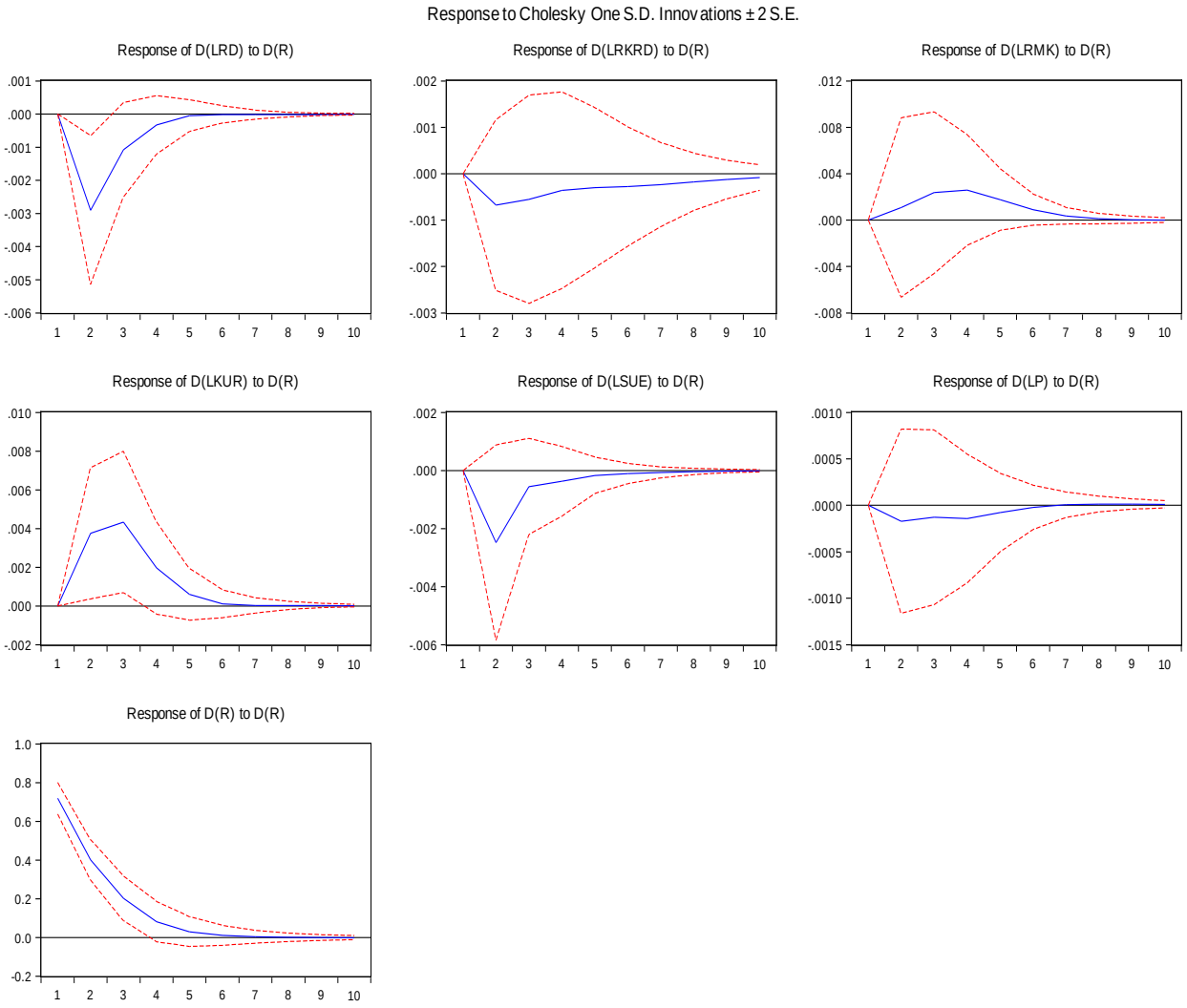
Level				
Series	MZa	MZt	MSB	MPT
LRD	-9.16	-2.13	0.23	9.99
LRKRD	-6.36	-1.73	0.27	14.33
LKUR	-20.42	-3.17	0.15	4.63
LP	-2.26	-0.94	0.41	34.56
LRMK	-8.11	-1.98	0.24	11.35
LSUE	-6.84	-1.81	0.26	13.36
R	-1.21	-0.58	0.48	47.92
Ng-Peron critical values the series for MZa, MZt, MSB, MPT respectively; %1 significance level -23.80, -3.42, 0.14 and 4,03; %5 significance level -17.30, -2.91, 0.17 and 5.48.				
First Differenced				
Series	MZa	MZt	MSB	MPT
LRD	-76.60	-6.19	0.08	0.32
LRKRD	-45.03	-4.74	0.10	0.55
LKUR	-25.77	-3.56	0.14	1.04
LP	-65.21	-5.70	0.09	1.43
LRMK	-14.45	-2.66	0.18	1.81
LSUE	-76.97	-6.20	0.08	0.32
R	-48.38	-4.89	0.10	0.56
Ng-Peron critical values the series for MZa, MZt, MSB, MPT respectively; %1 significance level -13.80, -2.58, 0.17 and 1.78; %5 significance level -8.10, -1.98, 0.23 and 3.17.				

Table 5 shows that the null hypothesis cannot be rejected for the all series except for LP, that is, all series except for LP are nonstationary in their level forms at %1 and %5 levels for both ADF and PP tests, suggesting that all variables except for LP are integrated of order I(1) according both ADF and PP tests. Table 6 shows that the calculated t statistics tested by MZ_a and MZ_t for the all series are less and for MSB and MPT tests the calculated t statistics for the all series are greater than the critical values which mean all series are non-stationary in their level forms. For the first difference of series, according to MZ_a and MZ_t tests, the calculated t statistics for the all series are greater and for MSB and MPT tests the calculated t statistics for the all series are less than the critical values at %5 values, suggesting that the series become stationary after differencing so that the all series are integrated of order I (1) according to Ng-Peron tests. We adopt that all variables are I (1) since Ng-Perron test is a stronger than the other two tests.

5.2. Impulse-Response Functions

Dynamic relations between variable in VAR model were analyzed with impulse-response functions. Responses by other variables in the system to a shock of standard deviation 1 in overnight money market rate representing monetary policy, provides information regarding the effectiveness of bank lending channel. Figure 1 displays the effect of a shock of standard deviation 1 in overnight rate on every other variable.

Figure 1: Variables' response to overnight interest rate shock



After a positive shock implemented on overnight money market rate (overnight rate), the change in banks' balance sheets is compatible with the process of bank lending channel. In consequence of the shock implemented on money rate it is seen that deposits and loans decrease while securities increase. When faced contractionary monetary policy the decrease in deposits is bigger than the decrease in loans. In Bernanke and Blinder's (1982) study, deposits' faster adjustment process compared to loans is interpreted as; banks can't dry up their loan's supply immediately because contracts regarding bank loans covers a certain period of time.

In order for loans to play an exclusive role in banks' balance sheets, banks need to reduce their loan's supply rather than selling securities in their portfolios against their decreasing deposits after contractionary monetary policy. Securities' response to overnight rate shock was positive. In other words, after contractionary monetary policy, banks reduced their lending's rather than selling securities they have. This result indicates that loans and securities aren't perfect substitutes and therefore, monetary policy provides the condition of affecting the loan supply. Increase in securities after the monetary shock reversed after nearly 4 months. It is possible to say that as increasing money rates boost the asymmetric information problems after contractionary monetary policy, it is rational for banks to reduce their loan supplies and invest in high-yield securities after the increase in money rates.

In order to analyze the reflection of monetary policy to real economy, response of industrial production index against the monetary shock was examined. As one can see from the impulse-response functions, response of industrial production index against the positive money rate was powerful and negative. The simultaneous movement of bank loans and industrial production index against the monetary shock indicate that the borrowers are bank-dependent. However, it is seen that the response of industrial production to the monetary shock reversed after 2 months and it died down after 6 months. After the money rate shock, prices initially decreased and then they were fixed until they started to rise after 4 months and after 6 months they were close to zero. After the positive shock implemented on interest rates, real exchange rate initially increased and after 3 months it decreased. In other words, after the contractionary monetary policy, domestic currency started to increase after 3 months. Accordingly it's possible to say that determining of exchange rate could be other factor (such as international developments, expectations) in Turkish economy.

6. CONCLUSION

According to credit view, banks play a special role in economy as banks are experts at solving asymmetric information problems in financial system. Influence of monetary policy actions on loan supply affects the expenditure of households and firms who are ineligible for direct access to capital markets. In this study, the effectiveness of bank lending channel for Turkish economy was analyzed by using VAR method with monthly data covering the period from 2002 to 2014. Before making the empirical analysis, it had been confirmed that required conditions for bank lending channel to operate were provided to a considerable extent for Turkish economy.

According to empirical analysis results based on impulse-response functions, bank credit channel is operating in Turkish economy. There was a decrease in bank loans because of a positive shock implemented on overnight money market rate. In other words, banks responded to the decrease in deposits against contractionary monetary policy, by reducing the loans instead of selling the securities in their portfolios. The response of industrial production index to the shock implemented on money rates was examined in order to assess the influence of monetary policy on real economic activity.

The response of industrial production index to the monetary policy shock was simultaneous, powerful and negative. However, it was assessed that this response occurred in a short term. This situation supports the idea that, monetary policy is effective in short term but is neutral in long term. In other words, the effect of the monetary policy shock on banks loans is reflected on the short-term economic activity. In parallel with the result of Cengiz's (2007) studies, it was discovered that monetary policy affects real economy in short term, however, in contrast to the studies in literature, the effect of monetary policy shock on exchange rates was initially positive. Initial decrease of the prices in response to the interest shock reveals that it is appropriate for monetary policy to use short-term interest rates in maintaining the price stability. Results obtained from the studies indicate that the monetary policy affects bank loans and this effect has important results regarding real economy in short term. Analysis results suggest that bank lending channel is an effective channel in monetary transmission mechanism for Turkish economy.

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APPENDIX - Bank Loans Channel Literature Summary

Researcher / Date of Publication	The Country	The Period	The Method	Obtained Results
Bernanke and Blinder (1992)	USA	1959-1989	VAR	-The decrease in deposits after the reducer monetary policy reflects on the loans with delay. - Bank loans and unemployment rate act jointly after a change in federal funds rate. Therefore, bank loans are an important component of monetary transmission.
De Bondt (1998)	6 European Countries	1990-1995	Panel Data	It has been determined that while Germany, Belgium and The Netherlands have solid bank lending channels, the banks face a liquidity limitation in Italy and France and the bank lending channel is not effective in England.
Holtemöller (2002)	Germany	1975-1998	VAR	As a consequence of strict monetary policy, the increase in short-term interest rates raises external financing premiums and this causes a weak negative effect on inflation and strong negative effect on production and, therefore, bank lending channel is effective.
Gambacorta and Rossi (2010)	Euro Zone	1985-2005	AVECM	It has been determined that contractionary monetary policy has a greater effect on bank lending, prices and real output than expansionary monetary policy.
Leroy (2014)	Euro Zone	1999-2011	GMM	Findings to prove the existence of bank credit channel have been obtained. It has been determined that capital value, liquidity level and magnitude of the banks affect the bank lending channel. Lerner index has been used to measure market power of the banks and it has been proved that banks with higher market power are less sensitive to the monetary policy. Also, it has been stated in the study that the increasing competition boosts the efficiency of monetary policy transmission through bank lending channel.
Gómez-González and Grosz (2007)	Colombia and Argentina	1995:1-2005:9 (Colombia) 2003:08-2005:11 (Argentina)	Panel Data	It has been determined that interbank overnight interest rate in Argentina cannot directly affect the total loan growth rate, along with that, the monetary policies in both countries affect the loan supply by changing capital adequacies and liquidities of banks. Therefore, it has been concluded that bank lending channels are effective in both countries
Sun, Ford and Dickinson (2010)	China	1996-2006	VAR/VEC	It has been determined that monetary policy affects macroeconomic activities through bank loans and, therefore, bank loans play an important role through which monetary policy affects real economy.
Saumitra and Toto (2012)	India	1996-2007	Dynamic Panel Data	In this study where an effective bank credit channel has been determined, it has been concluded that small-scale, illiquid banks are more responsive to monetary policy changes. Besides, it has been found that public banks are more responsive to monetary policy than foreign banks.
Aban (2013)	Philippines	2008-2011	OLS	It has been proved that the magnitude factor of the bank is a factor that affects the existence the bank lending channel and loans of small-scale banks are more responsive to monetary shocks.
Yalán (2010)	Peru	2001-2010	VAR, SVAR	It has been concluded in the study that bank lending channel operates in Peru but this channel is not important in the process of transmission of monetary policy into macroeconomic variables.

Çavuşoğlu (2002)	Turkey	1988-1999	Dynamic Panel Data	Based on the fact that there is not an important relation between the change in monetary policy indicator and real growth of loan supply, it has been concluded that bank credit channels do not function.
Aklan and Nargeleçekenler (2008b)	Turkey	1988-2001	Panel Data	-The effects of monetary policy on bank loan supply vary depending on the liquidity degree of the banks. -Banks with low liquidity degree are more responsive to the monetary policy changes than the banks with high liquidity degree. The researches interpret the obtained findings as a proof that bank lending channel does not function effectively.
Erdoğan and Beşballı (2009)	Turkey	1996-2006	VAR	-That loans decreased more than securities after a monetary shock has been interpreted as an indicator of banks conducting loan rationing. -Based on the fact that loans and industrial production index move in the same direction, it has been found that firms are dependent on bank loans and bank lending channel operates effectively.
Özşuca and Akbostancı (2013)	Turkey	1988-2009	Dynamic Panel Data	It has been determined that there was an effective bank credit channel between 1988-2001, however the efficiency of bank credit channel has been much greater after the crisis.

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DO POLITICAL RISKS AFFECT THE FOREIGN DIRECT INVESTMENT INFLOWS TO HOST COUNTRIES?

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ABSTRACT

When the investors decide to make a foreign direct investment, they take various factors into consideration such as political risk. In the study that covers the years 2002-2012 and data from 91 countries, the impact of political risk on foreign direct investment has been demonstrated by conducting panel data analysis. Political risk and control variables have been used. An increase in "*political stability and absence of violence"* and *"management effectiveness"* has reduced the foreign direct investment. Moreover, a rise in the variables of the "*exportation of goods and services", "population", "GDP growth", "regulatory quality"* has increased the foreign direct investment.

Keywords: foreign direct investment, political risk, panel data analysis, political risk index, multinational companies.
JEL Classification: F21, F23

1. INTRODUCTION

There are several factors that determine foreign direct investment which is defined as the foundation of a manufacturing plant by a company in the countries out of its headquarters or its taking over the existing manufacturing plants with the aim of expanding its manufacture to the cross border of the country in which it has been founded. When multinational companies (MNC), which makes foreign, direct investment (FDI), decide to invest in the host country, they take a lot of factors related to the country into consideration. Political risk is one of these factors. Political risk is the possibility that a government will change its policies in some way that is detrimental to a firm's profits (Shotts 2015, 1). Political risk refers to the risk that arises as a result of the potential actions of governments and other political forces within and across nations; this type of risk implies uncertainty about potential changes in government policies and the impact of such policies on the future economic environment (Huang et al. 2015, 393). Multinational corporations consider the political risk of the host country as one of the most important factors in investment decision making. The quality of a host country's investment environment especially the political situation is very important in attracting Foreign Direct Investment (Mawanza 2013, 78). By conducting political risk analyses, investors can reduce uncertainties about the future and will be in a better position to make rational choices about their operations in the foreign country. Political instability may expose business firms to the risk of decisions made by new governments or new factions within the government, which might impact the firm's ability to continue its operations or influence its profitability (Toit 2013, 7-10).

When political risk is determined, firstly factors that affect this risk need to be assessed. Risk assessment includes a lot of factors such as the relationships of the various groups in the country, the government's decision-making process and the country's history (Meldrum 2000, 5).

Among the factors that affect the political risk, regime of the country, political parties, effectiveness of the government in the management of the country, government crises, foreign policy of the country, economic policy, social, demographical, ethnical and religious structure of the country, effectiveness of the labor unions, laws related to the foreign capital, embargoes applied against the country and wars may be regarded as some instances (Acar, 2012). Also wars, revolution, coup d'etat, terrorism, strikes, extortion, kidnappings, the case of externally induced financial constraints, externally imposed limits on imports or exports, expropriation, confiscation, domestication, arms conflicts, insurrection factors can also be added to these factors (Andoh 2007).

The rise of the political risk can cause many adverse situations (Türkay 2013). Some of them are given as:

- Foreign investors may leave the country.
- Speculators may take a position that can increase the level of chaos (in foreign and domestic currency, on the stock exchange).
- Decrease in the investments in the country because of the uncertainty.
- Some local investors in the country may miss their capital abroad.

Several studies have been conducted to investigate the relationship between political risk and foreign direct investment (FDI) and different results have been obtained. Although there are some studies which put forward that foreign direct investment decreases as the political risk increases (Gastanaga et al. 1998, Wei 2000, Grosse and Trevino 2005, Demirhan and Masca 2008, Wyk and Lal 2008, Erramilli and Rao 1993) there are also some studies which claim that political risk has no effect on foreign direct investment (Wheeler and Moody 1992, Noorbakhsh et al. 2001). Some studies suggest that more entries into the risky countries would occur (Albuquerque 2000, Kolstad and Tondel 2002, Al-Khouri and Khalik 2013). In another group of studies, (Pan and Li 2000, Holburn 2001) it has been suggested that the effects of political risk in the country may vary from company to company. Pan and Li (2000) conclude that large companies are affected less when they are compared to small companies by the political risk conditions in the host country.

According to Baek and Qian (2011), with each political risk component different results are obtained in the studies that use 12 Categories Political Risk Index, which was compiled by International Country Risk Guide (ICRG). Both in the industrialized and developing countries a good level of “accountability” and “investment profile” shows that these countries attract more foreign direct investment.

On the other hand, in developing countries, markets with better “law and order", low level of "religious tension" and a more stable "government" tend to attract more foreign direct investment. However, in other studies (Tallman (1988), Grosse and Trevino (1996), Zhoa (2003), Aguiar et al., (2012)) it was concluded that the political risk in the home country may affect and reduce the investment in the host country.

According to Holburn (2001), political risks may have different effects on companies because of the differences in the out-of-marketing characteristics of the companies and companies with high level of political risk management have a more tendency to invest in the countries which have high political risk.

In this study, by presenting the literature review related to the relationship between the political risk, which is one of the effective factors in the selection of the country for FDI, and foreign direct investment, researchers aim to contribute to the findings of the previous studies with the new results of the present study.

2. LITERATURE REVIEW

Tallman (1988) studied the effect of economical and political conditions of home country on outward foreign direct investment (FDI) in the case of Western developed countries and the USA from 1974 to 1980. The results have shown that the political and economic conditions of the home country are important for the process of foreign direct investment decision. The economic development level of the home country (defined as GDP per capita) is an important determiner of the direct investment level in the USA. Wheeler and Moody (1992) did analyses on company level in their study in which they used the data from the USA. They found that the corruption in the host country doesn’t have any significant effect on foreign direct investment.

Erramilli and Rao (1993) conducted a survey on 114 service firms about their entrance to the foreign marketing. The preferences of the companies between full-control and shared control entry modes were investigated. Among the conclusions of the study it was also found that the sovereign risk prevents the foreign direct investment. They put forward that multinational companies avoid making investments in the host countries with high political risk profile. Singh and Jun (1995) performed an empirical analysis between 1970 and1993 within 31 countries about macroeconomic and sociopolitical variables affecting the geographical distribution of foreign direct investment. The political risk index of BERI[1]was found to have positive effect on foreign direct investment. The higher the value of the BERI political risk index is, the less the risk is.

Grosse and Trevino (1996) did a different case study of the USA which analyzes the effect of the political risk in the home country on foreign direct investment. For the period from 1980 to 1991, the study, which examines the factors that affect the foreign direct investments (FDI) between the USA and the source countries of the investment, has shown that the political risk in the home country has significant effect on the foreign direct investment in the USA. This study indicates that it is possible for the investors in the countries with political risks to invest in the USA. Gastanaga et al. (1998) conducted a research within 49 less developed countries over the period 1970-1995 to investigate the effect of political and institutional variables such as corporation tax rate, tariff rate, level of openness to the international capital flows, exchange rate bias, contracting administration, expropriation, bureaucratic delay and corruption on different types of FDI. It was concluded that the less the corruption and the risk of expropriation are and the better compliance to the contract (if it isn't violated) are, the more foreign direct investment entrance is.

Albuquerque (2000) examined the relationship between economic and political conditions of home country and foreign direct investment (FDI) with a study which was conducted within 14 host countries that invest in the USA including the years from 1974 to 1980. It was concluded that within the total entrance the share of FDI is higher in countries with more risks, there is a negative correlation between foreign direct investment and credit rating of the country and there is more foreign direct investment in the countries with high credit scores when compared to the countries with low credit scores. Pan and Li (2000) conducted a study to investigate the relationship between company size and capital attendant joint venture between the years 1981 and 1998. According to the study it was concluded that big companies brought large scaled capital attendant joint venture investments to the host countries. Furthermore, the study revealed that big companies, when compared to the small companies in the host country, were less affected by the risk conditions.

Wei (2000) suggests that corruption reduces the foreign direct investment considerably. It is also claimed that corruption affects both the capital volume and capital structure in the countries that import capital.

Holburn (2001) conducted a study to investigate the effect of political risk on internationally developing strategies of the firms in the electric power production for the years from 1990 to 1999 in 191 firms in 64 countries. For the dependent variable the decision of entrance to a country was taken. Holburn concluded that because of the differences of the firms in their out-of-market peculiarities, the effect of the risk is different on these firms and companies with a better skill of political risk management tend to enter to the countries which had high level of political risk.

Noorbakhsh et al. (2001) examined the relation between human capital level of the host country and the geographical distribution of foreign direct investment for the years from 1980 to 1994. The study covered the 36 developing countries from Africa, Asia and Latin America. Empirical findings are as follows: (a) human capital is a statistically significant determiner of foreign direct investment, (b) human capital is one of the most significant determiners of foreign direct investment, and (c) human capital is gaining more importance gradually. Furthermore it was stated in the study that the variables of democracy and political risk had no significant effect on foreign direct investment.

Kolstad and Tondel (2002) conducted a study which reveals that variables of marketing size and externality has strong positive effects on foreign direct investment within 61 developing countries covering the years between

[1] BERI index is a risk index developed by Business Environment Risk Intelligence.

1989 and 2000. Furthermore, no significant correlation between foreign direct investment and socio-economic conditions was found. According to the study, while the corruption was not a significant variable on its own, whereas it affected the foreign direct investment when it was taken into consideration with other control variables. A negative relation was found between FDI and corruption. This means that the more the corruption is, the more foreign direct investment will be. This result contrasts with the study of Wei that used the same corruption index. Strong variables that affect the foreign direct investment (FDI) are political rights, civil freedom, democratic accountability, religious and ethnic tension and internal conflicts. Considering the results, countries providing citizens with more political and civil rights tend to draw more attention of foreign direct investors. Ethnic tension, internal conflict and democracy affect foreign direct investment entrance. However, government stability, bureaucracy, external conflicts, legal order, and political power on politics have no effect on foreign direct investment.

Zhoa (2003) built a study by using the data from 21 source countries between the years from 1983 to 1999 in order to specify the determiners of foreign direct investments to China. It was concluded that the most influential factor was the political risk. It was found that there was an inverse relationship between political risk and foreign direct investment. It was also concluded that home countries with less political risk when they are compared to China made less investment to China whereas countries with higher level of political risks tended to make more investment to China to avoid political instability in their countries.

Pan (2003) examined the effects of the characteristics of home and host countries on foreign direct investment entrance within 30 home countries and China economy between 1984 and 1996. Two different variables related to risk were used. When dummy variable was used, negative but significant relation was found. In other words, political risk reduces the FDI. However, when Euromoney risk variable was used, the more favorable risk values are associated with lower FDI flows.

Trevino and Mixon (2004) conducted a study within Latin America (Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela) and the study covers the years between 1988 and 1999. Results of the study showed that political risk was a significant indicator of foreign direct investment to Latin America.

Smith-Hilmon and Omar (2005) accomplished a study via using a survey to examine the effect of regulation and political risk on 121 English firms' international activities between the years 1994 and 1996.The results of the study showed that underdeveloped countries, when compared to developed countries, draw less foreign direct investment. This result is considered as a reaction of multinational companies to the countries with weak government which have regional tendency to political risk and corruption.

Grosse and Trevino (2005) examined the effects of new institutional variables, which include efforts of the government to create a more favorable environment for FDI, on foreign direct investments in Central and Eastern European countries. The study showed that there was a negative and significant relation between political risk and foreign direct investment flows.

Daude and Stein (2007) examined the effect of institutional quality on foreign direct investment within 34 source country and 152 host countries between the years 1982 and 2002. The study showed that institutional quality and FDI flows have a positive and statistically significant relationship.

Busse and Hefeker (2007) examined the relationship between political risk, corporations and foreign direct investment flows. To specify the most significant determiners of the activities of multinational companies, different econometric techniques were used within 83 developing countries between the years 1984 and 2003. For the empirical analyses, the study used political risk and 12 different components of institution. The results showed that government stability, internal and external conflicts, corruptions and ethnic tensions, law and order, democratic accountability of the government and the quality of the bureaucracy are very significant determiners of foreign direct investment. In cross-section analysis, it was concluded that there was a close relation between foreign direct investment and the variables of political risk and institutions except government stability, law and order, and quality of the bureaucracy. Investment profile, internal and external conflicts, ethnic conflicts, and democratic accountability are significant determiners of FDI flows.

Wyk and Lal (2008) accomplished a study to examine the effects of institutional and macroeconomic variables on FDI within 31 developing countries covering the years between 1995 and 2003. The study showed that economic liberty made foreign direct investment easier and political risk hindered the investments. It was claimed that the lower the level of political risk is, the more the foreign direct investments are. It was concluded in the study that there is a positive relationship between market size, GDP growth rate and foreign direct investment. The results showed that low current accounts balance, the rise in the value of the currency of the host country and low level of inflation encouraged foreign direct investment.

Demirhan and Masca (2008) made a cross-section analysis within 38 developing countries covering the years between 2000 and 2004 to reveal the variables determining the foreign direct investment movements. In the model, dependent variable is the foreign direct investment. Independent variables are GPD per person, inflation, number of main phone lines for every 1000 people, labor cost per capital in manufacturing industry, external openness rate, risk and growth rate of the institutional top rate of tax. According to the results, there is a positive and significant relationship between number of phone lines per person, openness, and growth rate and foreign direct investment. The relationship between inflation rate, tax rate and foreign direct investment is negative and it is statistically significant. The relation between FDI and labor cost is positive and the relation between FDI and risk (compound) is negative. The results are not significant in both of these.

Lee and Rajan (2009) conducted a study using the data from APEC countries (60 source country and 60 target country) for the years between 2000 and 2005 and it revealed that the less the political risk is, the more foreign direct investment to the country is. It was concluded that %10 decreases in the political index of the target country would lead to %3.2 increase in the foreign direct investment movements. The results indicated that among the financial, economic and political risks, political risk is the most important one in terms of foreign direct investment entrance.

Krifa-Schneider and Matei (2010) did a research based on fixed effect model and dynamic panel model to reveal the relationship between political risk, business climate and foreign direct investment empirically and to present more supportive results within 33 developing countries and transition countries. The study concluded that the low level of political risk would lead to an increase in foreign direct investment entrance and business climate is a significant determiner for the FDI flows. Political risk affects the business climate. Low level of political risk means a better working atmosphere for foreign investors. The control variables used in the study are as follows: GDP per person to control marketing growth, GDP growth rate to check marketing potential and marketing growth, the proportion of import and export to GDP to reveal the trade openness, and GDP deflator as the indicator of macroeconomic political inadequacy.

Hayakama et al. (2011) accomplished a study that includes 93 countries (60 of which are developing countries) between the years 1985 and 2007. It is the first article to thoroughly examine the long and short term effect of the components of political and financial risk on foreign direct investment. The study showed that there was a relationship between the variables of political risk and foreign direct investment. Especially socio economic conditions, investment profile and external conflict are the strongest determiners that affect foreign direct investment (FDI). For the developing countries, among the financial risk variables, only exchange rate stability seemed to have a positive significant effect on foreign direct investment. Current account balance as the percentage of goods and service export, external debts as the percentage of GDP, net international liquidity (as the number of months of import cover) and current account balance as the percentage of GDP have negative effects on FDI. This study suggests that the financial risk in the host country is not taken seriously by the multinational companies.

Baek and Qian (2011) offered a study based on panel regression analysis within 22 industrialized and 94 developing countries between the years 1984 and 2008, to see if political risk affects foreign direct investment (FDI) and to reveal how political risk affects FDI. 12 categorized Political Risk Index which was edited by International Country Risk Guide was used for the study. The results are as follows: Firstly, political risk is a significant determiner of foreign direct investment in the industrialized and developing countries. Secondly, political risk does not affect the foreign direct investment stocks in the industrialized and developing countries in the same way. Thirdly, since the 11 September attacks, political risk has been a more significant and important determiner of foreign direct investment especially in developed countries. It was concluded that in

the developed and developing countries, foreign direct investment seems to react in a different way for different political risks.

Both in developed and developing countries, the only common political risk determiner that affects the foreign direct investment is "internal conflicts". It seems that both in developed and developing countries a high level of accountability" and "investment profile" draw more attention of foreign direct investment. "Ethnic tensions" and "military force in politics" may considerably affect the foreign direct investment in developed countries. However these variables have no significant effects on foreign direct investment in developing countries. Their effect on foreign direct investment is significant but they have no significant effect in developing countries. On the other hand, markets in developing countries which have a better "law and order", low level of "religious tensions" and more stable "government" tend to get more attention of foreign direct investment. This might be because "government stability", "law and order" and "religious harmony" are 3 most significant factors that affect the general stability of the country covering political and economic stability.

Jo Jakobsen (2011) made a study which includes 332 real political risk situations for the years between 1998 and 2005. The study applied a theoretical model which intended to reveal the relationships between the sources and effects of political risk. The study presents the analysis done with exploratory data about the effects of political risk in developing countries. %48 of the cases in the data are related to the government intervention, %39 of them related to interventionist acts against war, terror or social disturbance, and %13 of them are related to the acts performed by activists, International Private Companies or their competitors . However, in each of the given categories, the cases causing institutional losses seem to vary considerably. For instance, analyses show that governments and politicians in the host countries have various political instruments to increase their FDI incomes. The study has emphasized the importance of making distinction between political risk resources and political risk effects.

Aguiar et al. (2012) studied on the effect of political risk in the home country on foreign direct investment. The study covered 180 countries with political risks such as Brazil with the aim of analyzing the effect of political risk in the home country on investment decisions and foreign direct investment movements by using models of Probit, Tobit and Heckit multi guessing methods. The results indicated that political risk in the home country reduced the foreign direct investment to host country, namely Brazil.

Vadlamannati (2012) examined the relationship between the acts of the branch offices of American-led International Private Companies and political risk in the 101 developing countries out of OECD over the period 1997-2007. The study concluded that low level of political risk leads to an increase in the number of American-led companies whose shares are more than %51. The lower the political risk is, the higher level of the proportion of fixed asset is. Furthermore, low political risk is also related to the increase in the return on investments.

Sedik and Seoudy (2012) conducted a study within 20 MENA countries[2] between the years 1999 and 2010, to reveal the relationship between country risk and its ability to draw the attention of foreign direct investment and to explain whether the New Institutional Economics (NIE) criteria are significant in MENA region or not. The study included multi linear regression and panel data analysis. Foreign Direct Investment movement and Foreign Direct Investment stock variables were used as dependent variables. The results indicated that high level of political risk had a positive and significant effect on foreign direct investment whereas low level of economic and financial risk had a positive but not significant effect on foreign direct investment. On the other hand, New Institutional Economics criteria[3] have complicated results. Freedom of investment, financial freedom and regulatory quality seemed to have positive and significant effects on FDI whereas business freedom and accountability had negative and significant effects on FDI.

Berden et. tal (2012) have analyzed the impact of institutional quality in attracting FDI in Algeria between the years 1995 and 2011. The Heritage Foundation's economic freedom index which reflects economic institutional quality (EIQ) and two governance indicators was used. The study concluded that the inward FDI is significantly

[2]Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunis, United Arab Emirates.

[3]The quality of business environment, both the economic freedom and the governance indicators in the world.

negatively affected by government effectiveness; also a higher level of 'voice and accountability' reduces the inward FDI.

Subaşat and Bellos (2013) investigated the link between governance and FDI in the context of selected Latin American countries using a panel gravity approach over the period 1985- 2008. The results indicated the FDI enhancing character of poor governance in target countries. With the exception of "Democratic Accountability," the governance variables have negative and significant coefficients, which imply that poor governance is associated with a high level of FDI. "Democratic Accountability," has a positive and insignificant sign. The results suggest that poor governance does encourage FDI both in transition countries and in Latin America. The "Regulatory Quality" variable also has a negative and marginally significant sign, which implies that poor regulations do not discourage FDI. For the source countries the results suggested that high corruption levels in the source countries encourage MNCs to invest more in Latin America. The study concluded that better "Bureaucratic Quality" and "Democratic Accountability" in source countries encourage more outward FDI in Latin America.

Benacek et al. (2013), examined the effect of political and economic risk on foreign direct investment movements in 35 host countries in Europe, covering the years between 1995 and 2008, by using a cross comparative approach. The countries were analyzed within 4 groups. First group includes all European countries, second group includes 15 developed countries[4], third group includes 9 Accession countries[5] and the fourth group includes 11 candidate countries[6] for EU. The results showed that the relation between foreign direct investment decision making and risk isn't always negative. Also the results revealed that factors which are out of economy are important but their contribution to economic decision making process isn't easy to measure.

The quality of business environment, both the economic freedom and the governance indicators in the world. Australia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Holland, Norway, Portuguese, Spain, Switzerland, Swedish, United Kingdom, Cyprus, The Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia, Slovenia Albania, Belorussia, Bosnia, Bulgaria, Croatia, Macedonia, Moldova, Romania, Serbia, Turkey, Ukraine.

Al-Khouri and Khalik (2013) offered a study to examine the effect of various variables of political risk and other risks (financial and economic) in North Africa (MENA) region on foreign direct investment. The study also aimed to reveal that whether there was a difference between the factors affecting foreign direct investment among rich and poor countries or not. The analyses were done by using fixed effect and random model in the case of 16 MENA countries for the years between 1984 and 2011.The results showed that there was a positive relationship between deferred values of FDI, market size, and political risk and foreign direct investment. Furthermore among 12 political risk variables, there was a close relationship between corruption level, external conflict (tension) and FDI movements. It was also found that there was a difference between rich and poor countries in terms of drawing attention of foreign direct investment.

Demirtaş (2013) examined the effect of institutional factors on foreign direct investment, by using cross-section data from 71 developed and developing countries between the years 1995 and 2002. The results indicated that there was a positive relationship between institutional factors such as political stability, rule of law, fighting against corruption and FDI.

3. DATA AND METHODOLOGY

Data covers the years between 2002 and 2012. The analyses were applied for 91 countries. The countries used in the analysis have been presented in the attachment table. As for choosing the countries to get data, accessibility of the complete data of the significant variables to the study has been taken in account. The data of Political Risk Services has been used in the analysis. The equation used in the study is as follows:

[4]Australia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Holland, Norway, Portugal, Spain, Switzerland, Swedish, United Kingdom.
[5]Cyprus, The Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Slovakia, Slovenia
[6]Albania, Byelorussia, Bosnia, Bulgaria, Croatia, Macedonia, Moldavia, Romania, Serbia, Turkey, Ukraine.

$$fdi_{it}=\alpha_{it}+\beta_1 exp_{it}+\beta_2 lnpop_{it}+\beta_3 gdp_{it}+\beta_4 inf_{it}+\beta_5 prsva_{it}+\beta_6 prspv_{it}+\beta_7 prsge_{it}+\beta_8 prsrq_{it}+\beta_9 prsrl_{it}+\beta_{10} prscc_{it}+u_{it} \quad (1)$$

As seen in the Equation 1, six political variables have been used in the study. They are; prsva, *Voice* and *Accountability;* prspv *Political Stability* and *Absence of Violence;* prsge, *Government Effectiveness;* prsrq, *Regulatory Quality;* prsrl, *Rule of Law; and* prscc, *Prevention of Corruption.* Moreover, 4 control variables have been used for the analysis. Control variables were taken from World Development Indicators (WDI). These variables were determined according to literature and accessibility of the data. The variables are; Infdi, The logarithm of Foreign Direct Investment Net Inflow (BOP, Current USA$); inf, consumer price and inflation (*%* per year); lngdp, the logarithm of GDP (as current Dollar); exp, *Exportation of Goods and Services (as percent of GDP);* and lnpop is the logarithmic explanation for *Population.*

Short information about political risk variables are presented below (Çelen 2007, 88; Özcan and Arı 2010, 71; Thomas 2010, 31-54);

i. Voice and Accountability *(VA),* refers to the right of the citizens of a country to participate in the elections of government, their freedom of speech, organization and freedom of the media. This criterion has been used to measure the functionality of political, civil and human rights. Here people's participation in the election, their power of determining the government and the power of people and media to supervise the political authority have been analyzed.

ii. Political Stability and Absence of Violence *(PV),* refers to violence acts that include political violence and terrorism and destabilization of the government by unconstitutional acts. Many reasons from unfair distribution of income to ethnic and religious tensions in the country may be the source of political violence and instability. The final stage of political violence is civil war. Therefore viability and survival of a political system based on constitutional order and rule of law is crucial.

Existence of social tensions and the inability of the political system to act as compromising may cause the political opposition to go underground and get out of the legal system. This case leads to potentiality of rebellion actions, terrorist attacks and sabotages. Therefore to prevent political violence and instability, it is crucial that the law and order are provided, political and army power must exist, political system must be open to participation and representativeness, democracy culture must be developed, ethnic, religious and social class tensions mustn't exist.

iii. Government Effectiveness *(GE)* is related to the quality of public services, the quality of civil services and its level of freedom from political pressure, its quality of policy making and its practice and the reliability of the government in these kind of practices of the policies. It is the ability of political power to make influential and stable policies and practice them. For the effectiveness of the government, the amount of public services produced and their quality, the ability of bureaucracy and public officers, the credibility of public authority commitments, freedom of public services from political effect and their fairness are taken as criteria.

iv. Regulatory Quality *(RQ)* is the ability of the government to make policies and practice them to help private sector develop and support it. It is the effectiveness of the public policies shaped out of market relations. The fields that these policies focus on are price controls, acts related to examination and inspection of banking system, restrictions introduced to the production and consumption of goods and services that cause negative externality.

v. Rule of Law (RL) is related to the adaption to the rules of society and establishing of safety. It is also related to the quality of fulfilling the agreements, police against the possibility of crime and violence, and the quality of judgment mechanism. The effectiveness of fulfilling the agreements and the quality of police and judgment mechanism has been focused on. Additionally, protection of the right of possession and consolidation of the legal framework has been emphasized.

vi. The Control of Corruption (CC) *is avoided to* abuse of public forces for the purpose of private benefits. Corruption causes the reduction of effectiveness in public sector, the increases in public expenditures, the reduction of government credibility, obstruction of competiveness and the rise of country risk.

4. FINDINGS AND DISCUSSIONS

The pooled least squares (PLS), fixed effects (FE) or random effects (RE), which is better than the others? Does the model have entity effect? If the model has entity effect, is this effect fixed or random? First of all, these are going to be determined.

F statistics test and LM test are used in order to test whether there is a linear relationship or not between the dependent variables and independent variables (Zaman 2000, 1-11). Lagrange multiplier (LM) test provided parametric limitation tests with a standard appliance for various models. Among the LM test, likelihood ratio (LR), and Wald tests, the first advantage is generally the calculation of LM statistics in likelihood based inferences.

Because LM statistics is only calculated by the usage of only the results of null hypothesis (limited model), it is easier than the calculation of alternative hypothesis (unlimited model). Moreover, it has an additional advantage of having standard dispersion feature which the Wald and LR tests don't have. While alternative model estimation has used both maximum likelihood estimation (MLE) and generalized least squares (GLS) which are based on two-step process, Breusch and Pagan's (1980) LM test (which is based on the smallest pooled squares) is used for the random effects on the linear model remainders (Greene and McKenzie 2012, 2).

Table 1: Estimators and Tests for the Selection of Suitable Model

Variables	PLS	FE	GLS	RE	MLE
Exp	0,00106**	0,00162***	0,00042	0,00106***	0,00105***
Lnpop	20,1***	20,1***	20,4***	20,1***	20,1***
Lngdp	0,0439***	0,0366***	0,0374**	0,0439***	0,044***
Inf	0,00035	0,00041	-0,00752*	0,00035	0,00035
Prsva	-0,0043	0,0154	-0,0977	-0,0043	-0,00507
Prspv	-0,157**	-0,161**	-0,13	-0,157**	-0,156**
Prsge	-0,11*	-0,292**	-0,114	-0,11*	-0,109*
Prsrq	0,161***	0,176***	-0,0123	0,161***	0,161***
Prsrl	-0,00039	-0,038	0,00768	-0,00039	1,2e-05
Prscc	0,0611	0,0354	0,194	0,0611	0,0617
_cons	-41,3***	-41***	-41,8***	-41,3***	-41,3***
sigma_u_cons			**0,12*** **		
sigma_e_cons			**0,0926*** **		
Statistics					
R^2		1,0	1,0		
F_f		18,1			
Score					14678,5
LM				1614,6	
chi2_c					657,1
Hausman				12,8	
P	0,0			0,0	

Note: * p<0.10; ** p<0.05; *** p<0.01

Fixed effects (accumulative) are tested with F test and random effects are tested with Lagrange multiplier (LM) test (which was developed by Breusch and Pagan). If the null hypothesis isn't rejected, pooled least squares regression is preferred. Hausman specification test is used to compare the fixed effects models and random effects model. If the null hypothesis can't be rejected in the model which includes fixed effects, random model is considered better than the fixed model (Park 2009, 4). If the null hypothesis can be rejected in F test, it is determined that fixed effects model is decided to be better than the pooled least squares model (Park 2009, 18).

F test can be used for fixed effects model, while the Breusch–Pagan LM test can be used for random effects model. When the F and LM tests are applied, using the processes (shown in the Table 1) may provide convenience.

First of all, the results of the tests that are done for the selection of estimators are going to be evaluated. Various tests have been done to test the existence of entity effects. Here F test is shown as F-f, Breusch-Pagan Lagrange Factor test is shown as LM (which is done on the random effects estimators), and Likelihood Ratio Test done through Likelihood Ratio Estimator is shown as score test and chi_2. According to results of all of these tests Ho hypothesis is rejected. In other words, the existence of entity effects isn't accepted. Moreover, In Table-2; according to Hausman test's results, Ho hypothesis is also rejected. In other words, it's determined that fixed effects model is consistent.

Table 2: F test, LM Test and the Selection of Suitable Model

Fixed Effect (F Test or Wald test)	Random Effect (Breusch-Pagan LM test)	Selected Model
H_0 hypothesis can't be rejected *(It is not fixed effect)*	H_0 hypothesis can't be rejected *(It's not random effect)*	The smallest pooled squares method is suitable.
H_0 hypothesis is rejected *(Fixed effect)*	H_0 hypothesis can't be rejected *(It isn't random effect)*	Fixed effect model is chosen.
H_0 hypothesis can't be rejected *(It's not fixed effect)*	H_0 hypothesis is rejected *(Random effect)*	Random effect model is chosen.
H_0 hypothesis is chosen. *(Fixed effect)*	H_0 hypothesis is rejected *(Random effect)*	1) Fixed and random effect model is suitable. 2) One of the models is chosen according to Hausman results.

Source: Park, Hun Myoung (2010) Practical Guides to Panel Data Analysis: 1-3, URL: http://www.iuj.ac.jp/faculty/kucc625/writing/panel_guidelines.pdf. Date of Access: 15.04.2014.

Although Breusch and Pagan LM test is applied under the hypothesis of fixed N and endless T, as an alternative to this Pesaran test has become valid under the condition of small T or big N hypothesis. According to this test which is developed by Pesaran in 2004, according to null hypothesis there is no correlation between interdivisional entities (Hoyos and Sarafidis 2006, 485).

In Wald Test, however, null hypothesis is that fixed variance exists. Alternative hypothesis is that the model contains heteroskedasticity. Apart from DW test and LBI test, Wooldridge test can be used in order to identify whether there is a autocorrelation problem or not. In Wooldridge test, null hypothesis expresses that there is no first degree autocorrelation (Torres-Reyna 2007, 35-6).

In Table 3; various tests that identify the existence of assignment from econometric assumptions can be seen. In unbalanced panel model, interdivisional correlation test can be looked at with Pesaran test. According to the results that are shown in the Table 3, it is clear to understand that interdivisional correlation exists. In order to test the existence of heteroskedasticity in accordance with the units, adapted Wald test is used and in order to test the autocorrelation DW test and LBI test are used. Wooldridge test also takes place in the Table 3 in addition to these tests which are used to test autocorrelation. Therefore it can be seen that there are both interdivisional correlation and autocorrelation and heteroskedasticity in the model. Because there are these three problems in the model, resistant estimators will be acquired.

Table 3: Tests for Determining of Deviations from the Econometric Assumptions

Pesaran's test of cross sectional independence = 7,841, Pr = 0,0000
Modified Wald test for group wise heteroskedasticity in fixed effect regression model
H_0: sigma(i)^2 = sigma^2 for all i
chi2 (91) = 3,2e+05
Prob>chi2 = 0,0000
Ar
**
d1 1,217
LBI 1,570
**
Wooldridge test for auto correlation in panel data
H_0: no first-order auto correlation
F(1, 90) = 10,489
Prob> F = 0,0017

In Table 4, both the resistant estimators and unresisting estimators take place. While SE gives us the usual fixed effects model in other words in group estimator, robust gives us the Huber-White heteroskedasticity standard mistakes and resistant fixed effects estimators in the existence of autocorrelation. Arl, Ar (1) gives us the resistant fixed effects estimators in autocorrelation's existence, and SSC gives us the resistant fixed effects estimators in the existence of aoutocorrelation (which is guessed with standard mistakes), interdivisional correlation and heteroskedasticity. In the model, since the existence of autocorrelation, interdivisional correlation and heteroskedasticity is identified, it is determined that SSC estimator that is guessed with Driscoll-Kraay standard mistakes may be suitable to use.

Table 4: Applied Models and Resistant Estimators

Variables	SE	Robust	ar1	Scc
exp	0,00162***	0,00162**	-0,00562***	0,00162**
lnpop	20,1***	20,1***	18,5***	20,1***
lngdp	0,0366***	0,0366*	-1,01***	0,0366**
inf	0,00041	0,00041	0,00307	0,00041
prsva	0,0154	0,0154	-0,671***	0,0154
prspv	-0,161**	-0,161	-2,02***	-0,161**
prsge	-0,292**	-0,292	-3,26***	-0,292**
prsrq	0,176***	0,176***	0,0236	0,176***
prsrl	-0,038	-0,038	-1,24***	-0,038
prscc	0,0354	0,0354	0,266	0,0354
_cons	-41***	-41***	-4,96***	-41***
r2_w	0,99	0,99	0,913	0,99
F	8799	1018	829	80205

Note: * p<0.10; ** p<0.05; *** p<0.01

Table 5 includes Driscoll-Kraay Fixed effects model. The value of R^2 is about %99 and F test is significant. According to this model, it was seen that other versions are statistically significant. While Exp, Inpop, Ingdp, prspv, prsge, prsq versions are statistically significant, Inf, prsva, prsvl, prscc versions are not statistically significant. The signs of prspv and prsge have been negative. Thus, it was concluded that the increase in these variables decreases the lnfdi independent variable.

Table 5: Driscoll-Kraay Fixed Effects Model

Regression with Driscoll-Kraay standard errors				Number of obs =980		
Method: Fixed-effects regression				Number of groups = 91		
Group variable (i): id				F(10,92)= 80205,29		
Maximum lag: 2				Prob>F=0,0000		
				Within R-squared=0,9901		
Ln fdi	Coef.	Drisc/Kraay Std. Err.	T	P>|t|	[95% Conf,	Interval]
Exp	0,0016227	0,0006185***	2,62	0,010	0,000394	0,0028514
Ln pop	20,14288	0,3774565***	53,36	0,000	19,39299	20,89276
Ln gdp	0,0366114	0,018892*	1,94	0,056	-0,000921	0,0741437
Inf	0,0004104	0,0006302	0,65	0,517	-0,0008415	0,0016623
Prsva	0,0154287	0,0442472	0,35	0,728	-0,0724762	0,1033335
Prspv	-0,1610157	0,0674305**	-2,39	0,019	-0,2949781	-0,0270533
Prsge	-0,2919063	0,1643206*	-1,78	0,079	-0,6183577	0,0345452
Prsrq	0,1762682	0,0329023***	5,36	0,000	0,1109021	0,2416344
Prsrl	-0,0380475	0,0611811	-0,62	0,536	-0,1595945	0,0834995
Prscc	0,0353538	0,0421945	0,84	0,404	-0,048473	0,1191805
_cons	-41,03022	0,6482805***	-63,29	0,000	-42,31814	-39,7423

Not: * p<0.10; ** p<0.05; *** p<0.01

The signs of Exp, Inpop, Ingdp, prsrq have become positive. Therefore it was concluded that the rise in Exp, lnpop, lngdp control variables and in prsrq political risk variable increases Infdi dependent variable. It can be said that %1 rise in the Exp variable causes the rise of about %20.14 in Infdi variable, %1 rise in Ingdp variable causes the rise of Infdi variable at about %0.04, %1 rise in prspv variable causes the decrease in Infdi variable about % 0.16, %1 rise in prsg variable causes the decrease of Infdi variable about %0.29 and %1 rise in prsrq causes the increase of Infdi variable about %0.18.

5. CONCLUSION

Foreign direct investment has an important place in the development of the countries. When the investors decide to make an investment, they take various factors into consideration. One of them is the political risk. In the study, literature that investigates the relation between political risk and foreign direct investment has been presented initially. After that, the study data covering the years between 2002 and 2012 and 91 different countries has been put forward. Six political risk variables (freedom of expression and transparency, political stability and absence of violence, management effectiveness, regulatory quality, rule of law, prevention of corruption) and four control variables (foreign direct investment, consumer price with inflation, GDP, exportation of goods and services, population size) have been used in the study. In order to test the existence of the unit root effect, F test, Breusch-Pagan Lagrange multiplier test, likelihood ratio test were done. The results of these tests showed that unit root effect exists. After that, some tests were done to identify the deviations from the econometric hypothesis. So, these tests showed that there are interdivisional correlation, autocorrelation and heteroscedasticity in the model. Because of the existences of these was identified, using Driscoll-Kraay fixed effects model was considered more suitable. In the model, in which the R^2 value and F test is statistically significant, “exportation of goods and services”, “population”, “logarithms of GDP”, “political stability and absence of violence”, “the efficacy of administration”, “regulatory quality”, “inflation”, “freedom of expression and transparency”, “rule of law”, “prevention of corruption”, variables are not statistically significant. Results show that the increase in the political risks; “political stability and absence of violence” and “the efficacy of administration” causes the foreign investment to decrease and the increase in the “exportation of goods and services”, “population”, “logarithms of GDP” cause the foreign direct investment to increase.

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Appendix 1: Countries in the Analysis

Countries in the Analysis			
Albania	Dominican Republic	Japan	Philippines
Algeria	Ecuador	Jordan	Poland
Armenia	Egypt, Arab Rep.	Kazakhstan	Portugal
Australia	El Salvador	Kenya	Romania
Austria	Estonia	Korea, Republic	Russian Federation
Azerbaijan	Ethiopia	Liberia	Senegal
Bahamas	Finland	Luxembourg	Singapore
Bahrain	France	Malaysia	South Africa
Bangladesh	Gabon	Mexico	Spain
Belarus	Germany	Moldova	Sri Lanka
Belgium	Ghana	Mongolia	Sudan
Bolivia	Greece	Morocco	Sweden
Botswana	Guatemala	Mozambique	Switzerland
Brazil	Guinea-Bissau	Netherlands	Tanzania
Bulgaria	Haiti	New Zealand	Thailand
Cameroon	Honduras	Nicaragua	Tunisia
Canada	Hong Kong SAR, China	Niger	Turkey
China	Iceland	Nigeria	Ukraine
Colombia	India	Norway	United Kingdom
Costa Rica	Indonesia	Pakistan	United States
Croatia	Ireland	Panama	Uruguay
Czech Republic	Israel	Paraguay	Vietnam
Denmark	Italy	Peru	

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DETERMINANTS OF TURKISH MINING TRADE BALANCE WITH EU(15): ESTIMATES FROM BOUND TESTING APPROACH

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ABSTRACT

We estimate the short-run and long-run determinants of the trade balance of Turkish Mining with EU (15) countries as well as impact of Customs Union (CU) agreement using the bounds testing approach to the cointegration and the error correction modeling. In selecting the optimal model, we follow Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012) and adopt their model selection strategy where selection is made from the set of those models that satisfy both diagnostic tests and cointegrtion, thus ensuring the selection of a statistically reliable and cointegrated model. Estimation results based on the data for 1988-I to 2008-IV period indicate that in the determination of mining trade balance in the short-run only real domestic income matters. Long-run results indicate that real exchange rate and real domestic income variables have coefficients with expected signs but they are not statistically significant. Only statistically significant long-run determinant of mining trade balance is real EU(15) income. Dummy variable for the customs union agreement does not have a statistically significant coefficient, meaning that the agreement does not have a significant long-run effect on mining trade balance of Turkey with EU(15).

Keywords: Bounds testing approach, exchange rate, customs union, mining trade balance, Turkey

JEL Classification: C13, C22, F14, F31

1. INTRODUCTION

Trade balance is equal to export revenue minus imports expenditure. Every nation desires to have a trade balance with surplus meaning that it exports more than it imports because, otherwise, it will have to find ways such as borrowing from abroad to finance excess imports expenditure or trade balance deficit. It is undoubtedly important to know factors affecting trade balance especially for the policy makers to able to design and implement correct policies.

Trade balance is analyzed extensively in the empirical literature. Analysis is done at three levels: aggregate level (trade balance of a country with the rest of the world), bilateral level (trade balance of a country with a major trading partner) and sectoral level (trade balance of a country's sector with rest of the world or a major trading partner).[1] Bahmani-Oskooee (1985), Noland (1989) and Gupta-Kapoor and Ramakrishnan (1999) can be cited as examples of aggregate level studies. Examples of bilateral level studies include Rose and Yellen (1989), Marwah and Klein (1996), Arora *et al*. (2003) and Bahmani-Oskooee and Ratha (2004b). Carter and Pick (1989), Doroodian *et al*. (1999) and Baek *et al.* (2009) are examples of sectoral level studies.

The purpose of this paper is to explore the short-run and long-run determinants of the trade balance of Turkey's mining with EU (15) countries and the impact of customs union agreement using bounds testing approach with the model selection strategy developed by Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012).

2. LITERATURE REVIEW

Regarding the mining trade balance of Turkey, it is investigated in the literature but in a few papers, which, to the best of our knowledge, are Yazici (2008) and Yazici and Klasra (2010). Yazici (2008) examines and compares, using Almon lag technique, the response to exchange rate changes of trade balances with the rest of the world of three Turkish sectors; agriculture, manufacturing and mining. It is found that in the short-run in response to domestic currency depreciation mining trade balance first improves, then worsens and then improves again and in the long-run agricultural trade balance improves as a result of depreciation of domestic currency. Yazici and Klasra (2010) investigates, in the context of manufacturing and mining sectors of Turkish economy that use imported inputs at different rates, how the response of trade balance to currency devaluation is affected by usage of imported inputs in production of exports. They report that in none of the two sectors j-curve effect exists and that violation of j-curve effect is less severe in the sector with lower import content, mining.

These papers, Yazici (2008) and Yazici and Klasra (2010), are close to ours in the sense that they also examine the Turkish mining trade balance. Despite this similarity, there are three main differences: they look into Turkey's mining trade in the context of world trade, not trade with EU (15), different econometric methods, Almon lag technique and impulse response function, are employed by them and they don't consider the effect on the trade balance of customs union agreement.

In the estimation of the mining trade balance we employ a commonly used econometric technique of bounds testing approach developed by Peseran *et al*. (2001). The previous papers other than Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012) that have employed the bounds testing approach first select the model for estimation using a certain model selection criterion such as Akaike Information Criterion (AIC), estimate it and then apply the cointegration and diagnostic tests to this model. Whatever results come up regarding the cointegration and diagnostics are reported in the end even though some or all of the diagnostics may not be satisfied and/or cointegration may not exist in the selected model, thus making the reported model unreliable. In this paper we follow Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012) and use their model selection strategy where first the cointegration and diagnostic tests are applied to all possible models, given a maximum lag length, and then the subset of models satisfying both the cointegration and the diagnostics is determined. Finally, a model selection criterion is applied to this subset in order to come up with the optimal model for estimation.[2] Unlike the other studies, this strategy of model selection ensures that the estimated optimum model is co-integrated and passes the diagnostics, thus resulting in a statistically reliable estimated model.

The rest of the paper is organized as follows. In the following section the sources of data are described and their time series characteristics are displayed. Then the trade balance model is set out. The next section presents and discusses the empirical results, and the last section contains the key findings and the concluding remarks.

3. DATA AND METHODOLOGY

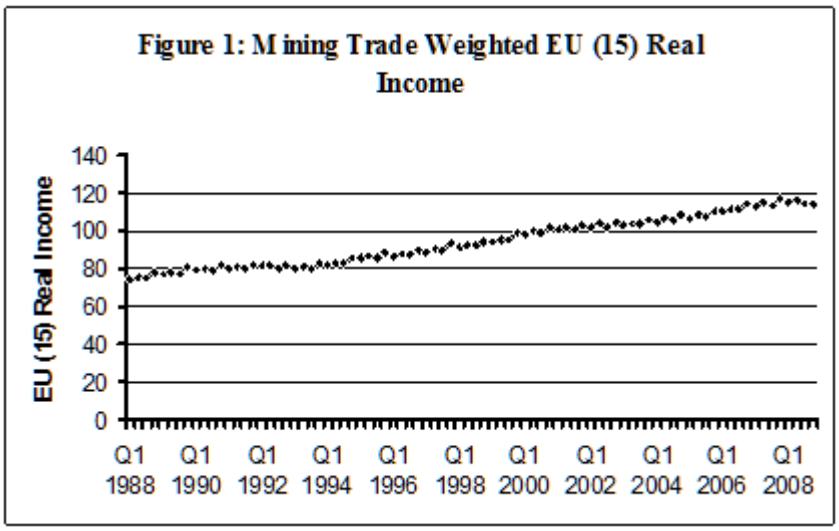
3.1. Description and Time Series Characteristics of Data

We use quarterly data covering the period from 1988:I to 2008:IV. Using 2000 quarterly average as the base, we have indexed the data. Besides, our data is also seasonally adjusted. Data come from three sources; IMF-IFS Country Tables, Statistics Office of Turkey and Eurostat. Export and import data is taken from Statistics Office of Turkey. Data for Real Gross Domestic Product (GDP), Industrial Production Index except for Greece, GDP Deflator and Consumer Price Index (CPI) are compiled from IMF-IFS Country tables. Source for Industrial Production Index of Greece is Eurostat.

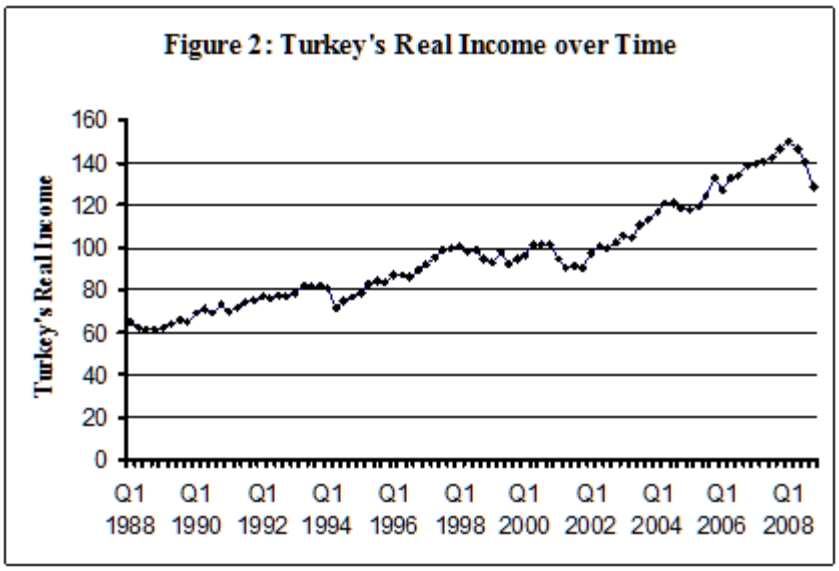
In the estimation of mining trade balance four variables are used, namely Mining trade balance (TB) defined as the ratio of mining exports of Turkey to EU(15) countries over Turkey's mining imports from EU(15) countries, Turkey's real income (Y_{TR}), Real income of EU(15) countries (Y_{EU}), constructed as the weighted average of real income of these countries where weights are mining-sector specific and assigned based on each country's share in total mining trade of Turkey with EU(15) and Real effective exchange rate (RER) between Turkey and currencies of EU(15) countries where nominal exchange rate is defined as the amount of Turkish Lira per

trading partner's currency. Real effective exchange rate (RER) we use in this study is also sector specific like Real GDP of EU(15) in the sense that when constructing RER, the share of a EU(15) country in Turkey's mining trade is assigned as the weight for the country in question.[3]

The behavior of these variables over the sample period is illustrated in Figure 1 through Figure 5.[4] Figure 1 shows EU (15)'s real income over sample period. As expected, it is increasing steadily over time.



In Figure 2 Turkey's real income over time is displayed. It is also rising. However, compared to EU(15)'s real income, we observe that Turkey's real income series has a lower starting value and a higher ending value. This indicates that Turkish real income changes more rapidly over time. We also observe that Turkey's real income fluctuates more so it has a greater variability.



The behavior of real effective exchange rate series over sample period is illustrated in Figure 3. Even though it shows increases from time to time, overall it has a declining trend, which means Turkish lira has appreciated over time with respect to Euro.

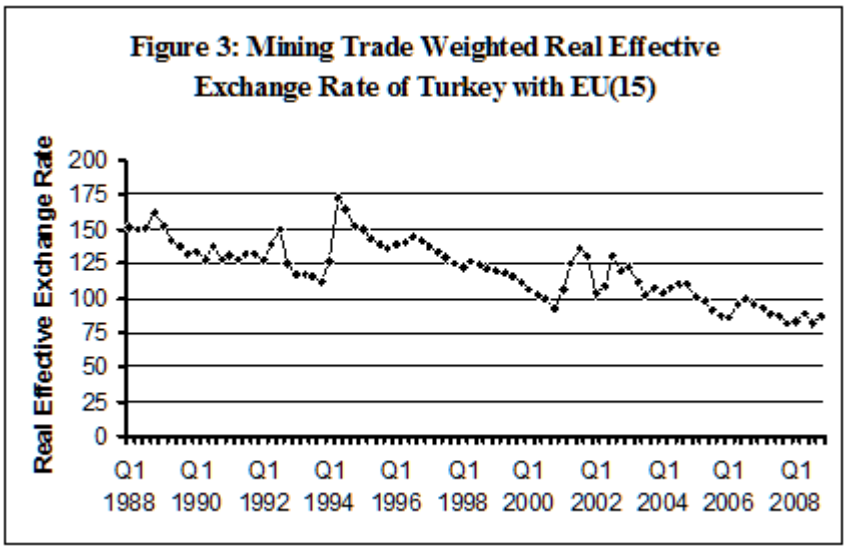
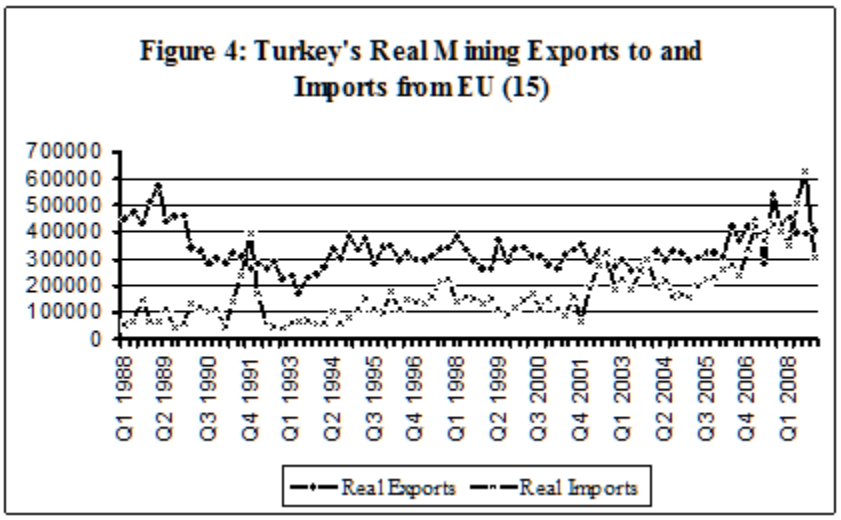
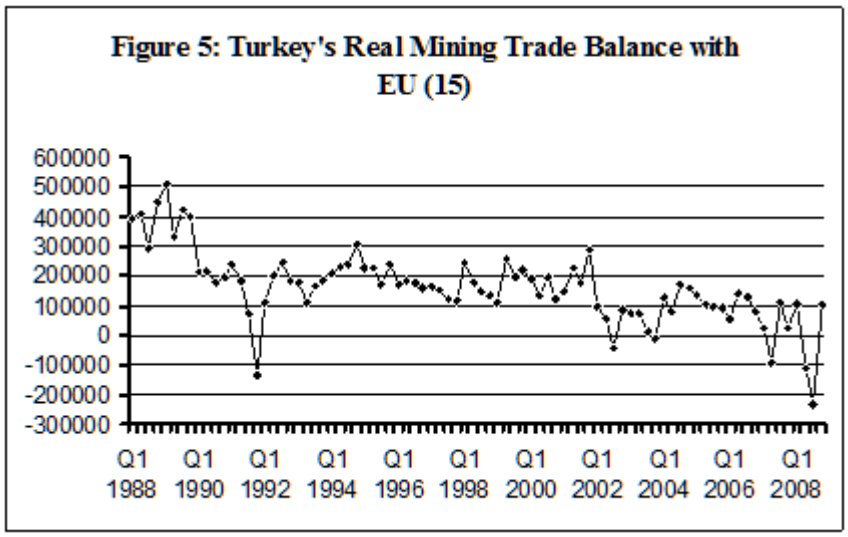


Figure 4 shows real mining exports and imports over time. First thing to note about them is that almost over the entire sample period real exports are greater than real imports, implying a surplus in mining trade balance of Turkey with EU(15) as also seen in Figure 5. Another feature of real exports and imports series is that the gap between two series is narrowing over the period.



Real mining trade balance series is shown in Figure 5. Even though it fluctuates, it has overall a declining trend, confirming our earlier observation that imports are catching up with exports. Except for a few periods, Turkey's real mining trade balance with EU(15) is in general in surplus.



3.2. Model

We employ the trade balance model most commonly used in the literature where trade balance depends on real domestic income, real foreign income and real exchange rate and we express it in log-linear form as follows [5];

$$\ln TB_t = a + b \ln Y_{TR,t} + c \ln Y_{EU,t} + d \ln RER_t + eD_t + \varepsilon_t \quad (1)$$

Where TB_t is the real trade balance defined as the ratio of mining exports of Turkey to EU(15) countries over Turkey's mining imports from EU(15) countries, Y_{TR} is Turkey's real income, Y_{EU} is the real income of EU(15) countries constructed as the weighted average of real income of these countries where weights are each country's share in mining trade of Turkey with EU(15), RER is the real effective exchange rate between Turkey and currencies of EU(15) countries where nominal exchange rate is defined as the amount of Turkish Lira per trading partner's currency and D is the dummy variable for the customs union agreement. Mining products started to circulate freely after 1999. Therefore, D takes on value 0 for quarters before 1999 and value 1 afterwards. Real effective exchange rate (RER) we use in this study is also sector specific like Real GDP of EU(15) in the sense that when constructing RER for mining sector, the share of a EU(15) country in Turkey's mining trade is assigned as the weight for the country in question.

We have the following prior expectations about signs of the variable coefficients. Because real domestic income growth will stimulate the imports, it should have a negative coefficient. However, if increase in production of import-substitutes is generating much of domestic income growth, the impact on the trade balance of the domestic income will be positive. By similar reasoning, opposite of what we just said about domestic income would be the case for the coefficient of foreign (EU15) income. Finally, a rise in the real exchange rate (depreciation) will lead to an improvement in the trade balance by making the exports cheaper for foreigners and imports more expensive for that country, thus yielding a positive coefficient.

Estimation of equation (1) gives us long-run determinants of the trade balance. We also want to find out the short-run determinants. For this purpose, following Peseran et al. (2001) and employing Autoregressive Distributed Lag Method (ARDL), we express equation (1) in the following error-correction modeling format.

$$\Delta \ln TB_t = \alpha + \sum_{j=0}^{k} \beta_j \Delta \ln Y_{TR,t-j} + \sum_{j=0}^{l} \gamma_j \Delta \ln Y_{EU,t-j} + \sum_{j=0}^{m} \lambda_j \Delta \ln RER_{t-j} + \sum_{j=1}^{n} \theta_j \Delta \ln TB_{t-j}$$

$$+ \delta_1 \ln Y_{TR,t-1} + \delta_2 \ln Y_{EU,t-1} + \delta_3 \ln RER_{t-1} + \delta_4 \ln TB_{t-1} + \delta_5 D_t + u_t \quad (2)$$

Using F-test, we test the null hypothesis of no cointegration ($H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$) against the alternative of cointegration ($H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$) to find out whether or not there is a cointegration among model variables. Given the fact that under the null hypothesis F-statistic has a non-standard distribution, in conducting the test of the above hypothesis we use new critical values in Peseran et al. (2001).[6] We reject the null hypothesis in case the calculated F-statistic exceeds the upper bound critical value and thus conclude that variables are cointegrated.

4. FINDINGS AND DISCUSSIONS

As mentioned earlier, we have adopted the model selection strategy in Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012), and have proceeded as follows in implementing it.[7] We have first set the maximum lag length of 10 on each first differenced variable in equation (2). We have estimated each model corresponding to every possible lag combination and kept those models satisfying the diagnostic tests of normality, no serial correlation and no heterescodasticty at least at 10 % level. We have then checked whether there exists a cointegration or not for each model in this set using F-test and have discarded those models for which no cointegration is eatablished.[8] At this stage we have the subset of those models that satisfy diagnostic tests and at the same time indicate a cointegration. As the last step, in order to determine the optimal model, we have applied AIC to this subset.

Having followed these steps, we have found out optimal lag combination as (k=0, l=1, m=0, n=9).[9] We have then estimated the model corresponding to this lag combination in equation (2) based on quarterly data for the period of 1988:I-2008:IV.

The short-run estimation results for Turkey's mining trade balance with EU(15) are demonstrated in Table 1. Looking at the table, we observe that only real domestic income has a statistically significant negative coefficient. Coefficients of real exchange rate and real EU(15) income variables are not statistically significant. This implies that in the determination of mining trade balance in the short-run only real domestic income matters. Coefficient of dummy variable for the customs union agreement is not statistically significant either, indicating that this agreement has not affected significantly Turkey's mining trade balance with EU(15) in the short-run.

In Table 2 long-run estimation results are reported. Results indicate that real exchange rate and real domestic income variables have coefficients with expected signs but they are not statistically significant. So exchange rate and domestic income are not significant determinants of mining trade balance in the long-run in trade with EU(15) countries. Only statistically significant long-run determinant of mining trade balance is real EU(15) income but its coefficient is negative, indicating that EU(15) countries grow, mining trade balance of Turkey worsens.

Table 1: Short-Run Estimates and Diagnostic Tests for Mining Trade Balance. Dependent Variable: $\Delta \ln TB_t$

Regressors	**Coefficient**	**t-value**
Constant	16.784**	2.485
$\Delta \ln Y_{TR,t}$	-2.885*	-1.793
$\Delta \ln Y_{EU,t}$	-11.501	-1.450
$\Delta \ln Y_{EU,t-1}$	12.486	1.542
$\Delta \ln RER_t$	-0.427	-0.503
$\Delta \ln TB_{t-1}$	0.728**	2.207
$\Delta \ln TB_{t-2}$	0.573*	1.883
$\Delta \ln TB_{t-3}$	0.367	1.355
$\Delta \ln TB_{t-3}$	0.425*	1.800
$\Delta \ln TB_{t-5}$	0.627***	2.792
$\Delta \ln TB_{t-6}$	0.369*	1.848
$\Delta \ln TB_{t-7}$	0.476***	2.927
$\Delta \ln TB_{t-8}$	0.247	1.547
$\Delta \ln TB_{t-9}$	0.236**	2.110
D_t	0.158	0.437
Diagnostic Tests	**Value of Statistic**	**p-value**
Normality[1]	1.4	0.49
No Serial Correl.[2]	6.7	0.16
No Heteroscedas.[3]	0.2	0.68
F (18,54)	3.96	0.00
F (Wald) [4]	4.25	
$\text{Adj. } R^2$	0.43	

Notes: *, **, *** indicate significance levels at 10%, 5%, and 1%, respectively. 1: Jarque-Bera test statistic is used having a $\chi^2(2)$ distribution. 2: LM test statistic is used having a $\chi^2(4)$ distribution. 3: LM test statistic is used having a $\chi^2(1)$ distribution. 4: The upper bound critical value for the F-statistic at 10% significance level is 3.77 (Peseran *et al*. (2001), Table CI, Case III, p.300).

This will happen, as explained in model part of this paper, if mining production in EU(15) countries increases as their economies grow. Dummy variable for the customs union agreement does not have a statistically significant coefficient. This means the agreement does not have a significant long-run effect on mining trade balance of Turkey.

Table 2: Long-Run Estimates for Mining Trade Balance Dependent Variable: $\ln TB_t$

Regressors	Coefficient	t-value
Constant	12.826*	1.791
$\ln Y_{TR,t}$	-0.841	-0.360
$\ln Y_{EU,t}$	-1.489***	-3.576
$\ln RER_t$	0.499	1.305
D_t	0.121	0.095

Notes: *, **, *** indicate significance levels at 10%, 5%, and 1%, respectively.

5. CONCLUSION

This paper has estimated Turkish mining trade balance in trade with EU(15) countries to investigate particularly the impact of the exchange rate and that of customs union using bounds testing approach with the model selection strategy adopted from Yazici and Islam (2011a, 2011b, 2012) and Yazici (2012) based on the quarterly time series data over 1988:I-2008:IV period. This paper contributes to the literature by considering an important sector of Turkish economy, mining, in the context of trade with an important trading partner, EU(15) countries.

Estimation results based on the data for 1988-I to 2008-IV period indicate that in the determination of mining trade balance in the short-run only real domestic income matters. Long-run results indicate that real exchange rate and real domestic income variables have coefficients with expected signs but they are not statistically significant. As far as the use of exchange rate policy is concerned, depreciation of Turkish lira with respect to euro has no significant effect on mining trade balance, suggesting that exchange rate policy can't be used effectively to improve trade balance of Turkey's mining sector with EU(15). Only statistically significant long-run determinant of mining trade balance is real EU(15) income but its coefficient is negative, indicating that EU(15) countries grow, mining trade balance of Turkey worsens. This will happen if mining production in EU(15) countries increases as their economies grow. As for the impact of customs union agreement, the agreement does not have a significant effect on the mining trade balance.

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ENDNOTES

1. For a detailed review of the aggregate and bilateral level studies, see Bahmani-Oskooee and Ratha (2004a).
2. Steps followed in model selection process in order to find the optimal model are shown more explicitly in a flow chart diagram in Yazici and Islam (2012).
3. Weights used (in the order of importance) are 1-Italy: 0.276, 2-Sweden: 0.131, 3-Spain: 0.10, 4-Germany: 0.091, 5-UK: 0.089, 6-Austria: 0.08, 7-Holland: 0.053, 8-France: 0.044, 9-Greece: 0.043, 10: Belgium plus Luxemburg: 0.043, 11-Finland: 0.037, 12-Portugal: 0.009, 13-Ireland: 0.003, 14-Denmark: 0.001.
4. To be able see fluctuations over time better in series, variables in this figure are displayed without taking their logarithms and trade balance here is measured as the difference between real exports and real imports.
5. A detailed derivation of this model can be found in Yazici and Islam (2012).
6. The upper bound critical value for the F-statistic at 10% significance level is 3.77, taken from Peseran *et al*. (2001) (Table CI, Case III, p.300).
7. An algorithm developed by Dr. M. Qamarul Islam is used for this purpose.
8. The upper bound critical value for the F-statistic at 10% significance level is 3.77 (Peseran et al. (2001), Table CI, Case III, p.300).
9. What lag combination would have been selected if the method of the previous literature were adopted? The lag combination that would have been selected by the method of previous literature is (k=1, l=6, m=8, n=10), which is different from ours: (k=0, l=1, m=0, n=9). When compared with our strategy, however, no serial correlation assumption fails in this case.

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WHY PEOPLE PARTICIPATE ROSCA? NEW EVIDENCES FROM TURKEY

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ABSTRACT

Rosca which is popular among the communities that cannot make use of the formal financial markets is preferably used more by the castes having limited or no regular income level. According to the results of the observations about Turkey–which is evaluated within the category of developing countries –it is found that roscas are used widely by individuals from a wide range of socioeconomic and demographic characteristics. Moreover, the literature review about the reasons of attending a rosca cannot explain properly this wide commitment rates in Turkey. According to the results obtained by the questionnaire developed for this research it is opposed that there can be new reasons of participating rosca such as avoiding from interest and socializing. Moreover by the parametric tests conducted it is found that the reasons of participating a rosca are affected by the socioeconomic and demographic characteristics of individuals.

Keywords: Roscas, informal financial markets, formal financial markets, income level, interest aversion

JEL Classification: G10, G20, O16

1. INTRODUCTION

Rosca (Rotating Savings and Credit Associations) is a worldwide phenomenon which is especially observed in developing countries and in societies belong to low income groups in developed countries (Eroğlu, 2010; Smets, 2000). Ardener (1964, 1995) defined rosca as “an informal financial organization in which participants pay periodically to a pot and get paid from that pot in turn”. In other words, roscas are a specific type of contracts in which participants vow to pay equal amounts regularly and which prompt national savings of the host countries in a portion that cannot be underestimated (Ambec & Treich, 2007). Here, the rotation word means that each participant gets paid the amount collected in the pot in turn and generally the participants wish that rotation will return at least one time (Eroğlu, 2010). In the process the participants of rosca take the roles of payer or creditor with respect to their turns in rotation.

Rosca is named as “Tanda” in Mexica, “Susu” in Gana, and “Chits” in India and “Gün” in Turkey. Although small local differences are observed during its applications the basic principals are same everywhere. These basic principles are (Ambec & Treich, 2007:2); a group of people come together periodically, in these meetings the participants pay equal amounts to a common pot, in each meeting the money collected in the pot is given only to one participant, this paid person cannot get the money collected in the pot again until the cycle is completed, the process continues until the situation that all the participants get the amount of money collected in the pot is provided, as a result the rosca falls and a new rotation starts. the paid turn of pot among the participants can be: coincident, determined by lot, determined previously.

The number of people in the groups is generally determined as a small number and the period of the meetings changes between 1 day (especially among venders and shoeblacks) and 6 months (Calomiris & Rajamaran, 1997). Especially in inflationist periods in order to avoid a disadvantageous situation to be occured for participants’ purchase power the periodic payments are indexed to a commonly used currency unit such as

Euro, Dollars or precious metals such as gold or any goods such as sugar. There are five main topics that people wishing to participate a rosca have to consider and arrive on a consensus about. These are number of participants, the amount of money paid periodically, the amount of money going to be paid to the person in turn, the period of meetings and the duration of rosca. Generally the amount of money paid periodically is determined by dividing the total amount into the number of participants and the period of meetings is determined by dividing the duration of cycle into the number of participants (Anderson vd., 2003).

Roscas in Turkey are generally known as socio-cultural activities for the socialization of women and according to the literature the topic is found to be examined overwhelmingly with respect to this aspect (Tezcan, 1984; Büyükokutan, 2012; Sağır, 2013). Whereas it is noticed that participating a rosca is sourced more from meeting the economic needs instead of social ones and men participate rosca in considerable amounts as much as women do. The fact that there is a considerable amount of studies about the topic in economic and development fields justify this view.

Roscas are used commonly in developing countries or in developed countries in the regions where mostly people from low income levels live (such as the regions that immigrants live). The main reasons behind this situation are that there is no formal financial market or/and the fact that the financial needs of people in those regions cannot be met by the formal financial markets. For example, it is known that only 20% of the African inhabitants can reach to formal finance (Abbi & Gamal, 2011:998). The financial associations such as banks and insurances become inadequate to meet the needs of people from low income levels because of several reasons. There are the situations that those people have no facilities of sufficient bail, their incomes and savings are too low to be considered, they do not have any credit history providing a credential for the new credit requests and they do not have enough information about the required procedure (Fadiga & Fadiga-Stewart, 2004). These people who cannot make use of the formal finance are forced to apply to the informal credit sources such as loan sharks, family members/relatives and roscas. According to this perspective it is thought that the roscas come out as being the best suitable type of financial contracts for individuals in terms of providing strong social norms about socio-economic situation and solidarity in the related countries (Ambec ve Treich, 2003). In other words, roscas are accepted as informal financial market operations which fill the gaps created by formal financial system and so have an important role in lives of people from low income level and on whom the norms and traditions have effects (Smets, 2000; Fadiga & Fadiga-Stewart, 2004; Eroğlu, 2010; Abbi ve Gamal, 2011).

Informal financial markets are the ones which base the groups of low income level, are based on the principal of mutual trust and on the relationship of mutual borrow and lending. When compared with the formal finance, model of informal finance provides advantages in terms of not having any transaction costs, providing both saving and the credit service and its forcing effect via social interaction on people to make savings. The provided credits being not in great amounts and not long termed, and the risk variety being not allowed are the disadvantageous aspects of rosca (Schreiner, 2000).

When the functions that rosca serves in the countries it is used frequently are evaluated it is observed that roscas provide an important social political perspective about the inhabitants' situation of reaching financial opportunities and using them to increase their personal wealth (Eroğlu, 2010). This informal financial market operation which stays beyond the public control mechanism-in other words which is never objected to any regulations- mobilizes an considerable amount of the national savings especially in developing countries. Roscas are used intensely in countries of Africa, Asia and Latin America (Ambec ve Treich, 2003). For example, the rate of participation among the adults in Kongo, Cameroon, Gambia, Liberia, Ivory Coasts, Togo and Nigeria changes between 50% and 95%. The ratio of national fund activated by rosca over national income is between 8% and 10% in Ethiopia and about 50% in Cameroon. In India, it is twice as big as the sector of bankings (Anderson ve Baland, 2002). Moreover in some countries the governments, financial and non-financial associations are observed to organize roscas. The the differences of formal rosca from standard rosca are the great number of participants, participants not knowing each other and the process which is going under a regulating authority (a public association, a bank, a company) within the legal contracts (Abdul-Yakeen,2012). In Argentina, the banks, car seller and government organize formal roscas. In Turkey especially in 1980's the newspapers used to organize car roscas. And still in Turkey due to the interest-free banking system being not

developed enough some special associations organize roscas with the name "cooperation system" and by this way they serve participants in terms of buying houses and cars[1].

When the literature review about the individuals' reasons to participate a rosca is examined it is observed that there is no clear consensus reached but the most commonly asserted reasons are (Besley at all;1993; Levenson ve Besley, 1996; Satkunasingam ve Shanmugam, 1997; Anderson ve Baland; Ambec ve Treich, 2003; Klonner, 2003; Gugerty, 2007; Eroğlu, 2010; Abbi ve Gamal, 2011); the wish of meeting the basic needs corresponding to savings, investments and insurance activites when the financial systems can not develop or individuals can not make use of current formal financial markets due to several reasons; buying durable goods (Indivisible Good Hypothesis); intra-familial dynamics about the women's socioeconomic status and about sharing and managing the family income; a forced mechanism of saving useful for people who have difficulties in saving their money (Commitment Hypothesis).

In Turkey rosca application is known as a women's activity. Furthermore about this application which is issued in traditions the thought of being carried out to meet the social needs instead of economic ones is dominant. In addition to this as a result of observations and interviews made recently it is found that women and also men from all ages, all professions and from all income levels organize roscas in an increasing rate. The situation that highly educated individuals especially from middle and high income levels participate roscas cannot be explained by the current reasons of participating a rosca in the literature. In this study addition to the basic reasons about participate a rosca, the reasons of mistrusting financial sector and cultural dynamics depending on religious beliefs are examined to see whether they are effective or not. Besides that bringing up the differences between the reasons of participating a rosca on the basis of socio-economic and demographic variables and providing an assessment of the general situation about rosca participation in Turkey's point of view are the other important purposes of the study.

As a part of study an instrument is developed by using the broad literature review about the reasons of participating a rosca. After that by conducting factor analysis via the data about the reasons of participating a rosca 11 sub headings some of which express new reasons to participate a rosca and are expected to contribute to the related literature are determined. Then, the differences between the groups formed according to the basis of demographic and socio-economic factors with respect these gathered 11 sub dimensions are found. In the analysis of data descriptive statistics (percentage, mean , standar deviation), factor analyses, reliability tests and parametric tests (T-Test and Anova) were used. As a result of the analyses reasons of participating a rosca were found to differ by the demographic and socio-economic factors of the individuals.

2. LITERATURE REVIEW

2.1. The Reasons of Participating A Rosca

When the items that motivate people to participate a rosca are examined it is observed that one of the main ones is people not being able to make use of the financial markets due to an undeveloped financial sytem or due to various causes. In this case because the needs about saving, consumption and investing are not met the individuals are directed towards to use rosca. The rationale of buying durable consumer products is also taking place on the same basis. The other important reason to participate a rosca is intra-familial dynamics more about the socioeconomic status of women and about the sharing and managing the family income. The very big portion of the rosca participants in the frequently used countires is women. This shows us that this intra-familial dynamics factor, which is indeed explained by socio-economic factors, is considerably affective on rosca participation. The last basic factor effective on rosca participation is about the difficulties that individuals face with in making savings. In this perspective participating a rosca functions as a forcing factor on individuals to make savings.

[1] http://www.eminevim.com/anasayfa

2.2. The Individuals Who Cannot Make Use of Formal Finance and Roscas

Rosca participation is common especially in developing countries, in immigrants' districts of developed countries and at the countrysides. The common property of these individuals at these places is that they cannot make use of formal financial markets to meet their own needs. Two factors are proposed as the causes of that situation. First one is that the formal financial system is not developed enough in this region. Second one is that the formal financial system is especially far beyond being accessible to low income level groups. Because of these reasons millions of people can not get the expected services from the financial system about basic consumptions, investments and insurance activities. Considering that low income level groups cannot make savings and need financial support even for the basic consumption needs it can be asserted that their expectations from formal finance are at the top level.

This means that low income level groups are included in the group requesting net fund in financial system. At the same time this group comprises the most disadvantageous group in terms of the prerequisities which formal finance expects from themselves in credit requests. These prerequisities are named as 5C rule (Character, Capacity, Colleteral, Capital, Conditions). In other words, because the individuals from low income levels have a very irregular income, have no capital and their social environment is under the required standard of bail and etc they can not meet the standards determined by banking system as the basis used for credit requests. Even this group get credits in the period that economic trade cycle is positive, their irregular income causes fails in repayments and in long term their relationship with financial system turns to be a negative vicious cycle.

The education level and also financial literacy being low in these low income level groups alienate them from financial system. Low income level groups spend both their individual and family possessions mostly on meeting their basic needs, on the foundation of micro sized enterprises and on the finance of other trading enterprises in informal sector and therefore most of the time the realized savings become not enough for the finance of these expenses. In conclusion these people ask help from loan sharks, family members and relatives who are all accepted as informal credit sources or they participate roscas (Abbi & Gamal, 2011).

2.3. Women and Roscas

The participation rate of women in Turkey and in other countires where rosca is popular is observed to be high. Meeting the need of socialization is considered at first as the reason of this situation. However, the fundamental need is beyond the need of socialization. It is proposed that the socio-economic factors, intrafamilial dynamics about the share of sources and norms about the expenses about family income are affective on the rosca participation of women (Tsai, 2000; Anderson ve Baland, 2002; Johnson, 2004). In other words, it is asserted that there are differences between women and men basically about the relationship between savings and expenses and in the way of spending the family income reserved for consumptions. As a result of the researchs women are found to be more sensitive than men especially for meeting the needs of children and family basics at the minimum level and providing its continuitiy (Satkunasingam and Shanmugam, 1997; Eroğlu, 2010; Abbi & Gamal, 2011). In addition, it is asserted that men use family income more for satisfaction of personal pleasures (cigarettes/alcohol, gambling etc) and buying products which are not in the first order priority of family wealth. According to Anderson ve Baland (2002) men spend gathered income freely to meet their personal needs whereas women spend their gathered income to meet the needs of children and common needs of family. In another study, a strong correlation is determined between the children's wealth and women's income (Strauss ve Beegle, 1996). Due to these basic differences, with an incentive of increasing their control on the family income women use rosca as a financial strategy to protect it from their husbands in order to meet the basic needs of children without any delay (Anderson ve Baland, 2002).

2.4. Forced Savings Mechanism and Roscas

Rosca is a mechanism which works on the basis of trust among participants and has no legal foundations. Therefore the question arises here: why participants prefer roscas even there are safer ways of saving and investing within the formal financial system? The answer of that question is generally explained by the Commitment Hypothesis (Eroğlu, 2010; Ambec and Treich, 2007; Dagnelie and Le may, 2009). According to this

hypothesis, making savings means abandoning today's pleasures to gain more pleasures in the future and generally people cannot postpone the pleasures that they can get today when they are in the middle of time varied options. For instance, to save the money required for a vacation in summer one must spend less money at weekends. However when it is weekend people cannot prevent theirselves from going out and spending money. Formal financial markets cannot fully meet these needs of people. In fact, making savings is a personal choice. When you have a deposit account in the bank, the bank cannot put you in a situation of legal obligation to pay periodically to that account. Of course the financial system awares of the problems individuals have in making savings and so by developing new methods they try to serve resolution advisories to the individuals in that point. For example, banks in Turkey has just strated a new service in which with the approval of customer some amount of the credit card operations' costs of the person is collected by transferring it to a different account of the same person.

Another application is again by monthly payment order making saving by transferring a portion of the salary, defined by the customer, to another account at each day of salary payment. This is useful especially for employees, wage earner or salariats. Moreover, individual pension system serves for the aim of reaching a higher level of wealth in the future by making savings today in a certain ratio. Althought an interest on the service of individual pension is oberved to increase individuals can stop making savings due to the attraction of any expense. Rosca participation provides individuals with making savings even when they lose their internal motivation towards making savings. Because the rosca participant knows that the wealth of other members in the group and his/her own wealth as well depend on his/her regular payment and so the occured socail pressure context makes participants behave carefully about regular payment. Especially it is known that women are very sensitive about making the payments in time and in full.

2.5. The Types of Rosca and the Problems Faced

Rosca applications differ from one country to another. These differences are directly related with the needs of people in these countries (Ambec, 2003: 2).Therefore the different needs and expectations of people cause rosca to have different types. The first of these types especially used commonly in Ethiopia is called *Simple or Random Rosca* (Abbi & Gamal, 2011: 1001). In this type of rosca the amount to be collected is determined via an organizer. Mostly the first turn in the cycle is of the organizer of rosca. Then the group members complete the cycle by the turn they determined before. Why the organizator takes the first turn is beacause of his/her effort and time spend. And, Because the organizator takes the first turn this stiuation removes the risk of other members' not making the payment and put other members in a aggrieved situation (Satkunasingam ve Shanmugam, 2006: 100). When the corresponding literature is examined Besley, Coate and Loury (1994) found that *Random Rosca* is more advantageous than organized markets (Ambec, 2003: 2).

The other type of rosca is *Consumer Durable Rosca*. Althought it is similar to Random Rosca in terms of application way the important difference is that the purpose here is buying durable consumer product as its name implies. The organizer of that type of rosca meets with the wholesaler after s/he and the group members decide on the durable consumer product (mostly electronic devices, furniture etc.) they want to buy. According to the aggreement done with the wholesaler it is guaranteed to buy the corresponding durable consumer products in the future with the price determined today. Still in Malasia with this type of rosca used group members can own durable consumer products by this way (Satkunasingam ve Shanmugam, 2006: 100). In Turkey it is observed that especially among housewives this type of rosca is used.

The third and last type of rosca which is commonly used in Asia is named as *Bidding (auction) Rosca.* In this type of rosca participants give discount offers about the collected amount by considering their own needs. The maximum discount amount is taken out from the total amount and the money is given to the person made this offer. If enough money is left afterwards new offers are accepted again and it goes on like this. At the end of the rosca, the money left becomes so little to distribute and at this time that amount is shared equally to all participants by the organizer (Calomiris ve Rajaraman, 1998: 211). In this type of rosca the person who needs cash urgently will give the maximum discount offer and so s/he will agree on a high discount amount. The basic advantage of the Bidding Rosca is that the participation turning cycle is under the control of the participants. In other types of rosca determining the turn by lot, by the organizer or by coincidence can be only limited to consider the needs of participants. Moreover, in the turns determined by the organizers, there can be cheats of

bribe to determine the turn. (Geertz, 1962: 258). Bidding Roscas are effective on dealing with the risk of net expenses when there are costs of supervising, process and information. However, in this type of rosca the changing rate of discount offers from mounth to mounth will couse group members to be affected differently (Calomiris ve Rajaraman, 1998: 215).

The most important problem arises generally in all types of roscas is the probability of participants' not paying the participation amount. There is no legal restricting contract among parcitipants in rosca which depends on the mutual trust between participants. This situation makes the probability of non- payments a risk factor. In the literature the most affective tool to remove the risk of non-payment is pointed as the psycho-cultural factors (Ardener, 1964; Fessler, 2002; Geertz, 1962; Oh, 2007; Sterling, 1995; van den Brink ve Chavas, 1997). The probability of non- payment is dealed with the psycho-cultural factors diversified as mutual trust, gossip mechanism, social pressure, isolation, embarrassment emotion. Moreover, selecting the members according to a certain basic criteria while rosca is formed can remove the probability of nonpayments. For example, selecting the members from the people of high income level or having regular income, putting the member who has the risk of non-payment in the last turn of the cycle or establishing a seperate fund for urgent situations (Handa ve Kirton, 1999; Van den Brink ve Chavas, 1997) are some of these dealing ways with risk of non-payment.

When we look at the purpose of the study and its significance, according to the literature review roscas are found to be used commonly in developing countries and by individuals belong to low income levels in developed countries. These individualds cannot access to formal financial markets. Because these individuals cannot reach to formal financial markets they cannot utilize the advantages of formal financial markets while making decisions about investment, basic consumption and making savings. Hence they prefer an informal financial market operation "rosca". According to the observations made in Turkey it is observed that rosca participation is not a uniqe application to low income level groups, it is also used by groups of people from various ages, various income levels i.e among groups of wide range of socio-economic and demographic profile. While considering this aspect the rosca participation in Turkey cannot be explained properly by the factors in the current literature. For this reason, this study aims to determine the factors effecting the rosca participation in Turkey and analyze how the effects of these factors differ with respect to socio-economic and demographic characteristics.

3. DATA AND METHODOLOGY

3.1. The Methods Used in Sampling, Instrumentation and Analyses

First of all, there are some limitations in the study. The first one of these limitations is the sample. The population is the all people participating rosca in Turkey. To reach the desired sample size by convenience sampling method the questionnaire could be apllied in a some cities of Turkey. Although the random sampling methods would provide statistically more generalizable results bacause these methods are limited in terms of being applicable and needs more time and cost they could not be preferred for this study. Lastly, the fact that there is no any tested measurement instrument accepted in common before can also be reported as a limitation. Due to that deficiency the measurement questionnaire was developed by the researchers by utilizing from the literature.

The population of the study is the all people participating rosca in Turkey. The questionnaires were at first sent to Samsun, Kocaeli, Ankara, Sakarya provinces and their counties. Out of this wide mass of people as much as possible were tried to be reached via digital media. 650 of the 1000 distributed questionnaires came back and 350 of these were determined to be filled by people experienced rosca before and hence only these 350 forms were taken into analyses. Tha data of the research were collected by the questionnaire technic. The questionnaire form is composed of two parts. First part is composed of 15 questions asking the demographic characteristics of the participants. Second part is designed as a questionnaire with 46 questions to measure the reasons of rosca participation. The reasons of rosca participation questionnaire composed of likert type questions for each of statement in 5 levels which are very important (1), important(2), little important (3), not important (4) and no idea (5). The data of the research were analyzed by using SPSS for Windows 21.0

software programme. In the analysis of data the descriptive statistics (percentage, mean, standard deviation), factor, reliability analyses and parametric tests (T-Test and Anova) were used.

4. FINDINGS AND DISCUSSIONS

The demographics of the participants of the study are shown in Table 1[2]. When the table is examined accordance with the literature it is seen that the majority of the participants are women. As it was predicted with respect to economic indicators, some distributions whose explanation does not exist in current literature emerge. These are: the 75% of the participants being working people and about 80% of these people having a moderate regular income level in Turkey standards and most importantly 45% of the participants being the income level group of 2.500 TL and higher. Moreover more than 50% of the participants have educational status of bachelor or higher. In conclusion, it can be asserted that the probability of not being able to use the formal financial markets and/or not being able to meet the basic consumption needs is a very low.

4.1. Factor Analysis and Reliability

The factor loads and subdimensions of the questionnaire are determined by conducting factor analysis on the questionnaire used in the study. Before conducting factor analysis, by conducting Kaiser-Meyer-Olkin (KMO) and Bartlett tests the questionnaire was determined whether it was applicable for the factor analysis or not. As seen in Table 2[3], the KMO value of the reasons of rosca participation questionnaire was found to be.858 and the p value gathered by Bartlett test was found as .000. Hence it was deduced that the questionnaire was applicable to conduct factor analysis.

According to the results of the conducted factor analysis the explained variance of the questionnaire is found as 67,195. So, it can be deduced that the questions of the questionnaire can explain the 67% of the reasons of rosca participation. The factor loads of the questionnaire changes between the values of 0,450 and 0,847. Cronbach Alfa value is checked in order for the reliability of the questionnaire to be evaluated. The alpha coefficient of the questionnaire is determined as .919.

The Cronbach Alpha values of “Socialization”, “intrafamilial dynamics of family income and expenses”, not being able to reach the formal financial markets”, “basic consumption”, “investment”, “avoding possible economic loss”, “need of being prestigious”, “second order needs”, “feeling of economic freedom” are .832, .834, .813, .699, .759, .802, .695, .739, .732, .573, .918 respectively.

After determining the subdimensions of the questionnaire, to see how the reasons of rosca participation differ by the basic demographic and socio-economic factors parametric tests were conducted. The results of the t-test conducted to determine the differences between the factors affecting the rosca participation of women and men were shown in the Table 3.

Table 3: The Occured Differences between Women and Men with respect to Factors Affective on Rosca Participation

Sub dimensions	Gender	N	Mean	Std. Deviation	Std. Error Mean	F	Sig.	Sig. (2 tailed)
1	1	235	26994	.91840	.06004	2418	0.00	0.00
	2	115	31681	.80348	.07559			
3	1	235	3836	.6487	.0425	10242	0.00	0.00
	2	115	3577	.7790	.0732			
4	1	235	3312	.7394	.0484	9420	0.00	0.00
	2	115	3019	.8811	.0821			
5	1	235	3368	.8884	.0582	.097	0.76	0.00
	2	115	3026	.8586	.0800			

[2] Appendix-1
[3] Appendix-2

6	1	235	3731	.8544	.0558	.005	0.94	0.01
	2	115	3508	.7672	.0715			
8	1	235	3412	.8812	.0576	1875	0.17	0.00
	2	115	3050	.9069	.0845			
10	1	235	3089	.8619	.0563	5690	0.01	0.00

According to this, the mean (3.1681) of socialization subdimension of men is significantly higher than of (2.6994) women. It can be asserted that because the labor force in Turkey is dominated by the men and there are other difficulties such as long working hours etc men prefer rosca to meet their social needs. As a reflection of men dominated labor force market, it is observed that the means of subdimensions of not being able to reach the formal financial markets and avoding from a possible aconomis loss are significantly higher for women (3.836/3.731) than they are for men (3.577/3.508). In accordance with the literature it is deterined that the mean of meeting basic consumption needs subdimension is significantly higher for women (3.312) than it is for men (3.019). And as a complimentary to that factor, it is observed that the mean of meeting second order needs subdimension is significantly higher for men (3.324) than it is for women(3.089). According to this it is seen that women participate rosca in order to meet the common needs of home such as basic consumption needs whereas men much rather participate rosca in order to meet their personal needs. It is found that the mean of making saving subdimension of women (3.368) is significantly higher than of men (3.026). While considering that marginal expense tendency is considerably low at Turkey it can be asserted that women who cannot be able to reach the formal financial markets use rosca as a forced mechanism of saving to make investment. Lastly, the mean of avoiding from interest subdimension of women (3.412) is found significantly higher than of men (3.050). As a result of observations done in Turkey it is determined that people prefer rosca just to avoid from interest due to the necessity of their religious beliefs. A question raises here: why these people do not preferer Islamic banking systems.

But as it is seen by the factor analysis, the banking system is perceived confusing by women and they are afraid of being misdirected. Therefore, it can be asserted that the women who would like to avoid from interest system use rosca application as an instrument to make saving and investments.

Tablo 4: The Occured Differences among Various Educational Status Groups with respect to Factors Affective on Rosca Participation

Mean Groups		**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**	**F10**	**F11**
1		2,6923	2,8974	3,6615	2,7692	3,301	3,417	2,908	2,776	3,821	3,333	3,359
2		2,79	3,136	3,4868	3,039	3,065	3,627	2,727	3,357	3,899	3,16	3,467
3		2,81	3,16	3,788	3,22	3,255	3,695	2,745	3,235	3,76	3,093	3,38
4		2,8947	3,3171	3,8614	3,3072	3,278	3,675	2,76	3,349	3,942	3,097	3,765
5		3,0805	3,5714	3,9357	3,7931	3,578	3,914	3,054	3,621	4,092	3,46	4
Total		2,8521	3,2279	3,752	3,2155	3,255	3,658	2,791	3,293	3,905	3,167	3,617
Relating groups Sig.<0.05		-	1-5	2-4 2-5	1- 3,4,5 5-2,3,4	-	-	-	1-4,5	-	-	-
Factor ANOVA		**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**	**F10**	**F11**
F		0.960	2.788	4.468	9.022	1.892	1.584	0.988	4.620	1.527	1.715	3.425
Sig.		0.43	0.02	0.00	0.00	0.11	0.178	0.414	0.00	0.19	0.14	0.00
Homogeneity of Variances	**Levene Stat.**	1.834	0.602	9.825	5.012	5.409	5.224	0.736	3.283	3.717	2.884	21.065
	Sig.	0.12	0.66	0.00	0.00	0.00	0.00	0.568	0.01	0.00	0.02	0.00

In Table 4 the occured differences among the various educational status groups with respect to sub dimensions affecting rosca participation are shown. By the conducted One Way ANOVA tests it is determined that only about sub dimensions of numbers 2,3,4 and 8 groups differ significantly. According to this, the mean (2.8974) of intrafamilial dynamics of family income and expenses sub dimension of the people who are primary school graduates is significantly lower than (3.5714) of the people who have post graduate degree. While considering that as the educational status increases the mean of this subdimension increases it can be asserted that this situation can be explained by the relative importance given by the individuals from various educational status and this importance increases as the educational status increases. Besides, it can be thought that the groups having high educational status use rosca application as an financial intsrument to meet a spesific need defined before (such as meeting the educational costs of children). According to the not being able to reach the formal financial markets sub dimension it is found that the means of groups having bachelor degree and post graduation (3.8614-3.9357 respectively) are significantly higher than of the groups having middle school degree (3.4868). Considering the assumption of a direct relationship between educational status and income level indeed this situation is the opposite of the expected one. The situation that as the mean of the not being able to reach the formal financial markets subdimension increases the educational status increases can be asserted to be explained by the impossibility of reaching financial markets for the middle school graduates and by the situation of rosca for bachelor graduates and post graduates that it is an option tried but fails.

This situation show that as the education status of the individual increases they use rosca application purposively to meet more specific needs. In other words, it can be deduced that the individuals perceive rosca as an financial instrument and prefer rosca to meet their needs which are defined before they start participating rosca. Lastly, it is observed that as the educational status increases the means of avoiding from interest subdimension increases. This situation cannot be simply interpreted as the increase in sensibilites related with religious beliefs as the educational status increases.this relationship can be interpreted by the assumed linear relationship between the educational status and income level. Moreover, the people who are affected frequently by the frequently occuring banking crisis in Turkey are the high educational status individuals having greater tendency towards making marginal expenses. The negative experiences and sensibilities related with relious beliefs can be asserted to cause that result.

In Table 5 the occured differences among the various age groups with respect to sub dimensions affecting rosca participation are shown. By the conducted One Way ANOVA tests it is determined that only about sub dimensions of numbers 2,7,8 and 11, groups differ significantly. According to this, the mean (3.8400) of intrafamilial dynamics of family income and expenses sub dimension of the people in the age range of 18-25 is significantly higher than of the people in the age range of 36-45 and of 46-55 (3.1030/3.0489). The rosca participation of young people in order to meet their educational needs is an expected situation when considering that their marginal consumption inclination is high due to lower income level in the age range of 18-25 than in the other age ranges –when all other conditions are accepted as constant- and due to the fact that this age region expresses the beginning of their career. It is observed that as the age increases the groups' means of the not being able to make savings subdimension increases as well. This situation can be asserted to be resulted from the pressure created by the increasing responsibility (marriage, children etc.) as the age increases.

Table 5: The Occured Differences among Various Age Groups with respect to Factors Affective on Rosca Participation

Mean Groups	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
1	2,8	3,84	3,667	3,2	2,817	3,75	2,4333	3,4833	4,044	2,822	3,867
2	3,091	3,392	3,718	3,242	3,227	3,803	2,6913	3,3207	4,017	3,199	3,847
3	2,744	3,103	3,731	3,202	3,218	3,699	2,7819	3,3228	3,948	3,165	3,505
4	2,801	3,049	3,817	3,207	3,282	3,535	2,8112	3,3936	3,801	3,181	3,575
5	2,707	3,3	3,733	3,176	3,507	3,399	3,2	2,8378	3,75	3,225	3,278
Total	2,856	3,223	3,748	3,212	3,251	3,655	2,7914	3,2967	3,912	3,171	3,613

Relating groups Sig.<0.05		-	1-3,4	-	-	-	-	5-1,2	5-,2,3,4	-	-	2-5
Factor ANOVA		**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**	**F10**	**F11**
F		2.403	3.831	0.337	0.060	1.749	2.319	2.938	2.919	2.230	0.750	2.738
Sig.		0.05	0.00	0.85	0.99	0.13	0.05	0.02	0.02	0.06	0.55	0.02
Homogeneity of Variances	**Levene Stat.**	0.415	0.513	0.517	0.876	1.389	4.933	0.722	1.443	2.858	1.954	8.956
	Sig.	0.798	0.726	0.723	0.478	0.237	0.000	0.577	0.219	0.02	0.10	0.00

With respect to the avoiding from interest subdimension the age group of "56 and more" is found to have significant mean difference from of the ranges of 26-35, 36-45 and 46-55. According to this it is observed that the individuals in the age group of "56 and more" are more flexible than young individuals in terms of getting into debt with interest. While considering the human life composed of four periods which are saving, insuring the wealth, consumption and being awarded that includes retirement; individuals in the being awarded period can be asserted to make investments that provide prestige for themselves and that support their childre (Karan, 2004: 706). Because the individuals in the age group of 56 and more are in being awared period they can be asserted to behave flexible in terms of avoding interest. Lastly, with respect to feeling of economic freefom as the age increases the means deacrease. And it is observed that the mean (3.2778) of age group of range "56 and more" is significantly less than of age group of range "26-35" (3.8469). This situation can be explained by the positive effect created by the increase in gathered money by the family as the income increases –even the women do not work-.

In Table 6. The occured differences among the various income groups with respect to sub dimensions affecting rosca participation are shown. By the conducted One Way ANOVA tests it is determined that only about sub dimensions of numbers 1,5,7 and 10, groups differ significantly. According to this, mean of the sociolization sub dimension of the people without a regular income (2.4280) is significantly lower than of people with income in the range of 1.501-2.500 TL (2.9457). This situation can be asserted to be resulted from the stress factor of work life which is the main difference between working people and unemployed people. With respect to basic consumption sub dimension generally as the income level increases the means of the groups increases. However, according to the related literature it is known that majority of the studies include individuals without a regular income and for these individuals meeting the basic consumption needs is the leading reason of participationg a rosca. As seen in the table 6, the mean of basic consumption needs subdimension (3.4034) of the individuals without a regular income is significantly higher than of the individuals whose income is in a range of 900-1500 TL. Whatsimore among the higher income level groups a positive relationship between income and mean of basic consumption needs subdimension is observed. This situation can be explained by the usage of rosca application purposively to meet the specific needs in the significantly higher income level groups. With respect to investment sub dimension the mean (3.6375) of the individuals having an income in a range of 3.501- 5.000 TL is found to be significantly higher than of the individuals having an income in a range of 900-1.500 TL and of the ones in a range of 1.501-2.500 TL (3.0313/3.1236). Being the marginal consumption tendency high for low income level groups and the situation that with increased income level the marginal consumption tendency decreases and the unnecessary expenses cannot be prevented explain this situation. Similar to the results of basic consumption subdimension, with respect to subdimension of not being able to make savings it is observed that the relationship between the individuals without a regular income and the two lowest income level groups is becoming reversed as the income level increases. Not being able to make savings is accepted as normal among the individuals without a regular income. The relationship becoming reversed as the income level increases can be asserted to be resulted from the situation that unnecessary expenses cannot be prevented. As a matter of fact it is observed that as the income level increases the mean of the subdimension of meeting secondary needs increases as well and these results support the thoughts explained above.

Table 6: The Occured Differences among Various Income Level Groups with respect to Factors Affective on Rosca Participation

Mean Groups		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
1		2,428	3,54	3,736	3,4034	3,534	3,773	3,182	3,25	3,767	3,174	3,5814
2		2,805	3,044	3,591	2,7734	3,031	3,672	2,434	3,207	3,99	3,073	3,5781
3		2,946	3,164	3,607	3,0955	3,124	3,551	2,71	3,169	3,959	3,225	3,4091
4		2,869	3,16	3,893	3,2739	3,2	3,54	2,821	3,392	3,772	2,954	3,6632
5		3,008	3,492	3,95	3,5875	3,638	3,919	2,923	3,438	4,025	3,408	3,85
6		3,131	3,354	4	3,8167	3,433	3,917	3,096	3,45	4,089	3,822	4,1538
7		3,667	2,5	3,4	3,875	3,75	4	3,125	3,75	4,333	3,833	4,5
Total		2,852	3,228	3,752	3,2155	3,255	3,658	2,791	3,293	3,905	3,167	3,6174
Related Groups Sig.<0.05		1-3	-	-	1-2 2-4,5,6 3-5,6	5-2,3	-	1-2,3	-	-	2-6 4-5,6	-
Factor ANOVA		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
F		2.541	2.147	2.787	8.034	3.328	1.682	4.065	0.913	1.876	3.843	1.801
Sig.		0.02	0.04	0.01	0.00	0.00	0.12	0.00	0.48	0.08	0.00	0.09
Homogeneity of Variances	Levene Stat.	1.687	1.438	6.609	4.543	3.572	4.758	0.492	1.958	1.624	3.068	5.856
	Sig.	0.123	0.199	0.000	0.000	0.000	0.000	0.814	0.071	0.139	0.006	0.000

In Table 7 the occured differences among the various vocation groups with respect to sub dimensions effective on rosca participation are shown. By the conducted One Way ANOVA tests it is determined that only about sub dimensions of numbers 1,5,7 and 10, groups differ significantly. According to this mean of the sociolization sub dimension of the housewifes' is lower than of retired people, employees, officers and people having a professional vocation. This situation can be asserted to be resulted from the potential difficulties of work life. With respect to investment sub dimension, it is observed that the mean of self-employed people is lower than of all other vocation groups except for the unemployed group's mean. This stuation can be asserted to be resulted from the characteristic of the income that of the corresponding vocation group. Except for the self-employment for other vocation groups income is stable and so if they want to make savings there is the necessity of making any saving from that stable income. However for self-employed people because the source of a new investment is again provided by the income gathered from their current investments for their rosca application preference making investment is not an important reason.

With respect to investment sub dimension it is seen that the mean of the retired people (3.4706) is significantly more than of the employees (2.3917). The reason of this situation can be asserted as the increase in marginal consumption tendency in retirement period due to the decrease in income of retired people. Lastly, it isobserved that with respect to to second order needs sub dimension the mean of retired people (3.6111) is significantly greater than of teachers (2.9091). Again similar to the case of making savings sub dimension, it can be stated that the second order needs of retired people cannot be met by their limited income due to the increase in marginal consumption tendency in retirement period and as a result they prefer rosca application to meet these needs.

Table 7: The Occured Differences among Various Vocation Groups with respect to Factors Affective on Rosca Participation

Mean Groups		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
1		2,9091	3,636	3,2	3	2,9318	3,886	2,364	3,591	3,939	3,212	3,212
2		3,1852	3,435	3,871	3,347	3,5972	3,611	3,471	2,944	3,907	3,611	3,611
3		2,3421	3,289	3,716	3,233	3,6053	3,711	3,031	3,154	3,744	3,234	3,234
4		3,3056	2,867	3,627	2,867	2,775	3,733	2,392	3,358	4,033	3,089	3,089
5		3,0388	3,212	3,705	3,07	3,25	3,541	2,709	3,157	3,903	3,264	3,264
6		2,7434	3,074	3,868	3,368	3,2336	3,594	2,718	3,513	3,896	2,909	2,909
7		2,9194	3,4	3,869	3,417	3,3373	3,857	2,91	3,413	4,005	3,18	3,18
8		2,6458	3,375	3,575	2,969	2	3,281	2,281	2,906	3,958	3,458	3,458
Total		2,8563	3,226	3,754	3,216	3,2586	3,662	2,788	3,295	3,908	3,171	3,171
Related groups Sig.<0.05		3-2,4,5,7	-	-	-	8-2,3,4,5,6,7	-	2-4	-	-	42157	-
Factor ANOVA		F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
F		5.140	1.727	1.893	2.571	5.948	1.252	4.353	2.110	0.883	2.293	1.687
Sig.		0.00	0.10	0.07	0.01	0.00	0.74	0.00	0.042	0.520	0.02	0.111
Homogeneity of Variances	Levene Stat.	2.093	0.645	5.105	2.510	1.987	2.590	1.674	3.504	2.973	2.792	8.465
	Sig.	0.04	0.718	0.00	0.01	0.056	0.01	0.114	0.001	0.005	0.008	0.000

5. CONCLUSION

The studies and efforts about financial markets' extension and becoming deepen are carried out in Turkey which is evaluated in the developing countries. However, it is observed that a considerable amount of the individuals in Turkey is still making savings, buying basic durable goods or directing their investments by using informal financial systems apart from formal financial markets. The rosca application which is very common in the immigrants' regions of the developed countries and in underdeveloped countries exist due to various reasons among many groups in Turkey. Today in Turkey rosca has the property of meeting financial, economic and social needs of a wide range of people from house wifes to private sector employees, from young people to old ones, from low income level to high income levels.

In this study, the individuals who are rosca participant were reached and than analyzed in terms of their reasons of rosca participation. As a result of the applied questionnaire which measures the individuals' reasons of preferring rosca, sub dimensions about rosca participation were determined. After determinetion, how the reasons of rosca participation differ with respec to to indviduals' socio-economic and demographic characteristics were examined.

As a result of the analyses 11 sub dimensions are determined about the rosca participation. These dimensions are: socializing, dynamics of intra-family income and expences, not being able to reach the formal financial market, basic consumption, investment, avoding from a possible economic loss, making savings, avoiding from interest, need of prestige, social needs and feeling of economic freedom. The effects of socio-economic and demographic characteristics of the individuals on the rosca participation can be summarized as; it is found the reasons of rosca participation differ considerably by gender; it is found the reasons of rosca participation differ by education status and as education status increases more indivuals use rosca as a financial instrument; it is found the reasons of rosca participation differ by age of the participants; different age groups prefer rosca for different reasons; it is found the reasons of rosca participation differ by income level of the individuls; it is concluded that because the incole level is highly dependent on the individuals' vocation, age and educational status it should be evaluated with them; it is found the reasons of rosca participation differ by vocations of the indivuals.

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Appendix 1 – Table 1: Distibutions of Frequencies and Percentages of the Sample

Gender	**Frequency**	**%**
Women	235	67,2
Men	115	32,9
Total	350	100
Age	**Frequency**	**%**
18-25 ages interval	15	4,3
26-35 ages interval	99	28,3
36-45 ages interval	105	30
46-55 ages interval	94	26,9
56 and older	37	10,6
Total	350	100
Educational Status	**Frequency**	**%**
Primary and middle school	39	11,1
High School	77	22
Associate Degree	50	14,3
Bachelors	155	44,3
Post graduate	29	8,3
Total	350	100
Vocation	**Frequency**	**%**
Not working	11	31,1
Retired	18	5,1
Housewife	57	16,3
Employee	30	8,6
Officer	86	24,6
Teacher	77	22
Professional Vocation	63	18
Self-employment	8	2,3
Total	350	100
Marital Status	**Frequency**	**%**
Married	299	85,4
Single	51	14,6
Total	350	100
Number of Children	**Frequency**	**%**
None	74	21,2
1 or 2	220	62,9
3, 4 or 5	55	15,7
More than 5	1	0,3
Total	350	100
Income (TL)	**Frequency**	**%**
None	44	12,6
900-1.500	64	18,3
1.501-2.500	89	25,4
2.501-3.500	96	27,4
3.501-5.000	40	11,4
5.001-10.000	15	4,3
More than 10.000	2	0,6
Total	350	100
Income Bracket (TL)	**Frekans**	**%**
None	228	79,4
1-2.000 TL	51	14,6
2.000-5.000 TL	18	5,1
5.001-10.000 TL	3	0,9
Total	350	100

Employment Status	**Frequency**	**%**
Not working	86	24,6
Wage earner, salariat or jobbers	246	70,3
Self-employed	12	3,4
Employee	6	1,7
Total	350	100
Rosca Type Preference	**Frequency**	**%**
TL	258	73,7
Dollar	31	8,9
Euro	5	1,4
Gold	55	15,7
Other	1	0,3
Total	350	100
Rosca Group Members	**Frequency**	**%**
Relatives	52	14,9
Neighbours	33	9,4
Collegues	137	39,2
Schoomates	3	0,9
Mixed	125	35,7
Total	350	100
Precaution for the risk of nonpayment	**Frequency**	**%**
Forced to feel responsible via peer pressure	34	9,7
Excluding from the group	20	5,7
Putting the most risky member in the last turn	28	8
Choosing the member by reference	15	4,3
Specying an organizer	54	15,4
Choosing the not risky people as members	154	44
Other	45	12,9
Total	**350**	**100**
Number of participants in Rosca	**Frequency**	**%**
Below 12	286	81,7
More than 12	64	18,3
Total	350	100
Amount of money paid regularly to Rosca TL	**Frequency**	**%**
0-100	184	52,6
101-249	82	23,4
250-499	47	13,4
500-749	20	5,7
750 and more	17	4,9
Total	350	100
Frequency of Meetings for Rosca	**Frequency**	**%**
Once ayear	342	97,7
Twice a year	8	2,3
Total	350	100
Frequency of turns	**Frequency**	**%**
Once a month	316	90,3
Twice a month	34	9,7
Total	350	100
Preference of turn style in rosca	**Frequency**	**%**
By lot	294	84
By coincidence	9	2,6
Determining previously	47	13,4
Total	350	100

Appendix 2 - Table 2: Factor Analysis of Reasons of Rosca Participation Questionnaire

	Variables	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
Sociolization	To relax and have a good time	.830										
	To have an opportunity of meeting with my friends	.824										
	To have an opportunity of evaluating the current issues	.786										
	To meet with new people	.652										
	To learn new things	.618										
	To have an opportunity of meeting with my relatives	.503										
Intrafamilial Dynamics of income and expenses	To support my children's education		.812									
	Because I am considering my children's future		.793									
	To meet the school needs of my children		.574									
	Beacuse I want my children not having less than their friends' possessions		.492									
	Because my husband/wife spends family income extravanagtly		.461									
Not reaching to formal financial markets	Because I am afraid of not being able to pay back the credit of banks			.772								
	Because the banks did not accept my credit application			.771								
	Because I cannot meet the criteria of credit apllications of banks			.737								
	To take a precaution of the possibility of loosing my regular income			.587								
	Because I have anxiety about not being able to meet the basic needs of my family			.585								
Basic Consumption	To buy food/cleaning materials				.692							
	To buy electronic devices, tv, household appliances etc.				.634							
	To meet the heating fuel needs(coal, firewood etc.) of my family				.509							
	To pay a debt				.450							
Investment	To buy a land estate such as a house or plot					.784						
	To buy a car					.739						
	To make a capital stock for the business establishment					.631						
	To make use of a current investment opportunity					.514						
Avoding possible economic loss	Because I am afraid of being misdirected by banks or other financial associations						.731					
	Because the banking operations are confusing for me						.706					
	Because the interest rates are too high and so I do not want to take up a loan on						.601					
	Because I want to get rid of my friends and relatives wanting debt money from me						.496					
Economising	Because I cannot stop myself making unnecessary expenses							.777				
	Because I have difficulty in saving money							.705				
	To meet the common needs of my family							.541				
	To contribute to family income							.462				
Avoiding from interest	I do not want to get an income from interest								.847			
	I do not want to take up a loan on with interest								.831			
	To feel a sence of solidarity								.478			
	I know that If I take up a loan on /get an income from interest people around me will criticize me badly								.473			
Need of being prestigious	Having the chance of showing off									.819		
	To math-make people who would like to marry									.769		
	To feel myself important and valuable									.469		
Second order needs	To go on a holiday										.700	
	To meet my personal needs (personal development, personal care etc.)										.645	
	To spend money for spoiling yourself										.605	
Feeling of economic freedom	To feel the emotion that I have an regular income independent from my husband/wife											.643
	Explained Total Variance									67,195		
	KMO and Bartlett Test									.858 and .000		
	Cronbach Alpha Coefficient (General, .919)	.832	.834	.813	.699	.759	.802	.695	.739	.732	.573	.918

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DETERMINANTS OF RESERVATION WAGES IN TURKEY*

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ABSTRACT

Reservation wage is the minimum wage level at which a person is willing to accept work. This wage level represents the starting point of the individual labor supply curve. This study aims to determine the factors which have an effect on an unemployed person's reservation wage. The survey prepared for this purpose was provided to unemployed individuals who applied to the Turkish Labor Agency in 15 cities located in different regions of Turkey. The total number of surveys applied was 2,162. When the number of surveys to be applied in each city was determined, the number of unemployed people living in the region represented by the city was taken into consideration, as was their distribution by gender. The two-stage least squares method was used in the analysis. As a result of the study, the social, demographic and economic determinants of unemployed people's reservation wages were determined. An attempt has also been made to develop various policy recommendations. In addition, it is thought that this study will also help provide a better understanding of labor supply in Turkey.

Keywords: Reservation wage, unemployed, Turkey

JEL Classification: J64, E24, J21

1. INTRODUCTION

Reservation wage is the wage level at which an individual is indifferent between working and not working. At this wage level, the individual thinks that the benefits to be derived from working are equal to the benefits to be derived from not working. Thus people are expected to make the decision to work above the reservation wage and not to work below it. In other words, the minimum wage that the individuals consent to work for is the reservation wage, and it has a key role in labor market analyses (Brown and Taylor 2013). In addition, reservation wage is an important factor for the unemployed person in terms of the possibility of finding a suitable job, and impacts the wage level he/she will receive (Lancaster and Chesher 1983; Jones 1989). Reservation wage constitutes the starting point of the individual labor supply curve because under this wage level the person makes the decision not to work. In other words, the person does not supply services.

Reservation wage is a wage level that exists for everybody. However, the level of reservation wage differs from person to person. The reason for this is that individuals have different characteristics. Individuals with different social, economic and demographic features determine different wage levels as their reservation wage. However, individuals should be realistic when determining this wage level because unemployment usually becomes a significant issue as a result of a high reservation wage (Brown and Taylor 2013). Therefore, a high reservation wage diminishes the probability of working, and results in a longer period of unemployment.

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By understanding the determinants of reservation wage it is possible to obtain information that will shed light on labor supply and job search behaviors (Prasad 2003). Therefore, it is important to determine which factors have an effect on the determination of individuals' reservation wages, and to what extent. However, these factors vary widely. In addition to the macroeconomic environment that the person is in, his/her own economic position can also be influential. However, the effect of macroeconomic factors is open to discussion. For example, Franz (1980) determined that effects of labor demand related variables are low. On the other hand, Jones (1989) found that the effect of regional unemployment rates was uncertain, while Hogan (1999) claimed that the effect was low. In addition to these factors, past educational investments which constitute a person's human capital, and environmental and family factors, along with a person's consumption habits, are also important.

In this study, in accordance with the explanations presented above, in addition to regional unemployment rate, which is one of the macroeconomic variables that affect reservation wage, variables relating to a person's individual characteristics were also used. Examples of such variables are a person's occupation and basic education, the number of children they have, the primary source of income in the family, duration of unemployment, and level of indebtedness.

Reservation wage and its determinants have been analyzed in the context of many different countries. However, no other study has been conducted on this subject in Turkey. The reason for this is most likely that no data exists in regards to reservation wage in Turkey. Therefore, this study is the first to analyze the Turkish example.

In the subsequent sections of the study, first, the theoretical background and previous studies on the subject will be presented. This section is followed by a material and methodology section, in which data and the method used in the study are analyzed. In the next section, on findings, an analysis of our results is provided. The study ends with a conclusion and recommendations.

2. LITERATURE REVIEW

This section presents brief information about the theory behind reservation wage. In labor markets, individuals try to maximize the expected current value of future income streams towards an infinite horizon. In such a case, under the assumption that wage offers are determined independent of known wage offer distribution, Lancaster and Chesher (1983) define the optimal reservation wage as follows:

$$w^r = b + \frac{\lambda}{\rho}\int_{w^r}^{\infty}(x - w^r)dF(w) \quad (1)$$

In this equation, w^r represents reservation wage, b shows net unemployment benefits, λ is job offer rate, ρ is the discount rate of future income streams, *x* denotes wage offer with distribution function *F(w)*. Equation (1) states that the optimal reservation wage is determined at the level at which marginal benefit of the job search is equal to its marginal cost. When a person receives a wage offer and if this offer is greater than or equal to w^r, this person accepts the offer. However, if it is less than w^r, he/she refuses it and keeps on searching for a new job. Besides, as Lancaster and Chesher (1983) mentioned, a person's choice should be rational. In other words, it should satisfy the following condition:

$$b \leq w^r \leq x \quad (2)$$

This condition requires that a person's unemployment benefits (*b*) are less than or equal to reservation wage (w^r) and also that reservation wage (w^r) is less than or equal to expected wage (*x*) shaped with wage offer.

Standard job search models state reservation wage as a function of wage offer, number of job offers received and the cost of the job search. All these factors take a shape depending on a person's characteristics. The first of these includes the wage which the employer offers to a jobseeker depending on the jobseeker's qualifications. The second changes with respect to whether or not the person has the required qualifications for the labor market. The third factor, on the other hand, is shaped by the characteristics of the economic situation that the person is in. The most important among the factors that constitute job search cost is whether the person receives unemployment benefit or not. Other than this, the existence of other working family

members and alternative income sources leads to a reduction in the cost of the job search. As can be seen in Equation (1) an increase in unemployment benefits (b) increases reservation wage.

This result can also be obtained by taking a partial derivative.

$$\frac{\partial lnw^r}{\partial lnb} = \frac{b}{w^r}\frac{x-w^r}{x-b} \tag{3}$$

b and w^r are positive. Besides, since $b \leq w^r \leq x$ will be satisfied for a rational person, $x - w^r$ and $x - b$ are positive. In other words the value of the partial derivative is positive. This shows that an increase in unemployment benefit leads to an increase in reservation wage. Likewise, if the partial derivative of reservation wage (w^r) is taken with respect to job offer (λ) the following result is obtained:

$$\frac{\partial lnw^r}{\partial ln\lambda} = \frac{w^r-b}{w^r}\frac{x-w^r}{x-b} \tag{4}$$

The difference of this partial derivative from the previous one is $w^r - b$. Since this value will be positive under the assumption that the person will be rational, the result is positive. This result shows that an increase in job offers increases reservation wage.

In addition to person specific variables, macroeconomic variables also have an effect on reservation wage. These effects are intertwined with the function mentioned above. For example, a high local unemployment rate decreases the number of job offers a person can receive and leads to a decrease in reservation wage (Prasad 2003).

Another important factor is the duration of the unemployment. Reservation wage can be endogenously determined by the unemployment duration because according to optimal job search theory there is a positive correlation between these two variables under the static reservation wage assumption. This opinion states that an increase in reservation wage leads to a longer period of unemployment. Therefore, when determinants of reservation wage are analyzed, the endogeneity problem that unemployment duration creates should not be disregarded.

The reservation wage that an individual states is usually higher than the wage they would actually accept. The reason for this is that individuals report the wage they consider "fair" for themselves rather than the "right" reservation wage (Zoch 2014). Therefore, the use in previous studies of reservation wages as expressed by individuals can be seen as a problem that diminishes the efficiency of these analyses. Addison et al. (2005) also take note of this problem and state that real reservation wage can only be established when the person receives a wage offer. In this case, how should the right reservation wage data should be obtained? One way could be by bargaining with the individual over the stated wage and making them think that they would receive a fair wage offer. When a person is asked whether he/she would actually work below reservation wage level after that person has quoted a reservation wage, it has been observed that a majority of people accept lower levels of wages. Later on they are offered a still lower wage and asked whether they would accept it. In this way, wages are lowered up to the point at which the person states that he/she will not work for the rate being offered. This wage level is the point at which the person is indifferent between working and not working. In other words, this is the reservation wage.

Another problem related to data gathering should also be noted here. During the interviews, when a person states his/her reservation wage, he/she does not consider many factors that are related to the wage in question, because the person is not receiving an actual job offer. When encountering a real job offer, the person will consider many other factors, such as whether the job is unsafe or if the travel costs are high, etc. Therefore, the data obtained could be different from the wage level at which the person is actually indifferent between working and not working. However, there is no method of preventing this divergence.

The studies discussed below can be given as previous examples of academic work on this subject. However, as mentioned earlier, there is no previous study analyzing the case in Turkey.

Kiefer and Neumann (1979) state that reservation wages can change over time due to various reasons and the distribution of job offers. Fishe (1982) analyzed unemployed people's reservation wages along with the topic of

unemployment insurance. Fishe's findings showed that non-whites and women received lower wage offers than whites and men, and that their reservation wages were also lower. In addition, the study found that when reservation wage decreased by 10% the chance of starting a new job increased by 8%, and that unemployment insurance had an effect on reservation wage directly and over time. Jones (1988) reached the conclusion that in general unemployment is due to reasons such as unemployed people's unwillingness to work, downward rigidity in wages and high reservation wages. In addition, Jones (1989) found that previous wages received had an important effect on reservation wage. A similar finding was also obtained by Hogan (1999). Hui (1991) analyzed the reservation wages of unemployed young people in Australia. He used the two-stage ordinary least squares method in his study, and unlike other studies he used weekly reservation wage data. He also analyzed the effect of place of residence. In this way, the differences between people living in cities, towns and villages were analyzed.

Heath and Swann (1999) also used the two-stage ordinary least squares method. According to this study, reservation wage does not affect unemployment duration. They found that experienced people, those with high skills and seniors have a higher reservation wage. They also found that people who do not live in urban areas have lower levels of reservation wage. In a study by Haurin and Sridhar (2003) the ordinary least squares and two-stage least squares methods were used. They found that men have higher levels of reservation wage than women. Hui (1991) and Jones (1988) reached similar conclusions. Haurin and Sridhar (2003) show that time spent in education had a statistically significant effect on reservation wage. People with a higher number of children have relatively low reservation wages. Living in urban places and cities has a positive but low effect on reservation wage. Unlike other studies, the authors also analyzed the effects of quitting a job or the fear of losing a job on reservation wage. In his study conducted with people in the 17-55 age range in western Germany, Prasad (2003) determined such factors as apprenticeship, vocational training, a university degree, and regional unemployment as the determinants of reservation wage. The study used the ordinary least squares method.

Rööm (2003) analyzed the factors that determine unemployed people's reservation wages. According to the study's findings, unemployed benefits and social aids do not have statistically significant effects on reservation wages in Estonia. Brown et al. (2007) analyzed the relationship between health and reservation wage. Despite it being an important variable, they determined that there was no significant relationship between health and reservation wage. Sestito and Viviano (2008) analyzed determinants of reservation wage in Italy. Using Italy's workforce research and European household panel research data, their aim was to draw attentions to regional differences. They determined that reservation wages in the southern part of the country were 10% higher than in central and northern parts.

Addison et al. (2010) used a data set that comprised 15 EU countries. They used the ordinary least squares method in the analysis. They determined that reservation wages go down during periods of unemployment, and that high reservation wages result in longer unemployment durations.

In the study conducted by Ophem et al. (2011) the researchers analyzed the northern, western and southern regions of the Netherlands; the people they interviewed stated that their perspectives about the market in general determined their reservation wage levels. In this way, market prices and wages significantly affect reservation wages in the same direction. Reservation wages are formed in line with market expectations; however, accepted wages are formed randomly. The researchers found that accepted wages are almost 8% higher than the wages considered acceptable by participants, and that men have 2% higher reservation wages than women. The study also found a positive relationship between age and reservation wage. In other, more developed regions reservation wages are higher. It was also determined that having a degree and having children led to an increase in reservation wage.

3. DATA AND METHODOLOGY

Although the household workforce survey conducted in Turkey provides a very wide set of data, it does not include reservation wage. Therefore, when a study is conducted into reservation wage this data set cannot be utilized. In order to overcome this problem, a survey study was carried out. This survey was conducted at the Turkish Labor Agency on a nationwide scale. In order to ensure that this survey is representative of all the

unemployed people in the country, certain criteria in particular were emphasized. First, the survey was conducted in all of the first degree regions in the nomenclature of territorial units for statistics. In addition, the survey was conducted with respect to number of unemployed people and with respect to their gender (male or female) distribution. In this way, the survey was conducted with a total of 2,162 unemployed people. Out of these 63.6% are male and 36.4% are female. In order to conduct the survey with people who fit well with the definition of being unemployed, special attention was paid to the selection of people "who do not have a job, are looking for a job and can work two days a week". In order to obtain their reservation wage, survey participants were asked "What is the lowest wage you would accept for a job suitable for you?" However, assuming that the answers provided to these kinds of questions are usually higher than actual reservation wages, survey participants were then asked whether they would work at a wage a little lower than the wage level they had just stated. In other words, survey participants were bargained with regarding their reservation wage. This question was repeated until the survey participants gave the answer "I won't work lower than this wage". This way the actual reservation wages, at which participants were indifferent between working and not working, were determined. Participants were also requested to state how many hours they would be willing to work in a week for their reservation wage. After this, reservation wage was divided by the number of hours participants would be willing to work, and thus hourly reservation wages were obtained.

In the survey application those who wanted to establish their own business were excluded. As Sestito and Viviano (2008) point out, the reservation wages of these people contain a risk premium in regards to variability in profit. In addition, another reason for including only unemployed people is that the wage levels current employees are getting affect their reservation wages.

Table 1 presents the explanations of variables obtained as a result of the survey and used in the analysis.

Table 1. Descriptive Statistics for Variables

Variable	***Definition***	***Mean.***	***St. Dev.***
lnRW	Logarithm of hourly reservation wage	3.264	0.327
lnUD	Logarithm of unemployment duration	1.482	1.025
lnHHI	Logarithm of household income	7.099	1.411
lnLW	Logarithm of participant's previous wage	6.432	1.963
lnINS	Logarithm of insurance period in months	3.009	1.605
GENDER	Gender (0 = male, 1= female)	0.363	0.481
EDUC	Education (0 = under or equal to 12 years, 1= under or equal to 13 years)	0.316	0.465
PSINC	Primary source of income for the family (0 = no, 1= yes)	0.352	0.478
DEGR	Graduate degree from most recently attended school	0.736	0.141
APPRNT	Has ever been apprenticed? (0 = no, 1= yes)	0.238	0.426
FRGLANG	Number of foreign languages spoken	0.385	0.537
RENT	Paying rent (0 = no, 1= yes)	0.384	0.486
Uİ	Receiving unemployment benefit? (0 = no, 1= yes)	0.087	0.283
CARE	Has a family member in need of care? (0 = no, 1= yes)	0.113	0.317
WRKMEMB	Number of working people in the family	4.136	1.541
UNEMP	Unemployment rate in the respondent's region of residence	10.098	2.145
SMOKER	Smoker (0 = no, 1= yes)	0.458	0.498
ALCOHOL	Drinks alcohol (0 = no, 1= yes)	0.104	0.305
RESID	Place of residence (1= city or grand city, 0 = other)	0.759	0.427
OWE	Owe money (0 = no, 1= yes)	0.469	0.499
DEPCHILD	Dummy variable (1= women with dependent child, 0 = other)	0.059	0.235
JOBOFFER	Number of job offers received	0.493	1.103

3.1. Methodology

In economic models, exogenous variables are believed to change endogenous variables. The assumption that other conditions are constant prevents any problems occurring. However, the assumption that other conditions are constant is quite restrictive when used to construct a model of a real-world situation. When it is desired that these restrictions be eliminated, exogenous variables can in some cases be determined by endogenous variables. The determination of an exogenous variable by an endogenous variable, in other words, an exogenous variable becoming an endogenous variable in the model, is referred to as the endogeneity problem. In the model used in this study there is an endogeneity problem. This is because, according to the theory, some variables which need to be exogenous are in an endogenous position. This situation causes these variables to be associated with an error term. In other words, $cov[x'u] \neq 0$. In such a case, the coefficients obtained from OLS estimation will be divergent.

In order to eliminate the endogeneity problem it is appropriate to use instrumental variables. Instrumental variables to be used should satisfy certain conditions. Katchova (2013) has itemized the z instrumental variables vector as follows:

- *z* is correlated with the regressors *x*, $\mathrm{E[z'x]} \neq 0$ (*z* predicts or causes *x*)
- *z* is uncorrelated with the error term *u*, $\mathrm{E[z'u]} = 0$ (*z* is not endogenous)
- *z* is not a direct cause of the dependent variable *y*, $\mathrm{cov[y, z|x]} = 0$ (*z* is not in the *y* equation)

Let us assume that we have an equation such as the following:

$$y_1 = \beta_1 y_2' + \beta_2 x_1' + u \tag{5}$$

where y_1 represents an independent variable, y_2 represents an endogenous variable, and x_1 represents an exogenous variable. In this case, we need to find a set of instruments $z = [x_1, x_2]$ in which x_1 is an instrument for itself and x_2 is an instrument for y_2. After finding such a set of instruments, in order to overcome the endogeneity problem the two-stage least squares method (2SLS) can be used. In this method, instead of the endogenous variable, the estimated values of the endogenous variable are used. In other words, the below equation is constructed for y_2:

$$y_2 = \gamma_1 x_1' + \gamma_2 x_2' + e \tag{6}$$

For $\hat{y}_2$ which was derived from this equation, estimated values are calculated and in the first equation these values are used. In this case, the model turns into the following form:

$$y_1 = \beta_1 \widehat{y_2'} + \beta_2 x_1' + u \tag{7}$$

If the number of instrumental variables is equal to the number of endogenous variables then the model is fully defined. In such a case, estimators will be without divergence as shown below. Because, as mentioned above, $E[z'u] = 0$.

$$b_{IV} = (z'x)^{-1} z'y = (z'x)^{-1} z'(x\beta + u) = \beta + (z'x)^{-1} z'u \tag{8}$$

Since $z'u = 0$, it leads to $b_{IV} = \beta$.

Because the model used in the study contains an endogeneity problem, instrumental variables, which represent the endogenous variables, were used. The model is presented below:

$$\ln RW_i = \alpha_0 + \alpha_1 lnUD_i + \alpha_2 \ln HHI_i + \alpha_3 \ln LW_i + \alpha_4 \ln INS_i + \alpha_{5i} X_i + \varepsilon_i \tag{9}$$

The dependent variable *lnRW* represents the natural logarithm of hourly reservation wage, *lnHHI* represents the natural logarithm of household income, *lnUD* represents the natural logarithm of unemployment duration, *lnLW* represents the natural logarithm of previous wage and *lnINS* represents the natural logarithm of insured period. The *X* vector, on the other hand, is the vector that contains explanatory variables which are determinants of reservation wage. Using logarithms in the regression equation allows useful results to emerge. In the regression equation, α_1, α_2, α_3 and α_4 show the elasticity of reservation wage with respect to unemployment duration, expected wage, previous wage and working time with social security coverage. In other words, α_1 shows the percentage change in reservation wage in response to a 1% change in

unemployment duration, α_2 shows the percentage change in reservation wage in response to a 1% change in household income, α_3 shows the percentage change in reservation wage in response to a 1% change in previous wage and α_4 shows percentage change in reservation wage in response to a 1% change in working time with social security coverage.

4. FINDINGS AND DISCUSSIONS

In order to determine whether there was an endogeneity problem, we first conducted Durbin and Wu-Hausman tests. In these tests the null hypothesis states that the variables are exogenous. The test results were 14.572 (p = 0.0001) and 14.515 (p = 0.0001) respectively. Given this result the null hypothesis is rejected and it is concluded that there indeed exists an endogeneity problem. In order to prevent this problem, the two-stage ordinary least squares method was used.

Table 2 shows the findings from the two-stage least squares model in which reservation wage is a dependent variable. Our findings show that, contrary to expectations, an increase in unemployment duration (*lnUD*) leads to an increase in reservation wage. Compared to women, men have a higher reservation wage level. Those who have university or graduate degrees (*EDUC*) have a higher reservation wage than those who have lower levels of educational qualification. As the level of degree (*DEGR*), which is an important indicator of achievement in educational life, increases, reservation wage also increases. Those who had done an apprenticeship (*APPRNT*) had a higher level of reservation wage. Likewise, an increase in the number of foreign languages spoken (*FRGLANG*) increases reservation wage. As the reason for the findings in regards to education, it can be suggested that people want to get a return for their additional educational investments and educational lives.

Table 2. Two-stage Least Squares Method Findings

	Coefficient	St. Error	t value	P value
lnUD	0.317*	0.115	2.750	0.006
lnHHI	0.010	0.007	1.420	0.155
lnLW	0.044*	0.014	3.170	0.002
lnINS	0.035*	0.010	3.480	0.000
GENDER	-0.043***	0.023	-1.850	0.064
EDUC	0.116*	0.028	4.180	0.000
PSINC	0.025	0.024	1.060	0.289
DEGR	0.152***	0.087	1.740	0.083
APPRNT	0.051**	0.024	2.160	0.031
FRGLANG	0.059*	0.022	2.610	0.009
RENT	0.041***	0.021	1.940	0.052
Uİ	0.124*	0.036	3.420	0.001
CARE	-0.065**	0.030	-2.170	0.030
WRKMEMB	-0.018*	0.006	-2.830	0.005
UNEMP	0.033*	0.006	5.270	0.000
SMOKER	0.037	0.022	1.640	0.101
ALCOHOL	0.038	0.035	1.090	0.276
RESID	-0.091*	0.031	-2.900	0.004
OWE	0.092*	0.025	3.700	0.000
DEPCHILD	-0.042	0.042	-1.010	0.313
JOBOFFER	0.002	0.010	0.250	0.805
CONSTANT	1.922*	0.348	5.520	0.000

Note: *, ** and *** show statistical significance of the coefficient with respect to 1%, 5% and 10% significance levels, respectively.

An increase in working time with social security coverage (*lnINS*), which is one of the variables related to the previous work life of a person and an indicator of their experience, and increase in previous wage (*lnLW*),

increase a person's reservation wage. People want to transfer their previous experiences and wage levels to their new jobs. People who have been receiving unemployment benefit (*Uİ*) have higher levels of reservation wage acceptance. Likewise, people who owe money (*OWE*) have higher reservation wage levels. The reason for this could be that they want to get rid of their debts quickly. Another unexpected finding is that unemployment rate in the region in which the person lives in (*UNEMP*) has an increasing effect on reservation wage.

Some factors which have a decreasing effect on reservation wage have also been determined. Paying rent (*RENT*) increases reservation wage, because thanks to owning a home or living with parents the person does not have to make rent payments and cost of job search decreases. This makes him/her willing to accept a lower wage. The existence of dependent family members (*CARE*) could drive the person to find a job faster. This can be interpreted as suggesting that the existence of a dependent family member is a factor that leads to lower levels of reservation wage. An increase in the number of working family members (*WRKMEMB*) is a decreasing factor for reservation wage. As the number of working family members increases, the share of common expenses that falls on the shoulders of any one family member will decrease, and the person will be willing to work for a lower wage. Finally, people living in cities or grand cities (*RESID*) have lower reservation wages than people living in other residential regions. This can be explained by the fact that there is more intense competition between the people who supply labor in cities and grand cities.

It is also possible to interpret some findings as elasticity. A 1% increase in unemployment duration (*lnUD*), working time under social security coverage (*lnINS*), and previous wage (*lnLW*) increase reservation wage by 0.317%, 0.044% and 0.035% respectively. According to these findings, it is understood that among the variables in question, duration of unemployment has the biggest effect on reservation wage.

5. CONCLUSION

This study analyzed the factors that affect reservation wages in Turkey. This is the first study to analyze reservation wage and its determinants in Turkey. When the data obtained from the survey, which was conducted in 15 cities with 2,162 people, was analyzed, important results were obtained. First, it was determined that an increase in unemployment duration leads to an increase in reservation wage. This finding in particular is notable, as it is not in line with the related theory. The second finding is about human capital. It was determined that increases in education led to an increase in reservation wage. On the other hand, the factors affecting the cost of the job search are paying rent and number of working family members. In line with the theory first of these is positively and the second is negatively correlated with reservation wage. However, no significant relationship was found between unemployment benefits and reservation wage. This study is the first on this topic to be conducted in Turkey. In addition, it uses a unique and comprehensive data set, and this further increases the importance of the study. It is believed that this study will make contributions to both the supply side and the demand side of the workforce market alike. In addition, it is expected that this study will be of great use to policy makers during their efforts to develop policies for the workforce market.

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