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MOTIVATION TOWARD THE EXTENSION OF ORGANIC RICE PRODUCTION IN NORTHEAST THAILAND

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ABSTRACT

Purpose- Organic rice growers have continued their lives and organic agriculture way of production firmly, although there is a common way of rice production by using chemical fertilizers and pesticides in Thailand. Movtivation of these organic growers will be explored for concerned organizations to encourage more organic production in the country. Surin and Yasothon provinces were the study area as there is a large number of organic rice production in these 2 provinces.

Methodology- Descriptive and quantitative analysis by Multiple regression analysis are applied.

Findings- The results showed that the most influential factors that motivated organic production was due to farmer's opinion that organic agriculture is the way of sustainable production mode, a good relationship within the household and no excessive resources compared with chemicals. In addition, government support, health concern, organic being the new production trend, and cost reduction were also statistically significant factors.

Conclusion- Facilitation from concerned organizations to motivate farmers to extend their production area from these factors are recommended.

Keywords: Motivation, organic rice, Surin and Yasothon, Thailand, multiple regression analysis.

JEL Codes: P48, Q13, R11

1. INTRODUCTION

The promotion of organic rice production in Thailand has been undertaken since the 8th National Plan of Thailand (1997-2001), aiming at changing the area of conventional rice production to be organic production, using organic fertilizers and biological pesticides (Mingchai and Yossuck, 2008). Although there was an encouragement from public sector and NGOs, an importation of agricultural chemicals such as chemical fertilizers, growth hormones, chemical pesticides, and herbicides increased continuously. Control of chemical pesticide importation was implemented in the 10th National Plan (2007-2011), however, it was increased at the end of the Plan (Tawatsin et al., 2015). It is indisputable that chemical residue was found in soil, water resources, and agricultural products, especially of rice which was the major economic crop, and a source of earning for the Thai farmer's households and for the country.

Organic rice production in Thailand was declined in 2007-2008, due to political instability in Thailand, causing a reduction of organic production area (Green Net 2008). Government subsidy also seriously affected organic agriculture through insured

rice price that was higher than the market, causing the reduction of 11.2% from 2011 to 2012 (Green Net, 2013). Rice mortgage policy in might be an obstacle of rice production in the organic way. However, there were groups of organic farmers separated in the remote areas all over the country continued organic rice production. Motivation factors behind are the crucial issues to analyze in order to promote or to encourage an extension of organic rice production in Thailand.

2. LITERATURE REVIEW

Organic production in developing countries is a tool of socio-economic development and is supported by various international and national development agencies (Kilcher & Echeverria, 2010). There are factors that support the growth of organic production, resulted in benefits in various aspects (Brodts & Schug, 2008), especially on economic and non-economic (Lampkin & Padel, 1994). Profitability gains compared to conventional system (MacRae et al. 2007), lower production costs, especially in terms of external inputs while using more farmer's labors (Qiao et al. 2016), though yielding less (MacRae et al. 2007; Lotter, 2008) and price premiums have been repeatedly reported in many studies. Non-economic benefits have been reported for the conversion to organic production. They are social dimension, including human relationship in the rural, health and environmental reasons. There are examples of some studies relating rural vitality (Mzoughi, 2011; Lasley et al. 1993; Bird et al. 1995), advancement of human skills on problem-solving and self-reliance which can mobilize local community (Flora, 1995), more community involvement (MacKinnon 2006), as well as health and environmental concerns (Bryne et al., 1991; Koesling et al., 2008; Padel, 2001; Hanson et al., 2004; Stofferahn, 2009; Khaleli et al, 2010) However, there were studies suggesting that profit motives were stronger than environmental motives (Carr & Tate, 1991; Newman et al., 1990). Therefore, concerning merely social and environmental attitude may not enough for the continuation of organic farming.

Due to the organic trend, the study of McEachern & Willock (2004) found that there was strong producer optimism about the future of organic farming as it was the "market forces" as well as "policy." Some studies in Thailand that were related to the decision for organic production are such as the paper of Vidyarthi et al. (2009). It was indicated that the conversion factors to do organic vegetable farming in Thailand were young age & higher education of farmers, labor availability, availability & ownership of land, availability of marketing channel, ownership of livestock, availability of credit, and training on organic farming techniques. Pornpratansombat et al. (2011) indicated that the early organic adopter may have better access to water, ability to find higher prices, and stronger attitudes toward conventional farming problems. In addition, to the finding of Mzoughi (2014), Organic farmers had higher levels of life satisfaction, compared to conventional farmers. This was positively associated with income, profitability, satisfaction at work, social recognition, and good health.

3. DATA AND METHODOLOGY

Samples from 336 respondents in this study were organic rice farmers in Surin and Yasothon provinces, the major areas of organic rice production and exportation in the northeast Thailand. They got "Organic Thailand" certification from Thailand's Department of Agriculture or got organic certification for exports from the National Bureau for Commodity and Food Standards (ACFS) in the year 2012-2013. A purposive sampling was deployed by using questionnaire. Descriptive statistics used were such as percentage, mean, and standard deviation. Multiple regression analysis (MRA) was applied to consider 11 items of motivation factors, exploring which motivation could help promote organic production area. MRA formula in this study was as follow:

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_nX_n + e_i$$

Where Y	= area of organic production in "rai" unit (dependent variable)
b_0	= constant
b_1, \dots, b_n	= coefficients
X_1, \dots, X_n	= motivation factors to perform organic production (independent variables)
e_i	= residuals

There were 11 items of motivation factors were cost reduction (X_1) good relationship in the household (X_2), increasing revenue (X_3), demand for organic products from the buyers (X_4), buyers can pay more (X_5), organic is the new production trend (X_6), health concerns (X_7), no excessive resources compared with chemicals (X_8), the way of sustainable production mode (X_9), afraid of chemical danger (X_{10}), and government support (X_{11}).

4. FINDINGS AND DISCUSSIONS

Personal information of the respondents was shown in Table 1. In each household, there were about 3 members on average. Average farming area was about 15.91 rai/household (about 2.54 ha/household). Transition period from chemical method to organic method was around 2 years and 8 months. Average experience years on rice production was about 29 years and experience years on organic rice production was about 7 years. Yield per rai was about 413.70 kilograms, and price per kilogram was 20.24 baht on average.

Table 1: Personal Information of the Respondents

Personal information	No. of persons (N = 336)	%
gender		
male	199	59.2
female	137	40.8
Education		
primary	275	81.8
junior high school	19	5.7
high school	28	8.3
diploma	4	1.2
bachelor	10	3.0
Marital status		
married	264	78.5
divorced	57	17.0
single	11	3.3
separated	4	1.2
Family structure		
Nuclear family	307	91.4
Extended family	29	8.6
Age (years of age)		
minimum	27.0	
maximum	78.0	
average	54.2	
S.D.	8.5	
Family members) persons)		
minimum	1.0	
maximum	10.0	
average	4.8	
S.D.	1.6	

Regarding the reasons of conversion to organic production, they informed that major reasons were health concern, help cost reduction, and environmental concern, respectively. There were 5 motivation factors which were in the “most

important" level were the government support, health concern, afraid of chemical danger, cost reduction, and organic is the sustainable way of production, while the other 6 motivation factors were in the "important" level (Table 2).

Table 2: Motivation Factors of the Respondents to Do Organic Rice Production

Motivation factors	\bar{x}	S.D.	Level of motivation*
Government support	4.57	0.68	Most important
Health concerns	4.55	0.57	Most important
Afraid of chemical danger	4.26	0.68	Most important
Cost reduction	4.23	0.59	Most important
Way of sustainable production mode	4.21	0.62	Most important
Good relationship in the household	4.16	0.57	Important
Organic is the new production trend	4.14	0.63	Important
Demand from the buyers	4.11	0.65	Important
Increasing revenue	4.11	0.59	Important
no excessive resources compared with chemicals	4.05	0.59	Important
Buyers can pay more	4.01	0.66	Important

* level of motivation was categorized into 5 levels, depending on the range of average scores from 1.00 to 5.00 point scale. "Important" level score was ranged from 3.40-4.19, while "Most important" level score was ranged from 4.20-5.00.

The correlation coefficient matrix was presented in Table 3, indicating that all the independent variables were within the acceptable range, meaning that they were not over 0.75, implying that there was no multicollinearity.

Table 3: Inter-Correlation Matrix among Independent Factors for the Analysis

	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁
X ₁	1.000	0.652	0.675	0.571	0.449	0.524	0.242	0.401	0.597	0.472	-0.138
X ₂		1.000	0.585	0.588	0.603	0.613	0.310	0.481	0.628	0.578	-0.045
X ₃			1.000	0.624	0.487	0.552	0.275	0.512	0.538	0.461	-0.086
X ₄				1.000	0.674	0.605	0.321	0.497	0.568	0.442	0.011
X ₅					1.000	0.547	0.356	0.512	0.521	0.424	0.035
X ₆						1.000	0.322	0.477	0.546	0.505	-0.022
X ₇							1.000	0.290	0.230	0.208	0.130
X ₈								1.000	0.401	0.430	-0.019
X ₉									1.000	0.703	-0.012
X ₁₀										1.000	-0.104
X ₁₁											1.000

Analysis of motivation factors that influencing an extension of organic production area by multiple regression analysis (MRA) was shown in Table 4. There were 7 motivation factors that had a direct effect on an extension of organic area, while the rest 4 factors had no significant direct effect on it.

Table 4: MRA on Motivation Factors Influencing an Extension of Organic Production Area

Variables	coefficient (b)	Std. Error	t-value	p-value	
Constant	4.557	4.337	1.051	0.294	
Cost reduction (X ₁)	-1.695	0.930	-1.823	0.069	*
Good relationship within the household (X ₂)	3.131	0.993	3.152	0.002	**
Increase revenue (X ₃)	-0.601	0.901	-0.667	0.505	
Demand from the buyers (X ₄)	-0.653	0.859	-0.760	0.488	
Buyers can pay more (X ₅)	0.709	0.796	0.891	0.374	
Organic is the new production trend (X ₆)	-1.339	0.786	-1.704	0.089	*
Health concern (X ₇)	-1.232	0.669	-1.843	0.066	*
No excessive resources compared with chemicals (X ₈)	-2.540	0.753	-3.374	0.001	**
Way of sustainable production mode (X ₉)	5.416	0.918	5.898	0.000	**
Afraid of chemical danger (X ₁₀)	0.331	0.767	0.431	0.667	
Government support (X ₁₁)	0.963	0.534	1.803	0.072	*
R ² = 0.222		SEE = 6.683	F = 9.342	p-value of F = 0.000	

Note: * a significance level of 0.1

** a significance level of 0.05

5. CONCLUSION

According to the results, good relationship within the household and way of sustainable production mode had a strong significant relation to the extension of organic production area. The finding confirms a result of study conducted by Pornpratansombat et.al (2011) that the conversion of organic agriculture was from the attitude towards conventional farming problem. A study by FAO (2002) and Setboonsarng (2006) indicated that organic production can alleviate migrant labor problems in rural areas, implying better relationship within the household. In addition, government support had a significant relation. The finding confirms a result of a study conducted by Tiraieyari et. al. (2014) that government support in terms of direct incentives and financial support are recommended.

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PROBLEMS FACED BY INTERNATIONAL FIRMS IN DEVELOPING COUNTRIES DUE TO EXCHANGE RATE FLUCTUATIONS: A CRITICAL STUDY OF INTERNATIONAL FIRMS IN TURKEY

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ABSTRACT

Purpose- Exchange rate fluctuations and instability have rekindled interest of researchers in the subject of relationship between international trade and exchange rate. This study focused on the impact of exchange rate on international trade churning out various problems faced by international firms in developing countries specifically in Turkey.

Methodology- A bi-variate framework was employed in the study for exchange rate and foreign trade. The study used the VAR approach and VAR granger causality in the identification of long run co-integration and causality. Data used was between 1975 and 2014.

Findings- It was found that there was no directional granger causality between exchange rate and foreign trade in Turkey. However, diverse dynamic linkages were found between exchange rate and foreign trade in Turkey using Impulse Response Functions.

Conclusion- The study concluded that, international firms in Turkey are not singularly motivated by exchange rate increase or decrease to engage in international trade.

Keywords: Exchange rate, foreign trade, international firms, VAR, impulse response function

JEL Codes: F23, F31, C53

1. INTRODUCTION

The recent trend of exchange rate relating to its instability and fluctuations has rekindled interests in the subject of international trade and exchange rate. The influence of exchange rate fluctuations is evidenced to have negative impact on foreign trade as its growth has been impeded (Ozturk, 2006) in developed and less developed countries (Arize et al, 2000). It is not unusual if not so many people are interested in the movements in a country's currency if it has a virtually closed economy. However, market participants, investors, firms and individuals become sensitive to currency movements if their economy opens up or becomes internationalized where their major decisions are subjected to exchange rate movement which has impact on trade and finance (Freiden, 2008). The major players in foreign/international trade, in other words international firms, are the ones that bear the primary consequences, whether positive or negative, of exchange rate fluctuations.

In analysing exchange rate fluctuations and trade flows with evidence from the European Union, Dell'Araccia, (1999) found that, there is a depressing effect of exchange rate uncertainty on international trade even though the extent to which

exchange rate volatility negatively affected trade was very small. In 13 Less Developed Countries (LCD's) Arize et al (2000) posited that, exchange rate uncertainty resulting from volatile/fluctuating exchange rate has a substantial adverse effect on export demand in the short and long runs influencing the decision of "market participants" (in this regard international firms) to explore other markets aside international trade. The impact of exchange rate fluctuations is anticipated to be higher especially in developing countries like Turkey. Turkey is a country that has many trade partners around the globe with exports contributing significantly to GDP growth between 2002 and 2008 (Dincer and Kandil, 2008) and has undergone currency crises that have been debated on by the European Monetary Union (Freiden, 2008).

International trade refers to the exchange of goods, services, factors or production between traders across borders or markets. International firms are therefore, the various firms or organizations involved in the exchange of goods and services (imports and exports) across international markets. Exchange rate fluctuations refer to the change in value of one currency against another currency due to various economic factors. When these fluctuations or movements in the exchange rate are not ultimately expected, the probability of international traders to divert investment from import/export to indigenous markets is high. These movements lead to increase in exchange rate volatility which in turn increases risk hence the diversity of investment (Dell'Araccia, 1999).

Knowledge of the problems faced by international firms in developing countries due to exchange rate fluctuations may aid in the decision making processes of existing and emerging international firms. Inasmuch as several studies have been conducted on the subject of international trade, problems faced by international firms engaged in international trade, especially in developing countries have not received lots of attention from researchers. Therefore, using a Variance Autoregression (VAR) system, this paper puts forward an empirical investigation into the impact of exchange rate fluctuations on international trade churning out problems faced by international firms in developing countries as a result of fluctuating exchange rates with a focus on international firms in Turkey.

2. LITERATURE REVIEW

There have been mixed results as to the impact of exchange rate fluctuations on foreign trade. The IMF's study of exchange rate volatility and world trade in 1984 and 2004 found evidence that the impact of exchange rate volatility on international trade was not significant even though conceding that presence of bilateral trade, exchange rate misalignments and other factors have the tendency to reduce trade levels (IMF Research Dept., 1984; Peter et al 2004)

Wang (2002) suggests two aspects of risks that are meted out by exchange rates on Multinational Companies (MNC's) namely; transaction and operations risks. These risks are encountered due to: the 'rights' and 'obligations' that emerge as a result of the operations of MNC's (transaction risk); and the impact on operating cash flow when there is an unanticipated change in the supply and demand of the market (operation risk). Nonetheless, arguments from previous studies suggest that, the issue of these and other risks associated with exchange rate volatility are not considered urgent in international trade (Frieden, 2008) since such risks are being hedged against by firms using derivative instruments such as forward, options, and swap contracts (Ethier, 1973; Wang, 2002).

In their paper, 'the relationship between exchange rates and international trade: a review of economic literature', Aubion and Ruta, (2011) observed the impact of exchange rate fluctuations from a macroeconomic perspective. They suggested that exchange rate fluctuations have significant impact on the economy stemming from their effect on investment and production, which results in "inefficient allocation of domestic absorption and external trade", the working front and prices. From this same perspective and according to Dincer and Kandil (2008), it is assumed for a period of time that, there is a component of steadiness in exchange rate fluctuations relative to the changes in macroeconomic fundamentals. They as well suggested contrasting outcomes of exchange rates fluctuations resulting from "complexity of demand and supply channels". For instance, in the goods market an unexpected appreciation of the local currency has an adverse effect on exports but increases imports and subsequently deepening competition between foreign and indigenous markets.

In the quest to understand the impact of exchange rate fluctuations on the competitiveness of business, Chawla (2011) opined that, in the face of globalization and competition, there are declines in profit levels of market participants, thus, the essence of exchange rate stability must take centre stage and given necessary attention. In this study, Chawla (2011) analysed the exports and imports relation of India and the US between 2001 and 2011 and found that there was no substantial evidence of correlation existing between real effective exchange rate and annual exports as well as imports. However, competitiveness in India's exports is based on effective cost and product differentiation.

Using a "heterogeneous-firm trade model' from a disaggregated Chinese data, Li et al (2015) found in their study that, there is always the tendency for firms to import more when the local currency appreciates which increases import value of firms. This sensitive phenomenon was found to be significant in firms engaged in ordinary trade than those in processing trade. An empirical evidence by same study suggested and confirmed the model that, there was a substantial increase in the likelihood of higher imports per the appreciation of domestic currency accounting for China's increased import from 2000

to 2006. Kandil et al (2006) also indicated that depreciation of a domestic currency has two sides to it. On one side, it brings down the prices of exports and on the other side raises the price of imports. Hence, there is a probability of a set off between imports and export price subject to a stable and unchanged balance of trade and terms of trade. Nonetheless, if there is an imbalance e.g. imports exceeding exports, the end result is a reduction in an economy's real income (Kandil et al, 2006).

Past studies (Hooper and Kohlagen, 1978; Medhora, 1990; Arize et al, 2000) have argued that: increased exchange rate fluctuation/volatility spell higher cost for risk-averse traders thus reduces foreign trade. This is due to the fact that exchange rates are normally agreed upon as a part of the trade's contract thus payment made following delivery. Subject to unpredictability of the exchange rate in this situation, it affects the profit and hence reduction of proceeds in international trade. Also, other studies posited that, Less Developed Countries (LCD's) faced problems with hedging, since not all traders or firms gain access to forward markets due to its limited presence in various countries. Costs involved and other limitations were found to hamper hedging activities even after traders gain access to forward markets.

Larger exporting firms are deemed to have fewer problems relative to exchange rate fluctuations due to their ability to hedge as compared to smaller firms. The relative large nature of contract, short maturity periods and considerable high fees limit the access of smaller firms to hedging contracts (Aubion and Ruta, 2011). Nonetheless, exporting firms that are able to hedge against exchange rate movements end up landing on higher export prices due to the hedging cost and the uncertainty of exchange rate negatively affecting international trade (Obstfeld and Rogoff, 1998).

The cost involved in setting up an export or import business, "sunk cost", substantially determines a firm's quest to enter or exit a foreign trade. Past studies by; Dixit, 1989, Krugman 1986, Franke 1991, Aubion and Ruta, 2011, suggest that, during exchange rate fluctuations, firms adapt the "wait-and-see" measure during the short term, especially considering the sunk cost. Nevertheless, the longer the fluctuation may persist, the increased urge to reconsider international trade option and stay out to reallocate same resources to the indigenous market which may be considerably profitable.

3. DATA

The effect of exchange rate fluctuations on international/foreign trade is deemed empirical issue since theory alone cannot ascertain the very relations between international trade and exchange rate fluctuations (Arize et al, 2000).

Various impacts have been felt in the development of the Turkish economy resulting from changes in exchange rate and its broad effect on foreign trade. Turkey is perceived as an emerging economy with highly regulated but liberal financial markets. Thus, financial variables receive variations from the market activities and are as well exposed to uncontrolled external shocks (Dincer and Kandil, 2008). This study establishes an investigation into impact of exchange rate fluctuations on international trade to churn out the various problems encountered by international firms in Turkey.

The study employed yearly foreign trade volume and exchange rate data for Turkey in the analysis. The secondary data for this study was obtained from the databases of Turkish Statistical Institute (TURKSTAT) and the World Bank.

Exchange rate employed by the study is the 'Official exchange rate' which refers to the "rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar)" (World Bank)¹

Foreign trade on the other hand is the "total of export and import of a country over a certain period of time (generally in a year)" (Turkish Statistical Institute)². The data used was yearly in nature which spans from 1975 to 2014.)

4. METHODOLOGY

In order to ascertain causality among foreign trade and exchange rate fluctuations, procedural stages are presented in this section. The study employed the VAR system comprising three steps. The first step takes care of the time series stationary properties where Augmented Dicker Fuller is used as unit root tests. Following same order stationary by all the variables, the Johansen Cointegration test was applied in order to conclude if there existed a cointegration equation in the system. Secondly, Vector Autoregression (VAR) was used based on the absence of a long run cointegration in the system. The last step investigated the dynamic linkage between foreign trade and exchange rate using Impulse Response Function which doubles as a tool of VAR.

Results of the VAR system gave a basis for the relationship between exchange rate and foreign trade and a subsequent identification of the various problems faced by international firms involved in foreign trade as a result of exchange rate fluctuations.

¹ <http://data.worldbank.org/indicator/PA.NUS.FCRF> (Assessed on April 23, 2015)

² http://www.turkstat.gov.tr/PreTablo.do?alt_id=1054 (Assessed on April 23, 2015)

Vector Autoregression Analysis (VAR)

The VAR model is an important and popular tool for cointegration in recent economic studies. It is mostly useful in both bivariate and multivariate time series analyses. This model encompasses the evolution and the interdependencies between multiple time series, generalizing the univariate autoregressive (AR) model. A significant importance of using the VAR model is that, all variables are considered endogenous and gives a description of the evolution of K variable in the system over the same time $t=(1, \dots, T)$ (Gujarati & Porter, 2009).

A reduced p th order VAR can be written as;

$$Y_t = c + \rho_1 Y_{t-1} + \dots + \rho_p Y_{t-p} + \epsilon_t.$$

Expressing the above in the bivariate vector form,

$$\begin{pmatrix} XR \\ FT \end{pmatrix}_t = \begin{pmatrix} C1 \\ C2 \end{pmatrix} + \begin{pmatrix} A1,1 & A1,2 \\ A2,1 & A2,2 \end{pmatrix} \begin{pmatrix} XR_{t-1} \\ FT_{t-1} \end{pmatrix} + \dots + \begin{pmatrix} A1,1(p) & A1,2(p) \\ A2,1(p) & A2,2(p) \end{pmatrix} \begin{pmatrix} XR_{t-p} \\ FT_{t-p} \end{pmatrix} + \begin{pmatrix} \epsilon_{1t} \\ \epsilon_{2t} \end{pmatrix}$$

Where XR= Exchange Rate, FT =Foreign Trade, A= individual coefficients of the lagged variables and ϵ are the error terms.

5. EMPIRICAL RESULTS

The empirical results of the study are presented in this section bringing forth the causal relationship between exchange rate and foreign trade.

The empirical results on the causal relations between exchange rate and foreign trade

Within the time series analysis, stationarity test commences the process. This test is conducted to ascertain the presence of unit root in the variables. Foreign trade and exchange rate were found to be stationary after first differencing using Augmented Dickey-Fuller Test. The table (1) below indicates a presentation of the stationarity test for the variables.

Table 1: Unit Root Tests

Augmented Dickey Fuller (ADF) Test for Stationarity

Variable	ADF Test statistic	P value	Results
Foreign Trade	-6.54	0.000*	I(1)
Exchange Rate	-3.10	0.03*	I(1)

Number of observations = 38

*significance at 5%, Lag (0)

The ADF test as indicated by the table above shows that Log of foreign trade and exchange rate were stationary after the first difference. To this end, the variables could be used for the Johansen test of cointegration.

As stated earlier, the study used the Johansen Cointegration test to examine the presence of cointegration equation in the VAR system. This test connotes the long run relationship or association between variables. The trace test and Maximum Eigen value test were used in ascertaining cointegrating equations that existed in the model. Table 2 below presents the results of the Johansen cointegration tests³. The trace statistic showed that, no cointegrating equations existed between foreign trade and exchange rate. Maximum Eigen value test, in the same manner indicated the nonexistence of cointegrating equations in the model.

Table 2: Cointegration Tests

Trace Test

Hypothesized number of CE(s)	Trace Statistic	0.05 critical value	Prob
None*	8.43	15.49	0.42
At most 1	3.24	3.84	0.07

³ Selection of an appropriate lag is essential aspect of the cointegration process. In order to achieve this, sequential modified LR test statistic (each test at 5% level), Final Prediction Error (FPE), Akaike information criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn information criterion (HQ) were used. Lag 1 was the most appropriate lag using these criteria. A residual test was done to check for autocorrelation at lag 1 using the VAR Residual LM test and the null hypothesis of no serial correlation was not rejected.

Maximum Eigen Value Test

Hypothesized number of CE(s)	Eigen Value	Max-Eigen statistic	Prob
None*	0.13	5.20	0.72
At most 1	0.08	3.24	0.07

From the table above it can be concluded that no cointegrating equations exist since the probability value of no cointegrating equation is more than 0.05.

Subsequently, and as stated earlier, VAR model in first differences of the variables with one lag is estimated paving way for Granger causality test and to compute the Impulse Response Functions (IRF).

Since the results indicated no cointegration between variables, estimate of a VAR model in first differences of the variables with one lag was carried out, Granger causality test was done and the Impulse Response Functions were computed.

VAR Granger Causality

This test was conducted in order to enable the study ascertain the directional causality of the variables in the VAR system. Below (table 3) is a tabular presentation of the results indicating no directional causality between exchange rate and foreign trade.

Table 3: VAR Granger Causality

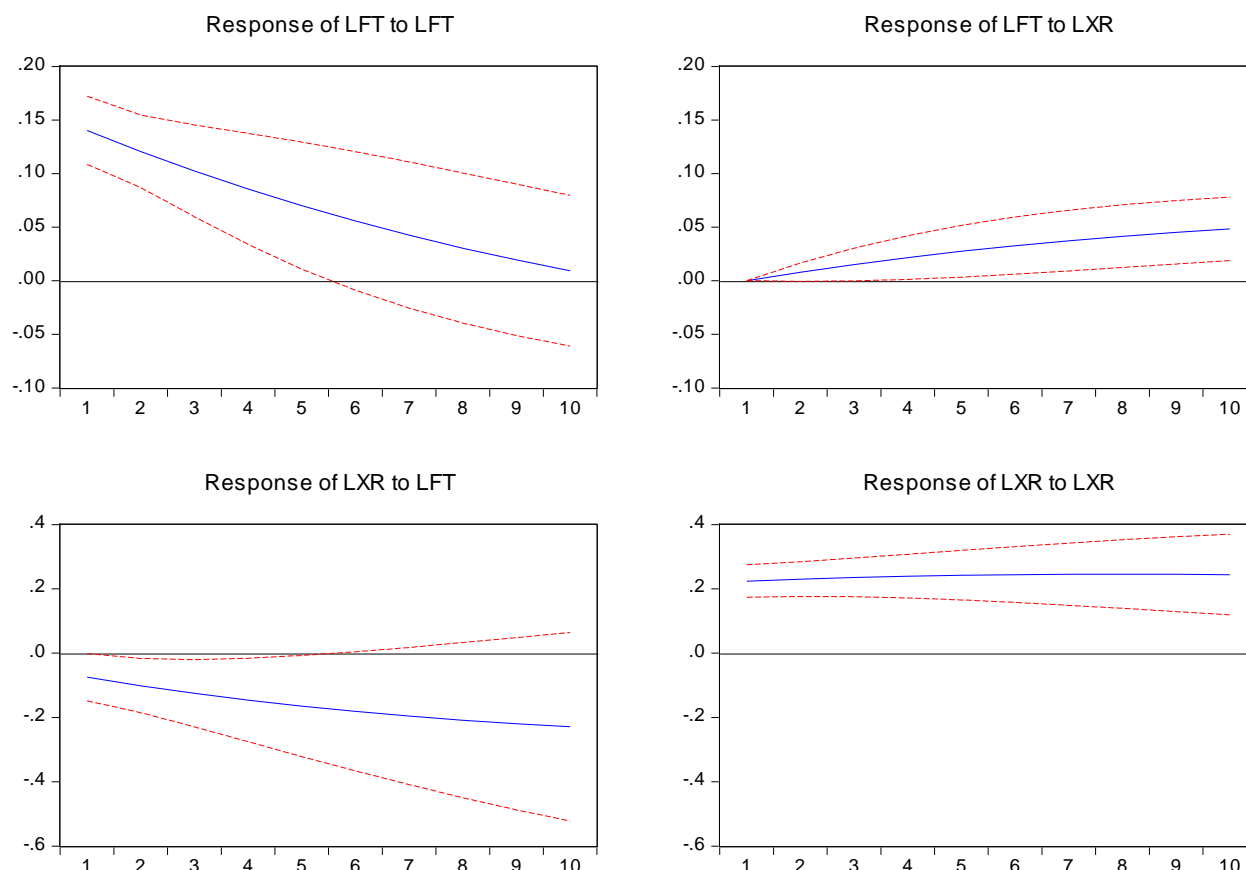
Dependent Variable	Foreign Trade			
Excluded	Chi-sq	df	Prob	Direction
Exchange Rate	3.60	1	0.0576	Foreign Trade----- Exchange Rate
Dependent Variable	Exchange Rate			
Excluded	Chi-sq	df	Prob	Direction
Foreign Trade	2.78	1	0.096	Exchange Rate ----Foreign Trade

*----- means no directional causality

Granger causality test normally indicates direction of causality, therefore to indicate the sign of the causality, IRFs between the two variables were used.

Impulse Response Functions

Response to Cholesky One S.D. Innovations ± 2 S.E.



Taking a closer look at the graph above, there seems to exist dynamic linkages between exchange rate and foreign trade. A shock to foreign trade has a positive downward response to itself and in the same manner innovation applied to exchange rate gives a positive dynamic linkage to foreign trade, however this response rises slowly. Conversely, a standard deviation shock applied to foreign trade shows a negative dynamic linkage with exchange rate. Shock applied to exchange rate shows a straight line trend to itself. The dynamic linkage is however positive.

Problems faced by international firms as a result of exchange rate fluctuations

The above analysis using the VAR system has paved way for the identification of the various problems possibly encountered by international firms. The analysis (VAR Granger Causality) indicated that, there is no directional causality between exchange rate fluctuations and foreign trade. This notwithstanding the Impulse Response Functions (IRF) test indicated dynamic linkages between exchange rate and foreign trade.

Operating exposure

It is argued that exchange rates have the probability of having a serious impact on operating profit (termed operating exposure)⁴ on businesses especially companies with assets and liabilities stated in currencies aside domestic currency (Lessard and Lightstone, 1986). Having determined non-directional causality between foreign trade and exchange rates, the

⁴ See Lessard and Lightstone, 1986

subject of operating profit exposure can be termed a problem encountered by firms engaged in international trade. These companies, even when not engaged in foreign operations, face stiffer competition in the domestic market as a result of the positive dynamic linkage of exchange rate to foreign trade.

The operating exposure can be controlled when companies enter into forward contracts to hedge against it. Again, operating exposure can be managed if companies are able to build factories or plants in trading partners' countries. By so doing, even though they forgo economies of scale, they stand a better chance to reduce negative impact associated with exchange rate fluctuations (Lessard and Lightstone, 1986).

Indecision in contracts

Exchange rate fluctuations plunge international firms into indecision during contractual agreements relating to foreign trade or business. There is a probability of a firm in Turkey that has made a \$10m deal, to end up having an amount far lesser/higher than the original amount as a result of exchange rate fluctuation. The strength and performance of businesses are partly contingent on the decisions taken. Indecision on contracts would negatively impact on the operations of firms.

Firms can therefore strengthen their finance and research and development (R&D) departments, equip and adequately resource them to conduct requisite research to give proper predictions relative to the behaviour of their major trading currencies and to advise management accordingly.

High costs of hedging

Hedging is deemed the relative best option in reducing the problem of exchange rate volatility. In the quest to hedge, firms face extra cost due to an extra compensation demanded by the risk-bearing party in the foreign trade contracts. The uncertainty normally associated with future spot exchange rates which calls for forward markets tend to put additional costs on the risk-bearing firms since forwards markets do not insure against nominal foreign exchange risk in entirety. The risk premium demanded are subsequently added to the prices of goods traded in order to cover the fluctuations unanticipated which cause high prices for internationally traded goods (Maskus, 1986).

Having resourced the research and development department to undertake adequate research, and applying cost effective methods, the problem of high hedging cost can be taken care of as well as a reduction in the cost of production.

Reduction in volume of trade

Firms engaged in international trade (import and export) like any other businesses have profitability objectives. International firms in Turkey resort to reduced trading volumes due to exchange rate fluctuations, which create uncertainties in international transactions. As a result of an unexpected depreciation in the Turkish Lira (TL) relative to the currency partners (especially the Euro and Dollar), the Lira value of international purchase contract entered into for an upcoming period (e.g. 2 months) rises. Firms engaged in importing raw materials may be discouraged and subsequently import less of the materials. The cotton/textile industry in Turkey which accounts for about 3.7% of world's cotton yarn and textile production⁵ faces the same problem and probably a reduction in volume of export due to exchange rate volatility.

Flow of capital restrictions

Many international firms expect to increase trade volume, profitability and a higher return on shareholders' equity. A highly volatile exchange rate in the country would restrict the international flow of capital, which would negatively impact on direct investment in foreign operating facilities and financial portfolio investments. Since foreign direct investment (FDI) is unattractive as a result of exchange rate fluctuations, international firms in Turkey face the problem of growth, expansion and increased production.

6. CONCLUSION

This article sought to ascertain the impact of exchange rate fluctuations on international trade and to identify the problems faced by international firms in Turkey. By the empirical analysis using VAR approach, it was identified that, foreign trade does not granger cause exchange rate fluctuations and vice versa. This implies that, international firms are not singularly motivated by exchange rate increase or decrease to engage in international trade. The IRFs indicated that there are various dynamic linkages between foreign trade and exchange rates. To this end, it is recommended that, other factors like an enabling environment that would attract more firms which would engage in foreign trade must be embarked upon by government. These factors may include reduction in monetary policy rate which would enable firms to access credit facilities from financial institutions to set up or expand their existing international businesses.

⁵ <http://www.yourarticlelibrary.com/industries/leading-producers-of-cotton-yarn-in-the-world/25406/> Assessed on April 30, 2015.

Moreover, a reduction in taxes and quick access to information concerning foreign trade must be prioritized in government policies to encourage more firms to engage in international trade.

It was identified that; operating exposure, indecision on contracts, high cost of hedging, reduction in volume of trade, and flow of capital restrictions were some of the problems encountered by international firms as a result of exchange rate fluctuations. These problems can be controlled when firms:

- create and/or equip their research and development departments;
- set up plants or factories in partner countries;
- engage government in dialogue in relation to speeding up processes involved in investments by foreign companies;
- create a marketing niche for their products to attract patronage from partner countries.

Creation and maintaining an economy that enjoys a liberalized capital market can be recommended. Government institutions could formulate policies in line with the above stated recommendations to help international firms operate in a more stable economic environment and control or reduce the problems associated with exchange rate fluctuations.

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ECONOMIC FACTORS INFLUENCING THE DYNAMICS OF UNEMPLOYMENT IN THE G10 COUNTRIES: EMPIRICAL EVIDENCE FROM PANEL DATA MODELING

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ABSTRACT

Purpose- The purpose of the study is to determine which macroeconomic factors and economic policy changes may affect unemployment in the G10 countries.

Methodology- Panel least squares approach is employed to estimate the role of economic factors inflencing unemployment in the G10 countries.

Findings- Our findings are in line with the Phillips curve approach, exposing the importance of expansionary macroeconomic policies triggering the aggregate demand along with maintaining economic and financial stability to reduce unemployment. Expansionary economic policies play a major role in providing an improvement in the labor market in the long run. An increase in the level of financial and economic integration and development may decrease unemployment in the G10 countries. An increase in the total value-added industry and education expenditures may lead to a decrease in the unemployment rates in these countries.

Conclusion- We suggest that these countries should focus on sustaining their financial stability and development to improve the conditions of the labor market permanently. Liberalization of foreign trade, financial flows and market capitalization are crucial factors for the development of productivity of production factors, technology and organizational capacity in the G10 countries. Policy makers in the G10 countries should identify the channels through which technology, human capital, government spending, investment-specific, foreign and other shocks and taxes affect unemployment.

Keywords : Unemployment, G10 Countries, economic factors, panel data, panel data least squares estimation.

JEL Codes: E30, E60, F16

1. INTRODUCTION

The negative effect of real GDP growth on unemployment has been debated over a sustained period of time as a reflection of “Okun’s Law.” Many recent studies have verified this negative relation (Ang and Loganathan, 2013; Dogru, 2013; Elshamy, 2013; Akeju and Olanipekun, 2014), whereas many others have stated that Okun’s Law is not always valid (Lal et al., 2010; Kreishan, 2011; Bankole and Fatai, 2013; Akram et al., 2014). Parallel to the approach by Okun (1962), the Phillips curve approach proposed by Phillips (1958) and Samuelson and Solow (1960) revealed that an inverse relationship exists

between the rates of unemployment and the corresponding rates of inflation in the short run, showing a trade-off that may not be observed in the long run.

Considerable theoretical and empirical research has examined the determinants of unemployment, especially after the 1973 oil crisis, weakening the theoretical framework of the Phillips curve. In this respect, the theoretical framework of the Phillips curve approach has been expanded by incorporating the role of expectations (Henzel and Wollmershäuser, 2008; Zhang and Clovis, 2010; Basarac et al., 2011; Palley, 2012; Mavroeidis et al., 2014) and other macroeconomic variables (Kim and Ahn, 2008; Woodburne et al., 2012; Bowdler, 2009; Malikane and Mokoka, 2014). On the other hand, various econometric techniques have been adapted to estimate the Phillips curve relation adequately for different economies. Theoretical and econometric approaches adapted to Phillips curve analysis in the open-economy framework have also considered the role of economic agents and institutional factors (Karanassou et al., 2008; Cooke, 2010; Ciccarone et al., 2014; Correa-Lopez et al., 2014; Mandelman and Zanetti, 2014; Matsui and Yoshimi, 2015; Mumtaz and Zanetti, 2015; Petrosky-Nadeau and Wasmer, 2015; Wesselbaum, 2015). In this study, we attempt to contribute to the existing literature by analyzing the dynamics of unemployment and thus the labor market in line with the Keynesian framework. For the G10 countries, the macroeconomic factors and economic policies affecting the aggregate demand and supply are considered in alternative panel data models since certain institutional factors cannot be incorporated into the empirical exercise due to the lack of available data from 1995 to 2014. Hereby, we aim to test which macroeconomic factors and economic policy changes may affect unemployment in the G10 countries and whereupon we make policy implications.

The rest of the paper is organized as follows. Section 2 reviews the previous literature analyzing the dynamics of unemployment. In Section 3, the empirical data and methodology are presented. Section 4 examines the estimation results. Finally, Section 6 concludes and discusses some policy implications.

2. LITERATURE REVIEW

According to the Phillips curve approach proposed by Phillips (1958) and Samuelson and Solow (1960), the major macroeconomic factor affecting unemployment is the inflation rate. More recently, studies in the literature have confirmed the validity of the Philips curve approach (Henzel and Wollmershäuser, 2008; Kim and Ahn, 2008; Zhang and Clovis, 2010; Basarac et al., 2011; Malikane and Mokoka, 2014). Kim and Ahn (2008) showed that the standard New Keynesian Phillips curve (NKPC) incorporating intermediate input costs, a change in the market structure and the movement of the relative price of imported materials in constructing marginal cost measures is relevant to the Korean economy, especially for the period between the early 1980s and the currency crisis. In this respect, Zhang and Clovis (2010) stressed the importance of sticky price setting of backward-looking firms to test the validity of the New Keynesian Phillips curve (NKPC) model of rational expectations following the instrumental variable (IV) approach. Zhang and Clovis (2010) found that further lags of inflation could be needed in the hybrid specification of the NKPC. Unlike Zhang and Clovis (2010), Henzel and Wollmershäuser (2008) employed direct measures of inflation expectations to test the consistency of the hybrid New Keynesian Phillips curve for selected eurozone countries, the US and the UK. It was revealed that the forward-looking Phillips curve can be rejected in favor of the hybrid New Keynesian Phillips curve and the measure of the output gap could not be used as a proxy for the real marginal cost. Similarly, Basarac et al. (2011) evaluated the hybrid New Keynesian Phillips curve by estimating dynamic fixed effects model and found a cointegration relation between the inflation, the expected inflation and the output gap (as a proxy for the real marginal cost) in nine transition economies. Malikane and Mokoka (2014) addressed the misspecification of the real marginal cost by formulating a broader measure featuring the labor share, output gap and supply shock variables. Using an appropriate lag of the labor share in the Phillips curve, Malikane and Mokoka (2014) found evidence for the empirical validity of the NKPC from five developed and five emerging market economies. However, empirical evidence has also been presented in the literature opposing the validity of the Philips curve approach (Martins and Gabriel, 2009; Abbas and Sgro, 2011; Mazumder, 2011). Additionally, Bowdler's (2009) assertion that the slope of the Phillips curve is unrelated to openness in fixed exchange rate regimes as the slope might increase with trade openness amongst countries maintaining flexible exchange rate regimes can be regarded as important. Therefore, it can be suggested that the interactions between unemployment and inflation dynamics in future periods should be determined with the aim of implementing economic policies to overcome the unemployment problem permanently.

As increases in economic activity are crucial for reducing unemployment and ensuring sustainable development, it is critical to determine the role of macroeconomic factors in unemployment under the conditions of an open economy. More precisely, macroeconomic variables under the influence of monetary and fiscal policy decisions and exogenous shocks may affect the dynamics of unemployment. In this respect, a real interest rate shock is under the influence of both monetary and fiscal policy changes and it is one of the macroeconomic variables that increase unemployment as a result of their negative effect on capital accumulation and labor productivity (Bassanini and Duval, 2006). Feldmann (2012) also confirmed that a rise in the real interest rate increases the unemployment rate using data on 68 developing countries. Carruth et al.

(1998) incorporated the real price of oil into their analysis along with the real interest rate. They adopted a model with two prices (the real price of oil and the real interest rate) to explain unemployment from 1979 to 1995 in the US. Their study revealed that an increase in the real interest rate or the real price of oil decreased the wages and increased the unemployment rate. Similarly, Dogrul and Soytaş (2010) examined the relationship between the real oil price, the real interest rate and the unemployment in Turkey for the period 1/2005–8/2009 and obtained parallel results to those of Carruth et al. (1998). On the other hand, Karanassou et al. (2008) developed both theoretical and empirical models for the analysis of unemployment dynamics for the case of Spain in terms of the interactions between money growth and nominal frictions. Karanassou et al. (2008) showed that a decrease in money growth leads to a permanent rise in unemployment of 5.3%, while a 10% decrease in money growth causes a permanent rise in unemployment of 3.7%. Ciccarone et al. (2014) developed the cash-in-advance New Keynesian dynamic stochastic general equilibrium (DSGE) model with frictions in both the labor and the credit market. Accordingly, they found that monetary policy shocks might cause an increase in employment under alternative specifications. Barigozzi et al. (2014) employed a structural dynamic factor model estimated on a large panel of euro area quarterly variables, emphasizing that the reactions to the European Central Bank monetary policy might differ between North and South Europe in terms of prices and unemployment due to the country-specific structures. Similar results were also obtained by Perry et al. (2015), who found that the differences in the responses of real wages to monetary policy shocks might arise from cross-state differences in unemployment, the share of agriculture in the state GDP, the unionization rate and the importance of intermediate goods in state production by estimating structural vector autoregression (SVAR) models. Herein, fiscal policy implementation should be coordinated with monetary policy and a financial stability measure to overcome the unemployment problem and to reduce income inequality, as suggested by Arestis (2015).

The possible effects on fiscal stimuli were taken into consideration by Faia et al. (2013), who calibrated their economic model to include monetary policy and fiscal policy regimes and labor market dynamics. Faia et al. (2013) showed that government spending shocks yield small multipliers, as they have little impact on hiring and firing decisions. In a similar effort, Matsui and Yoshimi (2015) developed a DSGE model with unionized and non-unionized workers and thus analyzed the dynamic labor market for Finland, Sweden, Denmark, Belgium, Norway, Italy, Luxembourg, Ireland, Austria and Canada. Simulations of their model revealed that the welfare loss to a monetary policy shock rises with the bargaining power of unions and thus monetary policy formulation becomes critical when unions are more influential. Additionally, Jovanovic and Petreski (2014) focused on the effects of the global economic crisis on economic policy in South-Eastern Europe and the Commonwealth of Independent States with a small New Keynesian model with price and wage rigidities. Jovanovic and Petreski (2014) estimated a panel-type generalized method of moments (GMM) model and found that fixed exchange rates and strong trade unions constrain the monetary policy in countries with weak trade unions and in countries with flexible exchange rates. Parallel results to those of Jovanovic and Petreski (2014) were also obtained by Cheng (2014), who used a small open-economy model with nominal rigidities and search-matching frictions. Cheng (2014) revealed that the optimal policy rule gives importance to unemployment targeting as well as inflation targeting, whereas the welfare gain from responding to unemployment fluctuations diminishes as the rate of exchange rate pass-through to import prices falls.

In line with DSGE modeling with New Keynesian features, the effects of fiscal policy on unemployment can be studied with consumption shocks, technology shocks, monetary policy shocks and terms of trade shocks. The theoretical approach by Rocheteau and Rodriguez-Lopez (2014) considered the effects of the supply and demand of liquidity on unemployment in their economic model. They found that public liquidity crowds out private liquidity and leads to an increase in unemployment, while scarce liquidity might lead to job creation. Similarly, Wesselbaum (2015) developed a discrete-time model for the US economy to study the effects of government spending and investment shocks. According to the model simulations, government investment is a driver of fluctuations in sectorial and aggregate outputs and labor market variables rather than consumption shocks. However, Wesselbaum (2015) discovered that government investment shocks lead to an increase in the unemployment rate. Along with the changes in government spending, taxes are also important in terms of affecting the changes in the labor market and unemployment. In their study, Daveri and Tabellini (1997) showed that higher labor taxes shift onto higher real wages, leading to the substitution of labor with capital and thus the deterioration of economic activity in Europe. Berger and Everaert (2013) employed a panel of 16 OECD countries over the period 1970–2005. It was found that labor tax increases influenced the unemployment positively in European and Nordic countries, while no significant impact was found in these countries as a result of labor tax decreases. Moreover, Berger and Everaert (2013) revealed that neither increases nor decreases in labor taxes had any impact on the unemployment in Anglo-Saxon countries. Agnello et al. (2014) also studied the effects of fiscal policies on labor market conditions and unemployment using a panel of 17 countries for 1978–2009. They found that tax-driven consolidations led to a rise in unemployment and labor market flexibility was a decreasing factor of long-term unemployment. In a similar empirical effort, Canale and Liotti (2015) studied the eurozone countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain) with a simple cross-section analysis including the role of the 2008 financial crisis. Their empirical results implied that fiscal tightening, especially in declining macroeconomic conditions, might

well worsen the unemployment problem in the eurozone. Accordingly, Canale and Liotti (2015) suggested that a reduction in the structural deficit has to be considered when the economies are on a growth path.

It has generally been accepted by economists that openness to trade is becoming a crucial factor in increasing competitiveness and economic growth in the long run. In this sense, liberal foreign trade policies have been recommended for developing countries with an unemployment problem by international institutions such as the World Bank and the IMF. Attanasio et al. (2004) investigated this assumption in their study on the effects of the drastic tariff reductions of the 1980s and 1990s in Colombia. They revealed that the overall probability of unemployment increased after liberalization and this increase was driven by non-traded sectors rather than traded sectors. Similarly, Dutt et al. (2009) detected an unemployment-increasing short-run impact of trade liberalization followed by an unemployment-reducing effect leading to a new steady state in their study using panel data modeling. According to Gamberoni et al. (2010), especially during the crisis, the role of trade openness had a reverse effect on employment but conversely provided a speedy upturn in the economy. In contrast to Attanasio et al. (2004) and Dutt et al. (2009), Felbermayr et al. (2011a) found that a 10% rise in trade openness reduced the unemployment rate by approximately 1% using panel data for 20 OECD countries and cross-sectional data on a large set of countries. Gozgor (2014) also emphasized the lowering impact of trade openness on the unemployment rate in the G7 countries using unbalanced panel data. Similarly, Gaston and Rajaguru (2013) proposed that trade improvements reduce unemployment based on the case of Australia. According to their study, high export prices, capital accumulation in tradable goods industries and low unemployment benefits are the factors that diminish the unemployment rate. Furthermore, Cooke (2010) developed a two-country general equilibrium model, revealing that a greater degree of openness might cause more aggressive usage of the short-run Phillips curve by policy makers since the terms of trade could be related to monopoly markups. Providing evidence from regional and micro data to analyze the effects of economic liberalization, Topalova (2010) stated that sectors in rural regions that are more exposed to liberalization experience a slower decline in poverty and lower consumption growth, thus implying that the trend of the decrease in unemployment might be relatively slower in these regions. Hasan et al. (2012) studied the Indian case using state- and industry-level unemployment and trade protection data. They found no supporting empirical evidence of any increasing effect of trade reforms in India. According to Hasan et al. (2012), trade liberalization may cause a fall in the unemployment rate in regions with flexible labor markets and larger employment shares in net exporter industries.

Productivity and therefore competitiveness are also key factors in the relation between foreign trade liberalization and unemployment (Felbermayr et al., 2011b). Felbermayr et al. (2011b) showed that the increase in aggregate productivity upon trade liberalization arises due to the weeding out of the least productive firms and the reallocation of labor to relatively more productive firms in a model of heterogeneous firm productivity. Analyzing trade liberalization effects on the unemployment rate of workers with different abilities, Michaelis and de Pinto (2014) implied that trade liberalization has a positive impact on high-skilled workers but a negative impact on low-skilled ones. From this point of view, they deduced that trade liberalization increases unemployment in countries with a considerable proportion of low-skilled workers. For the cases of Argentina, Brazil and Mexico, Ernst (2005) showed that trade openness primarily does not have a job-creating effect, but competitiveness in the exchange rate provides an expansion in production and then in employment. Menezes-Filho and Muendler (2007) implied that foreign import penetration and tariff reductions might trigger worker displacements but that neither comparative advantage industries nor exporters absorb displaced workers for years after trade liberalization policies. Nwaka et al. (2015) investigated the effects of trade policy on unemployment rates in Nigeria using vector error correction with data from 1970 to 2010. They implied that, in the long run, real output and income per capita lead to a decline in unemployment, but shocks in commodity prices and trade openness policy are associated with an increase in unemployment. Sectoral employment is also a crucial issue to be examined. In this respect, Yanikkaya (2013) examined the role of liberalization in the growth rate of sectoral employment in developed and developing countries and stressed that trade openness in the form of higher trade volumes is not successful in generating jobs in developing countries due to the negative output response to trade openness in these countries. It was also found by Yanikkaya (2013) that trade barriers have an adverse impact on employment growth in services in developed countries, whereas they have a positive effect on employment in industry and services in developing countries. Providing empirical evidence from the Indian manufacturing sector, Saha et al. (2013) revealed that greater import penetration would lead to an increase in the employment of contract workers, while greater export orientation would have the opposite effect on contract labor usage.

However, numerous studies in the literature have aimed to explain unemployment and structural unemployment as being driven by other institutional factors since the role of institutional complementarities in economic systems was recognized by the pioneering analysis by Blanchard and Wolfers (2000) and Aoki (2001). According to the article by Blanchard and Wolfers (2000), oil price shocks and a total factor productivity slowdown could help to explain much of the rise in unemployment. Based on a panel of institutions and shocks for 20 OECD nations since 1960, Blanchard and Wolfers (2000) emphasized that macroeconomic shocks had differential effects on unemployment and wage-setting when the labor market institutions differed. In this respect, Belot and van Ours (2001) studied the role of institutional factors in

unemployment for OECD countries. They reckoned that labor market institutions with a particular tax rate, replacement rate, employment protection, union density and level of bargaining caused a difference in the labor market conditions among OECD countries. Similarly, Autiero (2008) investigated 16 OECD countries for 5 periods from 1960 to 1995 with a panel data model incorporating the time effect. The empirical evidence of the study revealed that some of the institutional factors (the unemployment benefit replacement ratio, the index of unemployment benefit duration, the rate of total taxes on labor, income tax, consumption tax, the rate of owner occupation of the housing stock and the degree of non-market coordination) that caused labor market rigidities and usually higher unemployment may have the opposite effect when associated with a high coordination level. Otoi and Titan (2012) also considered OECD countries with panel modeling for the period between 1999 and 2008 to analyze the impacts of economic and institutional factors, such as employment protection, tax wedges, unemployment density, income replacement rates and labor market structural mismatch factors, on structural unemployment. Otoi and Titan (2012) found that increases in institutional factors caused a higher non-accelerating inflation rate of unemployment (NAIRU), while economic factors did not have a significant influence on the NAIRU. In addition, Otoi and Titan (2012) detected that increases in unemployment rates' variability by occupation were associated with a decrease in the NAIRU, while increases in unemployment rates' variability by industry had the opposite effect. Conversely, institutional factors such as regular contracts, temporary contracts, collective dismissal, membership of a trade union and unemployment benefits caused not only changes in unemployment rates, but also persistence in unemployment rates (Cuestas et al., 2011). Examining 8 countries from Central and Eastern Europe that joined the EU in 2004, Cuestas et al. (2011) revealed that shocks were highly persistent, implying a slow rate of convergence to the natural rate of unemployment. Srinivasan and Mitra (2014) used a time-varying parameter model of the unemployment rate for the US, the UK, Germany and France. The estimated parameters of their model showed that, among the determinants of the natural rate, institutions that alter labor market incentives for workers are more important than institutions that affect the labor demand. Most recently, Pérez and Yao (2015) employed panel data modeling for 20 OECD countries over the period 1985–2009. Their estimations exposed that employment protection legislation and collective bargaining coverage had opposing effects on the job destruction and unemployment duration. Accordingly, Pérez and Yao (2015) inferred that the implementation of the right reforms could reduce job destruction rates by about 0.05–1.3% and unemployment rates by up to 4% in OECD countries.

3. DATA AND METHODOLOGY

3.1. EMPIRICAL DATA

To specify the appropriate type of the panel data model, we use panel unit root testing that has a theoretical methodology parallel to unit root tests of single time series data. The panel unit root tests of Levin, Lin and Chu (LLC) (2002) are applied by assuming that the persistence parameters are common across cross-sections, while it is assumed that the persistence parameters vary across cross-sections in the panel unit root tests of Im, Pesaran and Shin (2003), Fisher-ADF and Fisher-PP. On the other hand, cross-sectional dependence is considered by applying the panel unit root test of Pesaran (2007) depending on Im, Pesaran and Shin (2003). The tests of Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), Fisher-ADF, Fisher-PP (proposed by Maddala and Wu (1999), Hadri (2000) and Choi (2001)) and Pesaran (2007) applied to the variables included in our empirical exercise. To specify the appropriate type of the model, we apply panel unit root tests with different assumptions, in which the possibility of panel cointegration relationships among the variables cannot be explored.

All the panel root tests reveal that all the variables are not integrated in the same order at the 10% significance level¹. In this case, the possibility of panel cointegration relationships among the variables cannot be explored. Thus, we ignore the unit root properties of the variables and employ panel least squares as an estimation strategy, considering random or fixed effects.

3.2. THEORETICAL METHODOLOGY

In this study, we employ panel data modeling to estimate the effects of consumer price inflation (cpi), the annual growth rate of final consumption expenditure (fce),² the annual growth rate of gross fixed capital formation ($gfcf$),³ the

¹ Panel unit root test results' can be provided upon request.

² Final consumption expenditure is the sum of household final consumption expenditure (formerly private consumption) and general government final consumption expenditure.

³ Gross fixed capital formation includes land improvements (fences, ditches, drains and so on); plant, machinery and equipment purchases; and the construction of roads, railways and the like, including schools, offices, hospitals, private residential dwellings and commercial and industrial buildings.

degree of openness (*open*),⁴ foreign direct investments (*fdi*), the market capitalization of companies listed on the country's stock exchanges at the end of the year – as a percentage share of the GDP (*mark*), waged and salaried workers – as a percentage share of the total employment (*wage*), the value added in industry – as a percentage share of the GDP (*vind*), social contributions – as a percentage of revenue (*soci*),⁵ the tax rate – as a percentage share of the GDP (*tax*), the tax rate – as a percentage share of the total profits (*taxi*), the education expenditure – as a percentage share of the GNI (*edu*) and the age dependency ratio – dependent people younger than 15 or older than 64 as a percentage of the working-age population (*age*) on unemployment – as a percentage share of the total employment (*unemp*) due to the availability of data.⁶ For the same reason, we use the time series of the variables of Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, the United Kingdom, the United States and Sweden for the period from 1995 to 2014.⁷ Thus, our empirical analysis is carried out for the G10 countries except for Switzerland (playing a minor role) within the Keynesian framework. In this respect, we assume that increases/decreases in *cpi*, *fce*, *gfcf*, *open*, *fdi*, *mark* and *wage* have a lowering/raising impact on unemployment rates, whereas increases in *age*, *soci*, *tax* and *taxi* have an increasing impact on unemployment rates due to the increased burden on the productive part of the population. Our economic model also considers the assumption that the influence of changes in education expenditures and productivity (proxied by added value in industry) on unemployment may vary, either increasing or decreasing the labor demand and supply. Conversely, we do not include interest rates and exchanges rates in our model since it is assumed that they influence unemployment rates particularly through the changes in final consumption expenditure, gross fixed capital formation, exports and imports and foreign direct investments in line with the Keynesian output–expenditure model.

$$unemp = f(cpi, fce, gfcf, open, fdi, mark, wage, vind, age, soci, edu, tax, taxi) \quad (1)$$

In this respect, we estimate alternative panel data models to show the evolution of the model parameters and test whether the coefficients of the models are in line with our theoretical assumptions.

4. FINDINGS AND DISCUSSIONS

Since the time dimension is relatively larger than the number of countries in our empirical exercise, we can infer that heterogeneity or individuality is most likely to exist among countries. Parallel to Hahn and Kuersteiner (2002), we employ panel least squares to estimate the effects of the annual growth rate of final consumption expenditures, annual growth rate of gross fixed capital formation, consumer price inflation, degree of openness, foreign direct investments, market capitalization, share of waged and salaried workers in employment, value added in industry, social contributions, tax/GDP and tax/profits, income and wages, education expenditure/GNI and share of dependent people younger than 15 or older than 64 in the working-age population on unemployment for the G10 countries. Within this context, the possible impacts of macroeconomic factors and policies on the aggregate demand and supply and thus on unemployment are studied. The evolution of our alternative panel data models' parameters is also shown to make inferences in that respect. For the identification of our modeling approach, the Hausman test imposed fixed-effects models, as shown in Table 4 below. Table 1 also indicates that our models have no serial correlation since the p-values of Pesaran's (2004) test of cross-sectional independence, shown in parentheses in Table 2, are higher than 0.1.

⁴ We compute the degree of openness to trade as (exports+imports)/GDP.

⁵ According to the World Bank, *SOC* includes social security contributions by employees, employers and self-employed individuals and other contributions for which the source cannot be determined.

⁶ We intended to include labor market institution and product market regulation variables, such as the degree of union density and union coverage, employment protection legislation, active labor market policies, minimum wages, average rate of wage taxes, average replacement rate of unemployment insurance, degree of coordination and/or centralization, incidence of part-time contracts, regulation of product markets and size of the informal economy. However, these variables cannot be added due to a lack of available data up to the year 2015.

⁷ All the series are extracted from the statistical database of the World Bank and they are all in levels. Some series with missing values are filled with plausible techniques. The estimations are carried out using Stata 13.

Table 1: Panel Models' Estimation Results

 Method: Panel least squares

Model 1 – R-squared-overall: 0.5701

Model 1 – Effect specification: fixed

Model 1 – Pesaran's test of cross-sectional independence = 8.463, prob. = 0.112

Model 2 – R-squared-overall: 0.704

Model 2 – Effect specification: fixed

Model 2 – Pesaran's test of cross-sectional independence = 2.793, prob. = 0.178

Model 3 – R-squared-overall: 0.775

Model 3 – Effect specification: fixed

Model 3 – Pesaran's test of cross-sectional independence = 2.530, prob. = 0.131

Model 4 – R-squared-overall: 0.727

Model 4 – Effect specification: fixed

Model 4 – Pesaran's test of cross-sectional independence = 3.996, prob. = 0.155

Variable	Model 1	Model 2	Model 3	Model 4
<i>c</i>	16.591 (0.000)	18.051 (0.000)	12.350 (0.006)	12.739 (0.001)
<i>fce</i>	-0.161 (0.023)	-0.107 (0.003)	-0.193 (0.012)	-0.146 (0.024)
<i>gfcf</i>	0.104 (0.009)	0.078 (0.003)	0.100 (0.012)	0.083 (0.025)
<i>cpi</i>	-0.237 (0.011)	-0.032 (0.082)	-0.206 (0.019)	-0.021 (0.009)
<i>open</i>	-0.015 (0.031)	-0.026 (0.059)	-0.005 (0.007)	-0.017 (0.023)
<i>fdi</i>	-0.045 (0.003)	-0.062 (0.000)	-0.039 (0.011)	-0.057 (0.000)
<i>mark</i>	-0.028 (0.000)	-0.002 (0.131)	-0.025 (0.000)	-0.029 (0.000)
<i>wage</i>	-0.026 (0.407)	-0.050 (0.001)	-0.038 (0.027)	-0.057 (0.073)

<i>age</i>	0.017 (0.027)	0.016 (0.034)	0.227 (0.022)	0.012 (0.048)
<i>vind</i>	-0.177 (0.001)	-0.202 (0.000)	-0.171 (0.001)	-0.200 (0.000)
<i>edu</i>	---	-0.877 (0.000)		-0.859 (0.000)
<i>soci</i>		0.006 (0.009)	---	0.021 (0.077)
<i>tax</i>	---		0.117 (0.003)	0.009 (0.093)
<i>taxi</i>	---		0.1805 (0.001)	0.128 (0.054)

Notes: p-values of the coefficients are in parentheses.

According to the alternative panel data estimations presented in Table 4, the variables reflecting the situation of economic activity may have a positive impact on unemployment, except for gross fixed capital formation, in line with Bande and Riveiro (2012), who found that consumption shocks had a lowering impact on unemployment, while we show that investment shocks led to an increase in the unemployment rates in these countries. Thereby, it can be deduced that increases in consumption and investments and rising inflation may have consequences for the labor market by affecting the labor demand and supply, similar to Karanassou et al. (2008), Ciccarone et al. (2014), Gozgor (2014) and Nwaka et al. (2015). Moreover, we can infer that growth in the aggregate demand may lead to a push in the demand for labor in the G10 countries, which in turn may increase the real wage and promote an increase in the labor supply. We can interpret the institutional environment of goods market, goods market frictions, degree of unionization in the labor market, labor market frictions and financial frictions as crucial factors to explain the dynamics of labor markets, in line with Ciccarone et al. (2014), Correa-Lopez et al. (2014) and Mandelman and Zanetti (2014). Despite the increases in the inflation rate lowering the real wage and thus decreasing the labor supply, we estimate that the inflation rate positively affects the employment in the G10 countries, parallel to the outcome of studies refuting the validity of the NKPC (Martins and Gabriel, 2009; Mazumder, 2011). This finding can be interpreted as the impact of rising economic conjuncture with rising inflation; more precisely, the effect of the increase in the labor demand due to the rising economic conjuncture is higher than the effect of inflation decreasing the labor supply in the G10 countries. Due to the coefficients of gross fixed capital formation, it can also be implied that investment-specific technological progress may deepen the unemployment problem and cause persistence in the unemployment rates in the G10 countries, in line with Collard and Dellas (2007), Schubert (2011), Mandelman and Zanetti (2014) and Hove et al. (2015) but in contrast to Canova et al. (2007), Mumtaz and Zanetti (2015) and Sunakawa (2015). Thus, we can state that labor and physical capital may be important alternatives to each other in the production process of the G10 countries. More precisely, we reveal that increases in investments and thus in gross fixed capital formation may be mainly under the influence of investment-specific technology shocks in these countries, which in turn lower the need for labor in the production process. Thus, in line with Iacovoiu (2012), we assert for the G10 countries that investments related to the modernization of the existing production capacity may affect unemployment negatively since these kinds of investments may increase the labor productivity and thus reduce the need for labor.

Along with the changes in supply dynamics, an increase in the share of waged and salaried workers in the total employment is critical for the sustainable increase in the aggregate demand in the long run. Moreover, this phenomenon increases the contributions to the social security system, which is essential for sustainable development. Our panel data estimations show that the coefficients of the share of waged and salaried workers in employment have negative signs in all the models, implying that rises in the share of waged and salaried workers in the total employment are a factor that lowers unemployment. However, increases in the share of waged and salaried workers cannot be accepted as a separate factor influencing the labor demand and supply. The level of the real wage, which is under the influence of labor productivity, is

another factor for analyzing the dynamics of the labor demand and supply. In our empirical exercise, an increase in the value added of the industrial sector is also found to be a factor that boosts the real economic activity, which in turn may increase the labor demand and employment, parallel to Mumtaz and Zanetti (2015), Sunakawa (2015) and Wesselbaum (2015) but in contrast to Collard and Dellas (2007) and Mandelman and Zanetti (2014). In this respect, education expenditures are also critical since they may cause technology and human capital shocks and may increase the productivity level of labor in the long run, consistent with the labor-augmenting technical progress in the Solow model (for the specification of Hicks-neutral, Solow-neutral and Harrod-neutral technological progress, see Fisher (2006), Michelacci and Lopez Salido (2007) and Altig et al. (2011)). The coefficients of education expenditures are negative and statistically significant in Models 2 and 4, exposing the positive impact on the unemployment problem in line with Mortensen and Pissarides (1999).

In line with the Keynesian view, it can be assumed that fiscal policy decisions influence the social security system and thus the dynamics of the aggregate demand significantly. We find that the coefficient of social contributions is positive and statistically significant, showing that social contributions cause a decrease in the aggregate demand. Our finding also implies that an increase in the role of the social security system can be accepted as a factor that lowers the spending capacity of economic agents. Moreover, social contributions may trigger unemployment by increasing the reservation wages of the unemployed. Hence, social contributions to the unemployed in the G10 countries should be studied, briefly considering this increasing effect on unemployment. Similarly, our panel estimations show that rises in the age dependency ratio may become a factor that increases the burden on the productive part of the population and thus may lower the spending capacity of economic agents. Our panel model estimation results are somewhat in line with the lowering impact of expansionary economic policies on the unemployment rate. Similarly, analyzing the impact of the public sector on the economy, the majority of the coefficients of taxes show that increases in taxes may lead to an increase in the unemployment rate in the G10 countries, revealing that contractionary economic policies decrease employment, in line with Tagkalakis (2013) and Agnello et al. (2014). Our findings related to the tax rate are in line with the theoretical expectations and the empirical findings in the context of the studies by Thomas (1998), Autiero (2008), Berger and Everaert (2013) and Agnello et al. (2014), who implied that a rise in tax rates, especially in payroll tax, affects the labor costs, which in turn may lead to job losses and a rise in unemployment. Moreover, in contrast to the view that fiscal policy can be productive and increase the economic activity in the long run, we find that the coefficients of tax rates from profits in Models 3 and 4 have statistically significant positive signs, implying that an increase in tax from the total profits of firms does not lead to changes increasing the total level of efficiency in production. Moreover, it may be interpreted that government expenditures funded by corporate tax do not lead to significant changes in real economic activity that might increase employment.

Considering that the wind of economic and financial liberalization has been prevalent over the last two decades, the dynamics of unemployment are studied in an open-economy framework in this study. The estimation results show that increases in the degree of openness may lower the unemployment rate in the G10 countries by boosting economic activity, parallel to Felbermayr et al. (2011a), Loganathan et al. (2011) and Gozgor (2014) but in contrast to Attanasio et al. (2004), Dutt et al. (2009) and Nwaka et al. (2015). Similarly, the coefficients obtained from our panel estimations point out that foreign direct investment may also lower unemployment by boosting economic activity. Accordingly, the liberalization of foreign trade and financial flows can be accepted as key factors for analyzing the dynamics of labor markets in the G10 countries. In contrast to the theoretical assumptions of the positive impact of financial development, the coefficient of market capitalization in Model 2 is not statistically significant, revealing that market capitalization has no impact on the dynamics of unemployment in the G10 countries.

5. CONCLUSION

According to our estimations, the changes in domestic economic activity are in line with the theoretical expectations. An increase in final consumption expenditure may lead to a fall in the unemployment rate in the G10 countries. Thus, we can infer that expansionary economic policies play a major role in providing an improvement in the labor market in the long run. Although these policies may also lead to a rise in inflation, we found that rising inflation may cause a fall in the unemployment rates in the G10 countries. Therefore, it can be asserted that our alternative panel data model estimations are in line with the Philips curve framework and they stress the importance of expansionary economic policies for the decline in unemployment rates in the G10 countries. On the other hand, expansionary policies may lead to the deterioration of financial and economic stability, which in turn may affect long-term unemployment negatively. Despite the possibility of economic policies aimed at ensuring financial stability to increase the unemployment rates in the short run, we suggest that these countries should focus on sustaining their financial stability and development to improve the conditions of the labor market permanently.

To examine the effects on unemployment in the G10 countries, we also incorporated variables reflecting the level of financial development along with macroeconomic variables in alternative panel data models. The coefficients of openness, foreign direct investments and market capitalization were mainly found to be negative in the models. We interpret this result as meaning that an increase in the level of financial and economic integration and development may decrease unemployment in the G10 countries. These variables are also critical in the open-economy framework since foreign shocks transmit to the labor market, particularly over the last decade. Thus, the liberalization of foreign trade, financial flows and market capitalization can be exposed as crucial factors for the development of productivity of production factors, technology and organizational capacity in the G10 countries, which should be studied briefly.

Sustaining the stability in the aggregate demand and supply is also vital in terms of decreasing the unemployment rate in the long run. In this respect, as automatic stabilizers, contributions to the social security system and taxation are also crucial. We found that an increase in the contributions to the social security system may have a negative impact on the unemployment rate in the G10 countries. More precisely, we can assert that an increase in the contributions to the social security system may lead to deterioration in the aggregate demand in these countries. This phenomenon shows that the social security system has a role as an automatic stabilizer, helping to maintain economic stability in the G10 countries. Another automatic stabilizer, taxes, was also considered in our empirical exercise. The signs and p-values of the coefficients imply that changes in the taxation policy may play a significant role in the aggregate demand and supply, which in turn affects the dynamics of unemployment in the G10 countries. However, fiscal policy, as a policy tool, can have an impact on the labor market by manipulating the aggregate demand and supply in the G10 countries since we found a significant impact of contributions to the social security system. Along with the burdening effect of increased tax rates on spending capacity and employment, we found that increases in the ratio of dependent people younger than 15 or older than 64 to the working-age population influence the unemployment problem negatively in the G10 countries.

Conversely, our alternative panel data estimations reveal that an increase in the share of waged and salaried workers in the total employment is a factor that maintains persistence and stability in the aggregate demand. In this respect, we assert that increases in the real wages of the employed are also important for the decline in unemployment rates in the long run. For the determination of the wage level, labor productivity is another crucial issue to be considered. We found that an increase in the total value-added industry and education expenditures may lead to a decrease in the unemployment rates in the G10 countries, implying that increases in the total factor productivity of labor raise the aggregate supply and output, which in turn lead to a fall in unemployment rates in the G10 countries. In contrast, our estimations reveal that increases in gross fixed capital formation arising from investment-specific technological progress may lead to an increase in unemployment since the need for labor in the production process may be decreased. Consequently, policy makers in the G10 countries should identify the channels through which technology, human capital, government spending, investment-specific, foreign and other shocks and taxes affect unemployment in the DSGE framework with frictions in goods and labor markets.

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SOCIO- ECONOMIC AND DEMOGRAPHIC DETERMINANTS OF CRIME BY PANEL COUNT DATA ANALYSIS: THE CASE OF EU 28 AND TURKEY

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ABSTRACT

Purpose- Aim of this paper is to examine factors that affect the total number of crimes recorded by the police for EU 28 and Turkey in 2001-2010, which is not used previously in the literature dealing with the developments and changes during a certain period in this study.

Methodology- We used panel count data in analysis of this paper. Count data models are appropriate to determine factors on the number of crimes because of the nature of the dependent variable.

Findings- we used growth rate, GDP per capita, inflation, unemployment rate, urban overpopulation, enrollment rate and the number of the police variables to examine effect on crimes. The results demonstrate that GDP per capita, inflation, unemployment rate and urban overpopulation has a positive on the number of crimes. The increases on the enrollment rate and the number of police decrease the number of crimes.

Conclusion- We observe higher crime rates in highly urbanized areas.

Keywords: Crime, panel count data, fixed effects negative binomial model, EU 28, Turkey.

JEL Codes: C23, C25, K42

1. INTRODUCTION

Crime, defined as a violation of the law, is a problem that afflicts all societies and countries though to varying degrees (Wu and Wu, 2012: 3765). The theory of crime was largely composed of recommendations made by sociologists, psychologists, criminologists, political scientists and law professors that were not based on rigorous empirical investigation, but on beliefs about concepts like depravity, insanity and abnormality (Entorf and Spengler, 1998:1). Criminality is denoted as a historical social phenomenon, which does not rule out from a person's life, but it keeps pace with the social and technological evolution. It has the tension to readjust all the time and as a result, a large variety of criminal activities is shown worldwide during different periods. Lately, types of organized, violent and profiteering crime appear to be the most prevalent, but without ruling out the different kinds of single crimes (Nikolaos and Alexandros, 2009: 51). Crime had traditionally been the domain of labour economists, who studied the educational and career choices of youth, including the choice to pursue crime as a 'career' (Fontenay, 2008: 71).

After some time of relative silence with only a few major contributions in the eighties, the last few years witness a vitalization of the "economics of crime" (Dilulio, 1996; Ehrlich, 1996; Entorf and Spengler, 1998: 2). In the 1980's and 1990's, economists embarked on an investigation into the relationship between crime and the economy, naming it the "economics of crime" which shifted the concern from the pure testing of the deterrence hypothesis to the analysis of socio-economic and demographic crime factors. In other words, research concentrating on the effects of changes in detection probability and the severity of sanctions has shifted to issues concerning some of the considerable factors (Chang and Wu, 2012: 4). The economics of crime are mostly related with these factors such as poverty, social exclusion, income, income inequality, unemployment, inflation, migration, human capital, worker ability or labor market skills, poor employment records, low legitimate earnings, cultural characteristics, age, sex, fertility, demographic transition, education level, family background, its unequal representation with regard to race, the level of urbanization and other economic problems (Nikolaos and Alexandros, 2009: 52; Chang and Wu, 2012: 4; Hamzah and Lau, 2013: 100; Freeman, 1999: 3532). Economic theory predicts that economic recessions generally tend to cause an upturn in criminal activities (Conley and Wang, 2006). Moreover, if, during a recession, government expenditures on crime prevention remain the same, then the rising crime rate results in a fall in the crime detection rate. When the recession is over, criminals may fail to adjust their anticipated probability of crime detection and thus crime rates will remain on a higher level compared to the prerecession period. Recession can have both a short-term and long-term impact on crime rates (Ivaschenko et al., 2012: 23). According to official data tables, during the last decades there is a constant rise of criminal acts in developed countries and countries of the western world (Nikolaos and Alexandros, 2009: 52). Thus, modern studies have been stimulated by the dramatic increase of crime rates in western countries on one hand, and by recent increase in social and economic problems on the other (Entorf and Spengler, 1998: 2).

High rates of crime impose significant costs on society and hinder economic development (Mehlum et al., 2005). At the individual level, the ultimate cost of crime is a loss of life, yet victims can also incur other costs, such as medical expenses, loss of property, or loss of income (Atkinson et al., 2005). At the social level, considerable resources are spent on avoiding being victimized. In response to high rates of crime, government is forced to spend a significant share of its budget on crime prevention, such as financing law enforcement agencies, running detention facilities and prisons, and implementing crime prevention programs. The social loss can be reflected in high spending on crime prevention and lower productivity of victimized individuals (Daniele and Ugo, 2008; Ivaschenko et al., 2012: 22). At the economic level, crime is an act that will show the wind and reap the whirlwind of economics in a country. It is a well-known fact that crime will influence the transmission of economic growth through hindrance of foreign direct investment, constraints for investment in human capital, decline in competitiveness, reducing productive capacity, and increase in expenditure of unprofitable sector (crime fighting) to name a few. Besides these, crime causes the economic loss such as loss of tourism (Hamzah and Lau, 2013: 100).

The aim of this study is to estimate empirically using panel count data models the relationships among the number of crimes, number of police officers, unemployment rate, growth rate, inflation rate, enrollment ratio, GDP per capita and the level of urbanization in EU 28 countries and Turkey during 2001-2010 periods. This paper contributes to the literature economics of crime in Turkey and EU 28 countries by estimating the factors that affect the number of crime through panel count data models in 2001-2010. The research literature on economics of crime is very limited. To our knowledge, no systematic empirical research exists in analyzing the number of crime in Turkey and EU 28 countries using a panel count data model. However, this study presents a comprehensive analysis for economics of crime and provides important findings.

The remainder of this study is organized as follows. Section 2 presents the effects of socio-economic factors on crime. Section 3 presents literature review. Section 4 presents the fixed effects negative binomial model employed in getting the results. Section 5 is devoted to presentation of the data and variables used. In addition, the results obtained from the fixed effects negative binomial model are presented in Section 5. Finally, conclusions are drawn in Section 6.

2. THE EFFECTS OF SOCIO-ECONOMIC AND DEMOGRAPHIC FACTORS ON CRIME

Modern criminology theories can be used to support economic deprivation as a causal factor in explaining many crimes. The variables of interest are depicted over time and between observational units. Analyzing the crime statistics and thus learning about regional differences in the incidence of crime and about the socio-demographic structures of the offenders leads to a better understanding of the factors that may prevent or foster crime (Entorf and Spengler, 1998: 4). Research problems in this area often deals with the multivariate causes of crime, such as: divorce, broken homes, poor schools, poor housing quality, racial and ethnic mix, residential mobility, single-family homes, lack of discipline, or the absence of other social and community controls and population turnover. It would be difficult, if not impossible to separate the variables and assess each one's sole affect on crime (Hall, 2007: 1).

Economic theories concerned with the area of crime try to explain crime rates with the incentives that individuals face in their choice between legal and illegal activity. Becker (1968) marked the beginning of attempts to apply economic models of rational decision making to crime. According to Becker (1968), the theory of the economics of crime considers crime as an activity that takes time and yields economic benefits. The individual compares the expected returns from committing a crime to the returns from legal work (Krüger, 2011: 179; Edmark, 2005: 355). Becker's theory was extended and tested by Ehrlich (1973), who considered a time allocation model and motivated the introduction of unemployment as a measure of how potential criminals fare in the legitimate job market. Since then, a number of significant theoretical and empirical developments have been made (Saridakis and Spengler, 2009: 2). Growing researches have turned their interest to certain economic and sociological aspects such as poverty, wages, income inequality, unemployment, inflation, education, fertility, and population to explain the incidence of crime. Criminology and socio-demographic issues have intersected and interacted with each other directly or indirectly (Hamzah et al., 2013: 101).

In this study, the number of police officers, unemployment rate, growth rate, inflation rate, enrollment rate, GDP per capita and the level of urbanization variables are taken as the determinants of the crime number in EU 28 and Turkey countries. The effects of these variables on the number of the crime are mentioned below. Indicators such as poverty, wages, income inequality and fertility were not included in the analysis due to lack of data in this study.

Crime literature illustrates that the increase in the number of police officers decreases the number of crimes committed (Güvel, 2004; Yıldız et al., 2010: 23). A significant inverse relation found that more police reduces crime (Marvell and Moody, 1996; Levitt 1996). There is some inconsistency in linking economic variables with all crime. This may be due to the difficulty of accounting for multiple variables in research. The existence of a causal link between unemployment and crime has been widely investigated in the past in most studies, leading to different approaches, although the strength of this relationship remains ambiguous both in its nature and in its robustness (Buonanno and Montolio, 2008: 92). The first one indicates a positive relationship known as 'motivation effect', where a rise in unemployment rates leads to economic problems and increases the motivation to engage in criminal acts. The second one indicates a negative correlation known as 'opportunity effect' and indicates that, during economic depression a rise in unemployment rates leads to decrease the consumption expenditures, mostly in households, decrease in median family income, so the potential earnings from illegitimate activities become lower and discourages a person from the decision to commit a crime (Nikolaos and Alexandros, 2009: 53; Freeman, 1999: 3542; Chen, 2009: 115; Chang and Wu, 2012: 4).

In the crime literature crime and growth rate, relationship remains ambiguous. Some of the crime studies have reached to the conclusion that the increase of growth rate affects property crimes negatively (Buonanno and Montolio, 2008: 95). Some of the crime studies found positive relationship between growth and crime rates (Cömertler and Kar, 2007). Some other studies indicate that as economy grows, while total crime and homicide numbers increase, robbery and theft crimes decrease (Güvel, 2004). Some researchers reported that inflation rate played a crucial role in criminal acts. It is found that the inflation rate was positively correlated with crime rate. Assuming the wages are constant, rise of inflation rate will reduce a person's purchasing power and the cost of living will be relatively higher than before. As a result, crime rate may increase because an individual is unable to maintain his/her standard of living as before. In other words an individual is likely to engage in criminal activities to maintain or/and improve his/her purchasing power. However, this phenomenon does not happen immediately because it takes time for inflation to gradually reduce the purchasing power (Tang and Lean, 2007: 313).

As for enrollment rate or education, may affect crime in several ways. Firstly, higher levels of educational attainment are associated with higher returns in the labour market, thus increasing the opportunity cost of criminal behaviour, in this way the negative relationship between education and crime is indicated (Lochner, 1999: 34; Buonanno and Leonida, 2006; Aytaç et al., 2007). Secondly, education may alter personal preferences in a way that affects decisions to engage in crime. In particular, education may have a sort of "civilization" effect (Buonanno and Montolio, 2008: 92). No consensus is also found in the case of income. Several studies show that changes in income can affect crime in three ways: First, an income decrease makes the need for returns from illegal activities. In other words, falls an income of low-wage workers lead to increases in crime (Grogger, 1998; Machin and Meghir, 2004). Second, an income increase sets the opportunities for criminal offences, due to the large amount of stolen goods (Levitt, 1999). Finally, an income increase leads to outdoor activities, thus increasing the likelihood of potential crime victims (Beki et al., 1999). Another factor that may affect crime is the level of urbanization. High levels of urbanization are closely linked to higher crime rates (Ivaschenko et al., 2012: 23; Buonanno and Montolio, 2008: 96).

3. LITERATURE REVIEW

Many studies that refer to criminality for decades were based previously on theoretical and sociological approaches, but only recently economic analysis has been applied. Although Fleisher (1963, 1966) was the first who worked on criminality

from its economic view, Becker's study (1968) became the major breakpoint by designing a model, analyzing a criminal's decision (Nikolaos and Alexandros, 2009: 53). Over the last three decades, a growing amount of research effort, largely inspired by Becker (1968) seminal paper, has been devoted to study the socio-economic determinants of criminal behavior, partly motivated by the remarkable increase in criminal activities in many developed countries (Buonanno and Montolio, 2008: 89). During the 15 years, an increasing number of studies have analyzed the determinants of crime for European countries or for Latin American countries. There are many studies related to the effects of socioeconomic and demographic variables on crime in the literature. Summary of some of these studies, which have different conclusions are given in order of construction date.

Masih and Masih (1996) examine the causal relationship between several categories of crime and various socioeconomic variables in Australia between 1963 and 1990. They find that each of the categories of crime they tested are cointegrated with a host of demographic and socioeconomic variables and that dwelling commencements (a proxy for wealth) and urbanization are the most important determinants of crime. Marvell and Moody (1996) analyze yearly police data and crime rates, at the 49 states and 56 cities in separate regressions, pooled over two decades. They find Granger causation in both directions. The impact of crime on the number of police is slight, but the impact of police on most crime types is substantial and more robust. Scorcu and Cellini (1998) investigate the economic determinants of crime rates in Italy over the period 1951 to 1994 by using cointegration analysis. They show that cointegrating relationships connect the long-run equilibrium levels of crime rates to economic factors in the presence of endogenously determined structural breaks. Entorf and Spengler (2000) study the model in the face of currently discussed factors of crime like demographic changes, youth unemployment, and income inequality. They use a panel of the German states. Results based on static and dynamic panel econometrics/criminometrics. The results confirm the deterrence hypothesis for crime against property. Economic and demographic factors reveal important and significant influences. Being young and unemployed increases the probability of committing crimes. Raphael and Winter-Ebmer (2001) research the relationship between unemployment and crime using a state-level panel covering the period 1971–1997. Using U.S. state data, they estimate the effect of unemployment on the rates of seven felony offenses. Instrumental variable analysis (with instrumental variables for unemployment based on contracts for the defense industry and oil prices), finds support for a causal direction from unemployment to crime. They find significantly positive effects of unemployment on property crime rates that are stable across model specifications.

Gould et al. (2002) deal the degree to which changes in crime rates for the U.S. from 1979 to 1997 can be explained by changes in the labor market opportunities for those most likely to commit crime. They conclude that both wages and unemployment are significantly related to crime. Moreover, they show that state- and county-level property crime rates in the U.S. are lower when unemployment is lower. The magnitude of the unemployment effect is sufficiently large to explain a fair portion of the decline in property crime rates. Deadman and MacDonald (2002) considers the reasons why the general level of recorded crime has been falling in the U.S. and many European countries (Germany, the Netherlands, France, Denmark, Eire, Scotland and Austria) during the 1990s, especially for property crimes. They review the time-series statistical evidence on the determinants of crime. The authors comment that a sustained period of economic growth, low inflation and unemployment in the U.S. has resulted in a fall in the crime rate. However, this is usually for a short period only. Narayan and Smyth (2004) apply Granger causality tests to examine the relationship between seven different categories of property crime and violent crime against person, male youth unemployment and real male average weekly earnings in Australia from 1964 to 2001 within a cointegration and vector error correction framework. Teles (2004) constructed an intertemporal general equilibrium model with micro-fundamentals to explain the relationship between macroeconomic policies and criminal activities. He attracted special attention to the inflation effects on crime. The author found that if the quantity of money held by an economic agent affects the marginal utility of crime, then inflation rate would affect the incidence of crime in economy. Machin and Meghir (2004) explore the role that economic incentives, particularly changes in wages play in determining crime rates. They use data on the police force areas of England and Wales between 1975 and 1996 and find (relative) falls in the wages of low-wage workers lead to increases in crime. The authors execute a number of experiments with different wage measures, including a wage measure that accounts for the effects of changes in the composition of employment. This research reinforces a strong association between the low-wage labor market and crime.

Edmark (2005) uses a panel data of Swedish counties over the years 1988–1999 to study the effects of unemployment on property crime rates. A fixed-effects model is estimated to investigate unemployment and crime relationship. The model includes time- and county- specific effects and a number of economic and socio-demographic variables to control for unobservable and covariates. The results show that unemployment had a positive and significant effect on some property crimes such as burglary, car theft and bike theft. Buonanno and Leonida (2006) examine the impact of education on criminal activity using annual data for the 20 Italian regions over the period 1980 to 1995. A number of hypotheses are tested regarding the effects of education and past incidence of crime on criminal activity. They find evidence supporting education's negative effect on crime in Italy. The results are robust to model specifications and endogeneity. Tang and Lean

(2007) use the modified Wald (MWALD) causality test to re-examine the relationship between crime and its determinants (inflation and unemployment) in the U.S. from 1960 to 2005. Bounds test approach is employed to investigate the existence of a long-run relationship. The empirical evidence illustrates that inflation and crime rates are cointegrated with a positive relationship. Moreover, the causal link is from inflation and unemployment to crime. Wu and Wu (2012) develop a model of crime based on principles from the existing literature. The implications of the model are: Income inequality and unemployment are important explanatory variables for crimes motivated by economic gain. They use panel data of UK regions over the years from 2002 to 2007 to test these predictions. The empirical results strongly support the hypothesis that crime is an economic phenomenon.

4. METHODOLOGY

The Poisson model is the most basic model for count data. The Poisson model has the strong restriction that the variance and mean are equal. However, this assumption is often violated in the real count data sets, that is, the data overdispersed. Overdispersion occurs when the conditional variance exceeds the conditional mean (for more information, see Cameron and Trivedi, 2007). This may be caused by unobserved individual heterogeneity, which is quite common in the real world. To deal with overdispersion, a distribution that permits more flexible modeling of the variance than the Poisson model should be used, the negative binomial distribution is such a distribution (Hu, 2002). The negative binomial model allows each country's Poisson parameter to have its own random distribution.

Since it is used panel data set in this research, panel count data models examine in this research. The fixed and random effects models were developed by Hausman et al (1984) for panel count data models. As a result of the Hausman test is selected in the fixed effects model with panel data, this model will be discussed in this research. Using the panel data, the hidden features can be captured by individual heterogeneity. The simplest fixed effects model for count data is the fixed effects Poisson model. The fixed-effects Poisson regression model for panel data has been described in detail by Cameron and Trivedi (1999). For the Poisson model developed by Hausman et al (1984), the fixed effects model as follows:

$$\lambda_{it} = \exp(\alpha + x_{it}'\beta) \quad (1)$$

where x_{it} is a vector of regressors including the overall intercept.

Fixed effects into the negative binomial model add some additional complexity.

$$f(y_{it}) = \frac{\Gamma(\lambda_{it} + y_{it})}{\Gamma(\lambda_{it})\Gamma(y_{it} + 1)} \left(\frac{1}{1 + \theta_i}\right)^{\lambda_{it}} \left(\frac{\theta_i}{1 + \theta_i}\right)^{y_{it}}$$

with $E(y_{it} / \theta_i) = \lambda_{it} \theta_i$

and $Var(y_{it} / \theta_i) = \lambda_{it} (\theta_i + \theta_i^2)$

Therefore,

$$f(y_{it}, \dots, y_{iT} / \sum_t y_{it}) = \frac{\Gamma(\sum_t \lambda_{it})\Gamma(\sum_t y_{it} + 1)}{\Gamma(\sum_t \lambda_{it} + \sum_t y_{it})} \prod_t \frac{\Gamma(\lambda_{it} + y_{it})}{\Gamma(\lambda_{it})\Gamma(y_{it} + 1)}$$

All terms involving θ_i are cancelled out (Hu, 2002).

5. EMPIRICAL ANALYSIS

5.1. Data and Variables

Dependent variable used in the negative binomial model with fixed effects is the number of crimes recorded by the police for EU 28 and Turkey in 2001-2010 in this study. The numbers of total crime recorded by the police include homicide, violent crime, robbery, domestic burglary, motor vehicle, theft drug trafficking (see Table 1).

Table 1: The Number of Crimes Recorded by the Police for the EU 28 and Turkey

GEO/TIME	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	522710	591584	643286	643648	605272	589495	594240	572695	591597	535745
Belgium	948268	992264	986899	993265	982215	1004097	1016441	1022682	1046442	1050235
Bulgaria	147022	146929	143921	142093	137800	136410	134685	126673	138105	147025
Croatia	78351	77905	80377	85416	79946	81049	75857	74571	73497	73328
Cyprus	4506	4758	7256	7615	7212	7917	7556	7341	7104	8387
Czech Republic	358577	372341	357740	351629	344060	336446	357391	343799	332829	313387
Denmark	473290	491511	486174	474419	432704	425093	445271	476953	491792	471088
Estonia	58497	53293	53595	53048	52916	51834	50375	50977	48359	48340
Finland	430343	435009	443481	445465	432302	416131	435824	440711	441416	431623
France	4061792	4113882	3974694	3825442	3775838	3725588	3589293	3558329	3521256	-
Germany	6363865	6507394	6572135	6633156	6391715	6304223	6284661	6114128	6054330	5933278
Greece	439629	441138	441839	405627	455952	463750	423422	417391	386893	333988
Hungary	465694	420782	413343	418833	436522	425941	426914	408407	394034	447186
Ireland	86633	106415	103462	99244	102206	103178	-	-	-	-
Italy	2163826	2231550	2456887	2417716	2579124	2771490	2933146	2709888	2629831	2621019
Latvia	51082	49329	51773	62173	51435	62328	55620	57475	56748	51108
Lithuania	79265	72646	79072	84136	82074	75474	67990	71972	76291	70618
Luxembourg	22646	26046	26163	26907	25321	25913	28252	28210	32378	30532
Malta	15929	17023	17739	18384	18580	16527	15005	13803	11953	13296
Netherlands	1379454	1401871	1369271	1319482	1341950	1304325	1292820	1266165	1243285	1192640
Poland	1390089	1404229	1466643	1461217	1379962	1287918	1152993	1082057	1129577	1151157
Portugal	372170	391599	417383	416420	392714	399563	398575	430486	426040	422587
Romania	340414	312204	276841	231637	208239	232659	281457	289331	299889	292682
Slovakia	93053	107373	111893	131244	123563	115152	110802	104758	104905	95252

Slovenia	74794	77218	76643	86568	84379	90354	88197	81917	87465	89489
Spain	2052492	2183457	2144155	2141295	2230906	2267114	2309859	2396890	2339203	2297484
Sweden	1189393	1234784	1255371	1248743	1241843	1224958	1306324	1377854	1405626	1370399
Turkey	400337	438714	472153	507539	667820	975118	970554	1012291	1288085	1521723
United Kingdom	5521825	5974960	6013759	5637511	5555172	5427558	4952276	4702698	4338372	4150097

Source: European Commission, EUROSTAT Statistics Database

Independent variables are growth rate, inflation, GDP per capita, unemployment rate, urban overpopulation, enrollment rate, the number of the police. The data being used are obtained from the World Development Indicator database, EUROSTAT database. Because crime data contained in the EUROSTAT database contains the most recent 2010 data, data range is set at 2001-2010 in this study. Descriptive statistics indicating the variables give Table 2.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.
The numbers of crime	1066587	98304.43
Growth rate	2.517164	0.244561
Inflation	3.859701	3.38E-01
GDP per capita	19789.93	844.5207
Unemployment rate	8.30E+00	2.26E-01
Urban overpopulation	8785203	746044.6
Enrollment rate	8.76E+01	9.16E-01
The number of the police	71713.05	5865.421

5.2. Results of the Fixed Effects Negative Binomial Model

Aim of this paper is to examine factors that affect the total number of the crimes recorded by the police for EU 28 and Turkey in 2001-2010 years by using fixed effects negative binomial model. Since it is used panel data set in this research, panel count data models examine in this research. Basic Poisson and negative binomial models have some limitations. The Poisson model requires the variance-to-mean ratio of the number of crimes data to be about 1. This assumption is often violated in the real count data sets. Both the Poisson and the Negative Binomial models require the number of crimes data to be uncorrelated in time. Due to unobserved heterogeneity and serial correlation in the number of crimes data, both models seem to be inappropriate. To overcome this problem, fixed effect models have been developed. Conditional variance exceeds the conditional mean in this paper. That is, the number of crimes data has overdispersion. Negative Binomial distribution has been adopted in the count data to take care of the over-dispersion problem (see Table 3). Hausman and F test result indicates that, the fixed effects negative binomial model that by treating the data in a time series and cross-section, is more suitable (see Table 3).

Estimated coefficients and marginal effects of the fixed effects negative binomial model are presented in Table 3. F test reported at the bottom of Table 3 of the results provides a formal test for the pooled negative binomial model estimator against the fixed effects negative binomial panel estimator. The result of the F test indicates that the fixed effects panel estimator is important. The Wald test statistics reject the null hypothesis that the parameters in the regression equation are

jointly equal to zero. Count data models are appropriate to determine factors on the number of crimes in EU 28 and Turkey because of the nature of the dependent variable.

Table 3: The Results of Fixed Effects Negative Binomial Model

Variable	Coefficient	Std. Dev.	z value	P> z	Marginal effects
Growth rate	0.0013	0.001725	0.76	0.446	0.001315
Inflation	-0.0039	0.002568	-1.51	0.132	-0.00387
GDP per capita	0.00001	3.55E-06	3.08	0.002***	0.000011
Unemployment rate	0.00841	0.003063	2.75	0.006***	0.008413
Urban overpopulation	1.47E-08	5.66E-09	2.6	0.009***	1.47E-08
Enrollment rate	-0.00931	0.002406	-3.87	0.000***	-0.00931
The number of the police	-4.44E-06	9.49E-07	-4.68	0.000***	-4.44E-06
constant	5.35736	0.239912	22.33	0.000***	
Log likelihood	-2789.4769				
Number of observation	290				
Number of groups	29				
Likelihood-ratio (LR) test ($\chi^2(01)$) Negative binomial vs. Poisson model	7.4e+07			0.000	
Wald ($\chi^2(7)$)	98.87			0.000	
Hausman Test $\chi^2(6)$	52.71			0.000	
F test fixed effect negative binomial vs. pooled:	113.82			0.000	

***p<.01, **p<.05, *p<.10.

Marginal effects results of the model in Table 3 demonstrate that, GDP per capita, unemployment rate and urban overpopulation has a positive and important effect on the number of crimes in EU 28 and Turkey. This finding is consistent with the results of Entorf and Spengler (1998). Some studies support the positive relation between unemployment and crime, while the other in general obtains significantly weaker results (Edmark, 2005: 354-355). Field (1990) and Pyle and Deadman (1994) stressed that unemployment might be a less important factor than the rest economic variables in order to investigate the crime rates fluctuation in Great Britain. The results in Tables 3 report that in contrast to the findings of Field (1990) and Pyle and Deadman (1994), unemployment has more important positive direct effect than the rest economic variables on crime in this study. The increases on the enrollment rate and the number of the police seem to have decreased the number of crimes in the direction of expectations. Negative binomial model with fixed effects results estimated using the STATA MP 12 software.

6. CONCLUSION

As stated previously, aim of this paper is to examine factors that affect the total number of the crimes recorded by the police for EU 28 and Turkey in 2001-2010 by using fixed effects negative binomial model. Count data models are appropriate to determine factors on the number of crimes because of the nature of the dependent variable. Marginal effects results of the fixed effects negative binomial model demonstrate that, GDP per capita, unemployment rate and urbanization has a positive and important effect on the number of crimes in EU 28 and Turkey. As usually found, in the literature, we observe higher crime rates in highly urbanized areas. The increases on the enrollment rate and the number of the police seem to have decreased the number of crimes in the direction of expectations. The effect of growth rate and inflation is not clear or insignificant.

Research using a series of victim surveys in 18 countries of the European Union, funded by the European Commission, has reported (Van Dijk et al., 2005) that the level of crime in Europe has fallen back to the levels of 1990, and notes that levels of common crime have shown declining trends in the U.S., Canada, Australia and other industrialized countries as well. The European researchers say a consensus identifies demographic change as the leading cause for this international trend. The European research suggests that "increased use of crime prevention measures may indeed be the common factor behind the near universal decrease in overall levels of crime in the Western world", since decreases have been most pronounced in property crime and less so, if at all, in contact crimes (Van Dijk et al., 2005, 2008; Kesteren et al., 2000). We know from comparisons with other EU members that crime in UK is very high. In 2004 the European Union's Crime and Safety Survey looked at 18 countries and found that the UK was a 'crime hotspot', along with Ireland, the Netherlands and Denmark. In 2007 the EUROSTAT statistics for the 27 EU members found that UK had the third worst crime rate. The report shows that a high-crime society with a particular propensity to violence short of intentional homicide (Civitas Crime, 2012).

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EFFECT OF THE TOURISTIC PRODUCT PRICES AND COSTS ON THE INTERNATIONAL COMPETITIVENESS: A COMPARATIVE PANEL DATA ANALYSIS

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ABSTRACT

Purpose- Tourism is an important sector for countries across the world which develops the fastest and contributes to country's economy. The countries in the tourism market are in a serious competition due to its contribution to the economic development. Therefore are countries increasing their international competitiveness by the price and cost advantage of the touristic products they offer in order to obtain a greater share of the international tourism market.

Methodology- In the study are the effects of the price and cost advantages on the tourism incomes determined by utilizing the data of 31 European stakeholder countries in the tourism sector for 2000-2014. The harmonized index of consumer prices, representing the price and cost advantage and established by the European Commission's (EC) Economic and Financial Affairs Council (ECOFIN) with 5 indicators based on the real effective Exchange rate, and the unit labour cost series are utilized.

Findings- The co-integration and causality relation between these series and the tourism income series of the current period are examined by the Kao (1999) panel co-integration and the Dumitrescu and Hurlin (2012) panel causality analysis.

Conclusion- As a result of the conducted analysis, it is determined that there is a co-integration between the price-cost advantage and the tourism revenues, and that the price-cost advantage is a statistically meaningful reason for the tourism revenues.

Keywords: Competitiveness, price, cost, tourism, panel data

JEL Codes: O11, L83, C23

1. INTRODUCTION

The factor, which determines the economic performance and economic precedence of a country, is the high competitiveness of such a country. And the supremacy of the competitiveness, which converts countries advantageous against other countries, is measured by quality, cost and speed (Kuşat, 2011). The international competitiveness of an establishment means that it is at the same level or better than competing domestic and foreign establishments with regards to product price and/or product quality, and elements except the price like the timeliness at the delivery and after sales services (Kibritçioğlu, 1996).

The ability of the economies of countries and the companies/establishments that constitute these economies to sustain their existence has started to develop depending on their competitiveness along with the globalization (Bahar & Kozak, 2005) and the companies/establishments converted such to compete seriously with each other with regards to price and

quality. This international competitive power has gained importance as a result of the competitive environment concentrated by the globalization (Tiryakioğlu, 2004).

As it is the case in all sectors were also the establishments in the tourism sector forced to develop their competitive strategies in order to make profits and to sustain or increase their existing market share (Bahar & Kozak 2005). Therefore needs a destination to ensure all its' attractivities and tourist experiences in order to obtain a competitive advantage in the tourism sector (Dwyer & Kim, 2003). One of the factors, which increases the competitiveness and ensures the competitive precedence of a destination are the cost and price. Destinations compete with each other with regards to the cost and price of a touristic product and ensure an attention competition advantage.

The success of touristic region/country is measured by its competitive power and the price competition index indicates the status of a touristic region with regards to its price competition power. It is revealed in this study that it is necessary to determine the competition power in tourism and to assess the different features destinations in competition by comparing these.

At the study are the real exchange rate based Harmonized Index of Consumer Prices (HICP) and Unit Labour Cost series (ULC) and the abroad tourism income relations (RECC) of 31 European countries¹ examined. According to the statistics definitions of the European Union are 5 statistics calculated in order to measure the price and cost competitions². These are;

1. Consumer Prices (Index of Consumer Prices and Harmonized Index of Consumer Prices)
2. GDP Deflator
3. Goods and Services Export Deflator
4. Unit Labour Cost (for the whole economy)
5. Unit Labour Cost (for the manufacture industry)

These series, established according to the real exchange rate, are variables that represent the international price and cost advantage of a macro-economy. At the study is the harmonized index of consumer prices handled as a proxy variable, which represents the touristic product price advantage and the unit labour cost as a proxy, which represents the touristic product cost advantage and the relation thereof is examined by the co-integration and causality analysis and it is tried to determine the importance of the price and cost advantage for the tourism sector by empirical methods.

2. LITERATURE REVIEW

2.1. International Competition Power and Tourism

Competition is a term which, together with comparative supremacies, covers different disciplines like the price competition perspective, strategy and management perspective, historical and social-cultural perspective (Man, Lau & Chan 2002). While competition means that a country has the say in an international level by having more sources than the other countries, it is maximizing the production and revenue for establishments by mutually competing with other establishments (Uysal, 2000). Whilst the competition power is a precondition for the increase of the production and efficiency in an economy, the improvement of the living standards of the society and the development of employment (Doğan, 2000), means the sustainment of this efficiency that a country gains competitive supremacy in the international market (Porter, 1991). For an establishment is the competition power the ability to produce with lower costs compared with its competitors in the national or international markets (price and cost competition power), to tower above the competitors with regards to factors like the quality of the product, the provided services and the attractivity of the product (quality competition power) (Aktan, 2003) and the ability to make innovations, to increase the quality (Porter, 1991). Countries and establishments determine the factors total cost leadership, diversification, focussing as a competition strategy in order to ensure competitive supremacy and to by-pass their competitors (Porter, 2003).

The company internal factor, which determine the international competition power, are stated to be the quality, cost (labour, raw material, energy, capital, import, marketing, tax, social security costs) of the good or service provided by the company, the price, efficiency level, profit, the information technology employed in the company, the organization and management structure, the efficient usage of the sources, innovation and creativity. And the company external factors are stated to be the position and interventions of the state in and to the economy, the international trade system, the structure of the domestic demand, the flexibility of the labour markets, economic stability, the exchange rate and interest rate

¹ Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Lethonia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom, Norway, Turkey.

² http://ec.europa.eu/economy_finance/db_indicators/competitiveness/documents/technical_annex_en.pdf

policies, foreign capital, the physical and corporate structure, the structure of the financial markets and the standards and rules, which regulate the competition (Tiryakioğlu, 2004). Though the plentiness of these factors are factors like the real exchange rates, inflation, wages, costs, labour efficiency, profitability, investments, unemployment, qualified labour power, research and development activities, export shares, the export/import ratio, import penetration rates, incentives, information technology usage, the organization and management structure, price-cost margin, industry intern trade and innovation and creativity are the widespread used tools (Demir & Çoban, 1996; Doğan, 2000; Kotan, 2002).

And there are many factors that can be correlated with the destination competition in the tourism sector. These are subjective and objective measurable quantitative factors like the roles of human capital and education; IT and technological development; the offer and demand conditions of tourism; investment, incentives and financial regulations; number of visitors; expenditures of tourists; relative exchange rates; distance; advertisement and promotion and the number of the natural sources. Beside this, there are also subjective measurable qualitative factors like sustainable tourism and environment, service quality and customer satisfaction, productivity and the effective utilization of the sources, touristic product diversification, destination image, tourism marketing and competition strategy, government and bureaucracy, richness in terms of cultural and historical heritage and natural environment (Bahar & Kozak 2005).

While the definition of tourism competition in the literature is the preservation, sustainment and by time development of the market share by the destination (Hassan 2000; d’Hauteserre’e 2000), it is tried in many studies related to completion in tourism to determine the factors that influence the competition power and revealed that the different features of the destinations in competing need to be assessed by comparison (Peattie & Peattie, 1996; Pearce 1997; Crouch & Ritchie, 1999; Kozak & Rimmington, 1999; Buhalis, 2000; Dwyer, Forsyth & Rao, 2000; Go & Govers 2000; Mihalic, 2000; Prideaux 2000; Dwyer, Forsyth & Rao, 2001; Poon 2002; Enright & Newton, 2004; Crouch, 2007; Kozak, 2007; Hong, 2008; Smit, 2010; Mazanec & Ring, 2011; Dimoska & Trimcev, 2012; Knezevic Cvelbar, Dwyer, Koman & Mihalic, 2015). Tourism or destination competition is defined as a general notion, which covers the price differences by the combination of exchange rate movements, the efficiency levels of different components of the sector and the qualitative factor that influence the attractiveness of a region (Dwyer, Forsyth & Rao 2002).

The World Economic Forum (WEF) publishes the Travel & Tourism Competitiveness Report in order to determine the travel and tourism competition levels, the competitiveness of countries. In the report published in 2015, are the competition variables of 141 countries handled and these countries are evaluated by 90 criterions under 4 main groups and 14 sub-groups. The competition power indicators in the Travel & Tourism Competitiveness Report, representing a total value for the travel and tourism competitiveness of each country, are examined under 4 main groups; being (1) Enabling Environment, (2) Travel and Tourism Policy and Enabling Conditions, (3) Infrastructure and (4) Natural and Cultural Resources. The price competitiveness index is included into the Travel and Tourism Policy and Enabling Conditions main group. It is known that low costs increase the country’s attractiveness for travellers and provides a price competition in the tourism sector. At the measurement of the price competition in the countries are factors like flight ticket taxes and airport fees, the hotel price index, purchase power parity and liquid fuel price levels are taken into consideration at the calculation of the cheapness or expensiveness of the goods and services in a country compared with the the goods and services in other countries (WEF, 2015).

Turkey ranks 6th with 39,8 Million tourist arrivals and 8th with a tourism revenue of USD 29,5 Billion and is among the top ten countries holding the highest share in tourism across the world (The World Tourism Organization [UNWTO], 2015). But the tourism income of Turkey is much behind the 7th country before it. Table 1 indicates the travel and tourism price competitiveness index of 31 European countries. Turkey attracts the attention with the low price factor compared with other countries with regards to the price competitiveness in travel and tourism. It is seen that due to that price factor the added value is realized lower though the increase of the number of tourists in terms of Turkey.

Tablo 1: 31 The Travel and Tourism Price Competitiveness Index of 31 European Countries (2015)

The Travel and Tourism Price Competitiveness Index							
	Country	Order	Point		Country	Order	Point
1	Bulgaria	35	5,08	17	Cyprus	111	3,97
2	Poland	46	4,94	18	Greece	113	3,93
3	Romania	54	4,89	19	Belgium	120	3,73
4	Lithuania	57	4,87	20	Finland	121	3,71
5	Lethonia	58	4,84	21	Ireland	122	3,69
6	Estonia	72	4,62	22	Germany	126	3,62

7	Hungary	76	4,60	23	Netherlands	130	3,56
8	Slovakia	80	4,51	24	Austria	132	3,49
9	Czech Republic	87	4,47	25	Italy	133	3,49
10	Turkey	94	4,37	26	Sweden	134	3,38
11	Slovenia	96	4,34	27	Denmark	135	3,31
12	Croatia	101	4,28	28	Norway	137	3,23
13	Portugal	104	4,23	29	France	139	2,95
14	Spain	105	4,22	30	United Kingdom	140	2,73
15	Malta	106	4,22	31	Switzerland	141	2,57
16	Luxembourg	108	4,10				

Kaynak: WEF, 2015.

2.2. Competition Power in Tourism: Cost and Price

The increase of the competition in the international markets resulted in the pressure on the establishments towards decreasing their prices. Therefore have the costs started to provide a serious advantages to sectors and companies with regards to competitiveness (Oral, 1993). Costs and prices are the most important factors with regards to determining the competition power (Doğan 2000). Particularly companies strengthen their position in the market by a price advantage due to the decreasing costs by implementing methods, which decrease the production costs. The most appropriate and reliable method for a company in order to enter into competition in terms of prices is to increase its market efficiency by controlling its costs (Drucker, 1998; Doğan, Marangoz & Topoyan, 2003).

While, as it is the case in any sector of the country's economy, the consumers aim to purchase the most qualitative product for the lowest price, the manufacturers aim to produce the touristic products with the lowest costs and sell these with maximal profit. High costs are seen as a negative factor at the preference of a tourism region since they reflect as high prices on the tourists. Therefore convert establishments, which offer the touristic product to the tourists with the lowest costs, more competitive. One of the competition strategies applicable to the tourism sector should be based on pulling down the costs to the as possible lowest level and thus to dominating the market with the most affordable price.

The price is an important determining factor for the competition power in tourism (Buhalis, 2000; Dwyer et al., 2000; Dwyer et al., 2001; Dwyer et al., 2002; Barros, Botti, Peypoch, Robinot, Bernardind & Assaf. 2011; Assaf & Dwyer, 2013). At the measurement of the competition power of a touristic region are the appropriateness feature of the products in the tourism sector with regards to the price (Dwyer et al., 2001) and price sourced promotional activities (Peattie & Peattie, 1996) deemed to be important factors. The ability of a touristic country or region to gain competition power is related to whether the product prices in the country's tourism sector have a competitive structure or not, and the price competition depends on the other sub-sectors which provide goods and services to the visitors (Dwyer et al., 2001).

At the answers to the open end questions asked to tourists in the study conducted by Bahar (2004) in order to determine the competition power of Turkey in the tourism sector was indicated that Turkey is in general a cheap country, but that the prices at the airports (particularly in the duty free shops) are very high. It is stated at the question in the questionnaire during the same study applied to local businesses that the existence of a tourism specific cost and incentive policies will positively influence the competition power of the country, but that some participants noted that the fact, that the VAT rates in Turkey are much higher than in competing countries, contributes negative to this.

Ayaş & Baydur (2005) have compared in the study they conducted the competition power of the touristic regions of Fethiye and Marmaris in Muğla by the aid of the price competition index and determined the price competition power index for Fethiye to be 5,2%, and for Marmaris to be 3,9%. It can be stated that Fethiye is about 25% cheaper with regards to the local prices or 25% more competitive compared with Marmaris.

3. DATA AND METHODOLOGY

This section of the study will provide information on the data set established in order to examine the relation of the price and cost advantage with the tourism incomes and the used econometric methods and deal with the achieved findings.

3.1. Data

At the study is the panel data set of 31 European countries complied from the EC Ecofin³ and World Bank's data⁴ and covering the years 2000-2014. And used variables are the Harmonized Index for Consumer Prices (HICP) in representation of the price advantage established according the real exchange rate, the Unit Labour Cost (ULC) in representation of the cost advantage and the abroad tourism incomes (RECC, \$, 2005=100). Descriptive statistics related to the data are indicated in the table below (Table 2).

Tablo 2: Descriptive Statistics

	HICP	NWC	RECC
Mean	102.2579	103.2908	1.33E+10
Median	100.7176	100.3408	6.74E+09
Maximum	133.6062	170.9900	6.80E+10
Minimum	76.66926	66.95425	1.53E+08
Std. Dev.	8.535360	14.76455	1.62E+10
Skewness	0.813120	1.534688	1.740753
Kurtosis	5.658743	6.768691	5.072757
Jarque-Bera	187.7957	456.7326	317.3992
Probability	0.000000	0.000000	0.000000
Sum	47447.64	47926.95	6.18E+12
Sum Sq. Dev.	33730.65	100930.3	1.21E+23
Observations	464	464	464

3.2. Method

At the study is the effect of the price and cost advantages of the tourism incomes examined by the Kao (1999) Panel co-integration and Dumitrescu & Hurlin (2012) panel causality tests. The tests applied during the econometric analysis process and basic application procedures are presented below.

3.2.1. Horizontal Section Dependency Test (CD Test)

Whether the dependency between the horizontal section, constituting the data set (in this study, countries), are taken into consideration or not influences the results to be obtained. Therefore needs at this study to control the horizontal section dependency in the series and the co-integration formula prior to starting with the analysis. At the investigation of the respective literature, we see that the Breusch-Pagan LM (1980), Pesaran LM (2004), Baltagi, Feng and Kao Bias-Corrected LM (2012) and Pesaran CD (2004) methods are widespread used in the studies, which test the horizontal section dependency. While results related to all of these tests are provided in the analysis section of the study, only information on the Pesaran CD test is provided in this section. The Pesaran (2004) test is as

$$CDLM = \left(\frac{2}{N(N-1)} \right)^{\frac{1}{2}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \frac{(T-K-1) \hat{\rho}_{ij} - \hat{\mu}_{Tij}}{\omega_{Tij}} \sim N(0,1) \quad (1)$$

Here represents $\hat{\mu}_{Tij}$ the average, and ω_{Tij} the variance. The tests statistics to be obtained show an asymptotic standard normal distribution. The test results against the zero hypothesis in form of that there is no horizontal section are presented in the following parts of the study in Table 3.

3.2.2. Panel Unit Root Test

The stagnation of the series is tested in the study by the Breitung (2000) panel unit root verification method. This test uses a different approach from the other panel unit root tests; the data is converted prior to calculating the regressions in order to be able to use the standard t statistics. The model is as indicated below:

$$Y_{it} = \alpha_i + \beta_i t + X_{it} \quad (2)$$

here is,

³http://ec.europa.eu/economy_finance/db_indicators/competitiveness/index_en.htm

⁴<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>

$$X_{it} = \sum_{k=1}^{p+1} \alpha_{ik} X_{i,t-k} + \varepsilon_{it} \quad (3)$$

assumed at the Breitung panel unit root test that all units have a fixed autoregressive parameter. The H_0 hypothesis is the difference stagnation. The test, which the conclusion criterion, is defined as

$$\tau = \frac{\sum_{i=1}^N \sum_{t=1}^T (\tilde{u}_{it-1} - \tilde{u}_{i0}) \tilde{e}_{it}}{\sqrt{\sum_{i=1}^N \sum_{t=1}^T (\tilde{u}_{it-1} - \tilde{u}_{i0})^2}} \quad (4)$$

The unit root results of the series are provided in Table 4.

3.2.3. Kao Panel Co-Integration Test

Kao (1999) co-integration test examines the long termed relation between the panel series by utilizing the Dickey & Fuller (1979) and Generalized Dickey & Fuller (ADF) type test structure. For the test is a model established in form of,

$$Y_{it} = \alpha_i + \beta X_{it} + e_{it} \quad i=1, \dots, N \quad t=1, \dots, T \quad (5)$$

Here is to be seen Y_{it} and X_{it} series are not stagnating and that the model to be presumed might have a fake regression. Therefore need the stagnation levels of the series to be determined and the long termed relation between the series need to be examined by the residual based co-integration analyse. The Y_{it} and X_{it} series in the model are primary grade stagnating panel series. The failure definition e_{it} in the model is obtained as

$$\hat{e}_{it} = \rho \hat{e}_{i,t-1} + v_{it} \quad (6)$$

It needs to be examined whether the autoregressive parameter ρ equals to 1 or not in order analyze the unit root in the failure definitions. For this purpose are the hypothesis established as

$$H_0: \rho=1$$

$$H_a: \rho=0$$

The Y and X series will be converted such to eliminate the internal correlation between the series after the presumption of the P autoregressive parameter by the presumption method. As a result of the Kao co-integration test is the standard normal distributed ADF test statistics with zero average and 1 variance obtained as

$$ADF = \frac{t_{ADF} + \frac{\sqrt{6N\sigma_v}}{2\sigma_{0u}}}{\sqrt{\frac{\sigma_{0v}^2}{2\sigma_v^2} + \frac{3\sigma_v^2}{10\sigma_{0v}^2}}} \quad (7)$$

The results of the co-integration test are provided in Table 5.

3.2.4. Dumitrescu and Hurlin Panel Causality Test

The Dumitrescu and Hurlin (2012) panel causality test is used during the examination stage of the short termed relation between the variables after the co-integration analysis. This method has three important advantages compared with the other panel causality tests. First, that it is able to take into consideration the dependency between the horizontal sections that constitute the panel, that it doesn't distinct between largeness and smallness between the time dimension (T) section dimension (N) and that it is able to reveal effective results at non-balanced panel data sets, too (Dumitrescu & Hurlin, 2012; Göçer 2013). The presumed basic model is as

$$y_{i,t} = \alpha_i + \sum_{k=1}^K \gamma_i^k y_{i,t-k} + \sum_{k=1}^K \beta_i^k x_{i,t-k} + \varepsilon_{i,t} \quad (8)$$

It is tested against the zero hypothesis that there is no causality relation from X to Y at all horizontal sections.

At the study is the Schwarz information criterion used for the determination of the optimal delay length (K). The zero hypothesis for not having a heterogenous reason is suggested against the zero hypothesis for not having a homogenous reason while testing the alternative hypothesis which asserts that there is a causality relation between some sections from X to Y against the Dumitrescu & Hurlin zero hypothesis and this hypothesis has eliminated the situation that all units are same with regards to the causality. Thus, it is possible to vary in the model above for the γ_i^k ve β_i^k unit and consequently is a variation at the causality analysis with regards to units allowed (Güriş, 2015). Dumitrescu & Hurlin calculate in their method the individual Wald statistics for each horizontal section and obtain the Wald statistic regarding the panel by obtaining the arithmetic mean of these.

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2K}} (W_{N,T}^{HNC} - K) \sim N(0,1) \quad (9)$$

$$W_{N,T}^{HNC} = \frac{1}{N} \sum_{i=1}^N W_{i,T} \quad (10)$$

$$Z_{N,T}^{HNC} = \frac{\sqrt{N} [W_{N,T}^{HNC} - N^{-1} \sum_{i=1}^N E(W_{i,T})]}{\sqrt{N^{-1} \sum_{i=1}^N \text{Var}(W_{i,T})}} \sim N(0,1) \quad (11)$$

The results of the conducted causality test indicated in Table 6 under the heading "Findings and Discussion".

4. FINDINGS AND DISCUSSIONS

Before the examination of the influence of the price and cost advantage on the tourism incomes by the co-integration and causality test are the horizontal section dependencies within the frame of the variables related to the 31 European countries constituting the panel data and the co-integration models tested below. The results are indicated in Table 3. According to the results is there a horizontal section dependency between the horizontal sections based on each variable and the co-integration models. This means that there is a dependency between the price, cost and tourism incomes in the 31 countries in question. Any price shock in any country affects also the other countries or any change to the tourism incomes of any country influences also the tourism incomes of the other countries.

Table 3: Horizontal Section Dependency Test Results

	Breusch-Pagan LM*	Pesaran scaled LM*	Bias-corrected scaled LM*	Pesaran CD*
HICP	2727,609	73,17735	72,07021	30,48714
NWC	1758,483	41,39844	40,29129	6,267456
RECC	5280,96	156,905	155,7979	70,97601
Model 1 RECC-HICP	2216,037	56,40224	--	43,22955
Model 2 RECC- NWC	2039,787	50,62277	--	39,02042

* Meaningful at a level of 1% (p-value < 0,01)

And the Breitung panel unit root test results, indicating that the series are difference stagnated is presented in Table 4. The co-integration analysis is a method able to be applied between combined difference stagnating series. The fact that all the series are difference stagnating allows the examination of the long termed relation between the series by the co-integration analysis.

Table 4: Breitung Panel Unit Root Test Results*

	Level Values		First Differences	
	t- statistics	Possibility Value	t- statistics	Possibility Value
HICP	2,42288	0,9923	-7,97343	0,0000
NWC	0,15370	0,5611	-6,58774	0,0000
RECC	0,13760	0,2912	-10,2673	0,0000

* All results are results of models with fixed and trend figures.

Kao co-integration test is referred to for the existence of the long termed relation between the variables. The test results are indicated in Table 5.

Table 5: Kao Co-integration Test Results

Model 1 $RECC_{it} = \alpha_{1i} + \alpha_{2i}HICP_{it} + \varepsilon_{it}$		Model 2 $RECC_{it} = \alpha_{1i} + \alpha_{2i}NWC_{it} + \varepsilon_{it}$	
ADF t- statistics	Possibility Value	ADF t- statistics	Possibility Value
-1,783712	0,0372	-2,087239	0,0184

According to Model 1, where the co-integration relation between the price advantage and the tourism incomes are examined, is there a statistically meaningful co-integration relation between the consumer prices and abroad tourism income. This means that the series are long termed acting together.

Tablo 6: Dumitrescu & Hurlin Panel Causality Test Results

	W-Stat.	Zbar-Stat.	Possibility Value
HICP → RECC	4,50813	2,69991	0,0069
RECC → HICP	3,63091	1,41074	0,1583
NWC → RECC	4,89168	3,26357	0,0011
RECC → NWC	2,16338	-0,74596	0,4557

The results regarding the causality relation between the series are indicated in Table 6. The harmonized price index is a statistically meaningful reason for the abroad tourism incomes. In other words is the price advantage a statistically meaningful descriptor of the tourism incomes. In a similar manner is also the unit labour cost variable a statistically meaningful reason for the abroad tourism incomes. According to these findings, it is determined that the price and cost advantage is a statistically meaningful descriptor of the abroad tourism data. As to be seen, the causality relation between the variables is unidirectional and the pre-analysis expectations indicate that the price and cost advantage influence the tourism income, but that there is no reverse relation.

5. CONCLUSION

The cost and price of the produced goods and services is among the most important competition power factors in the tourism sector for that a country/region and companies can conduct their activities successful in an international competition environment. Therefore are countries progressively increasing their competition power in the tourism sector by pulling down the costs of the products to the lowest levels and thus dominating the market with the most affordable prices. While the decrease of the costs is possible with the renovation of the methods and techniques to be used at the production of touristic goods and services, the conversion of the prices to a reasonable level is possible by increasing the quality of touristic products.

That companies and/or countries in the tourism sector, where the national and international competition progressively increases, get a larger share from the existing market, will increase with the advantages they will provide in the prices and costs of touristic products. The econometric results of the study have shown that the price and cost advantage is an important descriptor of the tourism incomes. It must be ensured that countries, which aim the increase of the international competition power of the tourism sector and to get a greater share from the tourism market, develop sectorial policies in order for that the sector can obtain a price and cost power. The first thought on this issue is that tax exemptions and the increase of the state contributions to the premiums of the working personnel will provide a significant cost advantage. On the other side, again incentive policies and the support of the sector are necessary for the strengthening of the companies in terms of international competition. This will particularly ensure that the tourism sector, which is faced with hard times, but is important in macroeconomic terms, can pass this period such to experience lesser losses and continue on its path without losing the share it has in the international market.

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THE RELATIONSHIP BETWEEN NATIONAL INNOVATIVE CAPABILITY AND PERFORMANCE IN EUROPE

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ABSTRACT

Purpose: The aim of this study is to empirically investigate the relationships between capacity and performance indicators of National Innovation Systems in European countries over the period from 2000 to 2014.

Methodology: As an analytical tool in order to examine the dynamics of innovation process at macro level, we used National innovation System approach which has had a large scope in innovation literature over the last decades. In this analytical framework, we employed Canonical Correlation Method to empirically examine the relationships between two variable set of capacity and performance components. National innovation capacity is represented by the dimensions of Research and Development activities, Human Capital and Information and Communication Technology (ICT) infrastructure. Dimensions of invention and innovation are chosen the proxies for performance components of NIS. Thus, this study applies an empirical method to get different capability dimensions of system together in order to determine their effectiveness on innovation performance.

Findings: Results of the empirical study reveal that the most significant contribution to innovation performance comes from Human Capital while dimensions of ICT infrastructure and Research and Development take second and third place, respectively. In addition, it seems that educational attainment and ICT-using levels are better indicators for determining the impacts of Human Capital and ICT infrastructure on innovation performance rather than the levels of education spending and ICT investment.

Conclusion: As generally argued, increasing of R&D intensity at country level is not only sufficient condition for improving innovation system in Europe. Accordingly, innovation policies like European Union focusing on an R&D-to-GDP ratio 3% is not enough without providing the requirements for an appropriate human capital development in national innovation system.

Keywords: National innovative capability and performance, Europe.

JEL Codes: O11, O31, O52

1. INTRODUCTION

Over the past decades, the capacity for innovation has played significant role in determining of the countries' competitiveness in the global economy. Accordingly, both academic scholars and policymakers have paid increasing attention to innovation as a basic source of long term economic growth. It has been also recognized that systemic approach is essential to understand innovation process and thus produce better policy implication. From this perspective, National Innovation System (NIS) approach has also become the most popular analytical tool in the economics literature focusing on innovation analysis (Carlsson, 2007, 861). Today, there is a common consensus among innovation theory scholars on the significance of NIS approach to examine the basic dynamics of innovation process at the macro level. Beyond its spread among the academic community, the approach of NIS has also been increasingly used by international organizations as an analytical framework for the study of innovation (Teixeira, 2013, 2). Consequently, NIS approach gets diffused across the

international and national organizations and academic world as a theoretical framework in order to analyse innovation process at national level.

NIS can be defined as the system consisting of “the elements and relationships which interact in the production, diffusion and use of new, and economically useful knowledge” (Lundvall, 1992, 12). NIS approach argues that innovation exists in a system composed of different components and performs depending on interaction of these components and institution surrounding all of the system. Every component in NIS has a function to promote innovation capacity and performance of system. Thus, innovation system consists of different capability and performance components. In conclusion, NIS approach gives new insight to researches focusing to examine innovative capacity and performance of countries. In other words, this approach let us to interpret innovative capacity and performance of the countries by mapping various components in national system. It is also clear that how well innovation system dynamics can be identified is crucial to design policy aims and tools at national level. Consequently, NIS approach provides an analytical tool to examine dynamic of innovation process and thus provide a comprehensive guide for policy making.

Based on the frame of reference in development of innovation literature indicated above, the objective of this paper is to examine the relationship between innovative capability and performance of European countries. National innovative capacity refers the country's ability to improve new technology leading long-term economic growth while national innovative performance here shows the success of innovative effort in a country. Accordingly, this paper aims to investigate the dynamic of innovation process and thus enhance policy design for better implication. The remainder of this paper is organized as follows: In the second part, we review the literature focusing on examining the dynamics of national innovation systems. In the third part, we present empirical analysis of innovation system of European countries and the findings. Final section concludes concerning with the basic dynamic of innovation process in Europe and makes some policy implications.

2. LITERATURE REVIEW

It has still been a big issue to measure and assess innovation process although literature on innovation has a long history. Indeed, there is no agreement on what indicators are used for assessment and measurement of innovation process in literature today. However, it has been some classifications concerning with the stages of development of ideas about innovations and the corresponding changes in the metrics innovation. In the first stage, science has been perceived as the main driving force of innovation process. Therefore, economists have paid their attention to Research and Development activities. Later, innovation studies focused on the direct results of Research and Development activities like the number of scientific publications and patent. In the final stage from 1990s to now, systemic perception of innovation process has become important in order to analyse innovation dynamics. Thus economists used the range of indicators symbolising different factors of innovation system since it has been widely accepted that innovation exist in a system consisting of different components (Kravchenko, 2011, 63).

Indeed, looking at the literature, it seems that innovation process has been firstly analysed by the linear models based on the causality relation from scientific research to innovation. Firm has also been accepted as the basic actor of innovation process. In this model, innovation begins with basic research and advances through applied research until becoming invention. Later firms test invention in commercial market and lead to diffusion. Thus innovation is seen as an output of a linear process performing in a sequential and hierarchical order (Samara, et. al 2012, 624) Accordingly, the innovation analysis has been mainly made by using single indicator like R&D investment of firm. However, from the beginning of the 1990s, it has been recognised that systemic cooperation in innovation process has been essential. Thus, systemic perception became main approach to understand the innovation process. In the framework of systemic perception of innovation, it has been argued that innovation exists in a system consisting of different components and performs depending on interaction of these components. Consequently, focusing of the innovation studies evolves from linear concepts to non-linear concepts including complex interactive relationship among different factors (Fagerberg and Sappasert, 2011, 42).

Under this line of view, the idea of thinking about innovation from a systemic perspective at the national level, called National Innovation System (NIS) approach, was developed by three main streams: C. Freeman at Science Policy Research Unit (SPRU) in the United Kingdom, B. A. Lundvall at the IKE Group in Denmark and R. Nelson at Columbia University in the United States. Firstly, Freeman (1987) brought the concept of NIS into the literature by his book titled “Technology Policy and Economic Performance: Lessons from Japan”. Later, Lundvall (1992) published as an editor a book titled “National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning”. Final seminal book named “National Innovation Systems: A Comparative Study” have been edited by Nelson (1993). These economists can also be divided into two groups in terms of their definition of NIS. Nelson considers with the narrow definition of NIS covering only organizations involved in research institutions and firms. On the other hand, Freeman and Lundvall consider the broad definitions of NIS covering all aspects of the economic structure and the institutional set-up (Varblane and Tamm, 2007, 5).

The idea of NIS has been rapidly expanded in the literature. Accordingly, economists have started to develop a methodology for assessment and measurement of national innovation systems. Different composite indicators producing scoreboards and indices have been developed to measure and compare different national innovation systems. Economists found the method of composite indicators to measure innovation process of national system. Thus, they combine a number of factors effecting innovation process in a single figure by attaching different weights to the relative importance of the indicators. Indeed, in the recent decades, the role of composite indicators of innovation remarkably increased in assessment of innovation process. International economic organisations have also elaborated different composite indicators to classify their member countries in terms of innovative capability and performance.

World Bank has developed Knowledge Assessment Methodology (KAM) to measure innovative maturity of nations. This methodology combined the indicators under four sub-title: Economic Incentive and Institutional Regime, Education, Innovation and Information and Communications Technologies (ICT). Thus two indices were produced: Knowledge Index (KI) and Knowledge Economy Index (KEI) (Karahan, 2012, 23). Organization for Economic Co-operation and Development (OECD) has also published Science, Technology and Industry (STI) Scoreboard. Analyses concerning with the member countries in the Scoreboard are summarized in five thematic sub-titles: Investing in Knowledge, Talent and Skills, Connecting to Knowledge, Unlocking Innovation in Firms, Competing in the Global Economy, Empowering Society with Science and Technology (OECD, 2015, 3). European Union has also proposed a composite indicator called "European Innovation Scoreboard" to measure and assess national innovation system in European countries. This scoreboard combines different system indicators into three dimensions: enablers, firm activities and outputs. Thus, national innovation system in European countries are categorized in terms of performance as Modest Innovators, Moderate Innovators, Strong Innovators and Leader Innovators (European Union, 2015, 7).

Looking at the literature, in order to examine national innovation system, it seems that composite indicators are also used widely among economists besides international economic organizations. Most popular one called "The ARCO Technology Index" belongs to Archibugi and Coco (2004). They have taken three dimensions of technology into account in order to develop composite indicators: Innovative Activity, Human Capital and Technology Infrastructure. They have examined 162 countries using the data for the period from 1990 to 2000. Finally, Bashir (2013) presented a study for measuring innovation capability and Innovation Index Ranking of top 15 most efficient innovative Islamic Countries. His innovation index consists of two input sub-index including the variables related to Human Capital and Research and Business Sophistication. Innovation output sub-index also consists of two input sub-index including Knowledge and Technology Outputs and Creative Outputs. In conclusion, although scoreboard methodology creates some problems, like single number cannot provide comprehensive information of the whole innovation process, it seems that this methodology continues to be used widely to examine the national innovation system. However, it is clear that scoreboard methodology lacks any systemic analysis to make further interpretation of the relations between different components of national innovation system.

Besides the studies using the scoreboard methodology based on composite indicators, some studies have applied different econometric methods in order to assess and measure the dynamics of innovation process in the framework of NIS approach. Griffith et al. (2004) examined the dynamics of innovation process by using panel data analysis of twelve OECD countries from 1974 to 1990. They tried to investigate the impacts of R&D and human capital on total factor productivity. The findings revealed the two impacts of R&D on the productivity growth of OECD countries. R&D stimulates growth directly through innovation and also indirectly through technology transfer. The results of study also indicated that human capital effects productivity by stimulating innovation and absorptive capacity. Thus they indicated the significance of R&D and human capital as the basic dynamics of national innovation system. Castellacci and Natera (2013) aimed to investigate the dynamics of innovation system for a panel of 87 countries in the period 1980-2007. For this aim, they examined the co-evolution of two main dimensions: innovative capability and absorptive capacity. The results indicated that innovative capability symbolising by innovative input, scientific output and technological output and absorptive capacity consisting of the variable of infrastructures, international trade and human capital are linked by a set of long-term structural relationships. They concluded that it should be taken the complementary between the variables relating to innovative capability and absorptive capacity into account for a better understanding of the dynamics of complex evolving system of innovation process.

Finally, it can be argued that Data Envelopment Analysis (DEA) as a statistical method is also quite popular to measure the efficiency of national innovation system. Sharma and Thomas (2008) examined the relationship between input variables consisting of R&D expenditure and researchers per million population and output variables including patents granted to residents and the number of publication for 22 countries. They found that both R&D expenditure and number of researcher have significant impact on output variables. Pan et al. (2010) measured the performance of the National Innovation system in 33 Asian and European Countries by using bilateral DEA model. Total expenditure on education and R&D, total R&D personnel and imports of goods and services are accepted as input factors while number of patent and scientific articles are

chosen output factors. Besides finding of effectiveness of input factors on output, by making the bilateral comparison analysis, they indicated that the input factors of Asian group is a better performer than the ones of European group.

3. DATA AND METHODOLOGY

As can be seen from the literature review, a lot system identification method has been proposed to examine innovation process. This study also aimed to develop an assessment for national innovation process in European countries. We know that National Innovation System consists of different components and the dynamics of the system arises from the interactions among these components. Accordingly, our system identification methods will be based on examining the interactions among capacity and performance components of national innovation system. In other words, while assessing and measuring the innovation process, we will examine the relationships among the data that belongs to capacity and performance components of systems in Europe. Thus, depending on the most recent and available annual data from EUROSTAT under the thematic subtitle of Science and Technology over the period from 2000 to 2014, we have considered 12 European countries which are Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and, United Kingdom.

The key set of variables related to capability and performance components in our model are shown in Table-1. Variables related to capability components can be seen from the left column of Table-1 while the right column of Table-1 presents variables related to performance components. National innovation capacity is represented by the dimensions of Human Capital, Research and Development (R&D) activities and Information and Communication Technology (ICT) infrastructure. Dimensions of Human Capital consists of total expenditure on education (X_1), graduates in upper secondary education per 1000 population aged 25–34 (X_2) and doctorate graduates per 1000 population aged 25–34 (X_3). R&D activities include R&D performed by Business (X_4), R&D performed by Government (X_5) and R&D personnel (X_6). ICT infrastructure covers the variables like Internet access of household (X_7), share of the ICT sector (X_8) and share of ICT sector investment in total investment (X_9). Performance variables consist of dimensions of invention and innovation. Dimension of invention includes the variables like number of scientific publication (Y_1) and patent applications to European Patent Office (Y_2). Dimension of innovation includes the variables like medium and high-tech manufacture exports (Y_3) and sales of new market and new to firm innovation (Y_4).

Table-1: Model of Canonical Correlation Analysis for Capacity and Performance of National Innovation System

Capacity Variables of National Innovation System	Canonical Variables of Capacity	Canonical Coefficient	Canonical Variables of Performance	Performance Variables of National Innovation System
Human Capital				
X_1 Total expenditure on Education (%GDP)				
X_2 Graduates in upper secondary education per 1000 population aged 25–34				Invention
X_3 Doctorate graduates per 1000 population aged 25-34				Number of scientific publication in scientific journal Y_1
				Patent Applications to EPO (per million inhabitants) Y_2
Research and Develop.				
X_4 R&D performed by Business (% GDP)	U_1	R_1	V_1	
	U_2	R_2	V_2	
X_5 R&D performed by Government (% GDP)	U_3	R_3	V_3	Innovation
				Medium and high-tech manufacture exports (% of total) Y_3
X_6 R&D personnel (% of the labour)				Sales of new market and new to firm inno. (% of total turnover) Y_4
ICT Structure				

X ₇	Internet access of household (% of all household)
X ₈	Share of the ICT Sector (% of GDP)
X ₉	Share of ICT Sector Investment (% of total Investment)

A number of system identification methods based on the focusing on interaction among components of system have been developed in the last decades. From the point of view of our analysis, we need an empirical methodology that takes account the interactions among all capacity and performance components of system. Accordingly, it can be argued that Canonical Correlation Analysis (CCA) is the best empirical method to satisfy the needs for this kind of system analysis. Indeed, CCA is a powerful method used to measure the relationship between two multidimensional variables. Thus it enhances our understanding of the system dynamics arising from interaction among capacity and performance components of NIS. In other words, system dynamics arising from the NIS capacity and performance components are easily obtained by CCA. This method has the ability to deal with variable pair of sets simultaneously to produce both structural and spatial meaning. That means it provides an effective technic to evaluate the causal relationship between several variables belonging to capacity and performance components of NIS.

Canonical correlation Analysis was first introduced by Hotelling (1936). This empirical model can be described briefly like below (Johnson and Wichern, 2007, 539-541). Assume that, there are original two data set: X-Variable Set (X₁, X₂,.....X_p) and Y-Variable Set (Y₁, Y₂,.....Y_q). Dual canonical variables U_i and V_i are derived by the linear combination of observed original data set indicated below.

$$U_i = a_{i1} X_1 + a_{i2} X_2 + \dots + a_{ip} X_p$$

$$V_i = b_{i1} Y_1 + b_{i2} Y_2 + \dots + b_{iq} Y_q$$

The criteria for determining the number of dual canonical variables (s); (U_i, V_i) s = Min (p, q) and (a₁₁, a₁₂, a_{1p}) and (b₁₁, b₁₂, b_{1q}) are called canonical vectors. Thus, linear components of the data set can be redefined as follows:

$$U_i = a' X$$

$$V_i = b' Y$$

Then the variance and covariance of canonical variables can be calculated as follows:

$$\text{Var}(U_i) = a' \text{Cov}(X) a = a' \Sigma_{11} a$$

$$\text{Var}(V_i) = b' \text{Cov}(Y) b = b' \Sigma_{22} b$$

$$\text{Var}(U_i, V_i) = a' \text{Cov}(XY) b = a' \Sigma_{12} b$$

Thus highest correlation coefficients (R_i) for canonical vectors a and b and therefore the canonical variables U_i and V_i can be obtained from the following formula;

$$R_i(U_i, V_i) = \frac{a' \Sigma_{12} b}{\sqrt{a' \Sigma_{11} a} \sqrt{b' \Sigma_{22} b}}$$

In the framework of canonical correlation analysis also produces "Canonical Loadings of the Original Variables with their Canonical Variables" and "Canonical Loadings of the Original Variables with opposite Canonical Variables" in order to indicate the impact of original variables on own and other canonical variables.

In conclusion, in the framework of Canonical Correlation Analysis, we will make three different calculation concerning with the original capacity and performance variables of NIS in Table-1.

- Canonical Correlation Analysis of Canonical Variables relating to Original Variables: The observed original variables in each component of NIS are combined together into one synthetic variable called Canonical Variable.

After determining a set of canonical variables relating to component of system, to evaluate the interaction or simultaneous relationship between system components, we measure the associations among pair of canonical variables.

- Canonical Loadings of the Original Variables with own Canonical Variables: These canonical loadings inform interpretation by helping to define the structure of the own canonical variable, that is, what observed variables can be useful in creating the canonical variable and therefore may be much more useful to explain the relationships among components.
- Canonical Loadings of the Original Variables with opposite Canonical Variables: These canonical loadings inform how certain variable related to one component of NIS effect other component by interacting with the other canonical variable belonging to opposite components of NIS.

4. FINDINGS AND DISCUSSIONS

In the framework of Canonical Correlation Analysis, the relationship among the variables relating to capability and performance components of innovation system indicated in Table-1 have been examined. Thus we tried to indicate both the whole impact of capability components and the relative importance of each variable in capability components on performance components.

The results of canonical correlation coefficients for data set of capacity and performance of innovation system are presented in Table-2. It seems that all coefficients are statistically significant. This result indicates that capacity components consist of the dimensions of Human Capital, R&D and ICT structure have the positive effects on innovation performance. Thus, it can be concluded that capacity components of national innovation system perform well in Europe.

For further analysis, following the criteria advised by the Canonical Correlation Analysis, first and the biggest significant correlation (0.819) sourced from the first pair of canonical variables ($U_1 V_1$) has been used to produce the Loadings and Cross-Loading of the Original Variables. Accordingly, in terms of the first pair of canonical variables ($U_1 V_1$), Table-3 and Table-4 present loadings and cross-loadings of original variables respectively to show the relative importance of each observed variable related to components. While loadings in Table-3 indicate the relationship between original variable and the own canonical variables, cross-loadings in Table-4 measure the impact of original variable on opposite canonical variables.

It seems from the values of both loadings and cross-loadings in Table-3 and Table-4 that all variables related to Human Capital (X_1, X_2, X_3) have the biggest effect on innovation performance compared to other capability variables related to R&D and ICT except the internet access of household (X_7) belonging to ICT component. The impact of internet access of household (X_7) on innovation performance is only bigger than the total expenditure on education (X_1) in Human Capital component. However, it can be generally concluded that the component of Human Capital is the most dominant factor determining the innovation performance in European countries. Second most effective group of variables concerning with the capability component are related to ICT structure while the least effective variables on innovation performance belong to R&D component in the national innovation systems of Europe.

We can also compare the relative impact of each components variables in their own component by looking at the values of loadings and cross-loadings in Table-3 and Table-4. Among the variables relating to human capital components, the loading value (0,718) and cross-loading value (0,679) of doctorate graduates have the biggest weights while loading value (0,616) and cross-loading value (0,578) of graduates from upper secondary school have the second weights compared to the share of total expenditure on education. The variable of expenditures on education has the least loading value (0,454) and cross-loading value (0,417) in Human capital component. These show that indicators relating to the level of graduates from education effect the dynamic of innovation performance much more compared to expenditures on education.

Looking at the ICT, the loading value (0,598) and cross-loading value (0,551) of internet access of household has much more weights than both the loading value (0,447) and cross-loading value (0,409) of share of the ICT sector and the loading value (0,418) and cross-loading value (0,383) of share of ICT sector investment in total investment. Thus, ICT-using comes out as a most effective measure of innovation performance in comparison to the indicators relating to volumes of ICT sector and investment.

Considering with the variables of R&D component, the loading value (0,423) and cross-loading value (0,387) of the number of personnel employed in R&D have the biggest weights compare to same values of private (0.311 and 0.271) and public (-0.152 and -0.103) performed R&D. That means the effectiveness of the number of R&D personnel on innovation performance is much bigger than the effectiveness of private and public performed R&D. By the way, the effect of public performed R&D, which is negative, is naturally also lower than private performed R&D.

Finally, looking at the relative importance of performance components, it seems from the Table -3 and Table-4 that invention values (Y_1 and Y_2) of loading and cross-loading are bigger than the related values of innovation (Y_3 and Y_4). This revealed that performance of European innovation systems is dominated by invention rather than innovation, which indicated that capacity components have the impacts on invention much more.

Table-2: Canonical Correlation Analysis

Pair of Canonical Variables	Canonical Correlation	Squared Canonical Correlation	Wilk's Lambda	Chi-Square	df	P value
$U_1 V_1$	0.819	0.671	0.168	111.851	36	0.000
$U_2 V_2$	0.701	0.491	0.214	41.950	24	0.011
$U_3 V_3$	0.490	0.240	0.724	27.672	14	0.172
$U_4 V_4$	0.299	0.089	0.897	6.831	6	0.374

Table-3: Loadings of the Original Variables with their Canonical Variables

X – Variable Set (Capability)									
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
U_1	0.454	0.616	0.718	0.311	-0.152	0.423	0.598	0.477	0.418
Y – Variable Set (Performance)									
	Y_1	Y_2	Y_3	Y_4					
V_1	0.668	0.545	0.337	0.218					

Table-4: Cross- Loadings of the Original Variable with opposite Canonical Variable

X – Variable Set (Capability)									
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
U_1	0.417	0.578	0.679	0.271	-0.103	0.387	0.551	0.409	0.383
Y – Variable Set (Performance)									
	Y_1	Y_2	Y_3	Y_4					
V_1	0.614	0.511	0.297	0.177					

5. CONCLUSION

A lot of empirical studies have been proposed in the framework of systemic perception to examine the dynamics of innovation process after National Innovation System (NIS) approach became popular as analytical tool. In our study we also aimed to measure and assess the dynamics of national innovation systems in European countries. Accordingly, by applying Canonical Correlation Analysis for the annual data from 2010 to 2014, we examined the impact of capability components on the performance of innovation system. We indicate whole impact of capability components and the relative impact of variables in every component on the performance of national innovation systems.

The results of canonical correlation coefficient reveal that variables related to capacity components like Human Capital, ICT structure and R&D have generally the positive effects on innovation performance in Europe. Among the capability components, empirical findings also indicate that variables related to Human Capital have the biggest effect on innovation performance of innovation systems in Europe. Variable belonging to ICT structure have the second significant effect on innovation performance while variables of R&D component have the latest impact on innovation process. Concerning with the variables related to human capital, the findings also indicated that the level of graduates from education effect the dynamic of innovation performance much more compared to variable of expenditures on education. Looking at the relative impact of variables belonging to ICT component, ICT-using comes out as a most effective measure for innovation performance in comparison to the indicators relating to volumes of ICT sector and investment. Finally, relating to variables of R&D component, the number of R&D personnel has a much more impact on innovation performance compared to private and public performed R&D.

Concerning with the policy design and implication process, it can be argued that policy makers in Europe firstly focus on the increasing number of people graduated from higher level education to promote innovation performance. They should also give importance to increasing the number of people using ICT and making R&D to reach better innovation performance. In conclusion, basic dynamic of innovation system in Europe comes mostly from the different aspects of human capital such as the number of people graduated from higher level education, using ICT and making R&D. Thus, as generally argued, increasing of R&D intensity at country level is not only sufficient condition for improving innovation system. Accordingly,

innovation policies like European Union focusing on an R&D-to-GDP ratio 3% is not enough without providing the requirements for an appropriate human capital development in national innovation system.

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