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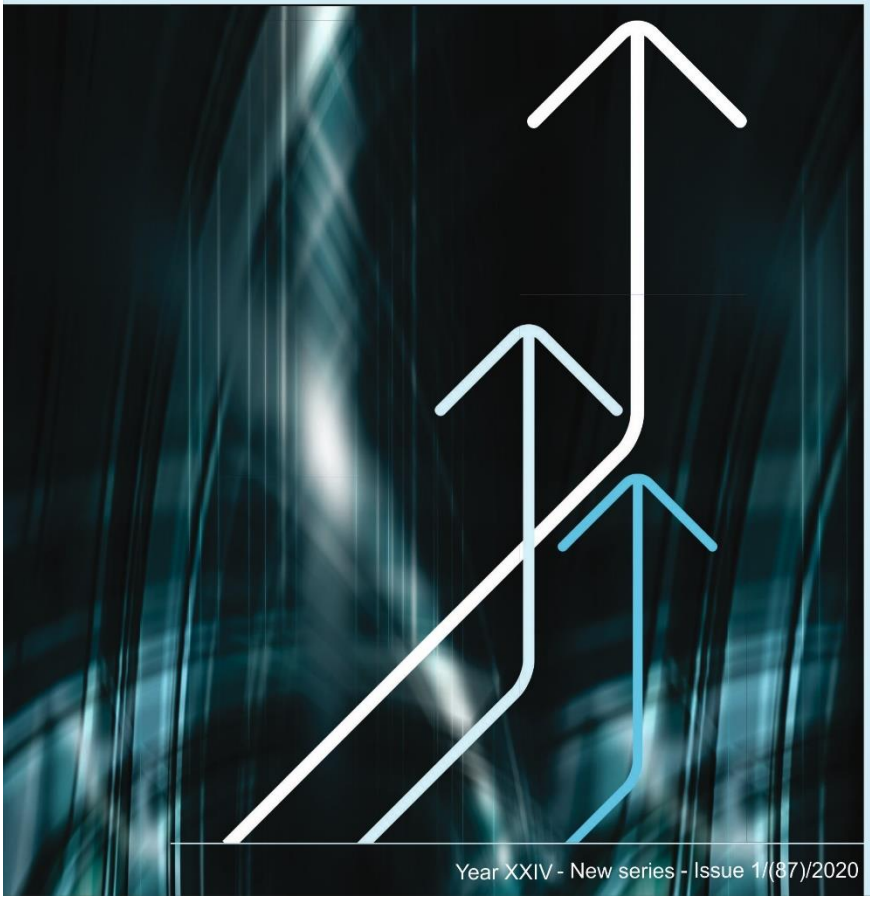

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“VICTOR SLĂVESCU” CENTRE FOR FINANCIAL
AND MONETARY RESEARCH

FINANCIAL STUDIES

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THE RELATIONSHIP BETWEEN INFLATION AND ECONOMIC GROWTH: EXPERIENCES OF SOME INFLATION TARGETING COUNTRIES

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Abstract

The relationship between price stability and economic growth has gained importance as a fundamental reason for the monetary policies based on the inflation targeting regime. Nevertheless, there is no theoretical evidence as to which inflation level is considered to be high or low for economic decision-making units. Therefore, empirical findings are required to determine which inflation level is a threshold for the economic growth. The aim of this study is to examine the relationship between price stability and economic growth of the selected countries applying inflation targeting. We use threshold dynamic panel data model in order to make a comparison between inflation targeting countries. According to the findings of the study, the threshold value is 4,182% in inflation targeting countries. Below the threshold, the inflation-growth relationship is insignificant, and above the threshold, inflation affects economic growth negatively. This result shows that the inflation-economic growth relationship is nonlinear.

Keywords: Monetary Policy, Emerging Countries, Threshold Dynamic Panel Data Analysis

JEL Classification: E31, E52

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1. Introduction

Since the 1970s, monetary policy has begun to play a primary role in the fight against inflation. Central banks have primarily tried to control inflation by targeting monetary aggregates and have succeeded in part. However, the objective-instrumental function of the central banks has started the process of direct inflation targeting instead of targeting monetary aggregates from the beginning of the 90's (Kumo, 2015: 5). New Zealand is the first instance of this process with the year 1990. Nowadays, many countries use the inflation targeting strategy (http://www.centralbanknews.info/p/inflation-targets.html).

Based on the main objective of price stability, the inflation targeting strategy is implemented to ensure that inflation is determined at a level that does not affect economic activities negatively. When the inflation rate occurs at high levels; sustainable growth, fair distribution of income, expected returns of investment projects, competitiveness of the country in foreign trade, distribution of tax burdens, etc. macroeconomic variables are adversely affected (Gokal and Hanif, 2004: 2). However, the question of which levels are high - under the title of inflation-growth relationship- is frequently investigated in the literature.

The 2007-2008 global crisis have given rise to the determination of financial stability as a macroeconomic policy objective (Tüzün and Kahyaoğlu, 2015: 26). This period has led to a review of the relationship between inflation and growth in the literature. The fact that academic studies include the relationship between inflation and growth is discussed from a nonlinear perspective by focusing on the calculation of the threshold value, which indicates the level at which inflation began to negatively affect economic growth (Burdekin et al., 2004; Cuaresma and Silgoner, 2004; Omay and Kan, 2010). Blanchard et al. (2010) states that if inflation is determined at single-digit levels, the relationship between inflation and economic growth cannot be precisely predicted. On the other hand, in developing countries, when the negative impact of inflation on economic growth is evaluated, the threshold value is higher than in developed countries (Kremer et al., 2013).

The most important question in this study: What is the threshold inflation rate for the countries that implement “inflation targeting

(selected 24 countries[1]) as the main objective of price stability in monetary policy? Thus, with the threshold value obtained; it has been determined after what level and in what direction the inflation rate started to affect economic growth. In this respect, the inflation target set by the central banks in countries implementing inflation targeting strategy the extent to which it overlaps with the target of sustainable growth could also be analyzed. Therefore, we examine the nonlinear structure of the inflation-economic growth relationship through the threshold dynamic panel method proposed by Caner and Hansen (2004).

In the following section of the study, the literature is summarized. In the next section, methods, data sets and analytical findings are reported. The final part of the study conclusions and policy recommendations are put forward.

2. Literature review

The relationship between price stability and economic growth, especially for countries that implement price stability, has been quite remarkable in how and in what way inflation affects growth. The results of the applied studies conducted on this subject show that the relationship is negative in countries that are not able to maintain price stability in the case of high inflation (Fischer, 1993; Alexander, 1997; Bruno and Easterly, 1998; Ghosh and Phillips, 1998; Barro, 1999;). In the case of high inflation, studies that find the relationship between inflation and economic growth positive (Mallik and Chowdhury, 2001). However, these studies are generally based on the assumption that the relationship is linear.

According to the determined inflation value, the direction and severity of the relationship between inflation and economic growth varies. For this reason, inflation is important for countries that target price stability. In recent years, studies have taken into consideration the assumption that this relationship is not linear. In the framework of these models, it is determined how and in what direction the relationship between economic growth and inflation is affected relative to threshold inflation. In these studies, it was tried to determine the direction of the relationship by applying it for the groups of countries as well as for a country.

[1] *The countries implementing the inflation targeting strategy have been included in the analysis since the year they started inflation targeting when creating the data set.*

In accordance with the purpose of the study, the studies on this subject are summarized in the following table within the framework of country and country groups based on the assumption that they are not linear.

Table 1

Literature review for inflation-growth relation by threshold value

Authors	Period	Sample	Threshold Value
Khan and Senhadji (2001)	1960-1998	140 countries	3% Developed countries 12% Developing countries 9% All countries
Mubarik (2005)	1973-2000	Pakistan	9%
Munir et al. (2009)	1970-2005	Malaysia	3.89%
Hasanov (2011)	2001-2009	Azerbaijan	13%
Akgül and Özdemir (2012)	2003:01-2009:12	Turkey	1.26%
Kremer et al. (2013)	1950-2004	124 countries	2.53% industrialized countries 17.228% Non-industrial countries
Omay and Kan (2010)	1972-2005	6 Developed countries	2.52%
Vinayagathasan (2013)	1980-2009	32 Asia Countries	5.43%
Tung and Thanh (2015)	1986-2013	Vietnamese	7%
Thanh (2015)	1980-2011	Vietnamese, Indonesia, Malaysia, Philippines, Thailand	7.84%
Aydın et al. (2016)	1980-2013	Emerging Countries (Selected 24 countries)	13.68%
Aydın and Odabasioglu (2017)	1992-2013	Azerbaijan, Kyrgyzstan, Kazakhstan, Uzbekistan, Turkmenistan	7.97%

Source: Prepared by authors.

In summary, in many recent studies, the relationship between growth and price stability is not linear and has a threshold effect. If inflation rates are below threshold value, the relationship is generally positive or insignificant, but if the inflation rates are above the threshold value, the effect of inflation on growth is usually found to be negative and significant.

3. Methodology

Consider the dynamic panel data model with units $i = 1,2, \ldots . . N$ and a fixed number of time periods $t = 1,2, \ldots T$, with $T \geq 2$:

$$y_{it} = \alpha y_{i,t-1} + x_{it}\beta + \varepsilon_{it} \quad (1)$$

where x_{it} is a $\mathrm{K_x}$ x 1 vector of time-varying variables. The initial observations of the dependent variable, y_{i0}, and the regressors, x_{i0}, are assumed to be observed. μ_i is an unobserved unit-specific effect of the i-th cross-section, and ε_{it} is the error term. Note that μ_i is correlated with the lagged dependent variable by construction.

This type of model was first studied by Balestra and Nerlove (1966) and is often called the dynamic panel data model. After this study, a lot of papers proposed several estimators and discussed their properties. These include Nickell (1981), Anderson and Hsiao (1981, 1982), Arellano and Bond (1991), Arellano and Bover (1995), Ahn and Schmidt (1995, 1997) and Blundell and Bond (1998).

In dynamic panel data model, the lagged dependent variable used in the fixed and random effect models is correlated with the error term. If lagged dependent variables appear as explanatory variables, strict exogeneity of the regressors no longer holds. For this reason, the idea of using an instrumental variable instead of lagged dependent variable has developed.

Anderson & Hsiao (1981) applied the lagging process in the above equation (1) to remove unit effects from the model, using $y_{i,t-2}$ instead of $\Delta y_{i,t-1}$ as instrumental variable (Baltagi, 2008). Estimation using the instrumental variable is consistent but inefficient, as it does not allow the use of all moment conditions. Arellano & Bond (1991) used all lagged values of y and x as instruments instead of first difference equation ($\Delta y_{i,t-1}, \Delta x_{i,t-1}$) and developed the method of generalized moments (GMM).

The Arellano-Bover/Blundell-Bond estimator, on the other hand, extended the Arellano-Bond estimator by introducing additional

assumptions, separating the first difference of instruments from the fixed effects. Thus, the efficiency of the Arellano-Bond estimator increased as a result of using more instruments. This approach based on combining two equations (original equation and transformed equation) into one system was referred to as "system GMM". Since the system GMM estimator increases sensitivity and reduces finite sample bias, it generally yields more efficient and unbiased estimators compared to the difference-GMM estimator (Baltagi, 2008).

In this study, we examine the relationship between inflation and economic growth within the framework of the dynamic panel threshold model. In estimating the dynamic threshold model, we follow the approach introduced by Caner and Hansen (2004). In their research, they provide an inference theory, developing an estimator with endogenous variables and an exogenous threshold variable. Here, as an endogenous explanatory variable, the countries ' initial income levels (gdp_{it-1}) were used. The basic panel threshold model can be shown as follows:

$$y_{it} = \mu_i + \beta_1' z_{it} I\left(q_{it} \le \gamma\right) + \beta_2' z_{it} I\left(q_{it} > \gamma\right) + \varepsilon_{it,} \quad (2)$$

where $i = 1, \ldots\ldots, N$ represents countries , $t = 1, \ldots\ldots, T$ time index, μ_i country specific fixed effects and the $\varepsilon_{it} \overset{iid}{\sim} \left(0, \sigma^2\right)$ is error term. $I(.)$ is the indicator function that indicate the regime defined by the threshold variable q_{it} and the threshold level γ. z_{it} represents the vector of m-dimensional explanatory variables containing the lagged value of y and other endogenous variables. The vector of explanatory variables is divided into a subset z_{1it} as exogenous variables which is uncorrelated with ε_{it}, and a subset of endogenous variables z_{2it}, correlated with ε_{it}. In the estimation progress, the model requires $k \geq m$ instrumental variables x_{it} including z_{1it}.

Before estimation procedure, the model has to be eliminated from the individual effects μ_i via a fixed effect transformation. But, the standard within transformation applied by Hansen (1999) leads to inconsistent estimates due to the correlation between lagged dependent variable and the mean of individual errors. On the other hand, first-differencing of the dynamic equation (2) results negative serial correlation of the error term. So, the distribution theory developed by Hansen (1999) is not applicable anymore to panel data.

Due to the problems, in this model, a novel transformation method namely the forward orthogonal deviations, suggested by Arellano and Bover (1995) is used to eliminate the fixed effect. The superiority of the forward orthogonal deviations as to other transformations is that serial correlation of the transformed error term in this method is avoided. Instead of subtracting the mean from each observation (within transformation), in this method, the average of all future available observations of a variable is subtracted. Thus, for the error term, the forward orthogonal deviations transformation is given by:

$$\varepsilon_{it}^{*} = \sqrt{\frac{T-t}{T-t+1}\left[\varepsilon_{it} - \frac{1}{T-t}\left(\varepsilon_{i(t+1)} + \cdots + \varepsilon_{iT}\right)\right]} \tag{3}$$

After this adjusted, the uncorrelated error terms obtained by the forward orthogonal deviation transformation can be defined as follows:

$$Var(\varepsilon_i) = \sigma^2 I_T \equiv Var(\varepsilon_i^{*}) = \sigma^2 I_{T-1} \tag{4}$$

In this paper, we followed Caner and Hansen (2004) procedure in the estimation stage. We use reduced form regression estimates for the endogenous variables of z_{2it} as a function of instrumental variables x_{it}. The endogenous variable z_{2it} in the structural model is then replaced by the estimation values of $\hat{z}_{2it}$. In the second step, the equation (1) including the estimation values of $\hat{z}_{2it}$ is estimated by the least squares method along with a constant threshold value γ. If the obtained error sum of squares is expressed with $S(\gamma)$, together with the threshold variable q, the process is repeated until the minimum error sum of squares $\hat{\gamma} = \text{argmin } S(\gamma)$ is obtained.

Critical values for the threshold value of 95% confidence interval are calculated as follows (Hansen (1999), Caner and Hansen (2004)):

$$\Gamma = \{\gamma : LR(\gamma) \leq C(\alpha)\} \tag{5}$$

where, $C(\alpha)$ represents the asymptotic distribution of likelihood ratio statistics $LR(\gamma)$ at 95% significance level. Once the threshold value has been estimated, the slope coefficients could be estimated using generalized moments method (GMM) together with instrumental variables and the predicted $\hat{\gamma}$ value.

4. Inflation threshold and economic growth

The threshold model for testing the effect of inflation on economic growth can be defined as follows:

$$\mathrm{dgdp}_{it} = \mu_i + \beta_1 \tilde{\pi}_{it} I(\tilde{\pi}_{it} \leq \gamma) + \delta_1 I(\tilde{\pi}_{it} \leq \gamma) + \beta_2 \tilde{\pi}_{it} I(\tilde{\pi}_{it} > \gamma) + \emptyset z_{it} + \epsilon_{it} \quad (6)$$

In this model, inflation is defined as both the threshold variable and the regime dependent explanatory variable. Where z_{it} represents the vector of internal control variables whose slope coefficients are independent of the regime. The model was also extended to allow for differentiation in regime averages (δ_1)based on Bick (2010). The initial income level is included in the model as an endogenous variable: $z_{2it} = initial_{it} = gdp_{it-1}$. z_{1it} represents the vector of other control variables. Arellano and Bover (1995) approach is used to determine instrumental variables. Accordingly, the lagged values of the dependent variable were used as an instrument variable in the model.

In the literature, the logarithm of the inflation variable is included in the model in order to eliminate the distorting effects caused by the inflation differences between the countries and the outliers. In this study, due to negative inflation, observations in the data set, the inflation variable was subjected to semi-logarithmic transformation (Drukker et al. (2005); Khan and Senhadji (2001)):

$$\tilde{\pi}_{it} = \begin{cases} \pi_{it} - 1, & if \quad \pi_{it} \leq \%1 \\ ln(\pi_{it}), & if \quad \pi_{it} > \%1 \end{cases}$$

Here, inflation rates below 1 are re-scaled. In this way, the inflation data is more symmetric and approaches normal distribution.

5. The Data

We examine the relationship between inflation and economic growth by means of panel data analysis in the 24 inflation targeting

countries[2]. The data consists of an unbalanced panel between the period in which each country applies the inflation targeting strategy and the year 2016. By using panel data analysis, we determine the nonlinear relationship between inflation and economic growth, and macroeconomic variables. The annual growth rate of GDP per capita (DGDP), which represents economic growth in the study, was used as a dependent variable. Inflation rate (π), which shows the annual percentage change in the Consumer Price Index (CPI) of the countries, and the other control variables considered to be related to inflation such as share of investments in GDP (igdp), population growth rate (dpop), initial GDP per capita representing initial level of income (initial), openness rate (open) and terms of trade (dtot) are used as independent variables. The data were obtained from the World Bank (www.worldbank.org.tr) and from the International Financial Statistics (IFS), the database of IMF. The variables used in the model and their notation are presented below

Table 2

Variables

Variable	Notation
Per capita GDP growth rate (2010 Prices)	$dgdp$
Inflation rate	π
Share of investments in GDP	$igdp$
Population growth rate	$dpop$
Initial level of income	$initial$
Openness	$open$
Terms of trade	$dtot$

6. Empirical Findings

Table 3 shows the results of the dynamic panel threshold model for the analysis of the relationship between inflation and economic growth in countries that implement inflation targeting.

[2] *Listed in the appendix.*

Table 3

Inflation Threshold and Economic Growth

Threshold	
$\hat{\gamma}$	%4.182
95% Confidence Interval	[1.044, 5.261]
Effect of Inflation (as regards regimes)	
$\hat{\beta}_1$	-0.475 (0.358)
$\hat{\beta}_2$	-1.748** (0.787)
Control Variables	
$initial_{it}$	-10.506*** (1.437)
$igdp_{it}$	0.529*** (0.071)
$dpop_{it}$	0.105 (0.441)
$dtot_{it}$	0.588 (1.522)
$open_{it}$	6.792*** (1.126)
$\hat{\delta}_1$	-0.611 (1.403)
Sample	405
High Inflation (Number of Sample)	146
Low Inflation (Number of Sample)	259
N	24

*Note: The lagged values of the dependent variable are used as instrumental variables in the model. Standard errors are shown in parentheses. *, **, *** indicate levels of significance of 10%, 5% and 1% respectively.*

The estimated inflation rate is 4.182%. The 95% confidence interval for the threshold value ranges between 1.044 % and 5.261%. Accordingly, the minimum threshold inflation value is 1.044% and the maximum threshold inflation value is 5.261%. On the other hand, the initial income level($initial_{it}$), the share of investments in gross domestic product($igdp_{it}$), and the openness ratio($open_{it}$) variables[3] have a statistically significant effect on economic growth. The effects of population growth rate ($dpop_{it}$), terms of trade($dtot_{it}$) and regime average $(\hat{\delta}_1)$ on economic growth are insignificant. The β_1 and β_2 coefficients show the effect of inflation on growth as regards the

[3] *These variables are regime independent control variables.*

regimes. Inflation seems to be negatively correlated with economic growth above the threshold value (β_2). In other words, every 1% increase in inflation above the 4.182% leads to a 1.478% decrease in the economic growth of the so-called countries. On the other hand, there is no statistically significant relationship between inflation and economic growth below the threshold (β_1). Thus, this result, which shows that the effect of inflation on growth becomes indefinite if the inflation falls below the 4.182%, is similar to most studies in the literature. When the inflation coefficients are compared in terms of absolute value, it is seen that the correlation between inflation and economic growth over the threshold ($\beta_2 = 1.748$) is much higher than the correlation below the threshold ($\beta_1=0.475$). This result shows compatibility with theoretical expectations.

7. Conclusion

In this study, the relationship between inflation and economic growth in 24 countries that implement inflation targeting strategy is examined with dynamic panel data analysis. By using the method, the non-linear relationship between inflation and economic growth is determined along with the main macro-economic variables. Thus, the inflation-growth relationship can be determined separately for the selected sample.

According to the empirical findings of the study, the threshold is 4.182% in inflation targeting countries. This indicates the importance of the "inflation targeting strategy". Inflation-economic growth relation is not significant below the level of 4.182%. However, above the threshold (4.182%), inflation affects economic growth negatively. This result means that inflation-economic growth relation is nonlinear and asymmetrical.

It is important to know the threshold to identify inflation expectations, expected yields of the investments, and the level at which the monetary policy will change direction. In this respect, central banks will need to know the threshold in order to determine monetary policy stance.

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APPENDIX

Countries	Starting Period of Inflation Targetting
Albania	2009
Australia	1993
Brazil	1999
Canada	1991
Chile	1999
Colombia	1999
Czech Republic	1997
Ghana	2007
Hungary	2001
Iceland	2001
Indonesia	2005
Israel	1997
Mexican	2001
Norway	2001
New Zealand	1990
Peru	2002
Poland	1998
Romania	2005
Serbia	2006
South Africa	2000
Swedish	1993
Korea	2001
Thailand	2000
Turkey	2006

A POST-KEYNESIAN APPROACH AS AN ALTERNATIVE TO NEOCLASSICAL IN THE EXPLANATION OF MONETARY AND FINANCIAL SYSTEM

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Abstract

The aim of this paper is to provide a Post-Keynesian view to economic theory as an alternative to traditional theory. Keynesian economics consists of an approach to economics derived mainly from the work of Keynes. It is grounded on the fields of observations of stylized facts of the economy and attempts to provide solutions to arising problems, which cannot be adequately explained and resolved by mainstream theory. We wish not in this paper to contradict the conventional with Keynesian and Post-Keynesian theory, but instead to provide an alternative and complementary view. However, we highlight the differences between traditional neoclassical theory and Post-Keynesian macroeconomics. Therefore, we shall focus on Post-Keynesian analysis on the operation of monetary and financial system in the endeavour to fill gaps on the explanation of relative phenomena. The main scope is the explanation of the financial system and financial stability.

Keywords: Post-Keynesian, neoclassical theory, monetary policy, financial system, financial instability

JEL Classification: B50, E44, E50

1. Introduction

The recent phenomena of financial distortions and crises have highlighted the inability of the mainstream theory to provide adequate explanations of the causes and their frequency. Alternative economic theories could provide addable insights to the existing traditional theory

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in order to result to a coherent and solid theory. Emphasis is given on the differences between neoclassical theory and Post-Keynesian approach, particularly in the fields of monetary and financial sector. The latter has become a matter of serious consideration among Post-Keynesians because they consider that the financial sector and real economy are inextricable intertwined. As soon as we present the main differences between theories, we proceed to an explanation of main Keynesian and Post-Keynesian contributions, regarding the monetary and financial sector within the concepts of expectations, uncertainty, speculative demand, interest and exchange rates. Thereby, we review Post-Keynesian theory in international economy, displaying its monetary targets and finally we deduct the main conclusions and questions about the relevance of the conventional theory and the Post-Keynesian approach. The method used in this paper is a common-sense approach to realize the processes of economy and finance. It is a rather complex combination between observed facts with theory that would derive from deductive methods. But the gist is that theory should be accorded with facts. The above argument constitutes a fundamental axiom to begin any endeavour so as to reach to certain useful conclusions. As Myrdal pointed out when the observations of facts do not agree with a theory, i.e. when they do not make sense in the frame of the theory utilized in carrying out the research, the theory has to be discarded and replaced by another (Myrdal, 1957, p. 160).

2. Differences between Post-Keynesian and Neoclassical approach

We may distinct three main features of neoclassical economics in terms of monetary policy. Firstly, the preference on flexible rate regimes than fixed rates. Secondly, the “efficient market hypothesis”, according to which all best possible information is contained within the price of an asset. Thirdly, the famous Say’s Law and the neutrality of money, making the role of effective demand useless. The implication of the above features is that regulation is unnecessary. Traditional theory deems financial system as stable and efficient, and whenever it turns unstable, that is due to an exogenous shock, where only monetary policy will be enough to restore its stability. However, there is a strong opposition debate on this view.

Buiter (2009) believes that the obsession on efficient market hypothesis has disorientated financial economics where the emergence of recent financial crises and the inability to provide

necessary explanations has raised serious questions concerning the relevance of neoclassical economics. Similar views have been shared by other economists (Krugman 2009, Stiglitz 2010, Allen and Gale 2007).

The important aspect in Post-Keynesian analysis is the role of effective demand, where its scarcity and not the scarcity of resources have to be faced in order to increase total output. On the other hand, traditional theory indicates the perception that operation of competitive market forces will tend to reduce inequalities and always move towards equilibrium positions, attributed by the efficient allocation of the available resources. That contention of market operation is the key to the potential growth of economy. Keynes mentioned that money-making process is the aim of market operations and therefore production is linked with money. It commences with money to result in more money, and in that sense, efficient allocation of resources is not consistent with production and investment decisions. Post-Keynesians discard the notion of economic equilibrium, a fundamental axiom of the neoclassical theory. They believe that either the economy is permanently in disequilibrium or that there is no equilibrium at all. There is no empirical proof that "the market" as it functions is seeking to equilibrium point. There are arguments coming from economists (Borio et al 2016) who suggest that the economy is always in a transition mood, or in a repeated cycle. There is also the Minskyan (1986) view, that instead of equilibrium, the economy simple experiences some periods of tranquillity.

Thirlwall (1993) had distinguished the main aspects of Post-Keynesian macroeconomics that bring up the arguments against mainstream economics. First of all, the employment depends on product market rather than labour market. Secondly, Post-Keynesian theory in contrary to mainstream economic, argues that involuntary unemployment does exist due to lack of effective demand. As far as the relation among investment and saving is concern, thirdly, causation flows from investment to saving. Fourthly and most relevant to this paper, money, finance and debt issues are essential part of economy, whereas money is not neutral discarding thus the quantity theory of money because money is endogenous[1].

[1] *The quantity theory of money equation sets (MV=PT). However, in post-Keynesian view causation runs from right to left, not from left to right; changes in liquidity preference mean that V is not constant.*

Similarly, macroeconomics is viewed as an aggregate of microeconomics in traditional theory which also underestimates the role of financial sector into real economy. Post-Keynesians object that view and give equal importance to the financial sector. They also suggest the existing of two pricing systems. The first concerns prices of labor and current output and the second the prices of financial and capital assets. The traditional theory pays no attention to the second pricing system, including it just as a variable to the trade sector.

Another important issue is the introduction of mathematical models to validate a theory. The tendency on mathematics has transformed political economy as a part of social science to core independent science of economics. Neoclassical economists are obsessed with the use of complex mathematical models, incomprehensible to anyone without relative training, based to questioned assumptions and thus warding off their conclusions from reality. The inclination to mathematics has been criticized by Post-Keynesians and other schools of economic thought for not paying the proper attention to relative phenomena. Even Adam Smith was not keen on mathematical models in political economy, but he rather preferred common sense, “the scientist could use mathematical tools or models to propose laws, but they should subordinate to observed phenomena” (Fleischacker 2004, ch.2). Accordingly, Minsky stated that any theory detached from observations should not be accepted since in sciences “theory is a servant of observations, contrary to neoclassical economics, where “theory determines the acceptability of observations” (Minsky 1985, p.1). Hence, this methodological issue is at great significance so it must be cleared under what terms credit must be given to any upcoming theory.

3. The contribution of Post-Keynesian economics

The essence of Post-Keynesian economics is the importance of effective demand. The primary target for the well function of the economy as Keynes (1936) suggested is the maintenance of full employment, which will be attained by an increase in aggregate demand, which in turn entails an increase in total output. The mean to obtain the target, contrary to classical approach, is through some kind of intervention. There are market imperfections that cannot be fixed on their own, and hence, intervention is needed to restore the economy back to the track of full employment. A key feature of Post-Keynesian economics according to Lavoie (2015) is the claim that aggregate

demand is the determining variable, both in the short-run and in the long run, contrary to neoclassical view that in the long run only supply-side determinants matter. Kaldor (1972) points out that a self-sustained growth is determined not by exogenous factors but by the growth of demand, which will be increased at the simultaneously operation of merchants, manufacturers, and a monetary and banking system, allowing the money supply to grow in automatic response to an increased credit demand. The above argument could also be applied on the basis of financial stability. He also believed that economic theory went on a wrong path, as soon as it focused on the theory of the value and the market allocation operations rather than on creative operations. In general, Arestis (1996) states that Post-Keynesian economics has moved on from the stage of criticizing mainstream theory to the phase of forming a reliable juncture described by endogenous consistence.

3.1. Money and credit

Post-Keynesians disagree with the neoclassical theory in terms of money and credit, issues not fully incorporated by neoclassical school, but they have vital role in economy. Post Keynesians reject the view that money is neutral, since in uncertain conditions, money can be hold as a safety asset. Therefore, money plays a significant role in portfolio choices and in financial system, inasmuch as it consists of an option, rather a safe one, with its own implications. It should not be forgotten that money is the outcome of transforming the value of assets into liquidity, and again, in an incalculable uncertain world with unpredictable expectations, money or liquidity preference can generate speculative activity. In the financial markets, we can deduct an observation that there is a trade-off between speculation activity and liquidity preference.

Post-Keynesians argue that the financial sector has often been a destabilizing factor of the economy. It is not possible to separate real from monetary factors. Credit creation, the nature of money, the role of debt, are among other aspects more concerned by Post-Keynesians. They incorporate an explicit monetary approach to economic theory. The stylized facts and observations of real world are needed to be taken into account, whereas production, money, interest and investment are connected through the financial system. Post-Keynesian economists also reject Say's Law, since employment and total output are determined by aggregate demand. A single representative agent and the efficient market hypothesis do not seem

to explain the complex phenomena we observe in the economy. Davidson (1994) states that financial markets cannot be deemed as the efficient market theory implies, since expectations are heterogeneous and often irrational that influence financial markets, and in reality, are grounded on psychological predictions that are certainly not statistically or mathematically reliable.

Post-Keynesians stress the importance of uncertainty to the function of the economic system. Economic agents deal with uncertainty. There cannot be a trustworthy prediction on future conditions and perceptions. Thus, probability distributions for the future can only be compiled from past distributions, which are non-stationary. Furthermore, money, in conditions of uncertainty, is non-neutral and is associated with the law of contracts (Davidson 1978, Minsky 1975, Kahn 1958). It consists of one main factors of the fluctuation of the economic system and the financial instability. Uncertainty is viewed as the sufficient condition for the existence of money. Money is not exogenously determined as it is traditionally believed, but endogenously and demand determined. A rise in demand of credit entails a rise in its supply. The game therefore stems from entrepreneurs who must guess the pattern of effective demand and the required cash flows. Thus, the credit demand is settled, and then central and commercial banks set their discount and interest rate thresholds, in order to grant loans to meet entrepreneurs' requirements. Uncertainty is related to insufficient effective demand. Firms and households whenever they decide to acquire assets, they compare the marginal efficiency of capital with the yield-curve of financial assets. Thus, their decisions depend on expectations and risky perceptions. Whenever negative expectations increase then demand for money in relation to capital increases, hence shifting economic growth and employment.

3.2. The speculative demand for money

Keynes in his liquidity preference theory suggests that money is an asset used as a medium of exchange, store of value and unit of account. It is well known that three motives explain money demand. Firstly, the transactions-motive, necessary for transactions where liquidity serves as a medium of exchange. Secondly, the precautionary demand for money motive, which is attributed as a safety net against unpredictable events. The precautionary motive is negatively related to effective money demand since liquidity demand converts money as a store of wealth. Thus, insufficient effective demand emerges when

precautionary money demand increases. Thirdly, the speculative motive, where demand for money is increased by the desire of agents to buy financial assets. The first two motives are understandable in the nature of the economy but the third is a crucial one for the monetary policy as whole. As Keynes quoted "it is by playing on speculative motive that monetary management is brought to bear on the economic system" (Keynes 1936, p.196). Despite the importance of the speculative motive, the supply and demand for liquidity in financial markets also emanate from the other two motives and to a certain degree by the money supply.

The key factor to explain the speculative money demand is expectations, either in general terms, that is, conventions prevailing in the financial system, or in particular, regarding the difference, which agents expect between actual and future interest rates. The speculative behaviour of agents and banks constitutes the supply and demand for liquidity in financial markets. Hereby, it establishes the interest rate paid by an asset in particular as well as the economy's interest rate, i.e., the yield-curve of the financial system. Thus, the yield-curve determination depends, on one hand, on the interaction between the expectations of banks and agents, and on the other hand, on how the central bank accounts for those expectations in its attempt to manage the demand and supply of money in order to influence expectations, and finally, the own yield-curve.

Therefore, we consider the expectations and the uncertainty in order to assess the speculative motive for money demand. Economic agents derive expectations concerning, for instance, the difference between the current and future interest rates, or various conventions and risk perceptions that dominate in the financial system. In a demand-led economy, investment determines employment and output. Due to the presence of uncertainty, investment decision-making depends on expectations. Thus, in case of positive expectations there is a rise in capital goods, instead of money holding and liquid financial assets, boosting growth and employment or vice versa.

Certainly, among the Post-Keynesians it is believed that the supply of money can be demand - determined up to an extent (Dow and Dow 1989, Wray 1990). Thence, there is a plausible combination of liquidity preference theory and endogenous money supply theory. Financial institutions are actually operating a variety of financial products and portfolio choices implying that they could also set their liquidity preference, and thus the money stock, according to their limits

and margins of safety that new products would allow them to fluctuate. However, the above argument highlights an implicit indication, that supply of money would surely satisfy its demand but not necessarily in equal terms. It might be less credit supply fuelled to the economy or even more in certain overoptimistic risk perception periods.

It should not be forgotten that in actual period banks through credit and innovations can create money. Indeed, there are profit-maximizing enterprises, meaning that higher effective demand offers greater margins of profits for their services as well. Thus, the banking system will encourage and seek financial innovations to give more flexibility to their balance sheet management and also to avoid from regulatory measures.

3.3. The role of Central Banks and the interest rates transmission channels

Central banks play a vital role in the design and implementation of monetary policy through discount and interest rates' determination. Therefore, central banks should focus on prevention of the emergence of money-demand for speculative and even precautionary purposes and to provide price stability, stable expectations and eventually financial stability. Central banks' attitude could be explained by the manner they evaluate the notion of expectations and conventions. The control of money supply and the degree of steady liquidity in the market is therefore essential.

Central banks act as lenders of last resort which moderates agents' concerns about the overall solvency of the financial system and finally it refrains from confining investment. Central banks should not be a passive institution, but also to give equal emphasis to transparency and credibility, transmitting these characteristics to the rest of the financial system. The current operation of the international financial system has shown its limits by encouraging implicitly high-risk positions. Controlling inflation policies by central banks accompanied by low interest rates have indirectly led financial intermediaries to expand their risky activities in an internationalized deregulated free capital movement environment. Therefore, it seems that the only vital role left for central banks is the one of lender of last resort. Nevertheless, central bank is the anchor of financial stability, mainly through surveillance and efficient interventions. Hence, the question is not to assess the well-known role of central banks but to focus on their actions by re-assessing their priorities.

It is interested to develop the function of interest rates through the transmission channel mechanisms. Interest rates are deemed to be the most important tool of monetary policy. Keynes considers it as "the governor of the whole system" (1930, pp. 189). Once the interest rate is set, then central bank uses the discount window to provide to banks the necessary liquidity, determining in this way the relative amount of liquidity the financial system requires in that specific rate of interest. The interest rate furnishes to effective demand through portfolio, credit, wealth, exchange rate and expectations.

Portfolio management alters through interest rates changes, since expected rate of returns will differentiate. Agents will respond to a shift in interest rate by reallocating their portfolio choices. The credit channel is highly associated with the interest rate. It serves as the rate that financial institutions will charge on their granted loans. The lower interest rate entails to relative lower credit rate, influencing investment and employment. Credit market rate influences on households and firms through consumption in the first case and the relation between costs and profits of firms. As far as the wealth channel is concern, Keynes recognizes it as "perhaps the most important influence, operating through changes in the interest rate, on the readiness to spend out of a given income" (1936, pp. 94). It is evident that a change in interest rate will result to a shift on the price of assets as well as on consumption of households. Whenever households consume according to their accumulated wealth, then the impact of the wealth channel is greater.

The exchange rate transmission channel operates in an open economy. In this case, external agents are entering in the concept of the shift of interest rate. International investors are usually on the search of differences between internal and external interest rates in order to decide their investments. However, in an open economy there is interdependence between domestic interest rate, exchange rate and capital mobility. Consequently, a local interest rate change in an open economy ensues movements in domestic production, due to the cost of inputs, in the imports and exports of the country and thus in its balance of payments. Moreover, the financial status of firms with foreign liabilities is directly affected. Capital flows change in the line with the shift of exchange rate and so does the liquidity of money market, since in an open economy conversion of foreign to domestic currency is required. Afterwards, what is happening is a rise in the level of external flows that change money market liquidity and eventually the

financial system's yield curve. In this case, intervention is required to moderate the impact of the external flows to the stability of the financial system.

The final transmission channel is expectations, which in general terms need to be stable in order to avoid fluctuations. However, agents interpret differently the future financial stance and decide accordingly. Monetary authorities should promote prudency, solvency and mainly credibility to encourage positive expectations, keeping therefore liquidity preference to normal levels. Otherwise, if expectations for liquidity rise then the speculative demand for money motive will emerge making it difficult for the authorities to conduct an efficient monetary policy. The expectations channel is the one that precedes the other channels since expectations on forthcoming interest rates will eventually drive interest rates to change, activating then the other channels.

3.4. Post-Keynesian approach in international level

We have seen the exchange rate transmission channel and we wish to stress the significance of the exchange rate stability globally. In the case of open economies, interest rates are also influenced from main events that occur in a foreign country. Thereby, the level of interest rates is set by domestic monetary authorities in line with the foreign monetary authorities. There is a mixture combination of the internal and external monetary ambiance. The external factor brings up the importance of balance of payments through the examination of capital and current accounts.

Following the domestic price stability target, the forthcoming goal in international level, is the achievement of exchange rate stability, meaning the stability of value money in the international standard. If we wish to proceed to the stability of international financial system, we need to state that any change in the national interest rate, will eventually entail to at least some difference within its relation with international interest rate. This shift is globally vital because that may lead to changes in the exchange rates and in capital mobility. Arestis and Sawyer (1998) argue that any policy on interest rates is inevitable delineated by global financial markets.

Changes in the exchanges rates present numerous implications. They affect the effective demand, both domestic and foreign, the expectations of agents as well as their financial status. The latter is at great importance, regarding firms and governments that borrow from foreign financial institutions, where a decrease in the

exchange rate entails to burdens in domestic balance sheets and budgets, hence increasing the financial instability. Also inflation will probably rise, due to devaluations, since domestic prices will start to increase.

4. Post-Keynesian monetary targets

According to Keynesian approach, monetary policy should aim at the promotion of full employment and economic growth. To do so, investment encouragement policies are required to maintain the level of employment. Post-Keynesian economics deem that a successful monetary policy needs price stability, exchange rate stability, good and stable expectations, credibility and transparency. All the above targets can be achieved through interest rates and regulation. A success of the Post-Keynesian monetary policy means an expansion of the effective demand, thus boosting output and employment. The challenging target for authorities is to ensure price stability on the assets value that will facilitate investment. In other words, inflation must be under surveillance to limit fluctuations of expectations and to sustain the general wealth.

Thus, price stability is essential for the well function of economy and can be mainly implemented by precautionary measures on the potential causes of inflation. Price stability generates financial stability and hence a stable financial system. In general, financial stability is the ultimate aim of the Post-Keynesian monetary policy. According to Buiter (2008) financial stability is the absence of asset price bubbles, illiquidity, and insolvency, whose occurrence threatens the financial markets and the real economy. Financial stability is the maintenance of a steady-state financial status that produces no significant fluctuations in the real economy. It does not permit radical and sharp changes in asset prices nor does it encourage excessive borrowing and lending. It ensures a stable capital flow to sound agents (firms, households, governments), who are in need to finance their investment projects in order to result to greater output and employment and certainly to be able to validate their debts in due time.

5. Concluding remarks

It is evident that neoclassical economics have prevailed in the interpretation of economic phenomena and more importantly in the implementation of economic policy. The traditional theory,

notwithstanding, has been insufficient to cope with recent events mainly in the financial sector. Among many defending views of traditional neoclassical theory, one of the most popular is the argument that there is no alternative. This argument of no other policy option forms an overoptimistic stance and perhaps implies a narrow-minded perception to overcome the alternative theories or to diminish their credibility. Despite its weaknesses, it continues to be the dominant policy, whilst inner and international inequalities are rising. Nevertheless, alternative theories could at least serve as contributors to an overall effort to resolve major global economic and financial issues such as unemployment, inequalities and financial crises.

Conventional theory could integrate the aspects of money and finance, apart from utility preferences, production function, goods and services. Output and production should be linked with the monetary system. Keynes in his theory integrated money and finance with total output, employment and investment. Firms, governments, and households have debts, which are assets to financial institutions which in turn have liabilities. Consequently, we observe a price system for capital assets and outputs that is highly determined by expectations and credit conditions. In other words, there are endogenous powers that arise within the monetary system and ergo in the real economy. The endogenous process unsettles the economy and, not necessarily always, could lead to crises.

The emergence of recent crises and the general instability of the system postulate the pertinent interpretations and policies acts. The prevailed neoclassical approach to monetary policy has been rather confined during the last thirty years. The main stance of the empirical policies in terms of monetary policy has been the overconfidence to the operation of free financial markets with a slight surveillance by monetary authorities. Central banks have considerably loosened the ropes of monetary control. They seem to have a passive role with limited interventions, unable to keep up the pace of excessive money supply creation that financial institutions have adopted. Additionally, commercial and investment banks have been the main players of monetary policy, since they respond to money demand and are capable of adding money supply through credit. Therefore, the role of central banks should be reassessed and redirected from price stability target to the stability of the entire financial system. They should act as real lenders of last resort, absorbing potential risks at early stage and maintaining liquidity levels and profitability.

There are some fundamental axioms in economics and finance that has been beyond any doubt during the last century, but notwithstanding, could not fill the gaps in unquestioned matters. The financial sector has equal role as the market economy. The growth of the financial system by means of indebtedness and credit expansion does provide an average GDP growth and aggregate demand increase. However, is the credit expansion process simply a period of robustness that enables investment and reinvestment leading to even more credit? We could not personally dare to provide a sound answer. On the other hand, mathematics and econometrics have always served as an undisputed tool to prove right or wrong, everything and anything in economics and finance. But how could this conception avails us to discover the reality in what is going on in the economy? What we seek in the world of business, economics and finance is nothing but the truth. A method that traditionally, or even from the ancient times, could be applied is definitely that of observation of true events.

Counter to the widely held belief, Post-Keynesian approach to economic theory provides us an alternative to comprehend how the economy and thereafter financial system actually work. Generally, we could argue that Post-Keynesian economics tend to explain the performance of the financial system through time and how it develops and changes under new circumstances. It emphasizes the endogenous developments of a financial system that could easily be fragile and unstable. Post-Keynesian approach is inter-temporal and due to the fact that the financial system in international level has currently become more integrated and interdependent, this instability could constitute a global threat. By contrast, traditional economic theory neglects that approach and attempts to explain how markets function at any moment in time. We could not support that Post-Keynesian economics offers a panacea and integrated theory. Also, it does not provide all the answers to the arising economic and financial issues we could recognize. Nevertheless, it asks the right relevant questions and seeks the right answers. Post-Keynesian economics seem to be more relevant to the explanation of global economic and financial issues and to the rising global income inequality.

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KNOWLEDGE SHARING, INNOVATION AND FIRM PERFORMANCE: EVIDENCE FROM TURKEY

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Abstract

The aim of this study is to determine relationship between knowledge sharing, innovation and firm performance. In the current study, a survey was conducted on a total of 150 high-tech companies operating in Istanbul, Ankara and Antalya. In the analysis results, it is seen that innovation speed and quality affect both the operational and financial performance of firms. In other words, as innovation speed and quality increase, so does the operational and financial performance of firms. Another important finding obtained in the current study is that explicit knowledge sharing, and tacit knowledge sharing have a positive effect on firm performance. A high level of innovation encompasses new products, processes or applications in most company activities. As a result, innovation can create a competitive advantage by creating synergy in the activities of companies and encourage creativity.

Keywords: Innovation Speed and Quality, Explicit and Tacit Knowledge Sharing, Firm Performance

JEL Classification: L25, O31, O33

1. Introduction

Information economy is an economy shaped on the basis of innovation. One of the key concepts that trigger the new economy is innovation that requires the continuous renewal of products, systems,

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processes, marketing and people (Kavak, 2009: 618). Innovation is a particular function of entrepreneurship. Innovation refers to the entrepreneur's ability to generate prosperity by creating new resources or by increasing the potential of existing resources (Drucker, 1998).

Innovation speed refers to a drastic change from more traditional patterns to today's rapidly changing business environments. Innovation speed is a crucial element for competitiveness. Innovation speed is a socially complex, shaped team that cannot be easily developed or imitated by competitors. Innovation speed enables companies to connect closely with their customers and to meet their needs and increasing speed of competition, technological advances in the market and shorter product life cycles force companies to innovate faster (Tatikonda and Montoya-Weiss, 2001; Slater and Mohr, 2006; Heirman and Clarysse, 2007; Lynn, 2008; Wang and Wang, 2012).

Innovation quality, which has a strong relationship with quality concepts such as innovation, creativity and standardization, can be explained by concepts such as innovation quality, efficiency, reliability, timing, costs and degree of innovation (Kessler & Chakrabarti, 1996; Kessler and Bierly, 2002; Allocca and Kessler, 2006; Wang and Wang, 2012). Innovation quality refers to the relative importance of an innovation in terms of physical, psychological and social satisfaction in the consumer’s consumption system. The existence and continuity of innovation quality is very important for the sustainability of enterprises in both short and long term (Aslan, 2014: 43-44).

In the current study, the relationship between knowledge sharing and firm performance was investigated. In the current study, a survey was conducted on a total of 150 high-tech companies operating in Istanbul, Ankara and Antalya. To this end, a scale with high reliability developed by Zhining Wanga and Nianxin Wang (2012) and accepted in the international literature was used.

The current study consists of five sections. In the second section following the introduction, the conceptual framework is explained. In the third section, the purpose, method, sampling and data collection tools of the study are discussed, and hypotheses are formulated. In the fourth section, the results of the regression and correlation analyses conducted to reveal the relationships between innovation, knowledge sharing, and firm performance are presented. In the last section, a general evaluation of the study is presented.

2. Conceptual framework

Information sharing is the transfer or dissemination of information from one person, group and organization to another person, group and organization. This definition comprehensively involves both explicit and tacit knowledge sharing. Therefore, knowledge sharing occurs in a complex manner. Knowledge, which is a valuable asset in an intense competitive environment, is not occasionally and randomly shared and it is very important how those who have knowledge share it, with whom and when they share it. Knowledge should be actively shared with those who use the knowledge in the organization because the circulation speed of knowledge is becoming increasingly important for the competition of organizations (Öztürk, 2005). Knowledge sharing, an information-centred activity, is the main tool by which employees can contribute to mutual exchange of knowledge, innovation and ultimately competitive advantage (Wang and Noe, 2010). Knowledge sharing becomes individual or group knowledge through the process of internalizing and socializing the organizational knowledge (Wang and Wang, 2012). Knowledge sharing practices throughout the organization are very important in terms of protecting valuable heritage, learning new techniques, solving problems, creating basic competencies and initiating new situations (Law and Ngai, 2008; Hsu, 2008; Huang, Chen and Stewart, 2010; Hu, Horng and Sun, 2009).

Explicit knowledge sharing refers to sharing of ready-to-use knowledge available in a certain format including scientific formulas, product properties, texts, graphs, pictures, computer software, diagrams and procedures. Explicit knowledge can be easily transferred through information technologies as knowledge whose accuracy is generally accepted (Demirel, 2007). The greater the extent to which explicit knowledge is available in the organization, the greater the use of this knowledge in the production; thus, more competitive advantage can be created. Explicit knowledge includes transferring all kinds of knowledge that can be documented, archived and encoded (Nonaka, Krogh and Ichıjo, 2002).

Tacit knowledge, on the other hand, includes talent and technical knowledge. Tacit knowledge can be shared to increase internal motivation for socialization and establishing friendship. Tacit knowledge and personal experience are claimed to be acquired by the individual through social interaction. Tacit knowledge is personal and

can be shared through social interaction. Therefore, social interaction is argued to facilitate the sharing of tacit knowledge among the workers of an organization. The difficulty of imitating tacit knowledge by rivals makes it a very important resource for sustainable competitive advantage (Aydıntan, et al., 2010).

Knowledge sharing leads to disseminating innovative ideas and plays a critical role in the emergence of innovation within the organization. Employee performance is influenced by many factors in the organization while affecting the general performance of the organization (Özdede, 2010). Seen from this perspective, performance is both the product of the interaction of individuals with each other and an element affecting this interaction. Performance functions can therefore be analysed at many different levels. These functions are surrounded by organizational features as well as by individual perceptions. Social networks provide an environment for the dissemination of knowledge and the development of innovations. When all team members share their knowledge with each other in a communication process through these networks, the climate of innovation culminates. This special communication process occurs through the exchange of ideas and the sharing of new ideas (Turgut, 2013).

There are many studies proving the positive impact of knowledge sharing on firm performance (Nonaka and Takeuchi, 1995; Coakes, 2006; Holste and Fields, 2010; Huang, Davison and Gu, 2010). In the studies exploring the relationship between innovation and firm performance, it has been stated that companies with high innovation will be more successful in responding to the needs of customers and developing new capabilities that enable them to achieve better performance or profitability. In other words, empirical findings have been reported suggesting that innovation has a positive impact on firm performance (Robinson, 1990; Brentani, 2001; Jenny, 2005; Tidd, Bessant and Pavitt, 2005; Singh, 2008; Clifton, Keast, Pickernell and Senior, 2010; Liao, Wang, Chuang, Shih and Liu, 2010; Yavuz, 2010; Vaccaro, Parente and Veloso, 2010; Erdem, 2011).

3. Method

The purpose of the current study is to determine the relationship between knowledge sharing and firm performance. To this end, a survey study was conducted on 150 high-tech firms with equity

capital of 250.000 TL and over and operating in Istanbul, Ankara and Antalya. In the study, regression, correlation analyses and descriptive statistics were used. A scale with high reliability developed by Wang and Wang (2012) and adapted to Turkish by Aslan (2014) was used in the current study. The scale used in the current study consists of two parts.

In the first part, there are 10 items aiming to determine the innovation level of firms; 5 of these items are for eliciting data about innovation speed and 5 items for eliciting data about innovation quality. There are also 6 items related to explicit knowledge sharing and 7 items related to tacit knowledge sharing. Moreover, there are 10 items related to firm performance; 6 of them are related to operational performance and 4 of them are related to financial performance. All these items are five-point Likert type items. In the second part of the scale, there are items about high-tech firms and their administrators.

In Table 1, Cronbach Alpha coefficients calculated for the sub-dimensions of the scale are given. As the Cronbach Alpha values calculated for the six sub-dimensions of the scale were found to be higher than the critical value of 0.70 (Nunnly and Bernstein, 1994), the sub-dimensions in the scale are accepted to be reliable. In the original scale developed by Wang and Wang (2012), the Cronbach Alpha coefficients calculated for the sub-dimensions were found to be ranging from 0.89 to 0.97. Aslan (2014) found the Alpha coefficients of the scale adapted to Turkish as varying between 0.81 and 0.95.

Table 1

Reliability of the Scale

Factors	Number of Items	Cronbach Alpha
Explicit Knowledge Sharing	6	0,893
Tacit Knowledge Sharing	7	0,803
Innovation Speed	5	0,886
Innovation Quality	5	0,952
Operational Performance	6	0,888
Financial Performance	4	0,960

Source: Authors

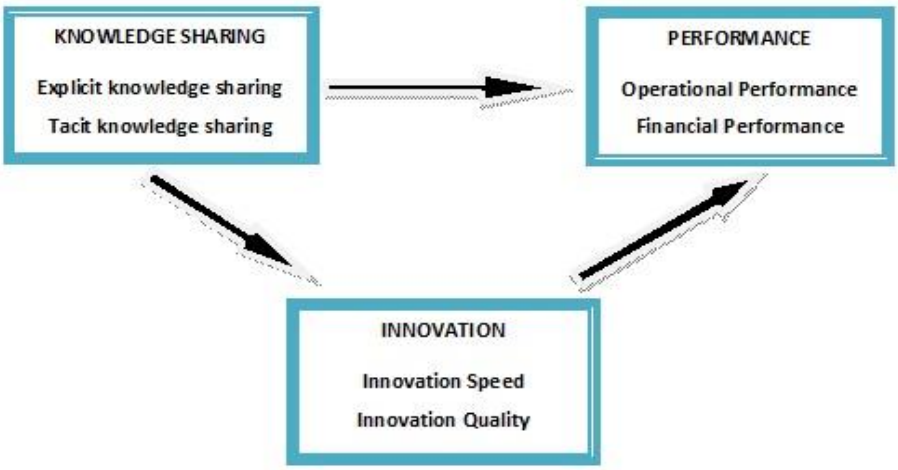
In order to determine whether the data obtained from the sub-dimensions of knowledge sharing, innovation and performance of the five-point Likert scale was distributed normally, Kolmogorov-Smirnov

analysis was run and as a result, it was found that the data were distributed normally for all the sub-dimensions (p>0.05).

The model and hypotheses of the study developed in light of all these findings are presented below.

Figure 1

Research Model



Source: Wang and Wang (2012)

$H_{1a.}$ There is a positive relationship between the firm's innovation speed and operational performance.

$H_{1b.}$ There is a positive relationship between the firm's innovation speed and financial performance.

$H_{2a.}$ There is a positive relationship between the firm's innovation quality and operational performance.

$H_{2b.}$ There is a positive relationship between the firm's innovation quality and financial performance.

$H_{3a.}$ There is a positive relationship between the firm's explicit knowledge sharing and innovation speed.

$H_{3b.}$ There is a positive relationship between the firm's explicit knowledge sharing and innovation quality.

$H_{4a.}$ There is a positive relationship between the firm's tacit knowledge sharing and innovation speed.

$H_{4b.}$ There is a positive relationship between the firm's tacit knowledge sharing and innovation quality.

$H_{5a.}$ There is a positive relationship between the firm's explicit knowledge sharing and operational performance.
$H_{5b.}$ There is a positive relationship between the firm's explicit knowledge sharing and financial performance.
$H_{6a.}$ There is a positive relationship between the firm's tacit knowledge sharing and operational performance.
$H_{6b.}$ There is a positive relationship between the firm's tacit knowledge sharing and financial performance

4. Research findings

In this section of the current study, the results of the regression and correlation analyses conducted to test the relationships between knowledge sharing, innovation and firm performance and descriptive statistics of the firms and administrators are presented and discussed.

In Table 2, the descriptive statistics of the firm administrators are presented. Majority of the participating administrators are males; are in the age group 31-50 and have education at the undergraduate and graduate level. Moreover, length of service in the organization and professional experience of majority of them are 8-15 years.

Table 2

Descriptive Statistics of the Participants

Gender	***f***	***n***
Male	118	78,7
Female	32	21,3
Age	***f***	***n***
20-25 years old	3	2,0
26-30 years old	13	8,7
31-40 years old	93	62,0
41-50 years old	37	24,7
51-60 years old	4	2,7
Education Level	***f***	***n***
High school and lower	8	5,3
Undergraduate	118	78,7
Graduate	24	16,0
Length of Service in the Organization	***f***	***n***
0-3 years	3	2,0
4-7 years	13	8,7
8-11 years	82	54,7
12-15 years	36	24,0

16-21 years	11	7,3
21 years and more	5	3,3
Professional experience	***f***	***n***
0-3 years	3	2,0
4-7 years	6	4,0
8-11 years	76	50,7
12-15 years	46	30,7
16-21 years	11	7,3
21 years and more	8	5,3
TOTAL	**150**	**100,00**

Notes: f= frequency; n= number of observations
Source: Authors

In Table 3, the descriptive statistics of the firms are given. A significant number of the participating high-tech firms have 50-549 workers and 12 years and longer length of operation in the sector. In the current study, all the sectors using high technology are included.

Table 3

Descriptive Statistics of the Firms

Sector	***f***	***n***
Information and Communication	15	10,00
Electronic, Mechatronics etc	24	16,00
Machine Industry	27	18,00
Petrochemical-Plastic	26	17,33
Medical	18	12,00
Chemical	32	21,33
Others	8	5,33
The Number of Workers	***f***	***n***
11-49 People	20	13,3
50-249 People	97	64,7
250 People and more	33	22,0
Length of Operation in the Sector	***f***	***n***
0-3 years	1	,7
4-7 years	2	1,3
8-11 years	24	16,0
12-15 years	40	26,7
16-21 years	35	23,3
21 years and longer	48	32,0
TOTAL	**150**	**100,00**

Notes: f= frequency; n= number of observations
Source: Authors

In Table 4, descriptive statistics related to knowledge sharing, innovation and performance are shown. When the results are examined, it is seen that operational performance is higher than financial performance and the innovation speed and innovation quality means are close to each other. Moreover, the tacit knowledge sharing mean is higher than the explicit knowledge sharing mean.

Table 4

Descriptive Statistics related to Knowledge Sharing, Innovation and Performance

ITEMS	Mean	Std. Dev.
1. Our firm is faster in producing new ideas compared to its rivals.	3,98	0,88
2. Our firm is faster in introducing new products to the market compared to its rivals.	3,91	0,87
3. Our firm is faster in developing new products compared to its rivals.	3,93	0,94
4. Our firm is faster in developing new processes compared to its rivals.	3,9	0,87
5. Our firm is faster in solving problems compared to its rivals.	4,23	0,89
Innovation Speed (IS)	**3,99**	
1.Our firm is better at producing new ideas compared to its rivals.	3,84	0,86
2.Our firm is better at introducing new products to the market compared to its rivals.	3,85	0,91
3.Our firm is better at developing new products compared to its rivals.	3,84	0,92
4.Our firm is better at developing new processes compared to its rivals.	3,87	0,84
5.Our firm is better at administrative improvements compared to its rivals.	3,88	0,88
Innovation Quality (IQ)	**3,86**	
1.The people working in this firm generally share reports and official documents with other workers.	2,74	1,44
2.The people working in this firm generally share the reports and documents they themselves have prepared with other workers.	2,95	1,41
3.The people working in this firm generally collect reports and official documents from other workers.	2,92	1,34
4.The people working in this firm are generally encouraged for knowledge sharing.	4,09	0,92
5.Various training and development programs are organized for the people working in this firm.	4,15	0,96

6.Information technologies created for knowledge sharing facilitate the work of the people working in this firm.	4,32	0,78
Explicit Knowledge Sharing (EKS)	**3,52**	
1.The people working in this firm share their experiences with other workers.	4,07	0,84
2.The people working in this firm generally collect knowledge about other workers' experiences.	3,90	0,83
3.The people working in this firm generally share knowledge about each other.	3,81	0,87
4.The people working in this firm generally collect knowledge about each other.	3,61	0,98
5.The people working in this firm generally share knowledge related to their fields of expertise.	4,05	0,86
6.The people working in this firm generally collect knowledge related to others' fields of expertise.	3,61	1,00
7.The people working in this firm share what they have learned from past mistakes with each other, when necessary.	4,40	0,75
Tacit Knowledge Sharing (TKS)	**3,92**	
1.Our firm is better in terms of consumer satisfaction compared to its rivals.	4,19	0,74
2.Our firm is better in terms of quality compared to its rivals.	4,31	0,77
3.Our firm is better in terms of cost management compared to its rivals.	4,19	0,80
4. Our firm is better in terms of adaptation to change compared to its rivals.	4,19	0,78
5. Our firm is better in terms of efficiency compared to its rivals.	4,21	0,75
6. Our firm is better in terms of asset management compared to its rivals.	4,07	0,82
Operational Performance (OP)	**4,19**	
1.Our firm's average profit obtained from investments is better than its rivals.	3,73	0,89
2.Our firm's average profit is better than its rivals.	3,61	0,87
3.Our firm's profit increase is better than its rivals.	3,64	0,95
4.Our firm's average sales income is better than its rivals.	3,65	0,93
Financial Performance (FP)	**3,66**	

Source: Authors

In Table 5, the results of the correlation analyses are shown. When these results are examined, it is seen that there is a significant and positive correlation between innovation speed and quality and operational and financial performance. In other words, as the innovation speed and innovation quality of firms increase, so does their operational and financial performance.

Table 5

Correlation Table

Variables	OP	FP	IS	IQ	EKS	TKS
OP	1					
FB	,530**	1				
IS	,683**	,439**	1			
IQ	,619**	,496**	,824**	1		
EKS	,307**	,234**	,330**	,359**	1	
TKS	,430**	,288**	,433**	,407**	,347**	1

*Notes: ** Correlation is significant at the 0.01 level (2-tailed)*
Source: Authors

There is a positive correlation between explicit knowledge sharing and tacit knowledge sharing and operational and financial performance. With increasing knowledge sharing, the performance of firms increases. Similarly, there is a positive correlation between explicit knowledge sharing and tacit knowledge sharing and innovation speed and quality. In other words, with increasing knowledge sharing, innovation speed and quality also increase.

In Table 6, the results of the regression analysis are presented. When the results are examined, it is seen that explicit knowledge sharing and tacit knowledge sharing and innovation speed and innovation quality, which are the independent variables, affect the operational performance and financial performance of firms, which are the dependent variables in the current study. In other words, there is a positive and significant correlation between explicit knowledge sharing and tacit knowledge sharing and innovation speed and quality and the operational and financial performance of firms.

Table 6

Regression Analysis Results

Hypotheses		Expectation	p	Explanations
H_{1a}	**IS → OP**	,540**	**0,000**	**Accept**
H_{1b}	**IS → FP**	,278*	**0,023**	**Accept**
H_{2a}	**IQ → OP**	,294*	**0,021**	**Accept**
H_{2b}	**IQ → FP**	,418**	**0,000**	**Accept**

Hypotheses		Expectation	p	Explanations
H_{3a}	**EKS → IS**	,205**	**0,009**	**Accept**
H_{3b}	**EKS → IQ**	,248**	**0,002**	**Accept**
H_{4a}	**TKS → IS**	,362**	**0,000**	**Accept**
H_{4b}	**TKS → IQ**	,321**	**0,000**	**Accept**
H_{5a}	**EKS → OP**	,190*	**0,022**	**Accept**
H_{5b}	**EKS → FP**	,183*	**0,035**	**Accept**
H_{6a}	**TKS → OP**	,367**	**0,000**	**Accept**
H_{6b}	**TKS → FP**	,235**	**0,005**	**Accept**

*Notes: *Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed)*

Explicit knowledge sharing and tacit knowledge sharing affect innovation speed and quality. In other words, there is a positive correlation between explicit and tacit knowledge sharing and innovation speed and quality. With increasing sharing of knowledge in firms, their innovation also increases. As a result, all the hypotheses formulated in the current study have been satisfied.

5. Results

In the current study, the relationship between innovation, knowledge sharing, and firm performance were investigated. To this end, a survey study was conducted on a total of 150 high-tech firms operating in İstanbul, Ankara and Antalya. In the study, regression and correlation analyses were employed.

When the results of the analyses are examined, it is seen that innovation speed and quality affect both the operational and financial performance of firms. In other words, as innovation speed and quality increase, so does the operational and financial performance of firms. A high level of innovation encompasses new products, processes or applications in the majority of company activities. As a result, innovation can create a competitive advantage by creating synergy in the activities of companies and encourage creativity.

Another important finding obtained in the current study is that explicit knowledge sharing, and tacit knowledge sharing have a positive effect on firm performance. Knowledge sharing at the same time makes positive contribution to innovation speed and innovation quality. As a conclusion, knowledge sharing facilitates innovation processes and is important in terms of the emergence of innovative ideas within the organization.

There are some limitations of the current study investigating the relationships between knowledge sharing, innovation and firm performance. The current study employed the survey model to investigate these relationships. In a survey study, it is always possible to encounter errors related to content, sampling, measurement and responding, which is also true for the current study. This makes it difficult to make some generalizations on the basis of the obtained results. Moreover, the data collected in the current study are limited to high-tech firms operating in İstanbul, Ankara and Antalya. Another limitation of the current study is the inclusion of only 150 firms and that factor analysis was not conducted in the study. Future research can investigate the same issue on different sectors and samplings and on firms of different size.

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TESTING J-CURVE EFFECT ON TRADE BALANCE IN TURKISH ECONOMY[1]

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Abstract

This study researches the effects of changes in the exchange rate on the trade balance after the transition to the floating exchange rate in the Turkish economy. For this purpose, ARDL and ECM models have been developed by using quarterly data from 2003 through 2018. The starting point of the research is to examine the validity of the J-Curve theory in the Turkish economy. According to the results of the analysis of the main model used in the study, there is no J-Curve effect on the trade balance in the related period. The results state that the effect of changes in exchange rates on the foreign trade balance is limited. The main reason for that is the high usage of imported intermediate goods and inputs in production. The results of analysis show that the fundamental structural problem of Turkey's economy is the usage of imported intermediate goods and inputs. Therefore, the effect of the exchange rate on trade balance differs from theoretical expectations. The main policy result of the study is that foreign trade balance might be improved by increasing the usage of domestic intermediate goods and inputs in production.

Keywords: Trade Flows, Real Effective Exchange Rate, ARDL model, Cointegration

JEL Classification: C32, F31, F41

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[1] *This paper is based on Zubeyir Can Kansel's Master Thesis, "The Effects of Exchange Rate Dynamics on Trade Balance in Turkish Economy", supervised by Bilgin Bari.*

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1. Introduction

The diversity of needs has led people and countries to establish exchange relationships with each other. Countries trade among each other for various reasons. Foreign trade is divided into two parts: Import and export. Communities market what they produce and import what they do not have an advantage in producing. The concepts of export and import are two critical determinants of a national economy. The main factor which affects imports and exports is the change in the exchange rates. In other words, it shows the price of the currency of one country in terms of the other countries' currency, where the trade is performed accordingly. In addition, the exchange rate also affects overall macroeconomic stability in an economy.

Different factors have an impact on foreign trade deficits. Changes in import and export of the country determine the trade deficit. These changes are also related to imported and exported goods and service prices. These prices fluctuate as a result of a change in exchange rates. Trade balance problems affect multiple macroeconomic variables within the economic system. Especially for developing countries, it is essential to keep the foreign trade balance under control because the balance in trade reflects not only the countries' trade among each other, but also it is an indicator that reflects the reputation of the countries' financial terms.

Emerging economies should reduce their trade deficits in order to have a balanced and sustainable economic growth. This study examines the relationship between the exchange rate and foreign trade in Turkey. We investigate the effects of exchange rate changes on the trade balance.

When the Turkish economy switched to a floating exchange rate system, exchange rates affected the trade balance. Thus, we studied the impact on the Turkish economy case. At the same time, we investigate the J-Curve effect on foreign trade balance.

The scope of this study is to examine the main determinants of the trade balance in the Turkish economy after introducing the floating exchange rate regime. In the second part, we present a literature review. The third part describes the data set, the methodology, and gives empirical results. The final section concludes the study with some policy notes.

2. Literature Review

Bahmani-Oskooee et al. (2015) explain the short and long-term effects of currency depreciation in trade balance and the J-curve effect for trade relations among U.S. and her six trade partners. The analysis estimates the nonlinear ARDL model using quarterly data over the period 1971 to 2013. The result of analysis shows the J-curve effect support in five trade partners. Non-linear approach shows us that in most cases the effects of exchange rate changes are asymmetric.

Yeshineh (2016) researches the short and long-run relationships of trade balance in Ethiopia. The analysis is estimated using the ARDL approach of co-integration and error correction model using annual data for the period 1970 to 2011. The result shows that exchange rate depreciation is positively related to the trade balance in the short and long-term. The results show that exchange rate play a faint role in determining the behaviour of the trade balance in Ethiopia. Balance of budget, income and money supply have a strongest impact on the trade balance.

Nusair (2017) reveals the J-curve phenomenon for 16 European transition economies (Bulgaria, Croatia, Czech Republic, Macedonia, Hungary, Poland, Romania, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Armenia, Georgia, Russia, and Ukraine). The analysis estimates the linear and nonlinear ARDL model using quarterly data over the period 1994 to 2015. The result of the analysis shows that when the linear ARDL model is used, they do not find evidence for the J-curve phenomenon. Besides, when the nonlinear ARDL model is used, they find support for the J-curve phenomenon for Armenia, Bulgaria, Croatia, Hungary, Georgia, Poland, Romania, Russia, Slovakia, Slovenia, the Czech Republic, and Ukraine.

Nazlioglu and Erdem (2011) explore the role of exchange rate on bilateral trade balance on Turkey's fresh fruits and vegetables with 14 trading partners (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, The Netherlands, Portugal, Spain, Sweden, and United Kingdom) in the European Union. The study is estimated by the method of ARDL and employs quarterly data over the period 1995:1 to 2007:2. As a result of the study, there is an evidence of the J-curve effect in two cases (Belgium and France) in the short run. In the long run, the exchange rate has a positive impact on the trade balance in 7 out of 14 cases (Belgium, Denmark, France, Greece, Italy, Sweden, and the United Kingdom).

Okay, Baytar and Saridoğan (2012) analyze the effects of the real effective exchange rate on the trade balance for Turkish economy. The study is estimated by using the VEC model and they employ monthly data over the period 2003:1 to 2010:12. As a consequence of the analysis, the real effective exchange rate negatively affects the current account balance in the long term. Furthermore, according to the impulse response function is determined that there exists a J-Curve effect on Turkey's economy.

Cambazoğlu and Karaalp (2012) examine the trends in Turkey's terms of trade over the thirty years. The analysis estimates Vector Auto-Regression (VAR) model using monthly data over the period from 1982 to 2011. The result of the investigation finds that the Prebisch-Singer thesis is not valid for Turkey and Turkish exports are affected by imports, which indicates the import dependency of Turkish exports.

Bal and Demiral (2012) mention the short- and long-term relationship between Turkey and Germany, with bilateral trade in the real trade balance with the euro exchange rate. The analysis uses the co-integration test and the VEC model. They employ the monthly data from 2001:1 to 2012:9 periods. The conclusion states that the J-Curve effect occurs for the trade between Turkey and Germany.

Ari and Cergibozan (2017) review the determinants of the trade balance in the Turkish economy. The study uses the Vector Error Correction model. They apply quarterly data over the period 1987:1 to 2015:2. The outcome of the study shows that an increase in the real effective exchange rate improves the trade balance in the long-run, while it does not affect the trade balance in the short-run. Besides, an increase in domestic and foreign income has negative effects on the trade balance. The results find that the J-Curve effect does not occur in the Turkish economy.

This study differs from others because we calculate the foreign GDP as a weighted index comprising the major trading partners with a trading volume of the Turkish economy.

3. Empirical Analysis

Long-term analyses are required to understand how variables affect each other in the economy. The variables we use for these analyses are non-stationary and follow the trends. However, the variables must be stationary due to the basic principles of the time

series. We consider a more recent econometric approach ARDL (Autoregressive Distributed Lags) model to set up our model regardless of the stationarity of the variables.

The ARDL model includes both lags of independent variables and the dependent variable. In its general form, with p lags of y and q lags of x, an ARDL (p, q) model can be written as (Hill *et al.,* 2011) below:

$$y_t = \delta + \theta_1 y_{t-1} + \cdots + \theta_p y_{t-p} + \delta_0 x_t + \delta_1 x_{t-1} + \cdots + \delta_q x_{t-q} + v_t$$

The ARDL bounds testing approach was developed by Pesaran et al. (2001). ARDL model is used to determine the long-term relationships between variables. Thus, this approach can test the existence of the co-integration relationship between the series with different degrees of stationarity. In other words, the main advantage of the ARDL bounds test is that it can be applied regardless of whether the variables included in the analysis are I (0) or I (1). Another advantage of this model is that it uses the unrestricted error correction model (UECM) and can provide statistically more reliable results than standard co-integration tests. Narayan and Smyth (2005) mentioned that the UECM is likely to have better statistical properties than the two-step Engle–Granger method because, unlike the Engle–Granger method, the UECM does not push the short-run dynamics into the residual terms. The applicability of the ARDL model to small sampling studies is more reliable than that of Engle-Granger and Johansen co-integration tests. This model helps to catch long and short-term causality relations (Pesaran et al., 2001; Narayan and Smyth, 2005).

The ARDL boundary test approach consists of three phases. In the first stage, the long-term relationship between the variables included in the analysis is tested. In the case of a co-integration relationship between these variables, long and short-term elasticity are obtained in the following stages, respectively. In the first stage of the ARDL boundary test approach, UECM is created. The value "p" in the model refers to the appropriate lag length. The appropriate lag length is determined by considering the Schwartz Bayesian Criterion (SBC) and Akaike Information Criteria (AIC) for the long-term ARDL model. After determining lag length in the ARDL boundary test approach, the existence of a co-integration relationship between variables. The second step is taken by rejecting the basic hypothesis as a result of the F test. In the following section, this model is estimated by the OLS technique. In the third and final phase, the ARDL model is estimated

for the short-term relationship between the variables. The error correction term variable in the model is the previous value of the residual series obtained from the long-term ARDL model. The coefficient for this variable shows how long the imbalance in the short term can be corrected in the long term (Narayan and Narayan, 2005). The empirical equation below is developed to analyse the determinants of the trade balance:

$$TB_t = \alpha + \beta_1 . REER_t + \beta_2 . GDP_t^h + \beta_3 GDP_t^f + u_t \quad (1)$$

where *TB* is trade balance, *REER* is real effective exchange rate, GDP_t^h is domestic output, and GDP_t^f is foreign output. α is constant and β_1, β_2, and β_3 are estimated elasticities of trade balance to real effective exchange rate, domestic output, and foreign output respectively. u_t is the disturbance term.

ARDL model discriminates between dependent and explanatory variables. The specified model of the trade balance for Eq. (1) can be written as the error correction representation of ARDL model:

$$\begin{aligned} \Delta TB_t = \alpha_0 + \sum_{i=1}^{\rho_1} (\beta_{1,i} . \Delta TB_{t-i}) + \sum_{j=0}^{\rho_2} (\beta_{2,j} . \Delta REER_{t-j}) \\ + \sum_{k=0}^{\rho_3} (\beta_{3,j} . \Delta GDP_{t-k}^h) + \sum_{l=0}^{\rho_4} (\beta_{4,l} \Delta GDP_{t-l}^f) + \lambda_1 . TB_{t-1} \\ + \lambda_2 REER_{t-1} + \lambda_3 . GDP_{t-1}^h + \lambda_4 . GDP_{t-1}^f + \eta_t \end{aligned} \quad (2)$$

where Δ is the first difference operator. α_0 is the intercept (drift component), and η_t is the error term. *i,j,k,l* are lag orders for the relevant variables. λ_i's are long-term coefficients. The null hypothesis in the Eq. (2) is $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$. It states that there is no long-run relationship in the model.

For the estimation, we use quarterly data for the period of 2003Q1-2018Q4. Table 1 presents dataset used in the estimation of the model.

Table 1

Definitions and Sources of Variables

Name	Variable	Definition	Data Source
TB	Trade Balance	The ratio of Turkey's export value to import value.	Federal Reserve Bank of St. Louis
REER	Real Effective Exchange Rate	The weighted geometric average of the prices in Turkey relative to the prices of its 45 trade partners.	Federal Reserve Bank of St. Louis
GDP^h	Gross Domestic Production for Home Country	Turkey's real gross domestic product index.	Federal Reserve Bank of St. Louis
GDP^f	Gross Domestic Production for Foreign Countries	The sum of real GDP indices of 23 trading partners after each of index is multiplied by their respective percentage of volume in trading with Turkey (USA, UK, Japan, Germany, Italy, France, Greece, Spain, Switzerland, Poland, Sweden, Belgium, Netherland, Czech Republic, Austria, Hungary, Romania, Bulgaria, China, Russia, India, Korea, and Israel).	Federal Reserve Bank of St. Louis and Central Bank of the Republic of Turkey

Note: GDP^f was calculated by the authors. Quarterly GDP data is only available for these 23 countries.

Table 2 presents descriptive statistics of the series used in the model. Natural logarithms of all variables are taken. LNTB, LNRER, LNGDPH, and LNGPF are logarithms of the trade balance, real effective exchange rate, domestic output, and foreign output, respectively.

Table 2

Descriptive Statistics of Variable Series

	LNTB	LNRER	LNGDPF	LNGDPH
Mean	-0.412244	4.650815	4.719379	4.351220
Median	-0.426094	4.670130	4.700726	4.321899
Maximum	-0.099500	4.849840	5.020745	4.748520
Minimum	-0.604647	4.134686	4.422449	3.904379
Std. Dev.	0.089276	0.125246	0.179971	0.245044
Skewness	0.806411	-1.467853	-0.013703	0.025465

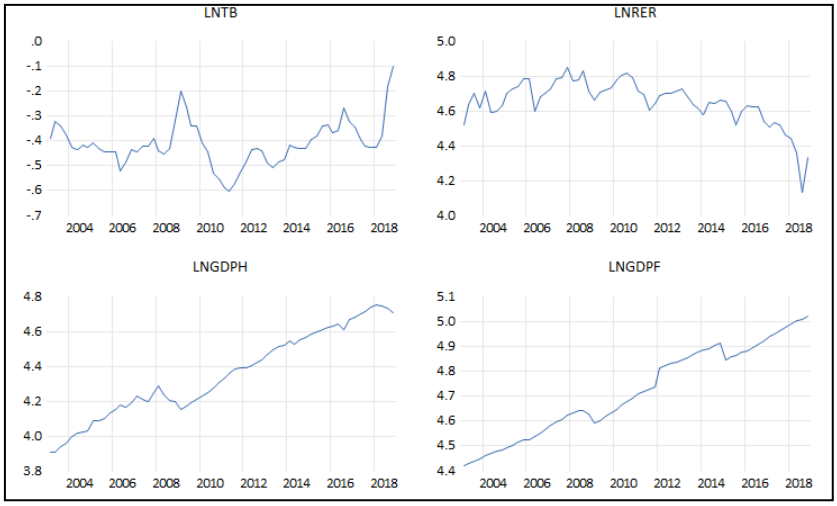
	LNTB	LNRER	LNGDPF	LNGDPH
Kurtosis	5.006999	6.533359	1.666241	1.856891
Jarque-Bera	17.67797	56.27465	4.745769	3.491442
Probability	0.000145	0.000000	0.093211	0.174519
Sum	-26.38362	297.6521	302.0403	278.4781
Sum Sq. Dev.	0.502126	0.988251	2.040533	3.782949
Observations	64	64	64	64

Source: Authors' calculations by using Eviews 10.5.

Figure 1 shows the graphs of the variables used in the study. According to the figure, foreign GDP and domestic GDP follow an upward trend depending on the economic growth process. The trade balance and the real effective exchange rate fluctuates.

Figure 1

Graph of Series Level



Source: Eviews 10.5; authors' calculations.

Before starting the analysis, we employ some unit root tests to ensure that the variables are not integrated order of I(2). These tests are Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). The results of the tests are reported in Table 3 and Table 4.

All variables are converted into logarithmic form, and "Δ" shows their first difference. Table 3 and table 4 show LNGDPF, LNGDPH, LNRER, and LNTB variables are stationary in the first-difference, the order of integration of LNGDPF, LNGDPH, LNRER, and LNTB are I(1).

Table 3

Augmented Dickey-Fuller (ADF) test results

Augmented Dickey-Fuller (ADF) Test					
	t-statistic	**Prob.**	**1%**	**5%**	**%10**
Δ LNGDPF	-7.071924***	0.0000	-4.113017	-3.483970	-3.170071
Δ LNGDPH	-6.760955***	0.0000	-4.113017	-3.483970	-3.170071
Δ LNRER	-4.692241***	0.0021	-4.137279	-3.495295	-3.176618
Δ LNTB	-5.551309***	0.0001	-4.113017	-3.483970	-3.170071

*Note: ***, ** and * show significance level respectively 1%, 5%, and 10%*
Source: Eviews 10.5; authors' estimations

Table 4

Phillips-Perron (PP) test results

Phillips-Perron (PP) Test					
	t-statistic	**Prob.**	**1%**	**5%**	**10%**
Δ LNGDPF	-7.071924***	0.0000	-4.113017	-3.483970	-3.170071
Δ LNGDPH	-6.737547***	0.0000	-4.113017	-3.483970	-3.170071
Δ LNRER	-11.36251***	0.0000	-4.113017	-3.483970	-3.170071
Δ LNTB	-5.531480***	0.0001	-4.113017	-3.483970	-3.170071

*Note: ***, ** and * show significance level respectively 1%, 5%, and 10%.*
Source: Eviews 10.5; authors' calculations

In Table 5, we calculated F-statistic value (14.33828) is greater than the 10%, 5%, 2.5%, and 1% significance levels. So, the null hypothesis is rejected. It is found that there is a co-integration relationship between the variables. Therefore, it is possible to state that there is a long-term relationship among the LNTB, LNRER, LNGDPH and LNGDPF.

Table 5

F-Bounds test statistic

F-Bounds Test Statistic	**Value**	**Significance level**	**I(0)**	**I(1)**
		Asymptotic: n=1000		
F-statistic	14.33828	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

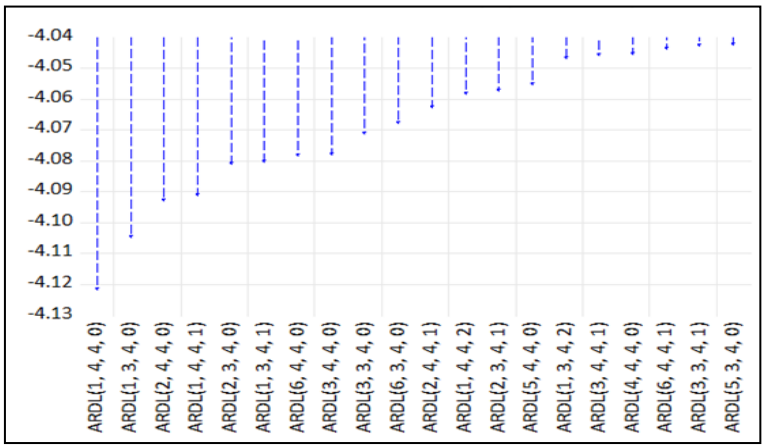
Source: Eviews 10.5; authors' calculations

Figure 2 shows the optimal model of ARDL for the Akaike Information Criteria. The first step of the ARDL model is the

determination of the appropriate lag length. At this stage, variables are tested with different lag combinations and the model that gives the lowest value according to the information criteria is selected as the appropriate model. In this study, the optimal lag length was determined as 4 considering the minimum (AIC) value.

Figure 2

Model selection criteria (AIC)



Source: Eviews 10.5; authors' calculations

We estimated the ARDL model, and we used Akaike Information Criteria for optimal lag length. The model's maximum lag order is 4. ARDL (1, 4, 4, 0) is shown the optimal lag length select based on (AIC). ARDL model explains the co-integration relationship between variables.

Table 6

Autoregressive Distributed Lags (ARDL) model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNTB(-1)	0.430037***	0.058755	7.319183	0.0000
LNRER	-0.146183*	0.076154	-1.919573	0.0610
LNRER(-1)	-0.062564**	0.029703	-2.106325	0.0405
LNRER(-2)	0.026420	0.116265	0.227244	0.8212
LNRER(-3)	-0.114210	0.079584	-1.435078	0.1579
LNRER(-4)	-0.121575**	0.059931	-2.028580	0.0482
LNGDPH	-0.928500***	0.139525	-6.654708	0.0000
LNGDPH(-1)	-0.269015	0.164767	-1.632698	0.1092

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNGDPH(-2)	0.030138	0.148404	0.203083	0.8399
LNGDPH(-3)	0.655353***	0.144028	4.550181	0.0000
LNGDPH(-4)	0.635530***	0.130795	4.858964	0.0000
LNGDPF	-0.231300**	0.090627	-2.552227	0.0140
C	0.925527	0.252178	9.230528	0.0000

R-squared	0.906512	**Mean dependent var**	-0.415820
Adjusted R-squared	0.027774	**S.D. dependent var**	0.090837
S.E. of regression	0.036256	**Akaike info criterion**	-4.140293
Sum squared residuals	137.2088	**Schwarz criterion**	-3.962797
Log likelihood	48.67486	**Hannan-Quinn criterion**	-3.962797
F-statistic	0.000000	**Durbin-Watson stat**	1.737171

*Note: ***, ** and * shows significance level respectively 1%, 5%, and 10%.*
Source: Eviews 10.5; authors' calculations

In Table 6, LNTB is the dependent variable, and LNRER, LNGDPH, and LNGDPF are explanatory variables. Our model accounts for approximately 90% of trade balance performance. The real effective exchange rate, gross domestic product for Turkey, and gross domestic product for foreigners explain 90% of Turkey's trade balance.

When we look at the long-term effects, the trade balance increases by 0.43% with a one-quarter lag enhance the trade balance by 1%, which is significant at 10%, 5%, and 1% significance level. The effect of a rise of 1% in the real effective exchange rate on the trade balance is 0.14%, which is significant at a 10% significance level. After one quarter, its effect reduces to 0.06%, which is significant at 10% and 5% significance levels. In the fourth quarter, its effect is 0.12%, which is significant at 10% and 5 % significance levels. When domestic GDP increases by 1%, the trade balance reduces by 0.92%, which is significant at 10%, 5%, and 1% significance levels. After the third quarter lag, raise by 1% in domestic GDP increase the trade balance by 0.65%, which is significant at 10%, 5%, and 1% significance levels. In the fourth quarter, the rise in domestic GDP increases the trade balance by 0.63%, which is significant at 10%, 5%, and 1% significance levels.

According to the results of the ARDL model, domestic income has a significant effect on trade balance when compared to other variables. The effect of domestic income on the trade balance is changing from negative to positive over time. The effect of the real effective exchange rate on the trade balance keeps negative over time. This means that the J-Curve does not occur. In other words, the effect of the real effective exchange rate on trade balance does not turn into positive over time. The foreign GDP has no long-term impact on the trade balance.

In this method defined a dynamic relationship between variables I (0), which involve a cointegrating relationship known as the short-term error correction model. The error correction model (ECM) is a consistent method for combining long and short-term effects. We derive the short-term dynamic parameter from the error correction model (ECM) estimation, which is related to the long-term estimation.

The most appropriate step in determining the ARDL model is short-term dynamics. In order to determine the short-term dynamics, it is necessary to determine the parameters of the error correction model. Conditional error correction model, including short term dynamics:

$$\Delta Y_t = \delta + \beta e_{t-1} + \sum_{i=1}^{p} \theta \Delta Y_{t-1} + \sum_{i=0}^{q} \delta_1 \Delta X_{t-i} + u_t \qquad (3)$$

The "e_{t-1}" in the Eq. (3) is a term lag of the error term derived from the long-term equation, and this variable is called the error correction term. For the error correction model to succeed, the coefficient of error correction term must be negative. Besides, this coefficient should be statistically significant. As a result, a negative error correction term indicates how long it will take to correct the deviation in the long-term relationship between variables.

Table 7.

Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δ LNRER	-0.146183***	0.053568	-2.728942	0.0089
Δ LNRER(-1)	0.209364***	0.077697	2.694624	0.0097
Δ LNRER(-2)	0.235785***	0.073210	3.220646	0.0023
Δ LNRER(-3)	0.121575*	0.070137	1.733388	0.0896
Δ LNGDPH	-0.928500***	0.166627	-5.572312	0.0000

Δ LNGDPH(-1)	-1.321021***	0.196958	-6.707124	0.0000
Δ LNGDPH(-2)	-1.290883***	0.214653	-6.013821	0.0000
Δ LNGDPH(-3)	-0.635530***	0.215353	-2.951103	0.0049
CointEq(-1)*	-0.569963***	0.064622	-8.820022	0.0000
R-squared	0.758423	**Mean dependent var**		0.004641
Adjusted R-squared	0.720529	**S.D. dependent var**		0.050435
S.E. of regression	0.026663	**Akaike info criterion**		-4.273626
Sum squared resid.	0.036256	**Schwarz criterion**		-3.959475
Log likelihood	137.2088	**Hannan-Quinn crit.**		-4.150744
Durbin-Watson stat	1.737171			

*Note: ***, ** and * shows significance level respectively 1%, 5%, and 10%.*
Source: Eviews 10.5; authors' calculations

Table 7 shows the estimate of the short-run coefficients of the ARDL model. In the short-run, Turkey's real income has a negative and significant impact on Turkey's trade balance with a one, two, and three-quarter lag. The real effective exchange has a positive and significant impact on Turkey's trade balance with a one, two, and three-quarter lag.

The error correction term has a negative sign and is statistically significant. It means that the deviations from the balance are eliminated in the long term. The estimated value of this coefficient is -0.569963; this shows the speed of adjustment from the short-run towards the long-run. The speed of adjustment after one period is 56.9% and it will take two quarters to reach new equilibrium.

When we look at the effects in the short term, all variables except the third quarter lag of the real effective exchange rate are statistically significant at 10%, 5%, and 1% level. The third quarter lag of the real effective exchange rate is significant at the 10% level.

In the short run, a 1% increase in the real effective exchange rate reduces the trade balance by 0.14%. The effect of the real effective exchange rate on the trade balance 0.20% after a one-quarter lag. After two and three-quarter lag, the trade balance enhances by 0.23%, and by 0.12 % respectively. When domestic GDP increases by 1%, the trade balance reduces by 0.92%. The effects of raise in domestic GDP on the trade balance are 1.32% for one-quarter lag, 1.29% for two-quarter lag, and 0.63% for three-quarter lag.

Table 8

Diagnostic Results for the Model

	F-statistic	Prob.
Serial Correlation	0.893199	0.4763
Heteroskedasticity	2.180515	0.0287

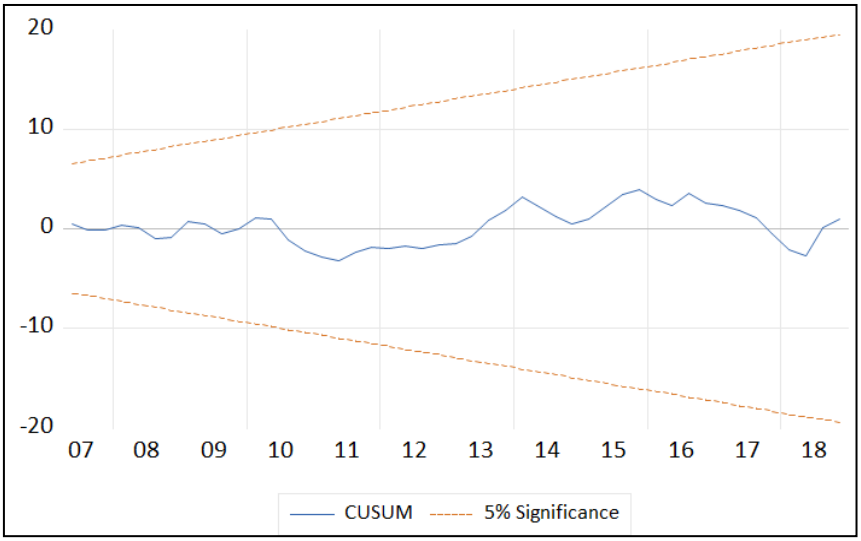
Source: Eviews 10.5; authors' calculations

Table 8 provides the diagnostic test results of the estimated ARDL (1, 4, 4, 0) model. Accordingly, in the estimated model, there is no serial correlation problem. Because, model calculating by the Newey-West HAC Consistent Covariance, the damage caused by estimating the variances made by the heterogeneity in the model can be eliminated with White's Heterostic-consistent variance estimates.

In Figure 3 and Figure 4, CUSUM and CUSUMSQ graphs are used to determine whether the estimated ARDL model has structural break of variables, using the squares of reversible error terms and thus investigating the structural break of variables.

Figure 3

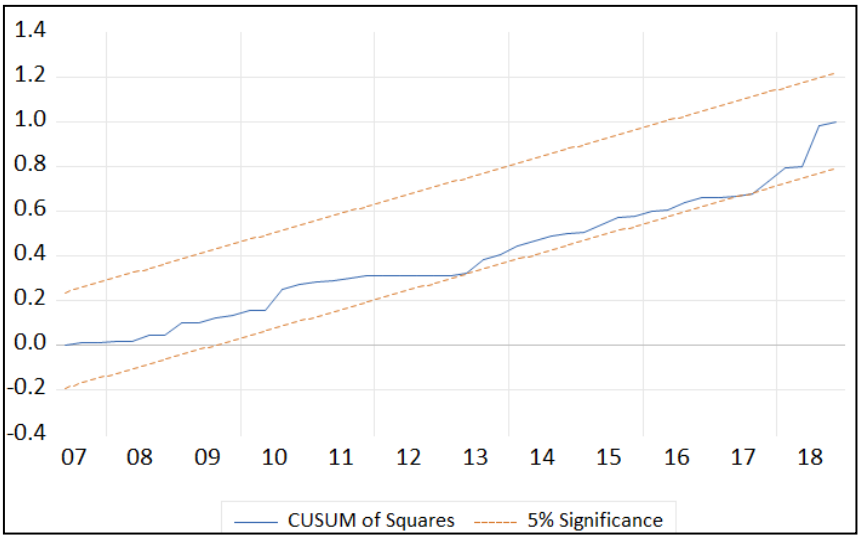
Graph of Cumulative Sum



Source: Eviews 10.5; authors' calculations

Figure 4

Graph of Cumulative sum of Squares



Source: Eviews 10.5; authors' calculations

If the CUSUM and CUSUMSQ statistics remain within critical bounds at a 5% significance level, the null hypothesis that the coefficient in the ARDL model is stable will be accepted. If the CUSUM plots are out of bounds, the null hypothesis, defending the stability of the coefficients, will have to be rejected.

When the CUSUM and CUSUMSQ graphs are examined, it shows that there is no structural break in the series.

4.Conclusion

This study aims to examine the validity of the J-Curve hypothesis using a reduced form trade balance model for Turkey. ARDL model was employed to examine the short-run and the long-run responses of the trade balance to the real effective exchange rate, domestic production, and income of foreign trade partners. Unlike previous studies, we developed a new weighted index to define foreign GDP more realistically.

The results of the error correction model show that the trade balance has negative relationship with the real effective exchange rate and domestic GDP in the short run. The results of the ARDL model show that the trade balance has a negative relationship with the real

effective exchange rate, domestic GDP, and foreign GDP in the long run.

The effect of the exchange rate on trade balance differs from theoretical expectations. The most important reason for that is the heavy dependency of the Turkish economy on imported intermediate goods and inputs (oil and natural gas). The rising imports of intermediate goods and inputs seem to be main driver of economic growth in Turkey. Therefore, the high growth rates are always associated with rising current account deficits.

The main policy implication of the findings of the study is that Turkey should find a better way to improve the trade balance, particularly decreasing its manufacturing sector's heavy reliance on imports. Obviously, that requires the adoption and implementation of new growth policy basically should depend on increasing the productivity of its resources.

The study can be improved as a future research by investigating the bilateral relationship between the current account deficit and exchange.

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