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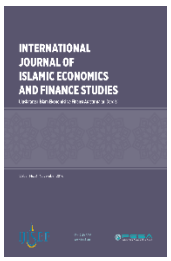

Growth, Islamic Banking and Schumpeterian Vision: An Empırıcal Evidence from the Gulf Arab States

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ABSTRACT

The rapid growth of Islamic banking has attracted much attention lately in the economic literature. The main goal of this paper is to investigate the relationship between the Islamic banking, economic growth and innovation using data for the five Gulf Arab States (Bahrain, United Arab Emirates, Kuwait, Qatar and Saudi Arabia) in the period of 2001–2015. In the empirical analysis where the panel data method is used, unit root and co-integration tests were applied to the variables. It is postulated that according to the test findings, economic growth is co-integrated with Islamic banking and patent application. Long run co-integration coefficients of the variables were analysed throughout the panel using the method of Panel Dynamic Ordinary Least Squares (PDOLS). The conclusion of the empirical study indicates that Islamic banking funds and innovation in chosen Gulf Arab states have positive and significant relations with economic growth.

Keywords: *Islamic banking, economic growth, Schumpeterian perspective, panel data, Gulf Arab States.*

JEL Classification number: *G00, O30, C51*

1. Introduction

Islamic banking has become a very fast-growing element of global capital markets and international banking system in the last twenty years. Neither any turbulences in the Middle East nor economic crises do prevent Islamic banks accessing to new markets and new companies. There is a great interest toward Islamic banking not only by those adopted Islamic law but in the global scale. According to World Islamic Banking Competitiveness Report 2016 of Ernst & Young, it is estimated that the size of assets of global Islamic banks as of the year 2015 is already over $1 trillion and the growth rate thereof between 2008 and 2012 is 17.6 % ((www.ey.com, 31.05.2016). Although most of them are in the countries of densely Muslim population, over 300 Islamic banks carry on their activities in more than 75 countries including many Western ones. The largest share of Islamic financial assets in the world belongs to Islamic banking and the ratio thereof has reached to 81 %.

What are the reasons of fast growth of Islamic banking? Intense demand is at the top of the list of such reasons. A significant part of such demand comes from the Muslim population living in Asia, Middle East, and North African regions, and desiring to utilize an economic system that befitting to their religious beliefs. Presently, Muslim population in the world is approximately 1.6 billion. In other words, 23 % of the world population is Muslim (The Global Religous Landscape, 2012, p.9). In addition, it is asserted that during the global economic crisis in 2008, Islamic banking displayed stable positions against risks and became more attractive leading to an increase of its share in the sector (Chapra, 2009, p.33-35; Beck et al., 2013, p.445-445). Accordingly, the non-Muslim population as well as those, although being Muslim, utilizing conventional banking system started inclining toward Islamic banking system. Another reason is that the role of Islamic banks increased substantially in the process of the oil-dependent growing wealth of the Gulf Arabic states being transformed to investments. Of the total assets of global Islamic banking, 34 % is in the Gulf Arabic states. Lastly, competition capacity of various financing and investment instruments unique to Islamic banking attracts the interest of all investors (Muslim and non-Muslim) (Qorchi, 2005, p.46).

The basic role of Islamic banks in economy is the same with the role of conventional banks. In both banking systems, surplus funds are consolidated and rendered to those demanding. In other words, accumulation of micro funds in banks creates a great and substantive resource for investments. Under such circumstances, increasing total investment demand promotes the growth of national income. However, methods and operations for funds demand and supply practices of both banking systems are different from each other. The basic characteristic of conventional banking system is to have a certain interest rate. According to the loanable funds theory, in the long run, market equilibrium interest rate occurs where amount of funds supplied (saving) is equalized with amount of funds demanded (investment) (Mankiw, 2014, p. 396-398). On the other hand, the basic principle in the practices of Islamic banking system is not to use the interest rate (Khan, 1986, p.5-10; Kettell, 2011, p.33). In Islamic banking practices, savings, and/or goods are offered to others on a partnership basis. While owner of goods has the proprietary right of goods, user exerts effort for growth and increase of goods. Since both parties contribute to creation of growth or increase, both parties deserve a share of the actual outcome of such a venture. An Islamic bank is an investor rather than a creditor supplying funds and operates on the basis of the profit/loss sharing principle (İqbal and Molyneux, 2004, p.19-34; Visser, 2013, p.61-66). This also requires sharing of risks. As an outcome of any project invested, a loss may occur or there may be no profit at all. Islamic banks share any losses as well. Accordingly, customers may feel much safer (Dar and Presley, 2000, p.3-6). In addition, speculative conducts (gharar) are prohibited in the Islamic banking system. It is asserted that this principle mitigates the risks of asymmetric information and intangible damages. No funds facilities are provided to any companies dealing with any forbidden works such as games/gambling (maysir) and operating in the business of foods forbidden to be consumed by the shariah law (Cattelan, 2009, p.393-395; Mashal, 2012, p.210).

Development of Islamic banks in quality and quantity and their various financial operational features have created a stage of discussion for the role of Islamic banking in economy. Actually, discussions on the banks' impact on growth processes of countries' economies go a long way back

in time. For instance; Bagehot (1873) states in his study entitled "Lombard Street" that banks have contributed to economic growth by transferring accumulated savings to those in need of funds, determining reliable firms, providing liquidity, pooling risks, and facilitating transactions. Similarly, Schumpeter (1911) also states that banking sector is the financier for efficient use of investment and causes gains in economic growth rates. Schumpeter is also the first researcher positioning innovation to the hearth of economic growth next to the banking sector. According to Schumpeter, innovation is technological advancement or discovery of new resources (Schumpeter, 1934, p.74). In the creation stage of innovation, at first, allocation of resources is required. In that case, credit need of firm is inevitable. There are two options for firms making innovation. One is that investor provides for innovation directly on its own resource. The other is that firm borrows from banks. Schumpeter favors innovation as a commercial activity which entrepreneurs approach for the aim of making profit by utilization of bank loans. This indicates the commencement of applying innovations in the trading domain (Schumpeter, 1934, p.99-105; Shane and Venkataraman, 2000, p.220-222; Sinha, 2001, p.65; Gürkan, 2007, p.253).

Aghion and Howitt (1992, 1998) revived Schumpeter's opinions on the efforts of establishing a connection between capital formation and innovation. Aghion and Howitt showed that capital formation and innovation stated by Schumpeter in the growth theory are the factors equal to each other in the growth process. The fundamental key in their conclusion is to acknowledge capital as input to research and development (R&D). Researchers expressed that the model they created without eliminating the priorities of the neoclassical growth model is a simple tool for discovering the relative role of capital formation and innovation in the long run growth (Aghion and Howitt, 1998, p.125). Innovation is endogenised in the long run growth equilibrium models which are based on the Schumpeterian model. Innovation is critical for economic development. However, the integral part of the Schumpeterian opinion is the requirement of having a banking system that makes technological innovation and economic growth possible. King and Levine (1993) developed the model by incorporating the financial system into the growth model where innovation was endogenised. By doing so, the model, which banking sector as the main intermediary of the financial system is incorporated into, became fully expressing Schumpeter's opinions (King and Levine, 1993, p.735).

Schumpeter featured the factor of fund raising for innovations. Banks activate credits by taking initiative. They undertake risks by acting in parallel with entrepreneurs. The way an entrepreneur meeting credit requirement is to sell to any bank his idea of any project embodying innovations. For a bank may facilitate credits against a commitment for reimbursement only after it is satisfied that relevant entrepreneur is sincere and competent, and that the reimbursement schedule is rational. In this case, banking system is influential in choosing entrepreneurs making innovation, funding innovations, or investment decisions. Accordingly, banks assume the role of central planners conducting the redistribution of national economic resources. At the same time, two types of entrepreneurs acting in different fields, one in production and the other in finance sector, are bounded by interaction (İçke, 2014, p.25-26). Since obviously not every innovation idea may be successful, it is banks' duty to sort out projects. Banks taking risks by providing loans will have to cover any deficit in their balance sheets from their own resources in case of a fiasco. Therefore, banks have to study thoroughly and choose meticulously among the projects submitted to them by entrepreneurs (Unal and Yücedağ, 2013, p.102-103).

It is unhesitatingly agreed that in the present era, economies of countries putting innovations into practice grow stronger. In this context, whether conventional banking system has any contribution to economic growth through innovation pursuant to the Schumpeterian tradition is started to be the subject of studies. However, inclusion of theoretical and empirical studies on the likely impacts of Islamic banking on economic growth pursuant to classical growth models without innovations in the literature predates only the last decade. In our opinion, Islamic banking based on real economic activity has a significant advantage in financing projects involving innovations. Because that Islamic banks do not utilize interest factor and the profit/loss participation principle theoretically requires conducting detailed feasibility studies on projects, being selective, and the application of a strict post-financing control mechanism. It is stated that due to such features, Islamic banks are effective

in their financing decisions and ensure optimal distribution of liquidity (Tajgardoon et al., 2013, p.543). Under such circumstance, Islamic banks may contribute positively to financing innovations by their loans, provide technological competitive advantage, and accordingly, economic growth. From this point of view, this study seeks an answer to the question of whether Islamic banking is interrelated to economic growth and innovation. The empirical analysis of the study was realized in line with the Schumpeterian tradition based on the studies of King and Levine (1993). Accordingly, the primary aim of the study is to examine whether Islamic banking is interrelated to both economic growth and innovation, and to provide contributions to the literature on the Schumpeterian growth model.

In the empirical analysis part, the Gulf Arabic countries utilizing both conventional and Islamic banking system in conjunction were chosen. These are the countries also in the high-income group allocating a substantial part of investments to information technologies. It is anticipated that estimated findings obtained from empirical applications provide benefits both to policy makers in rational decision-making stages by evaluation of options and to researchers.

In the second part following the introduction, various references are presented from the literature studying the relations of conventional banking and economic growth, conventional banking and innovation as well as Islamic banking and economic growth. In the third part, the panel data method and the tests used in the econometric analysis are explained, and the empirical model formed and the data set utilized are introduced. In the third part, estimated results of the empirical applications are given. In the conclusions, the findings emerged are evaluated.

2. Related Literature

The first generation of growth economists have not discussed the impact of financial system on economic growth. With the impact of financial liberalization following 1970s, a comprehensive literature was formed in the field of finance and economic growth relationship. Most of the studies in the literature widely reveal the conclusion that banking sector is important in economic growth process. This study focuses on the relation of Islamic banking holding a substantial role in the banking sector and innovation with economic growth. Therefore, in this part are presented the examples from the literature analyzing the relations of conventional banking and economic growth, innovation and economic growth, and Islamic banking and economic growth, respectively.

The studies focusing on the conventional banking and economic growth are in general in the literature on finance and economic growth. Levine and Zervos (1998) have analyzed the relation of development of stock market and banking sector to economic growth by utilizing the data from 47 countries in the period of 1976-1993. In their analyses, as a proxy of development of banking sector, they utilized the ratio of credit provided by deposit banks to private sector by Gross Domestic Product (GDP). As result of their analyses, a positive and significant relation was determined between development of banking and stock market liquidity and economic growth as well as capital formation (accumulation of capital) and productivity growth. Beck at al. (2000) found out in their study conducted through both horizontal section(cross-section) and panel data methods on the data for the period of 1960-1995 for 63 countries that there is a statistically significant relation in the long run between the loans (credit) provided by banks to private sector and economic growth. In their studies, as a proxy of development of banking sector, Beck and Levine (2004) have made use of the ratio of loans provided by deposit banks to private sector by GDP. A significant and positive relationship was determined between development of banking and economic growth. Webb at al. (2002), Güven (2002), Ceylan and Durkaya (2010), Özcan and Ari (2011) are among the studies in which the existence of the relationship between loans provided to private sector by banks and economic growth is confirmed.

Pursuant to the Schumpeterian paradigm, the examples of empirical analyses modeling the relationship between bank loans and creation of innovation, research and development (R&D), economic growth are as follows: Fagerberg and Srholec (2007) have investigated economic development capabilities in four categories utilizing 115 countries and 25 variables in the period of 1992-2004. They showed that innovation and governance have a statistically significant relationship with economic development. Bönte and Nielen (2010) have determined a positive relationship

between creation of innovation and loans provided to medium-sized enterprises in 14 European countries. Bittencourt (2012) has examined, by means of the panel data method, the relationship between economic growth and many variables such as loans provided to private sector by banks, liquidity, imports and exports, ratio of investments to GDP, urbanization rate, inflation tax, public debts in Latin American countries for the period of 1980-2007. They concluded that Schumpeter was right. Meierrieks (2014) has studied the relation of the Schumpeterian financing model to entrepreneur and economic growth for 51 countries for the period of 1993-2008 by means of Ordinary Least Squares (OLS). He has made use of such variables as number of patents, ratio of liquid assets to GDP, ratio of private loans to GDP, protection of economic rights, ratio of R&D expenses to GDP, schooling rate, rule of law, trade openness rate, per capita income. Results show that financial intermediaries contribute positively to investments of innovative entrepreneurs. Moreover, they concluded that economic policies strengthening financial system increase innovative capacity and accordingly, contributing to economic growth.

Researchers theoretically discuss Islamic economy and Islamic financing for thirty years in various aspects. Nonetheless, empirical studies on the relationship between Islamic banking and economic growth started only recently. Therefore, there are only few studies on whether Islamic bank funds contribute to economic growth. In the analyses, such variables as sums of Islamic financing to represent Islamic banks, rate of private sector loans to GDP, and Islamic deposits are favored. On the other hand, economic growth in general is represented by GDP, economic growth rate or per capita income. It must be stated that in the studies on the relationship between Islamic banking and economic growth, various variables, such as inflation rates, interest rates, monetary supply, foreign trade date, are included in empirical analyses. However, utilization of any variable identifying innovation is not observed. Concordantly, examples of empirical studies in the literature investigating the relationship between İslamic banking and economic growth are:

Farahani and Sadr (2012) have tested the long- and short-term relations between the development of Islamic banking and economic growth in Iran and Indonesia in the period of 2000: Q1-2010: Q4 by means (by technic) of co-integration approach and error correction model within the Autoregressive Distributed Lag (ARDL) model. The results indicate the existence of a significant relation in short and long runs. According to their analyses, in Indonesia and Iran, meanwhile Islamic banking contributes economic growth; economic growth in turn contributes development of Islamic banking.

Abduh and Omar (2012) have analyzed the development of Islamic banking and economic growth in Indonesia making use of the data from the 2003: Q1-2010: Q2 period by means of co-integration approach and error correction model pursuant to the ARDL model. The variables used are real economic growth rate, total funding by Islamic banks, and gross fixed capital. The results indicate the existence of significant relations in short and long runs, and that such relations are bilateral.

Abduh, Brahim, and Omar (2012) conducted empirical analyses on the causality relationship between Islamic financial development and economic growth in Bahrain in short and long run. In Bahrain, dual banking system is in use. They have used the variables of total Islamic deposits and total Islamic financing for Islamic banking, and the variables of total conventional deposits and total conventional loans for conventional banking, and the variable of gross domestic product for economic growth. The long- and short run relationship for the period of 2000: Q1-2010: Q4 were analyzed by means of co-integration test and error correction mechanism pursuant to the Vector Auto Regressive (VAR) model. In the long run, both Islamic and conventional banking sectors were significant and positive in the economic growth relation. According to Granger causality test it was not able to obtain any significant findings for the Islamic banking and economic growth relationship in the short run. However, the relationship between conventional banking sector to economic growth was found to be significant and with positive impact.

Manap et al. (2012) studied the relation of Islamic banking and economic growth in Malaysia making use of the data of 1998: Q1-2012: Q2 with technics of the Toda-Yamamoto method and bootstrap Granger causality tests. They have used total financing of Islamic banks by proxy of Islamic banking, and the data of real gross domestic product and real gross fixed capital formation

for economic growth. They concluded, according to the Granger causality test, development of Islamic banking contributes to economic growth.

Goaied and Sassi (2013) investigated the impact of Islamic banking on economic growth in some of the countries in Middle East and North Africa (MENA Region). They analyzed total amount of funds financed to private sector by Islamic banks using the panel date method utilizing such variables as per capita income, inflation rates, rates of government spends, ratio of monetary supply (M3) to GDP, loans provided to private sector by conventional banks. The results indicate the existence of a loose relation between Islamic banking and economic growth and that loans provided to private sector have negative impact on economic growth.

Tajgardoon et al. (2013) studied the relationship between Islamic banking and economic growth in Asian countries in the period of 1980-2009 using the panel data method. They have applied the Granger causality test, and used the loans provided to private sector by Islamic banks on behalf of Islamic banking and GDP and trade data for economic growth. Empirical application results indicate that a unilateral causality relation between Islamic banking and economic growth, and economic growth and exports.

Tabash and Dhankar (2013) studied the relationship between Islamic banking financing and economic growth in Bahrain using the annual data over the 1990 - 2008 by means of the time-series analysis. They utilized loans provided to private sector by Islamic banks and GDP as the variables. A long run relation was determined statistically according to the Granger causality analysis. It was concluded that development of Islamic banking contributes to economic growth.

Ustaoğlu et al. (2013) tested empirically whether or not participation banks in Turkey are affected from economic growth using the data of the 2003: Q1-2011: Q4 period. Real GDP as well as total deposits, total number of employees, and total number of departments in participation banks are the variables used. A regression model was formed and the test of Analysis of Variance (ANOVA) was applied. It was concluded that economic growth has positive impact on participation banks.

Yusof and Bahlous (2013) investigated the relation of Islamic finance and economic growth in Malaysia, Indonesia, and the Gulf Cooperation Council (GCC) countries using the annual data for the period of 2000-2009 by means of panel data methods, variance decomposition and impulse-response functions. It was concluded that Islamic banks contributed to economic growth. It was concluded that Islamic banking in Malaysia and Indonesia contributed to economic growth much more in comparison to the other countries included in the analysis.

Al-Oqool et al. (2014) analyzed empirically the contribution of Islamic banking to economic growth in Jordan in the period of 1980-2012 by means of Johansen co-integration test and Granger causality test. They have used real GDP for the determinant of economic growth, and total deposits and total finance funds of Islamic banks for development of Islamic banking. A significant long run relation was identified between Islamic banking and economic growth. Pursuant to the Granger causality test, they have found a bilateral causality relationship between Islamic bank funds and economic growth, and a bilateral Granger causality relationship between Islamic bank deposits and economic growth; the latter is from economic growth toward Islamic bank deposits.

Tabash and Dhankar (2014) analyzed the relationship between Islamic finance system and economic growth in Qatar with the time series analysis for the period of 1990-2008. Loans to private sector by Islamic banks, gross GDP, gross fixed capital formation, and foreign direct investments to Qatar were used as the variables. As result of co-integration and Granger causality analyses, a bilateral causality relationship was determined between Islamic banking financing and economic growth. In addition, a unilateral causality relationship was found out from Islamic banking financing to fixed capital formation and foreign direct investments.

3. Econometric Analysis, Model, and Data Set

In the empirical analysis, whether there is a relationship between, economic growth to Islamic banking and innovation was investigated. In the study covering certain Gulf Arab states the annual data of the 2001-2015 period was used. In order to test the existence of such relation, the panel

data analysis was made use of. Therefore, panel unit root, panel co-integration, and Panel Dynamic Ordinary Least Squares (PDOLS) tests used in the panel data analysis are theoretically briefly explained herein. Afterwards, the econometric model and the data set of the study are introduced respectively.

3.1 Panel Data Analysis and Tests

Panel data analysis is the method for estimating economic relationships by combining cross-section observations units having time dimension such as countries, individuals, companies, and households. Panel data is comprised of a largeindividual N units and a few T observations overtime corresponding to each unit. Having both sections assigned a value in the panel data analysis enables researchers to work with more data. In such case, both the number of observations and accordingly, degree of freedom increase. Thereby, the degree of multi-collinearity between explanatory variables decreases and the efficacy and reliability of econometric estimations increase. In general, basic panel data model is as follows (Baltagi, 2008: 12-13; Tatoğlu, 2013: 9).

$$Y_{it} = \alpha_{it} + \beta Xkit + \mu_{it} \qquad \text{i = 1,..., N (section) ; t = 1,.....,T (time)} \qquad (1)$$

In the equation (1), Y is the observation on dependent variable, X_k is the observation on independent variable, α is fixed parameter, β is the corresponding parameter vector of fixed coefficient (slope parameter), and μ is the error component that may be cross-section ally correlated. i subscript represents units (e.g., individual, company, country), t subscript represents time (e.g., day, month, year). That variables, parameters and error term having i and t subscripts indicates that they have a panel data set. In this model, fixed and slope parameters get values according to both units and time.

Before investigating the existence of a relation between variables in the panel data analysis method, it is essential to test stationary of variables. According to Granger and Newbold (1974), when testing with non-stationary data any relation found out between the analyzed variables could not be reliable. Therefore, stationary must be checked prior to regression analysis. Fisher ADF (Maddala and Wu, 1999), Breitung (1999), Hadri (2000), Fisher PP (Choi, 2001) Levin, Lin, Chu (LLC, 2002), Im, Peseran, Shin (IPS, 2003) are the most known panel unit root bench tests. These tests assume that there is no correlation between units, and in general, the dynamic fixed effects model, similar to Augmented Dickey-Fuller (ADF), is the starting point. In the equation (2), μ_i and τi parameters are used for indicating fixed effects and trend parameters, respectively. Existence of stationary may be searched by testing ρ with proper methods.

$$Yit = \mu i + \tau it + \rho Yit - 1 + \delta i\theta t + \varepsilon it \qquad (2)$$

Two types of hypothesis are assumed concerning to ρ. The first of these assumes that ρ does not vary from unit to unit, meaning there is a general unit root process. It is called the First Group of Panel Unit Root Test. LLC (2002), Breitung (2000), and Hadri (2000) tests accept this hypothesis. The basic hypothesis in the first two of these tests is as "there is at least one-unit root." Hadri (2000) switches the places of zero and the alternative hypothesis in the panel unit root test. The basic hypothesis assumes that "there is no unit root" while the alternative hypothesis says "entire panel has unit roots." Thus, rejection or acceptance of basic non-stationary hypothesis may be verified much strongly.

In the tests called as the Second Group of Panel Unit Root Test, it is assumed that ρ varies from unit to unit. IPS (2003), Fisher ADF (Maddala and Wu, 1999) and Fisher PP (Choi, 2001) are of such group of tests. Therein, each unit is allowed to have own autocorrelation coefficient. In these tests, the null hypothesis of "no unit is stationary" is tested according to the alternative hypothesis of "at least one unit is stationary." As result of the unit root tests applied, if the series pertaining to variables contains any unit root, linear combinations of these series may be stable. In such a case, existence of a long run relationship may be analyzed by means of panel co-integration tests.

Kao (1999), Pedroni (1999, 2004), and Johansen Fisher are among such co-integration tests frequently applied for panel co-integration analyses in the literature. In the empirical application of the study these three tests are utilized. Kao Panel co-integration tests are based on Dickey Fuller

(DF) and the Augmented Dickey – Fuller (ADF) tests. The null hypothesis of "there is no co-integration" is tested.

Pedroni (1999, 2004) recommends seven panel co-integration tests of which the basic hypothesis is "there is no co-integration." Heterogeneity is allowed under an alternative hypothesis. Rejection of the null hypothesis means that sufficient number of units individually has a diverging statistic from the mean. The tests recommended by Pedroni may be discussed under two categories. In the first category is used the average of co-integration tests calculated separately for the time series of all units. Four tests calculated within dimension are used. The first test is a statistics of variance ratio type. The second is similar to the Phillips-Peron (PP) (rho) statistics, and the third one to the PP (t) statistics. These are nonparametric tests. The forth test is a parametric statistics similar to ADF (t) statistics. In the second category tests, averages are made of components. Therefore, limit distributions are based on the limits of partial terms of numerator and denominator. It contains three tests in the between dimension. The first test in this group is similar to the PP (rho) statistics. The other two is alike the PP (t) and ADF (t) statistics (Güvenek and Alptekin, 2010:181).

If a long run relationship is found between the variables, long- run parameters may be estimated using the PDOLS (Stock and Watson, 1993) method. PDOLS Estimator (Kao and Chiang, 2000) is obtained by the regression estimation in the equation (3) below which is set using the values of initial and lagged variables of differentiated variables I (1).

$$Yit = \alpha i + X'it\beta + \sum_{j=-q}^{q} cit\Delta Xit + j + vit \quad (3)$$

The PDOLS method is a method that may eliminate deviations in the static regression by including dynamic elements to the model.

3.2. Model and Data Set

Empirical analysis covers Bahrain, The United Arab Emirates, Kuwait, Qatar, and Saudi Arabia which are among the high-income countries according to the World Bank Atlas Method established by the World Bank based on the data of national per capita incomes. Therefore, these five countries form the cross - section dimension of the study. These countries owe their wealth to petroleum revenues. Petroleum is an exhaustible natural resource. Of the world petroleum reserves, 62 % is in the Middle East region, and the life of proven petroleum reserves is stated to be around 50 years (BP, Statistical Review of World Energy June 2016: 6). After all, these countries have no revenue generating products other than petroleum. Geographically, they do not have vast fields for agricultural produces. Therefore, shifting investments to high-tech products requiring innovations may facilitate creation of new revenue sources other than petroleum. In these Muslim countries, conventional and Islamic banking systems coexist. The data used in the model are yearly and covers the period of 2001-2015.

In the study, the equation was estimated to analyze relationship economic growth, Islamic bank loans, innovation. For the empirical analysis, Eviews 8 econometric package software was used. Accordingly, the empirical model is defined in logarithmic form as below and studied by means of the panel regression analysis.

$$LGDPCit = \beta 1 + \beta 2LISCRit + \beta 3LPAit + \mu it \quad (4)$$

Innovation variable is defined as number of patent applications. The ratio of loans provided to private sector by Islamic banks to gross domestic product(GDP) symbolizes Islamic banking. For economic growth variable, GDP divided by midyear population (GDP per capita) is used. The variables used in the model and their sources are given in Table 1.

Table 1. Variables Used in the Analysis

Variables	Explanation	Source
$LGDPC_{it}$	gross domestic product divided by midyear population in country i in period t (US$)	Electronic database of the World Bank (www.data.worldbank.org, 2017)
$LISCR_{it}$	ratio of loans provided to private sector by Islamic banks to GDP in country i in period t (US $)	Bankscope, (https://bankscope.bvdinfo.com, 2017) annual activity reports of Islamic banks in respective countries
LPA_{it}	number of patent applications by country i in period t	Electronic database of the World Bank (www.data.worldbank.org, 2017), patent application offices in respective countries.

4. Empirical Results

Empirical findings of the study are presented in three parts as panel unit roots test results, panel co-integration results, and panel regression analysis results.

4.1. Panel Unit Roots Results

In order to determine the relationship between Islamic banking, economic growth and innovation in chosen Gulf Arab countries, primarily whether variables are stationary or not will be analyzed by panel unit root test.

Table 2: Panel Unit Root Test Results

Variables	LLC	Breitung	IPS	Fisher -ADF	Fisher -PP
LGDPC	-2.49045	- 0.94575	-0.97532	13.8172	12.1519
	(0.0064)	(0.1721)	(0.1647)	(0.1815)	(0.2750)
LISCR	0.04368	0.96460	1.00789	8.70101	9.79095
	(0.5174)	(0.8326)	(0.8432)	(0.5607)	(0.4590)
LPA	1.45486	-0.59424	1.13753	1.74954	1.20076
	(0.9271)	(0.2762)	(0.8723)	(0.9979)	(0.9996)
ΔLGDPC	2.85212*	-2.13980**	-1.66281**	20.5708**	38.2834 *
	(0.0022)	(0.0162)	(0.0482)	(0.0243)	(0.0000)
ΔLISCR	-3.90378*	-1.52607***	-1.84541**	20.2415**	44.1038*
	(0.0000)	(0.0635)	(0.0325)	(0.0270)	(0.0000)
ΔLPA	-2.77308*	-1.74469**	-1.31809***	17.3528***	47.0234*
	(0.0028)	(0.0405)	(0.0937)	(0.0669)	(0.0000)

Notes: Numbers parentheses denote p-values. Δ symbol denote first differences and (*), (**), (***) denotes rejections of null hypothesis at %1, %5 and %10 level of significance. Lag length selection automatic based on Schwarz criterion.

In this study, unit roots tests pertaining to LLC, Breitung, IPS, Fisher-ADF, Fisher-PP, and Hadri models are utilized. In Table 2 are given the t-statistics and probabilities at the level and in the first difference with individual intercepts and trends formed as result of unit roots tests application in respect of the variables used in the study to the panel data. According to the results of LLC, Breitung, IPS, ADP, PP, and Hadri tests, it is possible to say that the series contains unit roots at the level. Since that the series contain unit roots at the level is insufficient for co-integration test, difference process is performed. All the variables are stationary in the first difference.

4.2. Panel Co-Integration Test Results

At this stage of the study, it will be tested whether a long run relationship exists between the variables representing Islamic banking and development in the Gulf Arab countries. In this context, Pedroni, Kao, and Johansen Fisher Co-integration tests will be applied to the panel data set.

Pedroni (1999) co-integration test is used to prove whether panel data are co-integrated by using seven different tests assuming that there is no cross- section dependency. Four of these seven

different tests make estimations by using the estimator "within" and three by using the estimator "between." The model is estimated by using the Newey-West estimator under individual intercept and individual trend assumption in order to find the Schwarz criteria and long run variance. The estimations obtained as result of the test are organized in Table 3.

Table 3: Pedroni Co-Integration Test Results

	t-statistic	Probability
Panel v	1.682118**	0.0463
Panel ρ - (Phillips–Perron Type ρ)	2.488028	0.9936
Panel PP - (Phillips–Perron Type t)	-3.844321*	0.0001
Panel ADF - (Dickey–Fuller Type t)	-3.570830*	0.0002
Group ρ - (Phillips–Perron Type ρ)	2.687230	0.9964
Group PP - (Phillips–Perron Type t)	-5.033403*	0.0000
Group ADF – (Dickey-Fuller Type t)	-2.228238**	0.0129

Notes: Under the null tests, all variables are distributed normal, N (0, 1). (*) and (**) significant at %1and %5 levels.

In all the tests except the Panel rho and group rho statistics, the null hypothesis "there is no co-integration" is statistically rejected. Pedroni (1999) indicates that panel-ADF and group-ADF tests yield much significant results particularly for small samples. Also in this study, having these tests yielding significant results is a significant indication of co-integration in the panel data.

Kao (1999) error co-integration test (dependent on Engle-Granger) is the co-integration test that is applied secondly. The Kao test is conducted by using the Newey-West estimators in order to find the Schwarz criteria and long run variance when there is an individual intercept.

Table 4: Kao Co-Integration Test Results

t-Statistic	Prob.
-2.175429	0.0148**

Notes: (*) significant at % 5 level.

The result obtained by applying the test to the panel data set is given in Table 4. Having the probabilities come out significant, the null hypothesis "there is no co-integration" is rejected, instead, the alternative hypothesis "there is co-integration" is accepted.

Table 5: Johansen-Fisher Co-Integration Test Results

	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	58.03	0.0000	58.03	0.0000
At most 1	85.48	0.0000	61.42	0.0000
At most 2	44.68	0.0000	33.21	0.0003
At most 3	31.49	0.0005	31.49	0.0005

When the Johansen-Fisher panel co-integration test is applied with the delay figure 1 which is found as result of the Kao error co-integration test in the model with intercept and trend, the results in Table 5 are obtained. The null hypothesis is rejected at a statistically significant level according to the probabilities of both Trace and Max-Eigen statistics as result of applying the Johansen-Fisher panel co-integration test. It is postulated alternative hypothesis that there is a co-integration between economic growth, Islamic bank loans, and patent application for all the countries.

As results of Pedroni, Kao, and Johansen–Fisher co-integration tests, the conclusion that economic growth and İslamic bank loans and patent applications are co-integrated is accepted coherently,

effectively, and strongly. The long run coefficient will be estimated using the PDOLS method between the variables as a result of panel co-integration.

4.3. Panel Dynamic OLS Estimate Result

In the model where economic growth is dependent variable, and İslamic bank loans, and patent applications are independent variables, the long-run coefficients are included in Table 6.

Table 6: Panel Dynamic OLS Test Results

Variable	Coefficient	
LGDPC (Dependent variable)		
LISCR	1.880047* (3.290063)	
LPA	0.354622* (3.952152)	
Diagnostic statistics	R-squared	0.900701
	Mean dependent var.	10.01274
	Adjusted R-squared	0.889490
	S.D. dependent var.	1.432456
	Durbin-Watson stat	0.702307
	Sum squared residual	14.05905

Notes: (*) and (**) significant at %1 and %5 levels. Numbers parentheses denote t-statistics.

According to the results obtained by the analysis of the PDOLS model, the coefficients of the variables in the model are statistically significant and the signs there of are positive. That R^2 value is 0.88 points out that the independent variables may explain 88 % of the variance in the dependent variable. The empirical results indicate the existence of a positive and statistically significant relationship between economic growth, Islamic bank loans and innovation According to the long-term forecasts, a 1 % increase in Islamic bank loans to Gulf Arab countries chosen to represent the panel will result in a 1.88% decrease in economic growth, while a 1% increase in patent applications will result in a 0.35% increase in economic growth. This provides evidence that İslamic bank loans and patent applications have a positive impact on economic growth.

5. Conclusions

Empirical studies in the literature widely demonstrate that financing for investments with innovations contributes to economic growth. Also in the modern-day economic growth models, innovation is considered an endogenous factor. Principally, that banking sector will contribute to economic growth by supporting projects containing innovation was expressed by Schumpeter (1911) long time ago. Concordantly, Islamic banking has a great share in the sector in turning the revenues earned from high petroleum exports of the Gulf Arab countries to investments. Of the global Islamic banking assets, 34 % is accumulated in these countries. Having not using interest factor and financing investors with the principle of profit/loss sharing make different Islamic banking from conventional banking practices. Having that the role of Islamic banking increased and that innovation and R&D became highly important in economic growth caused empirical studies conducted on whether Islamic banking is related to economic growth and innovation (relevant to Schumpeterian tradition) in the chosen Gulf Arab countries.

In the empirical study, the panel data analysis was applied to the variables comprised of annual data from Bahrain, the United Arab Emirates, Kuwait, Qatar, and Saudi Arabia among the Gulf Arab countries over the 2001-2015. The logarithms of the variables in the panel data analysis were taken to eliminate small fluctuations and to make them suitable for analysis. Subsequently, existence of panel unit roots was tested. Since the study results verified the existence of unit roots at the level, the difference was taken in consideration and was found to be stationary at the first differentiation. After this stage, the panel co-integration tests were performed. The test results indicated that there is a long-run relationship between the variables comprised of the data from the chosen Gulf Arab countries. The coefficients of the long run co-integration relation determined between the variables were investigated by means of the Panel DOLS method. The DOLS test findings indicate that any increase of 1 % to occur in Islamic banking loans for the overall panel creates an increase of 1.88 %

in income per capita, and of 1 % to occur in patent applications for the overall panel creates an increase of 0.35 % in income per capita.

The conclusion of the empirical study indicates that economic growth in chosen Gulf Arab states have positive and significant relationship with Islamic banking funds, and innovation. Most of the studies in the literature demonstrate that Islamic banking sector plays a significant role in economic growth. The innovation is the component makes difference in this study. Thereby, it forms a basis for discussions on whether Islamic banking being part of the global financial system has any role in the economic growth process associated with innovation. This also indicates that even if petroleum is decreased or completely consumed in the Gulf Arab countries of which being among the high income countries depends on revenues from petroleum exports, they may continue their economic growth process by transferring Islamic banking funds to such investments containing innovations. This analysis seems to support the economic growth hypothesis consistent to the Schumpeterian paradigm that King and Levine (1993) have modeled.

In conclusion, Islamic banking funds can be channelized to such investments in the economic structure based on innovations. The real sector depending on economic capacities may be positively affected. Therefore, an economic structuring accelerated by Islamic banking sector may push on technical innovations. Development of dynamic technical processes may contribute to formation of a much competitive economic structure. In this point of view, it is possible to say that Islamic banking is compatible with the new-generation growth model.

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