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Statistical Economic and Social Research and Training Centre for Islamic Countries (SESRIC)

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Contents

EDITORIAL NOTE

Given the diverse ebbs and flows of the world economy, the OIC Member States are struggling to achieve more significant and tangible improvements in various fields related to research and development, economic growth, investment and integration. Although these improvements may seem to have a plausible impact on their economies, sluggish growth rates still become inevitable over the succeeding years, with significant reflections on many fronts. In this respect, this issue of the Journal of Economic Cooperation and Development – March 2017 analyses the various challenges facing some member countries and suggests some possible healing solutions by setting forth the ways and means to deal with these challenges accordingly.

The first article focuses on three important issues of economic freedom, domestic and international research and development (R&D) and highlights how foreign direct investment (FDI) and multinational corporations (MNCs) play a major role in the internationalization of R&D activities of 38 developing countries over the period 2000 to 2010. The article also adds that a good infrastructure, attractive domestic market, highly trained workforces and reasonable intellectual property protection measures will attract significant FDI in R&D.

The second article aims to determine the problems, solutions, and strategies for productive Waqf in Indonesia in accordance with perspective Regulator, Nazhir (those who manage Waqf) and Wakif (those who give their properties for Waqf), suggesting that expansions and innovations in the Waqf management and its strategies is the solution to develop productive Waqf and to transform Nazhir from individual to institutions.

The third article provides an input for policy makers on issues of economic integration, and assesses the "revealed comparative advantage" (RCA) of the two regions: sub-Saharan Africa (SSA) and Middle East & North Africa (MENA), on merchandise goods export. It also highlights that pattern of commodity export reflects the relative price and non-price factors that determine the structure of export of a country or region. That is to say, while sub-Saharan Africa has revealed comparative advantage in commodity export, Middle East & North Africa have comparative disadvantage during the whole period considered in this study (1995 to 2012).

The fourth article revisits the argument, using time series and panel data, on the contentious causality relationship between net FDI inflows and GDP

among the pioneering Association of Southeast Asian Nations (ASEAN-5) members which have undergone liberalization and free trade. It also reviews past work on FDI inflows into the ASEAN economies, presents the methodology and data used in the paper, analyses the results and sets the evidence from Thailand showing that GDP growth drives FDI outflows more than attracting FDI inflows.

The fifth article sheds light on the potential of cooperation in science, technology and innovation (STI) between the European Union and Turkey basing the argument on the remarkable economic performance, the Turkish economy has shown in various scientific areas like ICT, energy, defence, water and food over the last decade and examines in broader terms the nature of this EU-Turkey relations. Turkey set research and development as a priority area for the next decade to increase its competitiveness and avoid the 'middle-income trap', prioritising the role of SMEs in the Turkish national science, economic and innovation policy.

The sixth and last article aims to serve as one of the pioneering empirical references for investors to evaluate Islamic structured investments, stating that Takaful (Islamic insurance) operators have been taking initiatives to attract retail and institutional contributors by offering structured investment-linked plans that comply with the Shariah requirements in Malaysia and provides a brief discussion on the nature and basics mechanisms of structured products including the risks associated with these products.

Amb. Musa KULAKLIKAYA
Editor-in-chief

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The Role of Economic Freedom in Research and Development-Productivity Growth Nexus: Study Based on Different Income Level on Developing Countries

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This research focuses on three important issues of economic freedom, domestic and international Research and Development (R&D) and productivity growth by using Panel Dynamic Ordinary Least Square (P-DOLS) proposed by Stock and Watson (1993) in estimating 37 selected developing countries that classified based on income level for time period 2000 to 2010. To encourage domestic and international R&D activities, host and home countries must have a 'good' institution like economic freedom. Main focus of this study is on economic freedom that we examine the role of economic freedom as a mediating factor of domestic and international R&D on productivity growth based on different income level on developing countries. The findings indicate that there are mixed results that show positive and negative relationship of the role economic freedom as mediating factor on domestic and international R&D on productivity growth.

Keywords: Economic Freedom, Domestic Research and Development; International Research and Development; Panel Dynamic Ordinary Least Square (P-DOLS); Developing countries.

1. Introduction

Developing countries look at FDI and location of MNC's as an engine of growth. These international investments will benefits to a host country in terms of capital inflows, employment, new technology, management skills, and most importantly Research and Development (R&D) spillover that will encourage innovation at host country. UNCTAD (2008), FDI and MNC's in developing countries plays a

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major role in the internationalization of R&D activities. More than 95% of the 700 firms worldwide with the largest R&D expenditure are from MNCs. In order to attract the MNC's to invest in the R&D, host countries itself must present the location advantages. UNCTAD (2005) state that developing countries especially in Asia and the Pacific that have a good infrastructure, attractive domestic market, highly trained workforces and reasonable intellectual property protection will attracted the significant FDI in R&D. Host countries will benefited from the opportunities that provided and only increase the demand of MNC's for inexpensive talent and for new developing markets. Host countries will focus to maximize the technology spillovers from FDI and will encourage them to engage in R&D activities. So there exist the relationship between the countries that actively involved in R&D activities and countries that shown the significant economic improvement. To catch up with the developed countries, it is essential for countries either developing or least developed countries to build R&D capacities to upgrade their technologies. R&D activities represent the most privileged method by which companies generate and acquire technological information. For the decades, R&D is the only factor that driven the technology change and innovation that be an important sources for the country productivity growth. The R&D intensive FDI is expected to bring significant benefit to host countries that will associated with a net increase in host country R&D activity that involving more R&D expenditure and create the job opportunities for highly skill labor. These benefits will be larger when the R&D investment by MNC's complements the R&D at host countries. To encourage more benefit from FDI and MNC, host countries should have a good institution that can be refer to especially the level of economic freedom. The level of economic freedom is very important in explaining the inflows of FDI (Pejovich 2002).

The concepts of economy freedom can be defined separately based on individual, society and economy itself. From the individual view, in economically free, the individual can controls their productivity based on labor and initiative, which is individual has empowered to decide where to live and work and at the same time, they have the right to own property and dispose of it as they choose. Succeed and fail individuals based on the effort and ability. The concept of freedom on government view is government decision making is characterized by transparency

and openness, and the light of opportunity replaces the shadows where discrimination can be most subtle. Besides that, in an economically free, the power of economic decision making is widely dispersed, and the allocation of resources for production and consumption is on the basis of free and open competition so that every individual or firm has a fair chance to succeed. A country that provides for economic freedom allows for greater diversity, promoting creativity encourages new technology and innovation that impact on country economic growth. The relationship between growth and economic freedom is in one direction, which is the increase in the rating of economic freedom will enhance the economic growth, but there is no tendency for higher economic growth to increase the economic freedom. Previously, numerous researchers have studies these relationships and found that countries with higher and improving economic freedom grew more rapidly and achieve higher level of per capita GDP. According to James and Lawson (2008), countries with a large amount economics freedom grew significantly quicker than others, while those with the least economic freedoms experienced negative growth.

Economic freedom is main key to overall economic well-being. Countries that enjoy higher levels of economic freedom should be more attractive for foreign investors. The link between economic freedom and growth is then strengthened, since economic freedom affects growth through two channels: directly (De Haan and Sturm, (2000)) and indirectly (i.e. by facilitating of FDI that, in turn, fosters economic growth). Countries with the economically free increase 50 percent to the productivity investment. Countries with an economic freedom index rating more than 7.0 (based on Fraser index) shows with a 1 percent increase in investment expand output by 0.35 percent and on the other side countries with economic freedom index less than 5.0 only contribute 0.23 percent increase in output. So, there is highly supportive of the proposition that countries or institutions that consistence with economic freedom will lead to the higher rate of investment and at the same time will contribute to the greater productivity of the investment.

Countries that experience the economic freedom index more than 7 is group as mostly free economy show the productivity is higher than the countries that experience the index of economic freedom less than 7 that can be seen on Table 1, show the economic freedom rating and productivity during 1980 – 2000 and 2000 - 2010.

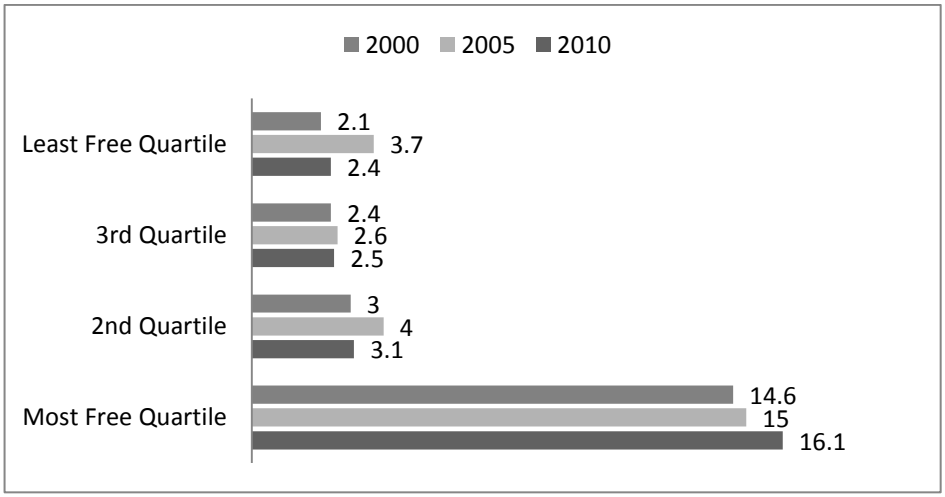
Table 1: Economic Freedom Rating and Productivity during 1980 – 2000 and 2000 – 2010.

Economic Freedom	1980-2000	2000-2010
EF less than 5	0.19	0.18
EF between 5 and 7	0.27	0.28
EF greater than 7	0.33	0.35

A country must have an adequate legal system sustaining property rights, low corruption and with constant fundamentals in order to attract FDI also influence R&D location. The level of economic freedom is very important in explaining the inflows, whereas the more economic freedom a country encounters the higher the expected investment inflows and at the same time will increase the R&D activities by MNC's.

The comprehensive data of relationship between FDI and economic freedom can be seen in Figure 1. As shown in figure countries with more economic freedom will attract more inflows of FDI and at the same time will boost countries growth and increase the productivity through the investment and establishment of MNC's at the host country.

Figure 1: Economic Freedom and Foreign Direct Investment

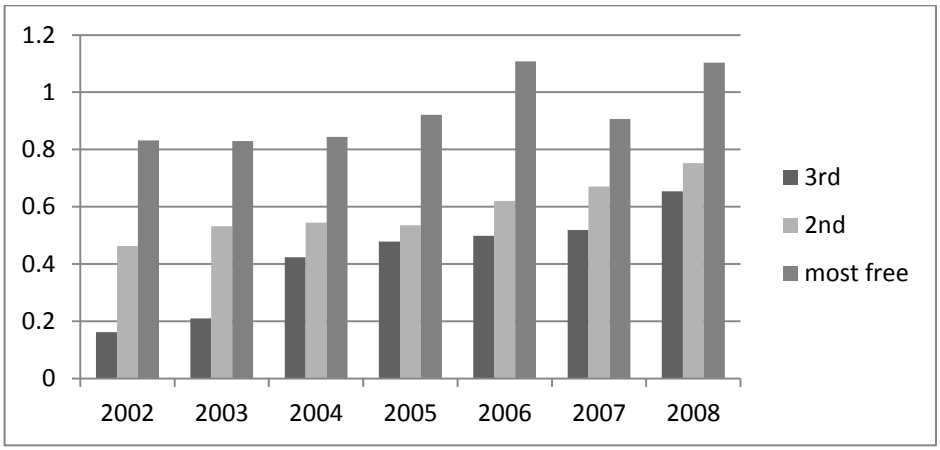


Source: Fraser Institute, Economic Freedom of the world: 2011 Annual Report

Beside the international trade, the level of country economic freedom will attract the location of MNC's. MNC's operation at host countries can result in technology spillovers from FDI, whereby domestic firms adopts superiors MNC technology which enables them to improve their productivity and at the same time enhance the R&D activities and developed new innovation. The R&D activities by MNCs have rapidly increased, along with increasing inflows of FDI. MNC's R&D location decisions, and the relative levels of R&D investment in a given country location, are mostly influenced by broad, macroeconomic and development factors.

Investment in R&D by international firms will be increasing when countries implement an economic freedom policy. R&D is considered as an important vehicle to maintain competitiveness in globalized economic environment. R&D is the most powerful mechanism in generating the new information in which it directly contributes to productivity growth. Figure 2 show the R&D expenditure in three groups of countries according to their level of economic freedom. Where R&D expenditure is measure based on percentage of GDP. R&D expenditure is expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications. R&D covers basic research, applied research, and experimental development. Based on figure 2, we can conclude that most free economy contribute more R&D expenditure compare to the less free economy.

Figure 2: R&D Expenditure (% of GDP) and Economic Freedom (2002-2008)



Source: Fraser Institute, Economic Freedom of the World: 2011 Annual Report

Overall the discussion about economic freedom illustrates the relationship of each component ceteris paribus, indicating that economic freedom index contribute most to economic growth, inflows of FDI and investment in R&D. Economic freedom proves to have a favorable effect on the economic condition at host countries.

1.1 Research Issues

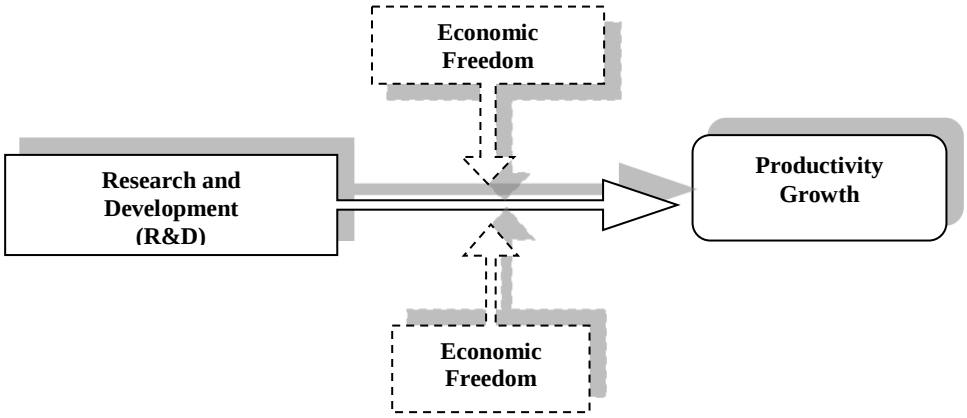
For many years, researchers have debated about the economic growth and total factor productivity. Among the key factors of growth and productivity are the level FDI. FDI is believed to have beneficial effects on economic growth in the host country due to advantages related to the introduction of new technologies and innovation, new managerial techniques, development of additional skills, increased capital, job creation and improvement of working conditions, improving the human capital, the development of the industrial sector in the host country, broadening of the tax base transfer of the technology and other skills, boosting the economic activity, boosting of export, better integration into the world markets and etc. (Perez 1997; Haddad and Harrison 1993; Markusen and Venables 1999; Babic and Strucka 2001). Besides knowing whether the market is a growing market, investor will look also at the host countries institutional as factor to make the investment decision. Institution can be viewed as a social structures element of a

country which has been instituted by law or customs. Since the 1990s, the importance of institutional quality has been highlighted and found to be very pertinent in addressing issues of growth and FDI with the literature by North (1990) and Williamson (2000). IMF (2003), quality institutions, and the rules of the game in a country are defined in terms of the degree of property rights protection, the degree to which laws and regulations are fairly applied and the extent of corruption. Civil liberties, organization rights, freedom of association and the freedom of expression, the rule of law and human rights, are all important influences on business decision-making. 'Good' institutions are an important determinant, or precondition for, economic growth and development. Institution can be referring to freedom whether economic, political or civil freedom that apply to economy. Dawson (1998), in fact institutions affect aggregate economic activity indirectly through an effect on investment or directly through an effect on total factor productivity. Institutions that undertaking economic freedom probably has the capacity to provide the growth-enhancing kind of incentives, for several reasons; as argued in Murphy et al. (1991), they promote a high return on productive efforts through low taxation, an independent legal system, and the protection of private property and Johansson (2001) they promote the flow of trade and capital investment. Pejovich (2002), the level of economic freedom is very important in explaining the inflows of FDI. The higher the level of economic freedom of country will attract more inflows of FDI. R&D spillover does not limit in the specific country but can cross all the borders. Romer (1986) allows companies to invest in R&D with condition that marginal profitability equal to innovation cost. According to Bart (1997) the estimated rates of return to R&D investment, considered being the major input in technology generation. For many years people have debated about the role of economic freedom on FDI and economic growth and R&D effect on productivity. The intention of this dissertation is to establish the purpose for which of the role of economic freedom, which particular reference to whether they are using in mediating the domestic and foreign R&D and further, to gather ideas to expand the country productivity.

The main research questions arise here is does economic freedom play a significant role in mediating R&D spillover on TFP growth? To answer question that arise in this study, we analyze the role of economic freedom in mediating R&D spillovers on total factor productivity. Based

on the goal of this study, we proposed conceptual framework that diagrammatically reflects the intention.

Figure 3: The Conceptual Framework



1.2 Significant of the study.

This study contributes to the literature by providing the empirical evidence on the significant role of economic in mediating the impact of domestic and foreign R&D on the productivity growth. Panel dynamic ordinary least square (P-DOLS) analysis is better way to understanding the relationship between the economic freedom and domestic and foreign R&D and it can accommodate the meaningful possibility that both domestic and foreign R&D kick in country productivity growth only after including the economic freedom as a mediating factor.

1.3 Organization of study.

The rest of the paper is structures as follow. In section 2, we provide an overview of related empirical work on domestic and foreign R&D, FDI, economic freedom and TFP growth. In section 3, we describe the data set that we use and methodology to analyze. The empirical analysis based on threshold in section 4 and finally in section 5 is conclusion and recommendation.

2. Literature Review

According to the pioneer study, the growth process is fundamentally one of improvement in TFP. It has long been recognized that TFP is about much more than "technology", understood as recipe like advances in scientific knowledge (Erken, Donselaar and Thurik, 2008; Acs Braunerhjelm, Audretsch and Carlsson, 2009). Since the initial identification of the "unexplained" cause of growth (Solow, 1956), significant attention has been devoted to R&D as a driver growth (Romer, 1990; Coe and Helpman, 1995). Acs et al. (2009), R&D itself does not drive the TFP, but the innovation that emerges from R&D will drive the TFP. The traditional literature (Chandler, 1989; Cohen and Levin 1989; and Griliches 1979), innovation and technological change for most theories of innovation have been the firm. In such theories firms are exogenous and their performance in generating technological change is endogenous (Cohen and Klepper, 1991 and 1992). Griliches (1979), the most prevalent model of technological change is the model of the knowledge production function. According to this model, incumbent firms engage in the pursuit of new economic knowledge as an input into the process of generating the output of innovative activity. The new economic knowledge is most important input in this model. The greatest source generating new economic knowledge is generally considered to be R&D (Cohen and Klepper, 1991 and 1992). Human capital, skilled labor, and educational levels considered as inputs in the knowledge production function.

Doing R&D is important for productivity and also economic growth. Domestic R&D has high spillover effects, it is enhances the ability of the business sector to absorb technology coming from abroad. R&D spillover does not limit in the specific country but can cross all the borders. Romer (1986) allows companies to invest in R&D with condition that marginal profitability equal to innovation cost. According to Bart (1997) that although the significance of the spillover effects is beyond doubt, the estimated rates of return to R&D investment, considered being the major input in technology generation, vary over a large range. Researchers also discuss the role of foreign R&D and domestic R&D in influencing the host country productivity. A number of studies for developing countries document that a foreign presence promotes higher productivity in host country sectors, while other studies point to limited or no significant efficiency spillovers. Lichtenberg and

Van Pottelsberghe (1998) show that foreign R&D can affect domestic performance through both imports and outward FDI that is through technology sourcing and learning practices. Coe and Helpman (1985), found a significant contribution of foreign R&D on the total factor productivity in 22 industrialized countries. They found in smaller countries, the effects of foreign R&D capital are as a big as those domestic R&D, while in the larger countries, domestic R&D play a crucial role rather than foreign R&D.

Bernstein (1994) and Bernstein and Yan (1995), foreign R&D exert a greater influence rather than domestic R&D not only in industry specific but also in country specific. Fors (1996) analyzed the productivity effects of domestic and foreign R&D in Swedish firms and found that domestic R&D impacts growth in foreign subsidiaries, but found no evidence of a reverse effect of foreign R&D. Coe and Helpman (1993) shown that the rate of return R&D is not only high in the performing countries, but that significant benefits are also derived by their industrial country trade partners. Coe and Helpman (1995) found evidence among 21 OECD economies, foreign R&D has beneficial effects on domestic productivity which are stronger the more open economy to trade. Jungsoo (2002), show that domestic R&D and foreign R&D spillovers across countries on economic growth provide potential explanations for the productivity gain in the recent years.

Belderbos et al. (2006) found that there is positive interdependence between the domestic and foreign R&D by examined the interdependence between foreign and domestic R&D by include the technology transfer and absorptive capacity. They found that foreign R&D activities by MNC is demand oriented, an increase in domestic R&D activities will enhance the complexity of technology transfer. Griliches and Lichtenberg (1984) examined relationship of R&D investment and TFP growth on sectoral level and find that strong relationship between foreign R&D expenditures and TFP growth in 1960s and 1970s. R&D activities either foreign or domestic R&D will benefited countries. This argument has been studied by Samimi and Alerasoul (2009) R&D is a key long run determinant of productivity and economic growth. Aghion and Howitt (1992) discussed the important contribution of R&D and economic growth and at the same time R&D

activities can lead to improve innovations like improvement in the technology.

Many researchers state that economic freedom is important factors for country because it is one of the main drivers of prosperity and growth. According to economic theory, economic freedom will affects incentives, productive effort, and the effectiveness of resource use. Numerous studies state that countries with having initial level of economic freedom will leads to the growth of that countries (Ali 1997; Easton and Walker 1997; Goldsmith 1997; Dawson 1998; Wu and Davis 1999; Hanson 2000; Pitlik 2002; Scully 2002; Weede and Kamph 2002; Haan et al. (1996). McQuillan and Murphy (2009), state that the main finding on their research is that economic freedom promotes not only higher incomes but growth rate in output and incomes especially in developing countries. Islam (1996) indicated that economic freedom has a direct relation with per capita income and economic growth rate by using cross-section data analysis in 98 low, middle and high-income countries. On the other hand, Cole (2003) looked at 106 countries and found that economic freedom had significant explanatory power across competing theories of economic growth, where Cole looked at the factors that different groups economist believed are important for economic growth and showed that adding the factor economic freedom shed more light on which countries grow fasters that others.

Gwartney et al. (1996), that develop the measurement of economic freedom in Fraser Institute's, note that the countries with the highest economic freedom scores have an average annual growth rate of per capita real GDP while those with the lowest economic freedom scores have an average of negative growth rate per capita real GDP. This supported by the Holcombe and Gwartney (2010), Gwartney and Lawson (2005), Berggren (2003), countries that have more economic freedom have on average higher per capita incomes and countries that increase their economic freedom exhibit higher rates of economic growth, which is the level of economic freedom can be seen when countries have lower unemployment rates, lower percentages of children in labor forces, higher life expectancies and more political freedom. Depken and Sonara (2005), investigate the impact of economic freedom and trade flows by estimating a gravity model using the freedom index developed by the Fraser Institute and find that higher level of economic freedom is strongly correlated with increased of trade flows. Calvo and

Robles (2003) explore the economic freedom and FDI flows and found that greater economic freedom in host country increases FDI inflows in the 18 Latin American countries. They also postulate that FDI is also positively correlated with economic growth in the host country with the adequate human capital, liberalized markets and economic stability to promote from long term capital flow. Pourshahabi et, al. (2011) supported this finding by indicates that economic freedom in OECD countries has positive and non significant effect on FDI and consistence with theoretical expectation and according to them it is not significant because there is not any large economic freedom gap between these set of countries that can lead to significant differences of FDI. Hanke and Walters (2000), development cannot achieve its goals without economic freedom because economic freedom can fuel economic growth and spur growth. Berggren (2003), show the clear about this complexity of economic freedom, by saying that some EFI components causing growth, some EFI components being caused by growth, and some EFI components being jointly determined with growth.

An economist who argues that economic freedom is a key ingredient for economic growth process fall in the institutional views. According to Powell (2003), the degree of economic freedom either hinders or helps in achieving economic growth is supported by the key institutional factor. The institutional which stresses the importance of creating an institutional and policy environment conducive for smooth operation of markets and realization of gains from trade and entrepreneurs activity (North, 1990; Hayek 1945, 1960). The other view by Berggrren (2003), economic growth will be boost if the institutions itself guarantee the economic freedom by promote capital investment where returns are highest, facilitate predictable and rational decision making through a low and stable inflation rate, by foster a dynamic economy in which competition can occur because regulations are few, enable talents to be located to where it generate highest value, and promote high return through low taxation, sound legal system and protection of private property. Gwartney et al. (1999) postulate that an economy with higher economic freedom can make the market operate well through offering the well-defined rule of trade and securing property rights. The strong protection of private property and a well functioning judicial system are the most importance of various institutions and policy variables for economic growth without consider to the economic freedom index

(Torstensson 1994; Goldsmith 1995; Barro 1997,1999; Nelson and Singh 1998; Norton 1998a; Hall and Jones 1999; Keefer 1999; Kneller, Bleaney and Gemmell 1999; Olson, Sarna and Swamy 2000; Vijayaraghavan and Ward 2001; Feld and Voight 2000).

3. Methodology

3.1 Introduction

This section comprises the discussion regarding the estimation model, data and econometric methodology that will be built and used to test the role of economic freedom in mediating R&D spillovers on total factor productivity. The econometric model designed is a total factor productivity (TFP) model, based on the extension of Mansfield (1984) model. The Dynamic Ordinary Least Square (DOLS) test is conducted, to test the long run and cointegration relationship between the variables.

3.2 Empirical Model Specification

To analyze the role of economic freedom in mediating the R&D spillovers, the econometric model can be expressed as equation (1);

$$\text{Log TFP}_{it} = \beta_i + \beta_1 \log \text{DRD}_{it} + \beta_2 \log \text{FRD}_{it} + \beta_3 \text{DRD x EF}_{it} + \beta_4 \text{FRD x EF}_{it} + e_{it} \quad (1)$$

where i is a developing countries and t is time index. TFP is total factor productivity, DRD is domestic R&D, FRD is foreign R&D, EF is index of economic freedom. In order to estimate the role of economic freedom in mediating R&D spillover, the interaction term will be used by DRD x EF and FRD x EF, whereas the interaction term is given by EF, DRD and FRD to ensure that interaction term does not proxy for economic freedom or domestic R&D and foreign R&D, because these variables also include in the regression model. All variables are in logarithmic form. β_i is country specific intercept, β_1 is the elasticity of TFP respect to domestic R&D, β_2 is the elasticity of TFP respect to foreign R&D, β_3 is the elasticity TFP respect to interaction term of domestic R&D and economic freedom, β_4 is the elasticity TFP respect to interaction term of foreign R&D and economic freedom and e is the random error term.

3.3 Long-run Elasticities: Stock-Watson Dynamic OLS

One method that proposed by Stock and Watson (1993) in estimation long run equlibria is dynamic OLS (DOLS). This method correct for possible simultaneity bias among the regressors. Besides that, this method suggest a parametric approach for estimating long run equilibria in system which may involves variables integrated of different orders but still cointegrated. The procedure advocated is similar to recent estimators proposed by Phillips and Loretan (1991) and Saikkonen (1991), but is much more practically convenient to implement and estimate. Stock and Watson DOLS parameters estimates of the long run parameters with all variables appearing in levels, along with their approximate asymptotic standard errors. Equation 2 examine long run estimation of domestic R&D with foreign R&D and interaction between economic freedom with domestic R&D and foreign R&D.

$$LTFP_t = \alpha + \beta_1\, LDRD_t + \beta_2\, LDRDEF_t + \beta_3\, LFRD_t + \beta_4\, LFRDEF_t + \sum_{j=-p}^{p} \delta_1\, \Delta \ln TFP_{t-j} + \sum_{j=-p}^{p} \delta_2\, \Delta\, LDRD_{t-j} + \sum_{j=-p}^{p} \delta_3\, LDRDEF_{t-j} + \sum_{j=-p}^{p} \delta_4\, \Delta\, LFRD_{t-j} + \sum_{j=-p}^{p} \delta_5\, LFRDEF_{t-j} + \varepsilon_t \quad (2)$$

3.4 Short-run Elasticities: Error Correction Term (ECT)

For short run estimation, we used error correction term estimates of all models in this study. According to Hendry's (1995), ECT is general to specific modeling approach that used to derive a satisfactory short run dynamic model. The value of ECT indicates the evaluation process on the variable concern by which adjusts for prediction errors made in the last periods. The regression results for the short run equations show several desirable statistical features. The coefficient of ECT measures the speed of adjustment back to the long run equilibrium value, and negative value of ECT indicate that error correction mechanism exist in the model. The literature postulates that the coefficient of the lagged error correction term should be negative and statistically significant to further confirm the existence of a long-run relationship.

$$\Delta \ln TFP_t = \alpha_1 - \lambda_t ECT_{t-1} + \sum_{i=1}^{p-1} \beta_{1,t}\, \Delta \ln TFP_{t-i} + \sum_{i=0}^{q-l} \beta_{2,t}\, \Delta\, LDRD_{t-i} + \sum_{i=0}^{r-1} \beta_{3,t}\, \Delta LDRDEF_{t-i} + \sum_{i=0}^{s-1} \beta_{4,t}\, \Delta\, LFRD_{t-i} + \sum_{i=0}^{u-1} \beta_{5,t}\, \Delta LFRDEF_{t-i} + \varepsilon_t \quad (3)$$

3.5 Data Set

The data set consists of panel data observation for 37 selected developing countries over the 2000 – 2010 periods. Where we classify developing countries based on income level of high income countries, middle income countries, lower middle income countries and low income countries to examine the role of economic freedom in mediating the impact of R&D on productivity growth. Variable that we used in this study are total factor productivity (TFP), economic freedom (EF), domestic R&D and foreign R&D. Where TFP measure based on Klenow and Rodriguez (1997) specification; economic freedom based on Fraser index developed by Gwartney et al. (1996); domestic R&D based on R&D capital stocks were calculated using the perpetual inventory procedure and foreign R&D based on the inward FDI weighted foreign R&D capital stock following Van Pottelsberghe and Lichtenberg (2001).

4. Result and Discussion

4.1 Introduction

This section will discussed the empirical result of role of economic freedom in mediating research and development (R&D) on productivity growth based on discussions in section 3. The methodologies that we used to examine the role of economic freedom are panel dynamic OLS (DOLS) proposed by Stock and Watson (1993) and supported basic test of unit root test of ADF and PP test, cointegration test of Pedroni and we estimate error correction term to support the dynamic OLS test.

4.2 Univariate Integration: Test of the Unit Root Hypothesis

As a necessary test for multivariate cointegration, two types of unit root test were carried out, that are Augmented Dickey Fuller test and Phillips-Perron test from now on called ADF and PP test. Both ADF and PP test based on the null hypothesis that a unit root exists in the autoregressive representation of the data variable. The results of ADF and PP tests are presented in Table 2 for income group basis for time period 2000 to 2010. The ADF and PP tests model are intercept, intercept and trend and none are reported based on p=1, p=2 and p=3. Table 2 presents results from two tests discussed earlier based on four groups of countries.

The results suggest that for all group of countries, at level, there are mixed result of significant and not significant, however at first difference all variables are rejected null hypothesis, thus the variables are integrated of order 1 or known as I(1). So it is possible that there is a long term relationship among them.

Table 2: Unit Root of Augmented Dickey Fuller (ADF) Test

Variable	**Level**		**First Difference**	
	ADF	**PP**	**ADF**	**PP**
Panel A: High Income Countries				
LTFP	1.36	0.52	44.52***	50.84***
LEF	8.38	8.88	78.99***	77.85***
LDRD	11.12	10.17	40.28***	30.63***
LFRD	9.88	12.36	98.44***	102.43***
Panel B: Upper Middle Income countries				
LTFP	41.65	54.58**	141.68***	138.46**
LEF	14.41	14.50	214.52***	224.44***
LDRD	52.99*	64.52***	176.35***	178.90***
LFRD	52.94**	61.05***	216.72***	218.98***
Panel C: Lower Middle income countries				
LTFP	7.32	7.21	73.35***	67.20***
LEF	6.15	6.89	80.26***	83.91***
LDRD	35.26***	32.13***	116.44***	121.01***
LFRD	16.54	24.32	93.28***	92.96***
Panel D: Low income Countries				
LTFP	22.11***	25.56***	7.06	7.05
LEF	0.64	0.20	34.51***	34.51***
LDRD	6.71	7.32	8.58**	8.11**
LFRD	9.50**	26.12***	18.49***	18.32***

Notes: Ho: Unit root process for ADF and PP. ***, ** and * indicate significance at the 1,5 and 10% levels. Optimal lag lengths in ADF and PP were selected based on AIC.

4.3 Panel Cointegration Test: Pedroni

To determine whether a cointegrating exist and to examine our fitted regression model is not spurious, we employed the developed methodology cointegration analysis proposed by Pedroni (1999). Basically, under Pedroni cointegration test, it employs four panel statistics and three group panel statistics to test the null hypothesis of no cointegration against the altenative hypothesis of cointegration. Based on seminal paper Pedroni (1999a), the results shows in two group , first group is "within dimension", that the statistics are constructed based on summing both the numerator and the denominators terms of the panel cointegration statistics over the N dimension. The second group is "between dimension" that the statistics referred to as a group cointegration statistics, which constructed by first dividing the numerators by the denominator prior to summing over the N dimension. The results of this test are reported in table 3 based on equation (2). The result of Pedroni statistics in Table 3(a) indicate that, Panel B of upper middle income are reject null hypothesis at intercept and Panel A are cointegrated at level and intercept.

4.4 Result of Long-run Elasticities: Stock-Watson Dynamic OLS

Estimation results of an equation (2) are reported in Table 4. This model examines domestic R&D with foreign R&D for FDI and interaction between economic freedom with DRD and FRD. Based on income group, reported results for panel A of high income countries indicate that economic freedom play an important role as mediating variable of domestic and foreign R&D, where based on results reported interaction of DRD and economic freedom is 0.27 while interaction between FRD and economic freedom is 0.15that we can conclude that economic freedom is highly influence domestic R&D in high income countries in developing countries. Panel B of upper middle income group indicate that economic freedom is positively impact on domestic R&D with 0.01 but for foreign R&D there are negatively sign of interaction variable with -0.05. We can conclude that at upper middle income countries foreign R&D channels did not influence by the level of economic freedom. Lower middle income group as reported in panel C showed that economic freedom did not influence domestic R&D where the result indicate the negative sign of elasticity with 0.07 but for foreign R&D there are positively value of interaction variable with 0.06. Panel D for

low income group indicate that economic freedom is important as mediating factor of domestic R&D and foreign R&D with the value of elasticity is 0.75 for interaction domestic R&D with EF and 0.13 for interaction foreign R&D with EF. Then we can conclude that at low income countries economic freedom play an important role in mediating the impact of foreign R&D compare to the domestic R&D.

Table 3(a): Pedroni Panel Cointegration Test

	Within dimension				**Between dimension**		
	v-Statistic	**rho-Statistic**	**PP-Statistic**	**ADF-Statistic**	**rho-Statistic**	**PP-Statistic**	**ADF-Statistic**
Panel A: High Income							
Intercept	-1.10	1.52	-5.15***	-4.06***	3.23	-1.88**	-1.09
Intercept and Trend	-0.62	2.70	-2.80***	-1.97**	3.31	-3.25***	-2.31***
None	-2.71	1.35	-0.50	-0.49	2.87	0.340	-1.61**
Panel B: Upper Middle Income							
Intercept	-1.77	3.41	-1.40*	-1.33*	5.26	-3.19***	-1.69**
Intercept and Trend	-2.61	4.96	-4.40***	-2.47***	6.60	-3.50***	-0.86
None	-4.56	2.64	-0.01	0.20	4.75	-0.51	-0.45
Panel C: Lower Middle Income							
Intercept	-0.21	1.92	-0.59	-0.65	3.14	-2.86***	-1.81**
Intercept and Trend	-0.33	2.77	-1.37	-1.21	3.85	-3.32***	-1.93**
None	-2.95	1.02	-2.83***	-3.11***	2.68	-3.16***	-3.74***
Panel D: Low Income							
Intercept	-1.20	1.95	2.15	2.14	2.35	1.88	1.83
Intercept and Trend	2.64***	1.04	-1.02	-1.02	2.08	0.99	1.06
None	-0.88	1.29	1.05	1.12	1.65	0.04	0.26

Note: Figure in parentheses are p-values and ***, ** and * indicate significance at the 1%,5% and 10% levels. Optimal lag lengths were selected based on AIC .

Table 4: Panel Dynamic OLS Results

	Panel A	**Panel B**	**Panel C**	**Panel D**
LDRD	-2.23	-0.12	0.51	-0.63
LDRDLEF	0.27	0.01	-0.07	0.13
LFRD	-0.20	0.10***	-0.06	-1.27***
LFRDEF	0.15	-0.05***	0.06	0.75**
R-squared	0.94	0.94	0.96	0.99

Note: ***, ** and * indicate significance at the 1, 5 and 10% levels, Panel A: High Income Countries; Panel B: Upper Middle Income Countries; Panel C: Lower Middle Income Countries; Panel D: Low Income Countries

4.5 Result of Short-run Elasticities: Error Correction Term (ECT)

For short run estimation, we used error correction term estimates of all models in this study. According to Hendry's (1995), ECT is general to specific modeling approach that used to derive a satisfactory short run dynamic model. The value of ECT indicates the evaluation process on the variable concern by which adjusts for prediction errors made in the last periods. The regression results for the short run equations show several desirable statistical features. The coefficient of ECT measures the speed of adjustment back to the long run equilibrium value, and negative value of ECT indicate that error correction mechanism exist in the model. The literature postulates that the coefficient of the lagged error correction term should be negative and statistically significant to further confirm the existence of a long-run relationship.

Short run model as equation (3), indicate the ECT values showed the negative sign that indicate there exist long run relationship in this model. Based on reported result in Table 5, the interaction variable between domestic R&D and economic freedom show that out of four panels that we examine, only two panels showed there are positive role of economic freedom in mediating the impact of domestic R&D on TFP that are panel A of high income and panel D for low income group. The interaction variable of foreign R&D and economic freedom showed there are positive role of economic freedom as mediating variable except

for the low income group. So, we can conclude that in short run, economic freedom play an important role in mediating the impact of foreign R&D not for domestic R&D. When we compare with the long-run result of dynamic OLS, we find that economic freedom play an important role in mediating the impact of domestic and foreign R&D.

Table 5: Result of Short Run Dynamics OLS

	Panel A	**Panel B**	**Panel C**	**Panel D**
ECT	-0.30***	-0.18***	-0.48***	-0.37***
ΔLDRD	-0.67	0.06	-0.0004	-3.24
ΔLDRDLEF	0.07	-0.01*	-0.005	0.49
ΔLFRD	-0.02	-0.01	-0.056	-0.02
ΔLFRDEF	0.01	0.01	0.028	-0.01

Note: ***, ** and * indicate significance at the 1, 5 and 10% levels, Panel A: High Income Countries; Panel B: Upper Middle Income Countries; Panel C: Lower Middle Income Countries; Panel D: Low Income Countries

5. Conclusion

This study investigates the role of economic freedom in mediating the impact of domestic R&D and foreign R&D of 38 developing countries over the period 2000 to 2010. First we carry out panel unit root tests to ensure that all panel variables are integrated of order 1, I(1). Visual inspection of the data reveals that the variables seem to follow a common trend over time so that we include constant and trend terms and none in the panel unit root and integration tests. Fisher-*ADF* and Fisher-*PP* panel unit root tests are employed and we have found that the variables are mixed of stationary and nonstationary in levels. After first-differencing the variables, all of the tests reject the null of nonstationarity. It implies that the first-differenced variables come from a stationary process where means and variances are constant over time. Seven panel cointegration tests have been carried out who are proposed by Pedroni (1999). From this test we find that all panels that tested showed an existence of cointegration within them.

Then, by using dynamic panel data we estimate for long run of dynamic OLS and short run of error correction term test. Empirical results show that economic freedom plays an important role in mediating the impact of domestic R&D in long run of high income group, upper middle income group and low income group but not for lower middle income group. In short run estimation economic freedom mediates domestic R&D only for high income countries and low middle income in influencing country productivity growth. Result for foreign R&D indicate that economic freedom does not mediate foreign R&D of upper middle income countries in long run estimation and low income countries at short run estimation. Others groups indicate economic freedom play a positive role in mediating foreign R&D on productivity growth.

Economic environments that conducive and provide for economic freedom will allows greater diversity, promoting creativity, encourage new technology and innovation. Policy marker and government should provide or formulate policy and ready to reduce their intervention to ensure that country is freer because economic freedom is one of the main drivers of prosperity and growth. On the other hand, government and policy makers should develop policy that provide good environment for domestic firm and foreign firm do business and trade. In other words, less regulation on trade, open the economy, flexible labor market, more developed stock market and financial market that will encourage more inflows of FDI and location of MNC's where they will bring along new technology that will encourage R&D activities that will boost country productivity.

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Problems, Solutions and Strategies Priority for Waqf in Indonesia

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This article aims to determine the problems, solutions, and strategies priority for productive *waqf* in Indonesia which is in accordance with perspective Regulator, *Nazhir* and *Wakif*. The method used in this article is the Analytic Networking Process (ANP). The research result shows that the *waqf* problems priority in Indonesia lies on the aspect of *Nazhir* which is not the main profession. The second problems is that the approved regulations are not socialized adequately which is led to the insufficient knowledge of *waqif* and it is considered as the third problems. The main solution to the *Nazhir* problems is to transform it from individual to an institutions, and the solution for the regulator problems is to create the harmonious relationship among the *dakwah* institutionss. Expansions and innovations in the *waqf* management is the solution for strategy problems.

1. Introduction

Waqf is the *waqif* legal act functioning to separate and/or to give up some of their wealth permanently or for a specified period of time for religious purposes and/or for public welfare in accordance with *Sharia Act* (Act No. 41, 2004 on *Waqf*).

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Wadjdy and Mursyid (2007), *waqf* law is *jaiz*, and even the majority of Syafi'iyyah consider it as *sunnah*. Their references are: firstly, surah *Ali Imran*: 92 in the Holy Qur'an, Allah SWT says: *By no means shall ye attain rightenousness unless ye give (freely)of that which ye love: and whatever ye give, Allah knoweth it well*. This verse advises to give charity; and because *waqf* is a form of charity, it follows of the charity law, it is *sunnah*. Secondly, based on the hadits of prophet Muhammad SAW; Anas bin Malik says, "When this verse was revealed to Muhammad SAW, Abu Thalhah says "*Indeed, Allah asks us to give out some of our wealth, and Rasullullah, be a witness for me that I give my land to the Almighty Allah*." And then Muhammad SAW says "G*ive it to your relatives, Hasan bin Tsabit and Ubay bin Kaab*."

Waqf has played the role to facilitate kinds of either religious or social activities, such as places for worship, for travelers, for science, for schools, for scientific papers making, for water supply and for the needs. At the time of *Bani Umayah* and *Bani Abasiah*, *waqf*'s role was not only to build places of wworship or of education, but also it provided the operational cost for knowledge, for library, for education, for scholarship, for teachers' and lecturers' welfare and for other educational staff. This shows the significant role of *waqf* for people's needs in facilitating the religious, social and academic activities (Çizakça, 1998;Muzarie, 2010; Ahmed, 2007; Wafa, 2010 ; Salarzehi et al, 2010).

The Indonesian *waqf* is regulated under the Law No. 41/2004 on *Waqf* and was signed by the Indonesian president on October 27, 2004. It is also published in the State Gazette of the Indonesian Republic No. 159/2004 and in the additional State Gazette of the Indonesian Republic No. 4459. Besides enhancing the existing *waqf* , this new *waqf* Law also regulates new problems: the management of *waqf* property must be productive and the use of it must be clearly stated, such as for the poor, for the new Indonesian *waqf* establishment, for the financial *waqf* management and for other needs in accordance with the developments. However, the *waqf* Law No. 41/2004 has no government regulation on its operation.

Fathurrohman (2012) states even though the government regulation has already been equipped with some its implementing regulations, including the Islamic Law compilation, violations still occur, such as

less understanding or economic driven causes. Less knowledge on *waqf* indicates that the government regulation is not sufficiently socialized, leading to the uncontrollable *waqf* implementation. In addition, the problems also lies on the *waqf* management. The main problems in this management is the financial constraints as well as the human resources or *Nazhir* who handle the *waqf*. They have less knowledge on *waqf* law. Meanwhile, there are still few Indonesian people who are willing to give away their productive land in the form of *waqf*. Even though it occurs, the problems lays on the financial constraint to manage the *waqf* and this problems should be solved.

Hasanah (2012) points out that there are some ways to solve the *waqf* problems. Firstly, people must be provided with proper and sufficient information on *waqf*, such as terms, conditions and *waqf*'s purpose. Secondly, people should be provided with the knowledge of *waqf* law. Thirdly, there should be qualified, hired human resources or *nazhir* to manage the *waqf* institutionss

If it is assumed that the middle-class of Muslim people are ten million people and they do the annual charity in term of *waqf* as much as Rp. 50,000, there will be 500 billions rupiahs in total. The Indonesian *waqf* agency claims that in 2012 there have been 566 millions rupiahs in total for the development and the management of *waqf*, although the obtained *waqf* is still far from the expected target, being only 1%. This shows that there might be problems which make the productive *waqf* is not significantly developed in Indonesia.

Table 1: Data on the Money *Waqf* Income from 2008 to 2012.

Year	***Waqf* Income (Rupiah)**
2008	61.378.050
2009	463.425.669
2010	745.716.967
2011	796.863.767
2012	566.277.039

Source : Indonesian *Waqf* Agency

Directorate-General for Islam Guidance of the Indonesian Ministry of Religion Affairs, Djamil (2012) states that Indonesia possess many lands in the terms of *waqf* up to 3,5 billion square meters located at 420,000 locations. Those lands are mostly functioned for mosques, Islamic educational schools and Moslem cemeteries. According to Jamil, of the 420,000 locations, only 282,321 locations are certified or 67.22%.

The use of most *waqf*-certified for *ibadah* proves that the *Waqf* law is not significantly socialized in the Indonesian Muslim community. This shows that there is a gap or a barrier which makes the *Waqf* law does not fully contribute the *waqf* property management. In addition, Fauroni (2008), the expansion of productive *waqf* models is obligatory to create the people's welfare in accordance with the *waqf* objective. The objective does not run smoothly since people are not familiar with *waqf* property investment and there are worries on the losing of the *waqf* property.

All problems related to the national *waqf* management should have been solved as soon as possible. Because of some limitations at *Waqf* agencies and other external factors, problems just can be solved gradually. It is the fact that there are still not many studies on the national *waqf* and it is considered to immediately conduct related studies which enable to prioritize the *waqf* problems in Indonesia, including its solutions and strategies. This article is the outcome of the study on *waqf* aiming at discovering priorities of problems, solutions and strategies on *waqf* in Indonesia in accordance with regulator perspective, *Nazhir* and *waqif*.

2. Literature Review

Waqf is devided into some parts according to the its aspects, such as aspects of purpose, time, property management and of its utilization/ *mauquf bih* (Kahf, 2006; Mahmood, 2007; Rahman, 2009). Firstly, aspect of *waqf* purpose: a) *Khairi waqf*: its benefits are widely used for public; b) *Wakaf Ahli*: its benefits are used for families, relatives and descendants without distinguishing the rich and the poor, the healthy and the sick among them.; c) *Musytarak waqf*: its benefits are for public and families.

Secondly, aspect of time: a) *Mu'abbad waqf*: it is the eternal *waqf*, such as land, buildings and moving properties/objects; b) *Mu'aqqat waqf*: its time benefits are restricted by *waaqif*, or it is the immortal property when it is utilized.

Thirdly, aspect of utilization and management, *mauquf bih*: a) Direct *Waqf*: Properties that is directly utilized to reach the *waqf* purpose, such as mosque, schools and hospitals; b) Productive *Waqf* (money *waqf*): Properties that are used and processed in order to be distrubuted to the needs in the form of charity and alms (detailed explanation will be presented later). Those types of *waqf* are already approved by ulemas, except *mu'aqqat waqf* which is only approved by *Maalikiyyah*.

Productive *waqf* is the properties which its sources are processed and utilized to be distributed to people in the form of charity and alms. (Kahf, 2006; Ahmed, 2007; Ikhasanuddin, 2012).

This type of *waqf* is basically the implementation of the *waqf* purpose by creating productive business sectors. In this way, the benefit of *waqf* properties can be optimally used and can be developed. There are four basic rules to implement the productive *waqf* , all of which are eternal benefits, responsibility, management professionality and social justice. Additiional four aspects are also the focus of the use of *waqf*; the renewal of *waqf* understanding, the development of *waqf* management system, *Nazhir* management system and proper development of *waqif* recruitment. By implementing all basic rules, the *waqf* implementation can be conducted by using the *waqf* lands for higher economic activities or by chanelling the money *waqf* to productive economic agencies that will be eventually invested for job vacancies. (Cizakca, 1995)

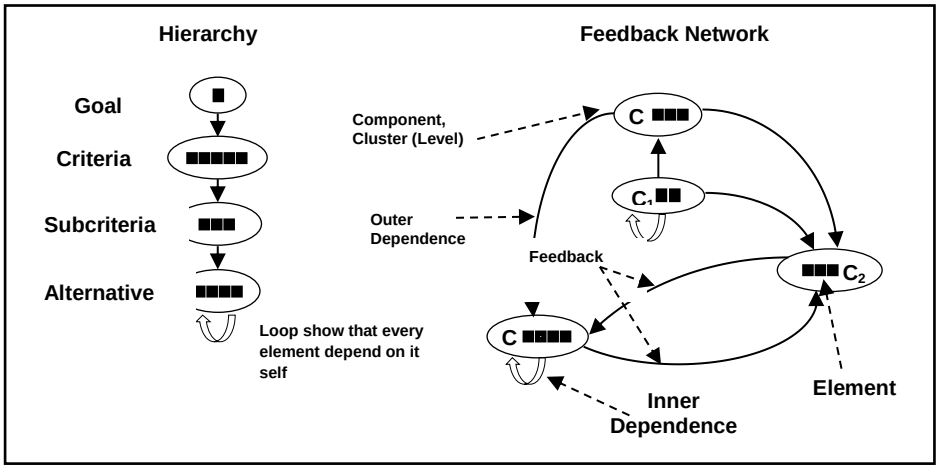
Waqf posseses social function. The Almighty Allah originates people with various characters and abilities. Hence, there are various conditions and environments among people: the rich, the poor, the strong, the stupid, the smart and the weak. Among those abilities, the rich should help the poor, the smart should help the stupid and the strong should help the weak. By doing this, people can make themselves closed to Allah and interactions among people can keep on moving (Kabisi, 2003; Horani, 2013).

Djunaidy and Asyhar (2005) explain that *waqf* agencies should be developed professionally and honestly. Furthermore, it can be used optimally for social needs; for instance, for the improvement of Islamic education and hospitals, for the empowerment of people's economic and the development of infrastructures of worships. A number of *waqf* goods, especially lands and buildings, are opportunities to improve people's economic in the future.

Analytic Network Process (ANP) is the general theory on relative measurement to lower the composite of individual ratio priority scale reflecting the relative measurement of inter-interaction elements influences related to control criteria (Saaty, 1999). ANP is the mathematics theory which enable someone to conduct systematic dependence and feedback to combine tangible and intangible factors (Azis, 2003).

Ascarya (2005) explains that ANP is the new approach in decision making which allows the general framework in treating decisions without making assumptions on independent elements at a higher level and on independent elements in a level. Unlike hierarchy in *Analytic Hierarchy Process*, ANP uses networks without determining a level, becoming the initial point of ANP. The main concept of ANP is influence whilst of AHP is preference.

Figure 1 : The Comparison of Network Structure between AHP (left) and ANP Methods (Right).



Source: Ascarya (2012)

Figure 1 shows that AHP network consists of levels of purpose, criteria, subcriteria, and of alternatives. Each level of alternatives possess elements. At the ANP network, levels are called clusters which possess criteria and alternatives. Both criteria and alternatives are named nodes.

Like on hierarchy, Feedback allows alternatives to depend not only on criteria but also on the alternatives themselves. Moreover, those criteria can also depend on alternatives and on the criteria themselves. Also, feedback can improve priorities from judgements and can make predictions more accurate, leading to the stable ANP result. From the feedback network on figure 1, the nodes or the main elements and other nodes which are to be compared can be different on different clusters. To illustrate, there is a direct relationship from the main node C_4 to other clusters (C_2 and C_3) which function as outer dependence. Meanwhile, there is the main node from the nodes which will be compared located on similar clusters, making these clusters connected to themselves to form the loop relationship. This formation is called inner dependence.

In a network, an element existing in a component/cluster could be in the form of people (e.g. individual in the Bank of Indonesia) and an element in another component/cluster could be people (e.g. individual in House of Representatives). An element in a component/cluster can influence other elements which are in similar component/cluster (inner dependence), and can influence other elements/clusters in different component/clusters (outer dependence) by paying attention to each criterion. ANP is to discover the whole influence of all elements. Therefore, all criteria should be set up and be made a priority within a framework of the control hierarchy or network and should perform a comparison dan synthesis to gain the order of priority of this set of criteria. Afterwards, we derive the influence of elements in the feedback system with the attention to each criterion. Finally, the result of this influence is weighted with the importance level of criteria is added to obtain the overall effect of each element.

Seven pillars of AHP can be used as the starting point of ANP. ANP is the combination of two parts. The first part consists of hierarchies or networks from criteria and sub-criteria which control interactions. The second part is the networks of influences between elements and clusters (Ascarya, 2005).

Studies on *waqf* have been conducted in some countries. First, *waqf* in Turkey. *Waqf* in Turkey are managed by Directorate General of *Waqf* and some are managed by *mutawalli.* Under the Turkish legislation, *waqf* must have a board of management and must be audited every two years. The Directorate-General received 5% of net income of *waqf* as the cost of supervision and auditing. The Directorate-General is appointed by the Prime Minister and is under the office of Prime Minister. *Waqf* services cover the health care, education and social (Babacan, 2011).

Second, *Waqf* in Egypt. At the beginning, *waqf* in Egypt was in the form of *waqf* for families and *khairi waqf* (*waqf* for public interests). In the form of *waqf* for families, *waqif* may take back the properties which have been given for *waqf* purpose or may change its use, but *waqif* is not allowed to withdraw the properties for the benefit of himself or herself. In the *khairi waqf, waqif* cannot either withdraw the properties or change its use. Due to some problems arising in the implementation of *Waqf* for families, it was decided that this type of *waqf* was removed, including *waqf muaqqat* (limited time *waqf*) which was included in the *waqf* for families. Egyptian government manages *waqf* in detail and the *waqf* is always developed according to the circumstances. For instance, the Egyptian law of *waqf* allows the change of farmlands for good purposes, and the economic institutionss are authorized to develop the outcome of agriculture for the people's economic improvement. The *waqf* law which is based on the Islamic *sharia* is regularly revised in accordance with the existing situations and an institutions specially handles *waqf* and its development was established in 1971 (Cizakca, 1998 ; Furqon, 2012).

Third, *waqf* in Kuwait. according to Ramli and Sulaiman (2006) Kuwait government has established a *waqf* foundation 'aamm Kuwait' or Kuwait Awqaf Public Foundation in 1993, managing *waqf* and its projects for people. This *waqf* foundation has distributed some helps, among others are scholarships for disadvantaged students, clothes for the poor, water supply and food during the holy month of Ramadhan for the poor.

Fourth, *waqf* in Qatar. Law no. 8/1996 on *Waqf*, Chapter IV, Qatar government allows mobile and immobile goods for *waqf*, such as shares, securities and banknotes. Islamic *law* still the basis for the

implementation of *waqf*. Even the money *waqf* can be invested at Islamic banks and the inestement outcomes can be used for the needs or *mauquf alaih* (Cizakca, 1998).

Studies on *waqf* problems and solutions have been conducted by some writers, one of whom is Suhadi (1995). He states the use of *waqf* lands is to provide a help for people's welfare as a worship to Allah SWT and the use of this *waqf* land should be conducted in the form of *waqf* pledge. *Waqif* have responsibility for the supervision and the use of the lands. Based on the studies, the *waqf* lands have yet to function properly for the public interest. The solution to this problems is that *Nazhir* must be authorized legally.

Hasanah (1997) claims that *waqf* is one of the Islamic institutionss which can be used to channel parts of Muslim's properties for the social purposes. Based on this, it will be interesting to conduct a comparative study on *waqf* at some *waqf* foundations, such as Foundation of Maintenance and Expansion at the Modern Islamic Boarding School Gontor, *Waqf* Board at Islam University of Indonesia, Foundation of *Waqf* Sultan Agung, Assembly of *Waqf* and Properties Muhammadiyah Centre and *Waqf* at Nahdhatul Ulama. In order to widen horizon on *waqf* management, it is also important to have a comparative study in some Muslim countries, such as Egypt, Saudi Arabia, Jordan and Srilangka Selanjutnya untuk memperluas wawasan pengelolaan wakaf, diadakan juga studi banding dengan beberapa negara muslim seperti, Mesir, Saudi Arabia, Yordania, and Sri Lanka. The result of Hasannah's study (1997) concludes that the *waqf* management at new research sites has yet to be able to implement the *waqf* purpose.

Fathurrohman (2012) explains that there are still problems in the management of *waqf* lands profitably in Bandung district. Most of the lands are still used for worship buildings and are not located in strategic areas. In addition to financial constraint, *Nazhir* do not have good knowledge and understanding on *waqf* and this contributes to the problems of *waqf* lands management. Well-managed *waqf* lands can be a solution for poverty alleviation.

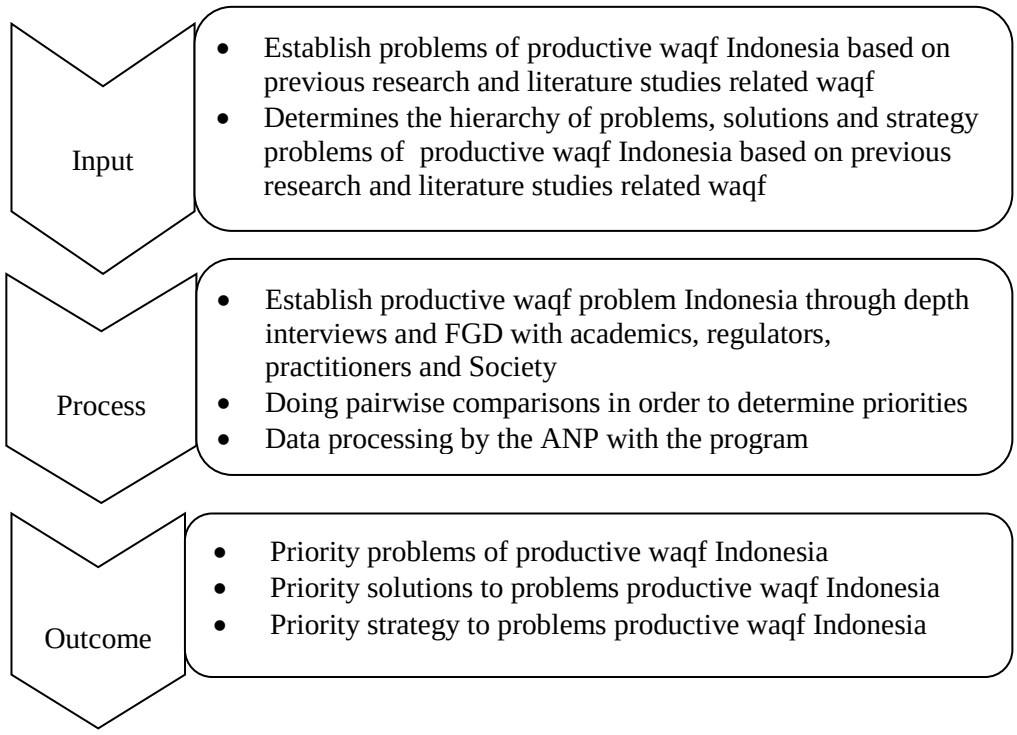
Meawnhile, Shalih (2007) emphasizes that *waqf* has a crucial role to maintain five pillars of *maqashid syari'ah*, namely, religion maintenance (*hifzhuddiin*). *Waqf* also has the role to purify the *waqif*'s

heart, leading him or her to *hifzhunnafs* (soul purification), *hifzhunnasab* (descendant purification), *hifzhul maal* (properties purification), and *hifzhul 'aql* (sense purification).

3. Methodology and Data

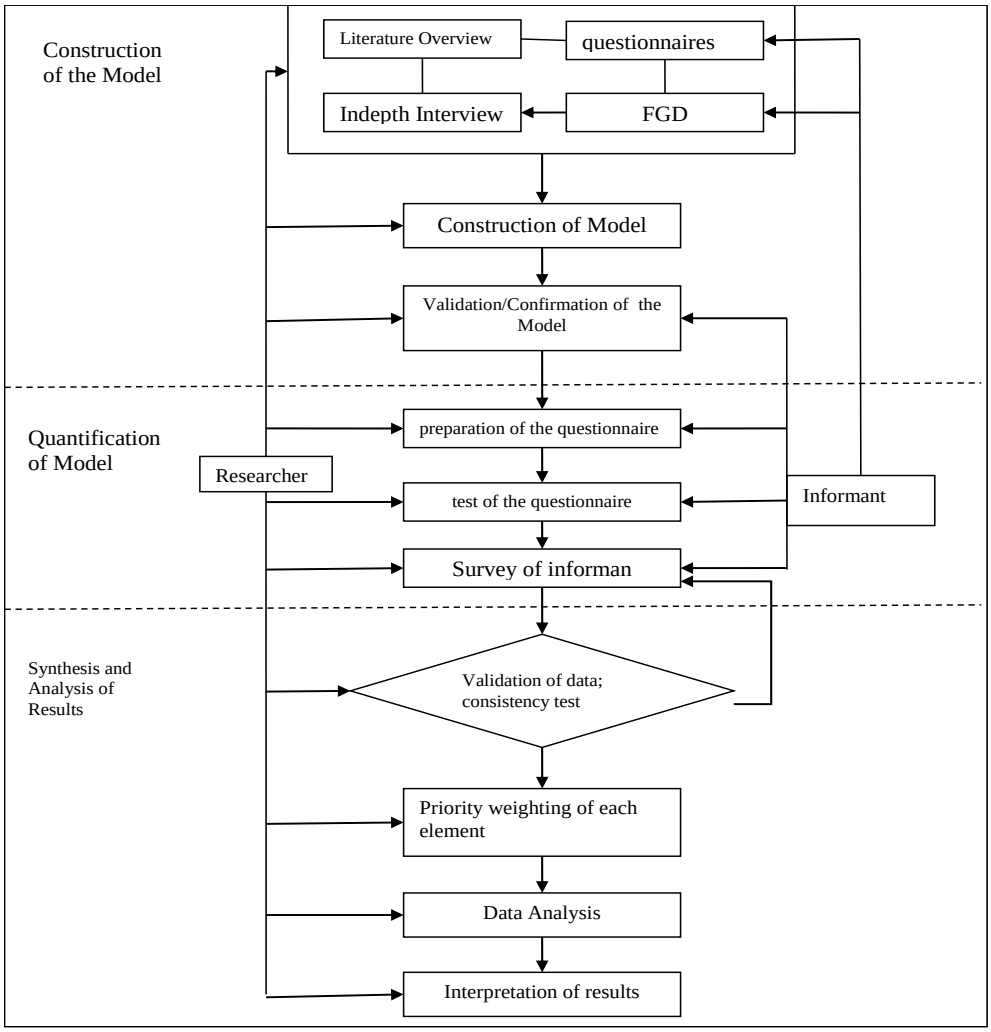
The research charts of this study as follows:

Figure 2: Research Chart



There are three stages of research in this study:

Figure 3: Research Stages



First, construction model. ANP model of construction is arranged based on the literature overview theoretically or empirically. Questions and in-depth interviews to informants are aimed at finding real problems. The main informants are taken on this study are: a) Practitioners, people who are actively in the management of *waqf* grouped in state-run institutionss or private-run institutionss/non-government organization (NGO) in some *waqf* potential regions. Data from BWI shows that the regions are: (1) North Sumatera (2) West Sumatera (3) Riau island (4) West Java (5) Central Java (6) East Java (7) West Nusa Tenggara (8) East Kalimantan (9) Gorontalo Province (10) Maluku; b) Academics, educators who have

scientific competence on *waqf* ; and c) Regulator, Head offices of Indonesian *Waqf* Board or representative offices located in 10 provinces.

Second, quantification model. This model uses ANP questionnaires in the form of pairwise comparison between elements to discover which of the two is more important. The measurements are made with a numerical scale 1-9. Then, data on measurement result are collected and is inputted in the software of Superdecisions. In illustration, *waqf* problems in Indonesia will be solved and are compared from two aspects of 'Internal *waqf* Institutionss and of 'Government's role'. Of the two aspects, which one is the most dominant and how big the difference is.

Third, Synthesis and analysis. Data validation is the first thing to do before analyzing the processed data. The data validation is carried out with consistency test. Data are considered consistent if they have consistency ratio (CR) <0.1 (Saaty, 1994). If the CR score is bigger than 0.1, the judgement will be re-conducted by informants. If the CR score is already consistent, the existing element priority weight can be used as the basis for data analysis and result interpretation. At this stage, solutions on prioritized problems offered by informants will be studied thoroughly. The output is the prioritized problems on national *zakah,* including its solutions.

The nature of research is the qualitative research transformed to quantitative research by using the ANP method. This method is chosen since it has the ability to make a quantitative decision from qualitative data. The combination of both qualitative and quantitave data is the advantage of ANP method. In its development, ANP can often be applied in various types of research to make the best decisions. Data collection is with interviews, questionnaires, recorder and video (handycam).

Data are processed with ANP method. Software superdecisions is used to conduct pairs of comparison. Afterwards, the research result will be compared in two steps. First, making problems priority at levels of institutionss by collecting all problems at *Waqf* Institutionss which later will be arranged in the form of problems priority. Outputs from the first data collection step are the *waqf* problems priority at level of institutionss grouped in each region. Second, combining problems priority from all *waqf* institutionss in each region by using *mean*

method. Then, the problems priority is arranged together with solutions at national level.

Interview and ANP model questionnaires from informants are the way that data collection is conducted. Informants are from regulators, namely Indonesia *Waqf* Board which has 11 representative offices, from *Nazhir* and *Waqif*. The 11 provinces which become the research focus are: (1) North Sumatera; (2) West Sumatera; (3) Riau; (4) DKI Jakarta; (5) West Java; (6) Central Java; (7) East Java; (8) West Nusa Tenggara Barat; (9) East Kalimantan; (10) Maluku; and (11) Gorontalo.

4. The Empirical Result

The research result has three types of problems priority and *waqf* solutions based on *waqf* stakeholders, all of which are regulators, *waqf* management units (*Nazhir*) and people who gives *waqf* (*waqif*). Model construction result is devided into two parts, (1). problems priority and (2). *waqf* solutions priority.

Priority problems in the regulators related to the *waqf* management is: 1) lack of state budget for *waqf* certification;2) lack of *waqf* law socialization; 3) lack of coordination between Indonesia *Waqf* Board (BWI) and related institutionss in improving *waqf*. Insufficient state budget for *waqf* certification causes the failure of *waqf* property legalization. It costs a lot for *waqf* certification. *Waqf* certification is considered substantial in order to keep the continuation of *waqf* property. Insufficient *Waqf* law socialization from government causes *Nazhir* do not understand well how to manage *waqf* –how to take care of the *waqf* certificate and how to develop the *waqf* property. The last problem is the non optimal coordination between BWI and other related institutionss in improving *waqf* performance.

Priority problems on *waqf* management unit (*Nazhir*) are: 1) the lack of *Nazhir* competence in waqf management; 2) *Nazhir* is not the main profession; 3) *waqf* management is not yet optimal. The low *Nazhir* competence becomes one of the priority problems in this *waqf* management. Meanwhile, most people still consider that *Nazhir* is not the main profession and this can influence the performance of *Nazhir*. Data from informants describe that the *waqf* management has yet to

meet people's expectation and because of this, *waqf* properties cannot give economic benefits to people.

Priority problems in *waqif* are: 1) *waqf* distribution is directly to individual; 2) *waqif* do not coordinate with the heirs; 3) *waqif* do not have sufficient knowledge on *waqf*. *Waqf* distribution to individual can be found in eastern part of Indonesia. This causes the *waqf* services are not optimal. Some heirs sue back their properties which have been channeled to *waqf* because lack coordination between *waqif* and the heirs. Moreover, most *waqif* do not have good knowledge on *waqf* and this becomes one of the barriers in *waqf* management.

Solutions taken are based on problems occurring in each aspect. Priority solutions on the lack of state budget are:1) provides more state budget allocation; 2) working together with BPN for *waqf* certification; 3) the use of state budget in each region. Meanwhile, the priority solutions to the lack of *waqf* law socialization are: 1) working together with Islamic missionary endeavour organizations (IKADI/DKM); 2) publishing the *waqf* newsdocuments in each regional offices of Indonesia Religion Affairs Ministry; 3) Functioning online media (facebook,twitter,website); 4) working together with Coordinator Ministry of Information. Solutions for the low coordination between Indonesia *Waqf* Board with other related institutionss are: 1) coordinating with *zakah* agencies; 2) coordinating with regionl governments; 3) coordinating with BPS.

Priority solutions for low competence of *Nazhir* in *waqf* management are; 1) intensive training for *Nazhir* held by Regional Offices of Indonesia Religion Affairs Ministry; 2) certification for *Nazhir*; 3) working together with local universities. Solutions for *Nazhir* which are not the main profession are: 1) increasing incentives for *Nazhir*; 2) transforming *Nazhir* from individual to an institutions. Priority solutions for *waqf* management: 1) working together with Islamic financial institutionss; 2) training on investment for *Nazhir*; 3) establishing *waqf* savings or money *waqf*.

Priority solutions for *waqif*, especially giving *waqf* directly to individual, are: 1) ease of service for *Nazhir*; 2) ease of obtaining information on *waqf*; 3) encouraging people's awareness to channel their *waqf* to *waqf* institutionss. Priority solutions to *waqif* who do not coordinate with the

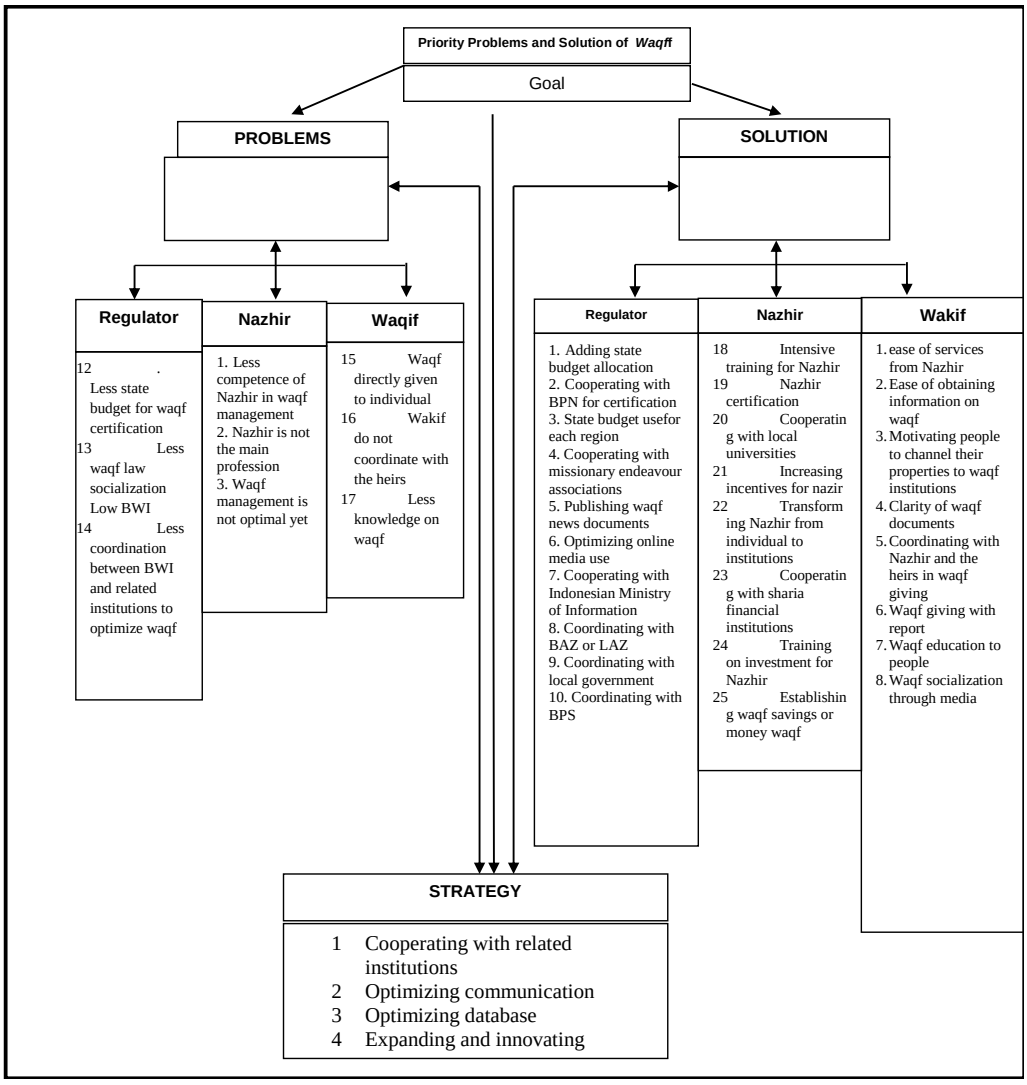
heirs are: 1) clarity of *waqf* documentss; 2) good coordination between *Nazhir* and *waqif* in *waqf* giving; 3) *waqf* giving must be in the form written report before the heirs. Solutions to the low knowledge on *waqf* are: 1) *waqf* education to people; 2) *waqf* socialization through all forms of media.

The above solutions functioning as actions to overcome *waqf* barriers are aimed at making the *waqf* management professional. Acoording to Antonio (2008), there are three basic philosophies in professional *waqf* management; first, the management framework must be integrated. Second, *Nazhir*'s welfare is the priority, balancing between rights and obligations which should be received. Third, principles of transparency and accountability. All the above aspects will be like in table 3 when being constructed into ANP model.

Model in figure 4 explains that the purpose of the model development is to find the problem comprehensively and then to find solutions for the best strategy in developing *waqf* management. This model divides problems and *waqf* solutions into three types based on the sources of institutionss, regulators, *Nazhir*, and *waqif*.

After making the ANP model, the next step is to make quantification model by conducting pairwise comparison. Result of pairwise comparison from the two model can be seen in the table.

Figure 4: ANP Hierarchy Structure



Source: Interview, data processed 2014.

Table 2 : Average Score of Priority from Indonesian ANP Model in Determining Priority Problems Comprehensively.

Aspect	Priority Score	PROBLEMS	Priority Score
1.Regulator	0,358	1. Less state budget for *waqf* certification	0,203
		2. Less *waqf* law socialization	**0,236**
		3. Less coordination between BWI and related institutions to optimize *waqf*	0,121
2. Nazhir	**0,384**	1. Less competence of Nazhir in *waqf* management	0,239
		2. Nazhir is not the main profession	**0,264**
		3. *Waqf* management is not optimal yet	0,201
3. Wakif	0,216	1. *Waqf* directly given to individual	0,096
		2. Wakif do not coordinate with the heirs	0,159
		3. Less knowledge on *waqf*	**0,240**

Source: Interview, data processed 2014

Table 2 describes the score of priority from Indonesian ANP model in determining priority problems comprehensively. As a whole, the main priority of *waqf* problems in Indonesia is on the aspect of *Nazhir*, the second aspect is on the aspect of regulator and the third one is on the aspect of *waqif*. Based on *Nazhir* aspect, *Nazhir* is not considered as the main profession and this will influence the *waqf* management. This condition can be found in East Kalimantan. Most *Nazhir* is individual. Ali Yaman, a member of *Nazhir* association in Samarinda, East Kalimantan, stated: "Many activities do not stay focus. We understand it. They need to be paid. *Nazhir* is the social activity, except the productive one. We are paid for the productive one."

What Ali Yaman said shows that *Nazhir* is not the main profession since they also manage the non-productive *waqf*. *Nazhir* has only responsibility to manage *waqf* after doing their main jobs as employees at workplace.

Nazhir in Ambon has similar problem to *Nazhir* in East Kalimantan. Umar At-Tamimi as *waqif* in this research says:

> "…Let alone, *Nazhir* here, their level of education..."

Umar At-Tamimi's statement indicates that Nazhir do not have high educational background. To become *Nazhir* is easy, the main requirement is just to allocate the time.

Like in East kalimantan and Ambon, *Nazhir* in West Sumatera experience similar problem with *Nazhir*. The Indonesia *Waqf* Board (BWI) in West Sumatera explains :

> *"...yup. This is the religious position, this is the main job. We have known what has happened at Islamic boarding school M. Nasir. Central BWI planned to provide productive waqf in the form of agriculture sector from August to December. But this plan did not work because we failed to set our time. We do not have specific time. Nazhir do not have strong motivation, that's the problem...."*

Problem of time for *Nazhir* gives bad effect to the *waqf* management. From the existing conditions in those provinces, the research focuses on *Nazhir*.

The second priority problem from the research is the regulator aspect with insufficient *waqf* law socialization. Afdi, *waqif* from West Sumatera, states that :

> *"...Yeah the socialization is not enough yet. Only few people can get this information. Even villagers were surpised when they knew that there was already money waqf...."*

Afdi's statement shows that the money *waqf* socialization is still far from sufficient. Similar condition also occurs in Central Java. Someone from Central Java claimed that *waqf* regulators in the province have yet to socialize the *waqf* law in his village. Many villagers are not familiar yet with *nazhir*, *waqif* and money *waqf*.

The next result of pairwise comparison is *waqf* priority solutions. The score of priority solution between ANP model is on table 3.

Table 3: *Waqf* Priority Solutions as a Whole, Indonesian ANP Model.

Aspect	Problems	Solutions	Priority Score
1.Regulator	1. Less state budget for *waqf* certification	1. Adding state budget allocation	0.127
		2. Cooperating with BPN for certification	**0.220**
		3. State budget usefor each region	0.116
	2. Lack of *Waqf* Law socialization	1. Cooperating with missionary endeavour associations	**0.185**
		2. Publishing *waqf* news documents	0.094
		3. Optimizing online media use	0.091
		4. Cooperating with Indonesian Ministry of Information	0.089
	3. Lack of coordination between BWI and related institutions to optimize *waqf*	1. Coordinating with BAZ or LAZ	0.161
		2. Coordinating with local government	**0.208**
		3. Coordinating with BPS	0.061
2. Nazhir	1. Low competence of Nazhir in *waqf* management	1. Intensive training for Nazhir	**0.272**
		2. Nazhir certification	0.134
		3. Cooperating with local universities	0.096
	2. Nazhir is not the main profession	1. Increasing incentives for *nazir*	0.207
		2. Transforming *Nazhir* from individual to institutions	**0.300**
	3. *Waqf* management not optimal yet	1. Cooperating with *sharia* financial institutions	0.106
		2. Training on investment for Nazhir	**0.212**
		3. Establishing *waqf savings* or money *waqf*	0.180
3.*Wakif*	1. *waqf* given directly to individual	1. ease of services from Nazhir	0.071
		2. Ease of obtaining information on *waqf*	0.145
		3. Motivating people to channel their properties to *waqf* institutions	**0.198**
	2. *Wakif* do not coordinate with the heirs	1. Clarity of *waqf* documents	0.101
		2. Coordinating with *Nazhir* and the heirs in *waqf* giving	0.088
		3. *Waqf* giving with report	**0.217**
	3.*Waqif* have less knowledge on *waqf*	1. *Waqf* education to people	**0.277**
		2. *Waqf* socialization through media.	0.175

Source: Research result, data processed.

Priority problem on *waqf* in Indonesia is at the *Nazhir* aspect, *Nazhir* is not the main profession. On table 2, it is shown that the priority solution according to Indonesian ANP is that *Nazhir* is not the main profession. So, the priority solution for *Nazhir* that are not the main profession is the transformation of *Nazhir* from individu to institutionss.

Priority solutions for *Nazhir* that are not the main profession is the transformation of *Nazhir* from individu to institutionss and this becomes priority solution in East Java, Central Java, and DKI Jakarta Solusi. In East Java, most *Nazhir* are still individual and this causes the *waqf* management is not optimal.

Ahyani, a member of BWI in Central Java, states :

> *"…Nazhir is not a profession, meaning they only work if they have time. Because of this, they have no responsibility for the waqf management. Nazhir actually can earn 10% of their responsibility. But they don't want to do that…."*

Based on Ahyani's statement, the professional *Nazhir* must be in the form of institutionss, not individual. In this way, the *waqf* problems can be solved; for example, to take care of *waqf* certification.

The second priority solution is to increase incentives. *Nazhir* are not paid for their job and this is the root of the problem why this is not the main profession. West Sumatera and Riau give the highest scores in increasing incentives as the solution. This can encourage *Nazhir* to work well in managing *waqf*.

The next priority problem is related to the regulator aspect, it is the insufficient *waqf* law socialization. The priority solution to this problem based on the Indonesian ANP is to work together with Islamic associations of missionary endeavour. This solution is taken because the majority of Indonesian people are Muslim and the Islamic teaching is in the role of Islamic clerics and ulemas. Most of them are in villages and this will be effective and efficient to socialize the *waqf* law by working together between Indonesian *Waqf* Board and Islamic missionary endeavour.

Waqif aspect is also the focus of priority problem, especially related to the low knowledge on *waqf.* Then, the priority solution based on the Indonesian ANP is to educate people on *waqf* knowledge and to socialize *waqf* through all types of media. Regulators in East Kalimantan have conducted socialization and education on *waqf* and this brings benefit to the local people. A *waqif* from East Kalimantan says:

> *"Due to socialization conducted by the Indonesian Religion Affairs Ministry, the Indonesian Waqf Board, Nazhir associations and by some other institutionss, people now understand waqf."*

Regulator in South Sulawesi province also has socialize and educated people on *waqf*. A regulator in South Sulawesi states:

> *"We are now making the strategy, inviting all Islamic clerics to take the role in giving information on waqf. This is the way to make them understand waqf."*

Solutions offered to overcome the *waqf* problems can be performed by some strategies as in table 4.

Tablel 4 : Strategy on *Waqf* Solutions in Indonesia

No	*Waqf* solution strategy	Priority Scale
1	Cooperating with related institutions	0.250
2	Optimizing communication	0.148
3	Optimizing database	0.190
4	Expanding and innovating	0.302
5	Standardizing *nazhir*	0.130

Source : Research data, data processed

Table 4 shows, based on Indonesian ANP model, that *waqf* solution strategy which has the highest priority scale is the expansion and innovation strategies. The strategy is related to some *waqf* objects which need expansion and innovation. The common *waqf* objects in Indonesia is in the form of land and most of them are not productive. People are in need of productive *waqf* objects to improve their welfare. Looking at this condition, the productive *waqf* needs developing, one of which is

the money *waqf*. *Nazhir* also become the object to be expanded and innovated because most *Nazhir* in Indonesia are still individuaal, not in the form of institutions. This makes the *waqf* management not professional. If this situation keeps going on, there will be possibility that people will not believe *Nazhir*. Consequently, people may have no motivation to channel their properties for *waqf*.

5. Concluding Remark

Some conclusions can be withdrawn from result and discussion above:

1. There are three kinds of priorities on *waqf* problems and solutions which are based on *waqf* stakeholders; they are regulators, *Nazhir* (those who manage *waqf*), and *waqif* (those who give their properties for *waqf*). According to the Indonesian ANP model, *Nazhir* is considered as the most problematic part in *waqf* management. *Nazhir*, according to the Indonesian ANP model, is not the main profession. The second priority according to the Indonesian ANP model is the regulator related to the lack of *waqf* law socialization. The third priority is *waqif*. The Indonesian ANP model claims that *waqif* in eastern part of Indonesia still have no good knowledge on *waqf* .

2. Priority solution to *Nazhir* aspect is the transformation of *Nazhir* from individual to institutions. Priority solution to regulator aspect related to the lack of *waqf* law socialization is to cooperate with missionary endeavour associations. Solution for *waqif* problem according to the Indonesian ANP model is to educate people on *waqf* knowledge.

3. Priority strategy in solving *waqf* is by conducting expansion and innovation. The expansion and innovation which are closely connected to the *waqf* objects and *waqf* management are strategies to develop productive *waqf* and to transform *Nazhir* from individual to institutions.

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Trade Integration and Revealed Comparative Advantages of Sub-Saharan Africa and Middle East and North Africa Merchandize Export

Hailay Gebretinsae Beyene[1]

To provide an input for policy makers on issues of economic integration, this study has been conducted to assess the "revealed comparative advantage" (RCA) of the two regions: sub-Saharan Africa (SSA) and Middle East & North Africa (MENA), on merchandise goods export (Manufactures, Ores & Metals, Fuels, Agricultural Raw Materials, and Food) for the period 1995 to 2012.

It is disclosed that SSA has revealed comparative advantage in ores & metals, fuels, food, and agricultural raw materials ranked in order of their strength of competitiveness. However, SSA region's economic integration through merchandise trade in the world is lower than the average economic integration of low and middle income countries. MENA has revealed disadvantage in all sub-products except in fuel export, while MENA has stronger integration in the world. In contrast to MENA, the population growth in SSA is not accompanied by commensurate economic integration in the world. The study uncovers the existence of immense potential for the two regions to integrate each other in food, ores & metals, and agricultural raw materials trade.

Keywords: Economic integration, merchandise export, Middle East & North Africa, revealed comparative advantage, sub-Saharan Africa, trade share

JEL Classifications: F14

1. Introduction

The concept of revealed comparative advantage has been introduced by Liesner (1958). Later the concept is refined by Balassa (1965), which is widely used to examine and identify the export products of countries that have revealed comparative advantage. Balassa's index is further

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enhanced through conceptual framework developed by Hillman (1980), expressed in the form of necessary and sufficient conditions. It is stated that an increase in a country's exports of specified commodity results in an increase in the concomitant Balassa index, if and only if the Hillman condition is met (Hinloopena and Marrewijk, 2008).

The pattern of commodity export reflects the relative price and non-price factors that determine the structure of export of a country or region. If the net export of the specified commodity in a product group export is large, then it will be considered that country has revealed comparative advantage in the export of the specified commodity in the world. In fact, when Balassa method to examine countries' export competitiveness was limited to manufactured goods. This was for the reason that whenever it is evident, distortion happens in trade with primary products. Using trade under such condition fails to reflect the real comparative advantage of a nation (Balassa, 1965).

Ricardo argued that despite the fact that a country happens to have an absolute advantage, from the bundle of goods, in two or more of them, by focusing on the one with the highest advantage while importing others can gain from trade (Deardorff, 2011).

2. Literature Review: RCA Theory and Previous Studies

Revealed Comparative Advantage[2]

Revealed comparative advantage (RCA) has been introduced by Bela Balasa. It is highly popularized concept and commonly used economists tool that uses the trade pattern of countries. The model is applied by countries or regions interested to specify the sectors, product categories, or commodities that have comparative advantage. Based on the theory, basically, the ideal method of computing comparative advantage requires the utilisation of relative prices of the commodities of interest under the condition that there is no trade between the countries. However, as data on relative prices of commodities is not readily available, it becomes cumbersome to strictly rely on the assertions of the

[2]The same concept and its definition of revealed comparative advantage as depicted in this study is similarly applied by the author for computing RCA index values of comparative studies of sub-Saharan Africa versus South Asia, East Asia and the Pacific, and Latin America and the Caribbean regions.

theory so as to measure the comparative advantage. This necessitated for measuring it indirectly using a proxy model. Hence, a model is adopted that can measure indirectly a country's or a region's comparative advantage. Under this backdrop and absence of the requisite data (factor input prices) to compute relative prices, Balassa developed a method that is widely used for computing a country's revealed comparative advantage. According to Balassa, an indication can be made on the situation of a country's competitiveness based on the computed values of comparative advantage taking in to account the trade performance of individual economies. In fact, Balassa has used the model of RCA only for one part of international trade that is export (Balassa, 1965).

The original formula developed by Balassa, which serves as a tool for measuring the revealed comparative advantage (RCA) is as shown below (Balassa, 1977; 1979; 1986).

$$\mathrm{RCA} = \left[\frac{\left(X_{ij} \Big/ \sum_i X_{ij} \right)}{\left(\sum_j X_{ij} \Big/ \sum_j \sum_i X_{ij} \right)} \right]$$

Where,

X_{ij}	denotes exports of sector "i" at country "j",
$\sum_i X_{ij}$	denotes total exports of country "j",
$\sum_j X_{ij}$	denotes "world" exports of sector "i", (sum of countries sector's "i" exports),
$\sum_j \sum_i X_{ij}$	denotes total "world" exports.

The range of the RCA indices value is between zero (0) and positive infinitive (+∞). If the computed value of RCA of a country exceeds unity, it is assumed that the country has revealed comparative advantage in the sector.

3. Literature Review on Comparative Advantage and Economic Performance

A number of studies have been carried out using revealed comparative advantage. In the investigation whether Swaziland has comparative advantage on its exports to Southern African Development Community (SADC), Southern Africa Customs Union (SACU) Common Market for Eastern and Southern Africa (COMESA), and the rest of the world, revealed comparative advantage approach of assessment is followed by Karambakuwa and Mzumara (2013). It is revealed that Swaziland has higher revealed comparative advantage in 449 product lines, which is greater or equal to one. They suggested that Swaziland's comparative advantage can be improved by enticing FDI through transnational corporations, discovery and extraction of other new resources.

Based on revealed comparative advantage (RCA) indices, Botswana has revealed comparative advantage in the export of natural resources (diamond and copper) as well as from farming in the export of meat of bovine animals in 1999 and 2004 (Makochekanwa, 2007).

Anthony and Hasson (2012), investigated the role of industrial policy in South Africa related to the situation of unemployment. They pointed out the possibility of achieving economic shift without the pursuant of comparative advantage shift. To alleviate the employment problems, South Africa need to engage in producing those products that involve the abundant labour resource. This enables South Africa's products to become competitive and will result in a growth path characterized by labour absorption.

ATPC (2010) examined future potential of African market that attracts African exporters. The study has attempted to compare the relative advantages of Africa with those supply sources outside the continent. It is explained that there exists the potential of intra-Africa trade, which strengthens regional integration in the continent. One of the formidable challenges cited in Africa for intra-African trade is the similarity of products to trade with, as well as relative competitiveness of African exporters.

It is stated that one of the factors for weak integration among sub-Saharan African countries through international trade is that most of the

countries are small fragmented economies and poor. Fragmentation becomes a barrier for scale of economies in production and transportation of commodities from and within the region. Furthermore, significant number of countries (about 15 countries) in the region are landlocked, which adversely affects their trading activities which raise their transaction costs (McCarthy, 2010).

McCarthy (2010:6) states that "… regional integration remains an economic arrangement that must be justified in economic terms. A regional integration arrangement is a political construct held in place by economic cement. If the 'cement' is weak the construct collapses."

Even though various regional integration blocks are established in Africa, none of these integration arrangements have cropped up to customs union. This is exacerbated by the underdeveloped intraregional infrastructure facilities in the continent (McCarthy, 2010). This is buttressed by Hartzenberg (2011) who suggested for trade facilitation activities should be taken seriously by the member states of regional blocks including the small and land locked countries.

Haddad (n.d) examined the comparative advantage of exports of Middle East & North Africa Region beyond oil. It is found that the region had descended downwards the ladder of comparative advantage, due to the pressure from China's export to Eastern European countries. Moreover, it is indicated that ten of the fifteen countries of MENA region mainly export primary products. More than 50 per cent of the region's export is concentrated on three commodities. The region's export diversification is also low. Even though efforts to improve the competitiveness of non-oil products are not vivid, noticeable efforts are done by GCC countries to diversify and upgrade exports.

Al-Kawaz (2008) examined the economic diversification of Kuwait. It is stated that trade openness, liberalisation, domestic protection, or orthodox trade liberalisation do not necessarily result in diversification and economic growth. This is because of the fact that absolute protection erodes the competitive power of the firms, and unmanaged trade openness leads to financial and trade crisis. It is suggested that trade diversification should be undertaken for specified sectors in the short and medium terms.

Turkey's competitiveness position as compared to its non-EU-15 competitors in the EU-15 market has been examined by Özçelik and Erlat (2013). Their study applied Balassa's model of RCA. With respect to the region, it is revealed that the countries have heterogeneous products that have comparative advantage. However, in relative terms, with respect to the contribution of those exports that have revealed comparative advantage to total export earnings, the countries' exports are homogeneous.

Sayan (2003) conducted a study on the role of free trade in relation to water resources of Middle East and North Africa. The revealed comparative advantage and net trade indices are computed for 13 sectors in the countries considered on the study. The study found that the Heckscher–Ohlin theory is applicable in the region. It asserted that free trade will make countries with relative endowment in water to specialize and export on water intensive products, while those with scarce water resource specialize in other products which require less water.

Noland and Pack (2007), cited in Lee and Gohar (2010), explained that the intra and inter regional trade in the Arab region is found to be "under traded" in the export of manufacturing export.

A study by DeRosa (1995) done on international trade, regional integration and food security in the Middle East found that greater improvement in food security results from non-discriminatory trade liberalization. Moreover, intra-regional trade yields in an improvement in food security in the region with the exception of wheat and other cereals. Wheat and other cereals are imported both commercially and through bilateral and multilateral food aid programs.

Furthermore, Al-Kawaz (2008) citing IMF (2006) explained that, even though Saud Arabia had set the largest plan of diversification in the region, the result was limited. The share of the output of manufacturing industry on GDP has shown a modest increment from 5.9% in 1980 to 8.1% in 2004. According to Looney (1994), cited in Al-Kawaz (2008), the lower diversification pace is attributed to exaggerated cost of infrastructure and continued investment on infrastructure resulted the prices of the manufactured goods to become higher, despite significant subsidies provided to the manufacturing sector.

A study on the impact of regional trade agreements on North African countries' foreign trade and economic welfare has been examined that covered a 10-year period (2000-2010). It is revealed that even though the regional membership resulted in the creation of trade leading to an increase in economic welfare, it is not adequate to resolve the export related challenges and regulate trade in the region (Haddoud et al., n.d).

Ghani (2011) finds that trade liberalization favourably influences economic growth. It is evidenced that trade liberalization in OIC has improved the rise in GDP per capita in the medium term. However, trade liberalization did not increase the trade of the OIC countries. In other words, no improvement has been observed in export and total export of the region because of trade liberalization.

Bilquess et al. (2011) examined the effect of trade openness, capital flows, and institutions on financial development of D-8 countries (includes Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey) though Iran is excluded in their study. It revealed that these factors have positive and significant impact on the financial development of D-8 countries. In accordance with the findings of their study, they recommended for developing countries to promote foreign capital flows, trade openness, enhancing institutions, and economic growth to improve financial development in the D-8 countries.

Uslu and Polat (2012) in their assessment of the impact of international trade on employment found that trade (import and export) positively influences employment and economy. They suggested for countries to promote export as it creates job opportunities. Tariff reduction policies are supposed to be implemented in selected sectors as long as the importation has positive role on employment and with due attention paid to competitiveness of domestic firms.

Khasawneh et al. (2012) disclosed the long term interrelationship between real export and economic growth in the non-oil exporting countries of MENA, while the oil-exporting countries economic growth pace is determined by other factors such as capital inflow.

Tsen (2007) investigated the interrelationships among export, domestic demand and economic growth in the countries of Middle East region. The finding indicated that export, domestic consumption and investment significantly influence economic growth and vice versa.

Anthony and Hasson (2012) argued that in the case of South Africa, it is a paradox to see in this unskilled labour abundant country with massive unemployed has comparative advantage revealed in commodities that are capital intensive. South Africa's economy is characterised by some pockets of technological sophistication with high skilled labour. However, also there exists a massive unskilled labour force.

Ortmann (2005) suggested that to improve the competitiveness of South African agricultural exports, the existence of good governance at all management levels of the government and industry, enhancement of institutional innovations at small-scale farmers and commercials, encouraging farmers to adopt new technological outcomes of research and development and the improvement of quality of school education with due and special emphasis on science, mathematics and skill training.

So far it can be observed from the reviewed literature that no studies have been undertaken that explore the comparative advantage of sub-Saharan Africa vis-à-vis Middle East & North Africa. Though few studies made an attempt to assess and explore the revealed comparative advantage of the African continent and Middle East at country level and also at disaggregated product classification level. From this one can note that the African continent and the Middle East region in general's comparative advantage are unexplored areas this study aimed to examine. Furthermore, this study examined the revealed comparative advantages with an emphasis on the broader product classification of merchandise trade, specific on export. The merchandise trade included product categories, such as, Manufactures Export, Ores and Metals Export, Fuels Export, Agricultural Raw Materials Export, and Food Export of sub-Saharan Africa and Middle East & North Africa. Furthermore, in order to examine the proportion and trend of export of sub-Saharan Africa and Middle East & North Africa regions with the world trend, the size of the population along with the regions' respective shares are assessed.

4. Conceptual Framework of the Study[3]

The commonly used tool of measuring suggested by Balassa (1965), revealed comparative index, is adopted in this study to investigate the revealed comparative advantage of sub-Saharan Africa as compared to Middle East & North Africa. Basically, the model is constructed to enable examine the status of these two regions (sub-Saharan Africa and Middle East & North Africa) with respect to their comparative advantage in relation to the world export of the five sub-sectors of the merchandise sector. The RCA method adopted in this particular study enabled the examination of the magnitude of each region's comparative advantage on the sub-sectors. The results of the analyses indicate the potential economic integration in between these two regions.

In addition, a benefit can be drawn from the model as it indicates the trading complementarity and competitiveness between the two regions on export of merchandise goods. These goods include various factors intensities of labour, capital and technology and knowledge. The formula adopted, based on Balassa's definition, to compute the respective RCA of the two regions specifically used for this study is defined as given below.

$$\text{RCA} = \left[\frac{\left(X_{ij} \Big/ \sum_i X_{ij} \right)}{\left(\sum_j X_{ij} \Big/ \sum_j \sum_i X_{ij} \right)} \right]$$

Where,

X_{ij} denotes exports of sector "i" of a region (Sub-Saharan Africa or Middle East & North Africa) "j",

$\sum_i X_{ij}$ denotes total exports of region "j",

[3]The same concept and its definition of revealed comparative advantage as depicted in this study is similarly applied by the author for computing RCA index values of comparative studies of sub-Saharan Africa versus South Asia, East Asia and the Pacific, and Latin America and the Caribbean regions.

$\sum_j X_{ij}$ denotes "world" exports of sector "i", (sum of countries sector's "i" exports),

$\sum_j \sum_i X_{ij}$ denotes total "world" exports.

Vollrath (1991) has developed a modified revealed comparative advantage that some authors adopt it along with the commonly used RCA, which is denoted by RCA #. It is used to examine the revealed comparative advantages of the two regions this study has specified (sub-Saharan Africa and Middle East and North Africa). The utilization of the modified method, which is suggested by Vollrath is assumed appropriate as some agree in the literature especially for a group of economies that pose greater influence at a global level than a single country poses. Basically, this study deals with regions that contain group of countries (the countries in sub-Saharan Africa as a group and the countries in Middle East & North Africa as a group). The basic difference between the two methods of computing revealed comparative advantage indices is that Vollrath's method avoids double counting. The original form of RCA# suggested by Vollrath intended to examine the revealed comparative advantage of a specific country vis-à-vis the world in the export of commodities in a specified sector. This study has customized the analysis of RCA# approach that suits the aim of the study that attempts to examine from regional rather than country perspective. Thus RCA# method is utilized in this study and the index values are computed for each region's sub-Saharan Africa or Middle East & North Africa) export in the specified sectors.

For the specified sub-sectors, this study has computed their respective relative revealed comparative advantages based on the given formula below. Conceptually, RCA# is defined as given below. The notations given for the variables are similar to that of Balassa's modified model specified for this study as defined and described in above.

$$\mathrm{RCA}_{\#} = \left[\frac{\left(\frac{X_{ij}}{(\sum_i X_{ij}) - X_{ij}} \right)}{\frac{(\sum_j X_{ij}) - X_{ij})}{\left((\sum_j \sum_i X_{ij}) - (\sum_j X_{ij}) \right) - \left((\sum_i X_{ij}) - X_{ij} \right)}} \right]$$

5. Data and Methodology[4]

To investigate the revealed comparative advantages of sub-Saharan Africa and Middle East & North Africa, as described above in the conceptualization of the frame work of the study, the commonly used tools are adopted. The application of RCA in merchandise export sub-sectors (Manufactures, Ores and Metals, Fuels, Agricultural Raw Materials, and Food) has the significance of assessing the endowed factor endowment of each region in relation to the specified sub-sectors of the merchandise export.

To evaluate the gap of competitiveness between the two regions, the difference of the RCAs of the two regions is considered. To capture the differential values, the following equation is specified.

$$\text{RDRCA (SSA and MENA)} = \text{RCA}_{\text{SSA}} - \text{RCA}_{\text{MENA}}$$

Where,

RDRCA refers to the Revealed difference in the RCA of sub-Saharan Africa and Middle East & North Africa

SSA refers to sub-Saharan Africa, and

MENA refers to Middle East & North Africa

The expanded form of the equation specified above is shown as given below.

$$\text{RDCA} = \left[\frac{\left(X_{ij}/\sum_i X_{ij}\right)}{\left(\sum_j X_{ij}/\sum_j \sum_i X_{ij}\right)}\right]\text{SSA} - \left[\frac{\left(X_{ij}/\sum_i X_{ij}\right)}{\left(\sum_j X_{ij}/\sum_j \sum_i X_{ij}\right)}\right]\text{MENA}$$

[4]The same concept and its definition of revealed comparative advantage as depicted in this study is similarly applied by the author for computing RCA index values of comparative studies of sub-Saharan Africa versus South Asia, East Asia and the Pacific, and Latin America and the Caribbean regions.

Revealed comparative advantage is widely applied concept as it focuses determining the relative productivity differences among countries of internationally traded goods. The larger the relative productivity differences, the higher the gains from trade. Despite undisputable advantages the theory of comparative advantage has, it is not free of limitations. The theory of comparative advantage does not account changes that result from suitable international trade policy implementation, and upgrading of factor endowments in the regions/countries considered. Thus the established trade pattern of countries or regions can change because of the trade and economic policies that affect the sources of comparative advantage. Kowalski (2011) identifies physical capital, quality of education and average time to complete, energy supply, availability of finance and credit, and governance quality as determinants of a country's comparative advantage.

To have an overview of the whole picture, the analysis commences revealing the reality of the regions' population and trade shares in the world. The study attempted to assess the relative population shares vis-à-vis trade shares of the economies of the world categorised into regions. Data published by World Bank, specifically, World Development Indicators data is used for analyses.

6. Finding and Analysis

The population proportion in the world, given in a statistical summary of the economic regions known as *low and middle income*, and *high income economies*, is presented in Table1. As can be seen from the Table, more than 80 percent of the world population lives in the low and middle income, while the minority that accounts to 20 percent lives in the high income economies. It is shown that in the past two decades (1990-2010), the population proportion has decreased by 2.22 percent in high income economies, while it increased by the same percent in low and middle income economies. However, in 2013 the population proportion of the high income economies as well as the low and middle income economies is somehow reinstated in 2013 to the proportion it had in 1990 (slightly higher, by 0.24 percentage point, for low and middle income economies; slightly lower, by the same percentage point, for the high income economies). This further implies that over the past two decades, the disproportionate possession of the world wealth is

aggravated as evidenced by the increment in the population proportion of low and middle income economies.

As far as the population proportion of the sub-sectors of the low and middle income categories is concerned, in 1995 it accounts to 4.31 and 9.75 percent for the Middle East &North Africa and sub-Saharan Africa respectively. The proportion has increased by 0.54 percent and 3.39 percent in 2013 for the Middle East & North Africa and sub-Saharan Africa respectively. The rate of increment by Middle East & North Africa is a little bit higher than the increase shown by low and middle income economies that is 0.24 percent. In contrast, sub-Saharan Africa has increased by 3.39 percent which is higher than the increase sustained by low and middle income economies in general. The population size of sub-Saharan Africa is larger, which was 2.26 times higher than Middle East & North Africa in 1990 has grown further and become 2.71 times larger in 2013.

The trade share and proportion of the population of the respective sub-Saharan Africa and Middle East & North Africa regions for periods 2005 and 2013 are shown in Table2(the data for trade share is for the year 2012).In this study trade refers to the aggregate of total export and import of goods and services in a year. The Table shows that while 11.54 percent of world population lives in sub-Saharan Africa, the region has very low trade share in the world that accounts to 1.74 percent in 2005. The trade share of sub-Saharan Africa rose by 0.47percentage point and become 2.21percent in 2012. This is accompanied with a rise in its population share in the world by 1.60 percentage points in 2013.The trade share when it is evaluated in terms of population proportion, sub-Saharan Africa trade share is lower by 6.63 times in 2005 than the average of the low and middle income countries whose trade share is lower by 3.1 times. Comparatively with 2005, some progress is shown by sub-Saharan Africa that its trade share in relation to its population proportion in the world is lower by 5.95 times in 2012. However, this is still much lower than the average of the low and middle income countries' whose trade share is lower by 2.62 times in 2012. It can be concluded that, in relation to the population size, sub-Saharan Africa region's share in world trade is significantly lower than the average share of the lower and middle income countries. From this one can deduce that economic integration of sub-Saharan Africa

region is weaker than the average economic integration of low and middle income countries.

Table 1: Percentage of World Economic Regions Population during 1990-2013.

Economic Region	**1990**	**2000**	**2003**	**2004**	**2005**	**2006**	**2008**	**2009**	**2010**	**2013**
Low & middle income	81.43	82.84	84.50	84.22	84.30	84.24	84.04	83.52	83.65	81.67
East Asia & Pacific	30.30	29.65	29.57	29.37	29.29	29.04	28.81	28.69	28.45	28.15
Europe & Central Asia	7.43	6.51	7.53	7.42	7.33	7.04	6.62	5.97	5.88	3.82
Latin America &Caribbean	8.25	8.41	8.49	8.58	8.56	8.51	8.45	8.45	8.45	8.25
Middle East & N. Africa	4.31	4.53	4.97	4.72	4.75	4.75	4.86	4.88	4.81	4.85
South Asia	21.38	22.85	22.71	22.73	22.83	22.93	23.07	23.14	23.69	23.45
Sub-Saharan Africa	9.75	10.89	11.23	11.40	11.54	11.96	12.23	12.39	12.38	13.14
High income	18.57	17.16	15.50	15.78	15.70	15.76	15.96	16.48	16.35	18.33
World	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Author's computation (2015) based on WDI data, published by World Bank

The lag in economic integration of sub-Saharan Africa can be evidenced by McCarthy's(2010) study. It revealed that the existing economic size of sub-Saharan Africa is smaller than India. Even if the envisioned sub-Saharan Africa integration becomes successful, the market size remains small. To expand the market size, it is suggested that the integration process should go beyond the African continent that entails the global market.

Furthermore, Osabuohien and Efobi (2014) explained that most of the world countries' economic and financial systems are adversely affected

because of the 2007/2008 global economic crisis. Consequently, it is evidenced by the fact that there was shrinkage in FDI inflow to sub-Saharan Africa that has been flowing in an increasing trend by more than 85 percent FDI to GDP ratio in 1995-1999 to 48 percent in 2008. Likewise, sub-Saharan Africa's export of merchandise as a proportion to GDP has reduced by 17.9 percent in 1995 to 2008.

The trade share of Middle East & North Africa, unlike sub-Saharan Africa has squeezed by 0.73 percentage point in 2012 accompanied by a rise in its population proportion by 0.10 percentage points in 2013. In relation to the population proportion, in contrast to sub-Saharan Africa, this region has a higher trade share than its population proportion in the world. In fact, during 2005 to 2012, Middle East & North Africa region has shown a decline in its trade share from 2.93 to 2.20 in 2005 to 2012. In terms of population proportion, Middle East & North Africa has much higher trade share than the average share of low and middle income countries. Therefore, it can be concluded that, in terms of population proportion of Middle East & North Africa, the region has higher economic integration in the world in the form of trade than the entire low and middle income economies.

The findings of Gundogdu (2009) shows that in 1995-2007 trade within the OIC countries and with the rest of the world has increased because of the unilateral actions taken and their commitments to trim trade barriers to meet trade requirements of regional blocs such as COMESA, ECOWAS, and the like. Furthermore, it is suggested that improvement of infrastructure facilities and service delivery facilities and mitigation of financial constraints among the OIC countries boost economic integration within the region and the rest of the world.

In comparative terms, in 2005 the population size of sub-Saharan Africa is 2.43 times larger than Middle East and North Africa, but the trade share of Middle East and North Africa is 1.68 times higher than sub-Saharan Africa. Moreover, in 2013, the population size of sub-Saharan Africa has grown and become 2.71times larger than Middle East & North Africa, and the trade share of Middle East & North Africa has become almost the same as that of sub-Saharan Africa. From this it can be inferred that, despite the low trade share sub-Saharan Africa has in relation to its population proportion, in absolute terms the region has shown positive improvement attaining a status of trade share with

slightly higher than Middle East & North Africa in 2012. Even though modest improvement is revealed by sub-Saharan Africa, in contrast to Middle East & North Africa, the population growth in sub-Saharan Africa is not yet accompanied by commensurate economic integration in the world.

Hence, when economic integration is evaluated in terms of population proportion, unlike the average low and middle income countries in general and sub-Saharan Africa region in particular, its economic integration is very low. On the other hand, Middle East & North Africa region has stronger integration in the world than the whole low and middle income economies.

In the past two decades, the success in reducing poverty significantly by the emerging countries, such as Brazil, China, and India is attributed to the determined commitment and execution of accelerated structural transformation process. However, in Africa structural transformation is at its infant and formative stage (African Economic Outlook, 2013).

UNECA (2010) identified that high transaction cost has put Africa at a disadvantage as compared to the rest of the world. It is suggested that policies be set that enhance the competitiveness of African exports by reducing costs, and encourage marketing activities that link rural farmers with the global trade supply chain. These entail the provision and expansion of roads, and market information networks. It emphasised the importance of reduction of transaction cost to boost Africa's regional integration, especially trade among land locked countries.

Though the infrastructure barrier for intra-Africa trade is much stronger, the tariff and non-tariff barriers to trade also pose formidable dreadlocks. The existence of significant population land locked that accounts to about 35 percent of African population as compared to 1 percent of the world average, worsens the trade challenges Africa face. In addition, delays due to cumbersome procedures in customs clearance and crossing of borders adversely affected Africa's competitiveness in international trade as compared to other regions (UNECA, 2010, citing Njinkeu and Fosso, 2006).

Table 2: Population and Trade Share* of Sub-Saharan Africa, Middle East & North Africa, Low and Middle Income, and High Income Economies during 2005 and 2013.

Economic Region	Percent in World Population	Percent in World Trade	Percent in World Population	Percent in World Trade
	2005		2013	
Sub-Saharan Africa	11.54	1.74	13.14	2.21
Europe & Central Asia	7.33	3.16	3.82	3.64
Latin America &Carib.	8.56	4.44	8.25	5.49
Middle East & N. Africa	4.75	2.93	4.85	2.20
Low &Middle income	84.3	27.19	81.67	31.14
High Income	15.7	73.21	18.33	68.81

Source: Author's computation (2015) based on WDI data, published by World Bank

*Trade refers to the total export and import of goods and services. Moreover, the data for trade refers to the year 2012.

The revealed comparative advantage of sub-Saharan Africa and Middle East & North Africa during 1995 to 2012 on the sub sectors of the merchandise export are shown in Table3. Figure-1 shows RCA trends of the sub-sector, food export. Sub-Saharan Africa has revealed comparative advantage on food export during the whole period, 1995 to 2012. However, its trend shows that it has been rising consistently and peaked at an RCA index value of 2.29 in 2004 followed by consistent decline afterwards.

Alves et al. (2009) underpinned that despite Africa's comparative advantage in agriculture and agro processed commodities, its exports are facing difficulty in reaching a target market due to high tariff, and non-tariff barriers imposed by advanced countries. Furthermore, the subsidies role on local producers of similar products of advanced countries undermines Africa's exports and the value expected from farm products.

In the case of Middle East & North Africa, in contrast to sub-Saharan Africa, it has a comparative disadvantage during the whole period, 1995 to 2012. However, the trend is similar to sub-Saharan Africa that it had consistent improvement and peaked in 2004 followed by a decline trend afterwards.

The gap in revealed comparative advantage between the two regions is wide that ranges from an RCA index value of 0.77 to 1.57. This gap implies that sub-Saharan Africa's competitiveness in the export of food is higher by at least more than one fold times than Middle East & North Africa.

Table3 and Figure2 show the summary of statistical results of RCA values of the two regions (SSA and MENA) in Agricultural Raw Materials export. It is disclosed that the revealed comparative advantage of sub-Saharan Africa is strong in the export of agricultural raw materials in the world. This advantage has been highest and stable at an RCA index value of 2.5 during 2000 to 2006. Then a decline to an RCA index value of 1.5happened in 2008 followed by a rise to 2.45in 2012. In general, sub-Saharan Africa region never had the experience of comparative disadvantage in export of agricultural raw materials in the world during 1995 to 2012.

This sector is considered crucial for structural transformation in Africa as revealed in African Economic Outlook (2013). It is found that the employment in the primary sector serves as a preliminary booster for structural transformation in Africa. This is associated for the fact that it links to higher value added adjacent activities, a pool for employment of low skilled labour, and as generator of demand for new products.

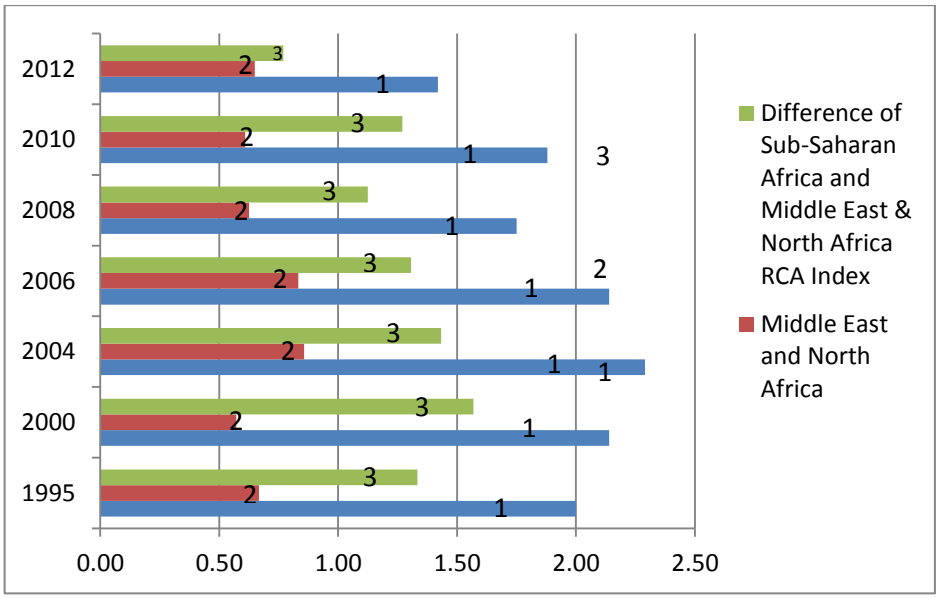
Table 3: Revealed Comparative Advantage of Sub-Saharan Africa and Middle East & North Africa

Year	Food Export		Agricultural Raw Materials Export		Fuels Export		Ores and Metals Export		Manufactures Export	
	Sub-Sah. Africa	Middle East & North Africa	Sub-Sah. Africa	Middle East & North Africa	Sub-Sah. Africa	Middle East & North Africa	Sub-Sah. Africa	Middle East & North Africa	Sub-Sah. Africa	Middle East & North Africa
1995	2.00	0.67	2.33	0.33	5.14	10.43	2.67	1.00	0.37	0.22
2000	2.14	0.57	2.50	0.50	3.70	7.70	2.33	0.67	0.41	0.21
2004	2.29	0.86	2.50	0.50	4.75	8.75	3.33	0.67	0.40	0.26
2006	2.14	0.83	2.50	0.00	3.60	6.91	3.33	0.50	0.44	0.21
2008	1.75	0.63	1.50	0.00	3.00	6.25	4.00	0.50	0.46	0.23
2010	1.88	0.61	2.00	0.00	2.67	5.21	3.60	0.38	0.45	0.23
2012	1.42	0.65	2.45	0.00	2.87	4.48	2.74	0.59	0.38	0.32

Source: Author's computation (2013) based on WDI data, published by World Bank

Notes: Scores greater than unity ($RCA > 1$) reveal a comparative advantage, while scores less than unity ($0 \leq RCA < 1$) reveal a comparative disadvantage.

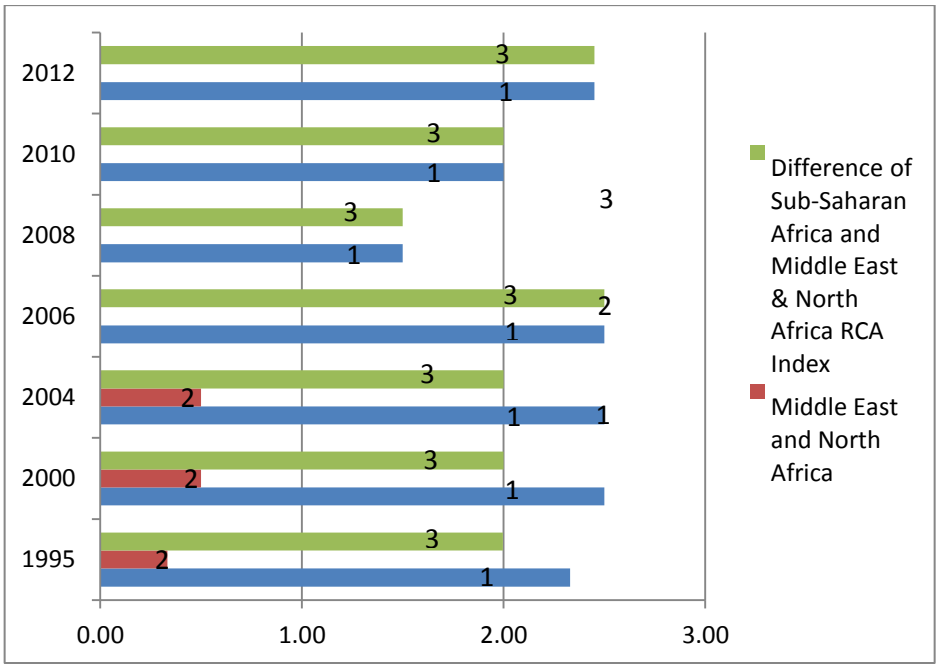
Figure 1: RCA and RDCA of Food Export of Sub-Saharan Africa, and Middle East & North Africa



Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity (*RCA* >1) reveal a comparative advantage, while scores less than unity ($0 \leq RCA < 1$) reveal a comparative disadvantage.

In the case of Middle East & North Africa, had comparative disadvantage in the export of agricultural raw materials throughout the period considered in the study with much lower records in the latter periods, 2006 to 2012.It is disclosed that, the gap in competitiveness between the two regions shows that sub-Saharan Africa has higher competitive position over Middle East & North Africa by about two folds in the export of agricultural raw materials.

Figure 2: RCA and RDCA of Agricultural Raw Materials Export of Sub-Saharan Africa, and Middle East & North Africa

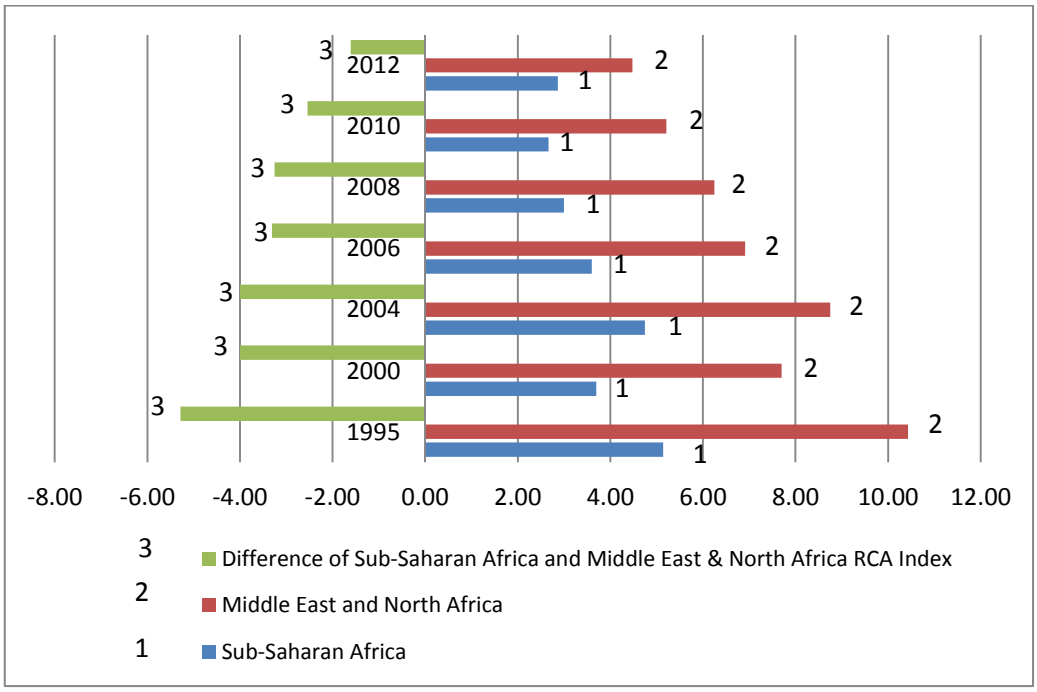


Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity (*RCA* >1) reveal a comparative advantage, while scores less than unity (0 ≤ *RCA* <1) reveal a comparative disadvantage.

The summary of the revealed comparative advantage on *Fuel* export of the two regions, sub-Saharan Africa and Middle East & North Africa, is presented in Table-3 and Figure-3. During the whole period under consideration, it is revealed that both sub-Saharan Africa and Middle East & North Africa have strong revealed comparative advantage in export of fuel in the world (1995 to 2012).The highest revealed comparative advantage has been recorded for each region in 1995with an RCA index value of 5.14 and 10.43 for sub-Saharan Africa and Middle East & North Africa respectively. However, the two regions have exhibited similar declining trend in their respective RCA indices. In comparative terms, even though both regions have very strong revealed comparative advantages, it is higher for Middle East & North Africa. The gap of their competiveness is also characterised by a consistent declining trend that ranges from an RCA index value of 5.29 in 1995 to 1.61 in 2012.

Therefore, despite the shrinking trend of the gap of revealed comparative advantages between the two regions, Middle East & North Africa's competitiveness is stronger than sub-Saharan Africa.

Figure 3: RCA and RDCA of Fuels Export of Sub-Saharan Africa, and Middle East & North Africa



Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity (*RCA* >1) reveal a comparative advantage, while scores less than unity (0 ≤ *RCA* <1) reveal a comparative disadvantage.

It is depicted in Table3 and Figure4 that the revealed comparative advantage of sub-Saharan Africa in export of ores and metals is characterised by a rising trend. The RCA index ranges from 2.33 in 2000 to 4.00 in 2008. It can be concluded that sub-Saharan Africa has higher revealed comparative advantage characterised by a rising pattern. Middle East & North Africa, on the other hand has a consistent revealed comparative disadvantage in almost the whole period, 1995 to 2012.

This can be supported by the evidence that, while 80 percent of Africa's export is resource based raw material and semi-processed good, it is 60

percent in the case of Brazil, 40 percent in India and 14 percent in China. In addition, because of the relative comparative advantage Africa has in natural resources enhanced by its significant land abundance and scarcely populated feature, most of green field foreign direct investment (FDI) inflows of Africa had been applied on resource related activities. Besides, it is disclosed that as compared to other regions, Africa has less diversification in the export of natural resources (African Economic Outlook, 2013).

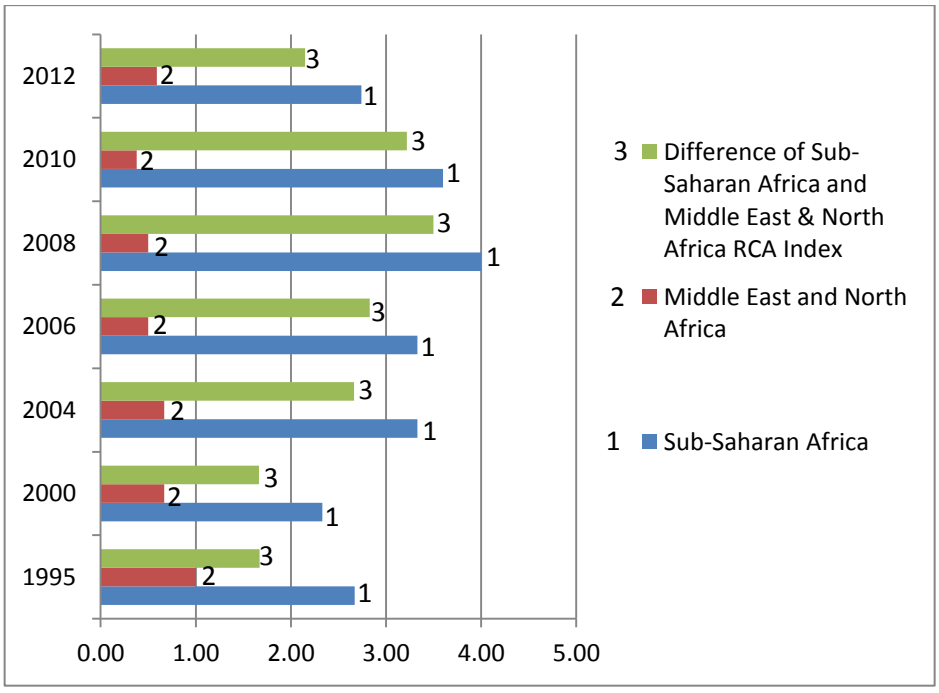
The trend shows that while more of a rising trend is observed for sub-Saharan Africa, a consistent declining trend is observed in the case of Middle East & North Africa. These opposite trends made the gap in the degree of revealed comparative advantage between the two regions to widen overtime. This gap ranges from 1.66 to 3.50RCA index value during 1995 to 2012.

The comparative advantage of Africa on natural resources and its promising future potential for foreign direct investment can be reinforced by the fact that the cost of exploration per square kilometer is 5 US dollar while it is 65 US dollar in Canada (Ncube, 2012 cited in African Economic Outlook, 2013). Furthermore, the mineral asset share of Africa in the world has declined from 10.3 per cent in 1995 to 5.2 per cent in 2005. This implies much has to be done to attract investors to extract the huge latent natural resource remains untapped.

The summary of the statistical result of the revealed comparative advantage of export of manufactured goods in the world for sub-Saharan Africa and Middle East & North Africa is presented in Table3 and Figure5. Even though sub-Saharan Africa assumed a comparative disadvantage in the whole period, 1995 to 2012, it has an improvement trend in its revealed comparative advantage in export of manufactured goods. In fact, the improvement is low that ranges from an RCA value of 0.37 in 1995 to 0.45 in 2010, though a reminiscent decline is exhibited in 2012 to 0.38 index.

One of the barriers that discourages Africa's move towards up stream of the supply chain is the tariff escalation of advanced countries on Africa's export of industrial goods. This practice has the implication that African countries confine themselves to export of primary products (Alves et al. 2009).

Figure 4: RCA and RDCA of Ores and Metals Export of Sub-Saharan Africa and Middle East & North Africa



Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity (*RCA* >1) reveal a comparative advantage, while scores less than unity ($0 \leq RCA < 1$) reveal a comparative disadvantage.

With regard to Middle East & North Africa, similarly, it has revealed comparative disadvantage during the whole period, 1995 to 2012.The study revealed that this region's comparative advantage is lower than sub-Saharan Africa and demonstrated more of declining trend. Due to the rising trend in sub-Saharan Africa and declining trend in Middle East & North Africa made the gaps in between these two regions to widen over time.

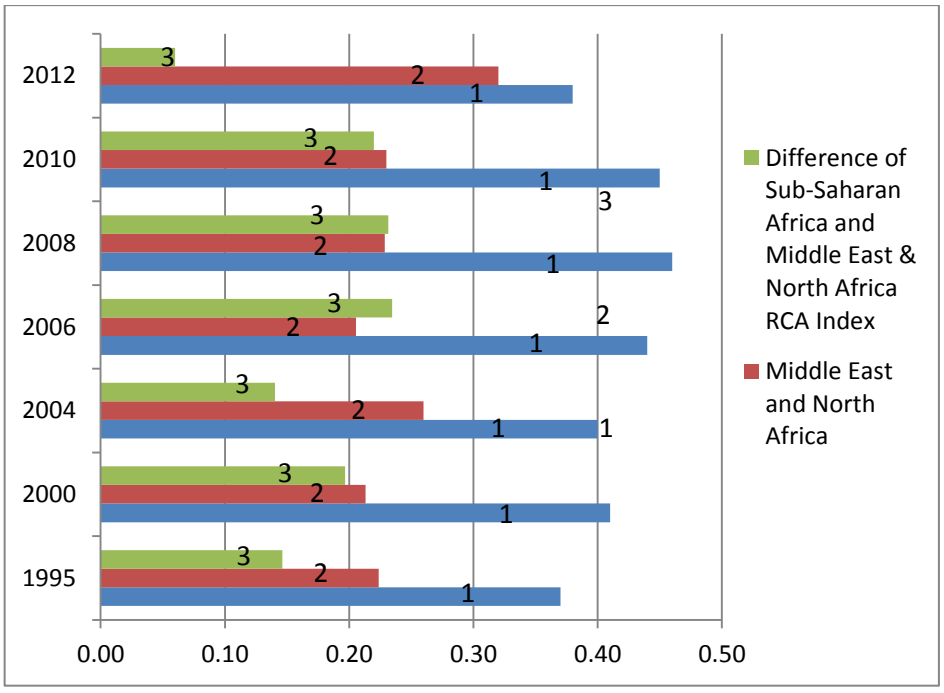
The reality in Africa (including North Africa) is that it is an importer of capital goods, manufactures and services from advanced countries. The flow of FDI to Africa is mainly on extraction of natural resources, which reinforces Africa's dependence on primary commodity exports (Alves et al. 2009).

Wood and Mayer (2001) argued that the existence of land abundance in Africa will continue to play its role being more suitable for primary sector than for the manufacturing as compared to Asia or Europe. This is associated with the fact that Africa's land-to-skill ratio is higher than Asia or Europe. This implies that the lower land-skill ratio is a constraint for Africa's transformation from simple to complex manufacturing sector, which takes time to match that of Asia or Europe. One of the reasons that holds back Africa is not attributed to the large share of the primary sector per se, but the underutilization of the sector. The non-transformation of the agriculture sector and extracting natural resources below the potential are observed factors that make Africa lag behind other regions. However, the recent phenomenon of price boom associated with a rising demand from the emerging markets in the East and South Asia has favourably influenced the growth of the primary sector.

Venables and Collier (2008) underpinned that the political fragmentation of Africa to more than 50 small countries has made African citizens incur cost. This fragmentation deterred Africa from using its comparative advantage on the sectors where economies of scale are important for its competitiveness such as manufacturing and services.

It is added that the creation and development of capacities through entrepreneurial skills help Africa's structural transformation to take off. The development of entrepreneurship in Africa has the merit of combining job creativity and a rise of productivity (African Economic Outlook, 2013).

Figure 5: RCA and RDCA of Manufactures Export of Sub-Saharan Africa and Middle East & North Africa



Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity (*RCA* >1) reveal a comparative advantage, while scores less than unity ($0 \leq RCA < 1$) reveal a comparative disadvantage.

The following definitions are set under four ranges for each RCA or RCA# index values as given below. The specified ranges help to examine the relative magnitude and strength of revealed comparative advantages of the respective regions in the sub-sectors of the merchandise export.

Very High for RCA or RCA#> 2.00,

High for 2.00>RCA or RCA#> 1.00,

Low for 1.00>RCA or RCA#> 0.50, and

Very Low for RCA or RCA#< 0.50.

To enhance convenience the above four ranges are redefined maintaining the meaning of the discretely specified ranges. Thus, the

analysis that follows the Tables will be based on the following definitions.

RCA or RCA# > 2.00, to signify Very High,

RCA or RCA #> 1.00, to signify High,

RCA or RCA# > 0.50, to signify Low, and

RCA or RCA# < 0.50, to signify Very Low

This interval helps to examine and detect the sub-sector's competitive status during the later period (2006-2012) as compared to the regions' competitiveness during the former period (1995-2004). For the sake of analyses, interpretation and consistency of the computed results, the current study discusses at length using RCA indices than both (RCA and RCA#).Thus, the comparative analysis on the changes that took place in competitiveness in the specified export categories of merchandise export of the two regions is consistently discussed. The study has also provided the computed revealed comparative advantage values using Vollrath's method (RCA#) in a separate appendix section. The time period covered in the study are dived in to two scenarios, 1995 to 2005 and 2006 to 2012. To avoid the problem of ups and downs in the values of RCA across each year, computed average values for the two scenarios are used. This helps to compare the changes in RCA during the two periods in the export of merchandise goods. Table 4 and Table 5 present the results of the computed average RCA indices.

As per the rankings of the revealed comparative advantage of sub-products, fuel, and ores & metals exports are the two items for sub-Saharan Africa that their RCA index values are the highest ones. However, it is revealed that export of manufactured goods ranked the least during 1995–2012.Their competitiveness and rank has been maintained at a status of very high with the exception of ores and metals that has shown an improvement and stepped up from second to first rank. On the other hand, fuel export has descended to a second rank that indicates it is out competed by the export of ores and metals in the later periods, 1995–2012. The trend uncovered food export's competitiveness strength deterioration which slide down from a *very high* to a *high.*

In the case of Middle East & North Africa, during 1995–2004, has high revealed comparative advantage in only one sub-product, fuel export.

However, it had low competitiveness ores & metals, and food export; and very low competitiveness in the export of agricultural raw materials, and manufactures. The status of competitiveness of the region can be concluded that it has maintained the competitiveness of fuel. However, its competitiveness changed unfavourably in the later period as depicted by deterioration in ores and metals.

Ghani (2007) pointed out that the total trade volume of OIC countries is small owing to the smallness of their GDPs. It is suggested that to increase OIC countries trade, it demands the improvement of the quality of their institutions and governance systems, and reduce the likelihood of conflict that erupts in their borders.

Lee and Gohar (2010) posits that, despite series of regional agreement and negotiations undertaken in the Arab region, the result tuned out to be for a short term and insignificant. The factors responsible for ineffectiveness of the regional trade integration are lack of complementarities on the goods to be traded; underdevelopment of the region's capital market; wider disparity in the per capita income between the lowest (Sudan at $ 600) and the highest (Kuwait at $12,710); highly protecting trade policy that discriminated prioritised exports from de-prioritised ones; overwhelmingly larger government institutions that inhibit the economic strength and activities of private firms.

It is suggested that to boost Africa's trade integration serious attention should be paid to enhance the capacity of supply side factors. These include expansion of economies of scale and scope, and trade facilitation measures (Alves et al. 2009).

Table 4: Ranking of Average Revealed Comparative Advantage of Sub-Saharan Africa and Middle East & North Africa

Rank	1995-2004		Rank	2006-2012	
	RCA			RCA	
	Sub-Saharan Africa	Middle East & North Africa		Sub-Saharan Africa	Middle East & North Africa
1	C > 2.00	C > 2.00	**1**	D > 2.00	C > 2.00
2	D > 2.00	D > 0.50	**2**	C > 2.00	A > 0.50
3	B > 2.00	A > 0.50	**3**	B > 2.00	D < 0.50
4	A > 2.00	B < 0.50	**4**	A > 1.00	E < 0.50
5	E < 0.50	E < 0.50	**5**	E < 0.50	B = 0.00

Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity ($RCA > 1$) reveal a comparative advantage, while scores less than unity ($0 \leq RCA < 1$) reveal a comparative disadvantage.

A – signifies Food Export of the region,

B – signifies Agricultural Raw Materials Export of the region,

C – signifies Fuels Export of the region,

D – signifies Ores and Metals Export of the region, and

E – signifies Manufactures Export of the region.

Table 5 presents the competitive position, described range of competitiveness defined in above from very low to very high. The study disclosed that sub-Saharan Africa which had four of the five sub-sectors in a very high competitive position has maintained in three of them throughout the time period 1995 to 2012. It is uncovered that the competitiveness of the region in food exports has come down from very high to high status

Middle East & North Africa, with the exception of fuel export, other sub-sectors fall either in the low or very low competitiveness spectrum during the whole period considered in the study, 1995 to 2012. It is revealed that the competitiveness of the region in ores and metals export reduced from low to very low status. In other words, the competitiveness status in the merchandise exports during 1995 to 2005 of Middle East & North Africa that has been maintained in the latter period (2006 to 2012), with the exception of ores and metals.

In general, it can be summarized that the competitiveness position of sub-Saharan Africa is higher than Middle East & North Africa in all merchandise export with the exception of fuel export in the world.

Consistent with the findings of this study Gundogdu (2009) suggested that, apart from its dominance of oil based integration, OIC region should look into other areas in which it can integrate through trade with small OIC countries especially with those countries in the sub-Saharan Africa region. To enhance trade with sub-Saharan Africa, involving in trade financing, developing single window custom clearance, capacity development and trade cooperation endeavours, and on product development that has strategic significance are important activities that demand attention by the region.

Table 5: Intervals of Revealed Comparative Advantage (RCA)

Sub-Saharan Africa	Average Value, 1995-2004				Average Value, 2006-2012			
	Very High	**High**	**Low**	**Very Low**	**Very High**	**High**	**Low**	**Very Low**
A	A					A		
B	B				B			
C	C				C			
D	D				D			
E				E				E
Middle East & North Africa								
A			A				A	
B				B				B
C	C				C			
D			D					D
E				E				E

Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: A – signifies Food Export of the region,

B – signifies Agricultural Raw Materials Export of the region,

C – signifies Fuels Export of the region,

D – signifies Ores and Metals Export of the region, and

E – signifies Manufactures Export of the region.

7. Conclusion

It is revealed that more than 80 percent of the world population lives in the low and middle income, while the minority that accounts to 20 per cent lives in the high income economies. It is shown that in the past two decades, it is disclosed that the population proportion that has been

recorded in 1990 is maintained in 2013 with slight increment (by 0.24 percentage point) in low and middle income economies and slight decline (by the same percentage point) for the high income economies. This further underpins the disparity in the wealth distribution between these two economic regions.

The population proportion of Middle East & North Africa in 1995 accounts to 4.31 per cent, while 9.75 percent for sub-Saharan Africa. This proportion has increased by 0.54per cent and 3.39per cent in 2013 for the Middle East & North Africa and sub-Saharan Africa respectively. The rate of increment by Middle East & North Africa is slightly lower than the increase shown by low and middle income economies that rose by0.24per cent. In contrast, sub-Saharan Africa has increased by 3.39per cent, which is higher than low and middle income economies. The population size of sub-Saharan Africa is larger, which was 2.26 times higher than Middle East & North Africa in 1990, and grew further and become 2.71 times larger in 2013.

It is uncovered that, while the population size of sub-Saharan Africa is 2.43 times larger than Middle East and North Africa in 2005, the trade share of Middle East and North Africa is 1.68 times higher than sub-Saharan Africa. Moreover, after two decades, in 2012, the population size of sub-Saharan Africa has grown and become 2.71 times larger than Middle East & North Africa in 2013, and the trade shares of Middle East & North Africa sub-Saharan Africa have become almost the same. Hence, when economic integration is evaluated in terms of population proportion, the average economic integration of low and middle income countries as a whole and sub-Saharan Africa region in particular are very low. In terms of population proportion, Middle East & North Africa has stronger economic integration in the world as compared to low and middle income countries. Despite the improvement in sub-Saharan Africa's trade share, it faces huge gap that should be narrowed through extensive economic integration to reach to equity in trade share equivalent to its population share in the world.

The study unveiled that in the export of food, while sub-Saharan Africa has revealed comparative advantage, Middle East & North Africa has comparative disadvantage during the whole period considered in this study (1995 to 2012), with similar trend. The gap in revealed

comparative advantage between the two regions is wide that ranges from an RCA index value of0.77 to 1.57.

It is disclosed that the RCA of sub-Saharan Africa in the world is strong in export of agricultural raw materials, and has not ever experienced comparative disadvantage during the whole period.

During the whole period under consideration, it is revealed that both sub-Saharan Africa and Middle East and North Africa have very strong revealed comparative advantage in export of fuel in the world (1995 to 2012). In comparative terms the revealed comparative advantage is higher for Middle East & North Africa. The gap in their competiveness is characterised by consistent declining trend that ranges from an RCA index value of 5.29 in 1995 to1.61 in 2012.

In the export of ores and metals, the study disclosed that sub-Saharan Africa has revealed comparative advantage with RCA indices that range from 2.33 to 4.00 in the later period. In contrast, Middle East & North Africa region has revealed comparative disadvantage in the export of ores and metals in the whole period, 1995 to 2012. The trend shows that while more of rising trend is observed for sub-Saharan Africa, consistent declining trend is observed in the case of Middle East & North Africa. These opposite trends made the gap in degree of revealed comparative advantage between the two regions widen overtime. This gap ranges from 1.66 to 3.50 RCA index value during 1995 to 2012.

Both Middle East & North Africa (MENA) and sub-Saharan Africa regions (SSA) have revealed comparative disadvantage in the export of manufactures. Despite the disadvantage in competitiveness, sub-Saharan Africa has revealed an improvement trend. However, Middle East & North Africa unveiled more of declining trend. Due to the rising and improvement trend in sub-Saharan Africa and declining trend in Middle East & North Africa made the gaps in between these two regions widen over time.

The study disclosed that fuel, and ores and metals export are the two items for sub-Saharan Africa that their RCA index values are the highest ones, while manufactured goods export is the least. The study disclosed that sub-Saharan Africa, which had four of the five sub-sectors in a very

high competitive position, has maintained three of them in a very high status in the latter period (2006 to 2012).

It is uncovered that Middle East & North Africa has high revealed comparative advantage in only one sub-product, fuel export. However, it had low competitiveness in ores & metals and food export; and very low competitiveness in export of manufactures. Moreover, in the later period, 2006 to 2012, the competitiveness of the region in fuel export is maintained. However, the region's competitiveness in ores and metals export reduced in the latter period (2006 to 2012).

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Appendix

Table A: Ranking of Average Revealed Comparative Advantage

Rank	1995-2004		Rank	2006-2012	
	RCA#			RCA#	
	Sub-Saharan Africa	Middle East & North Africa		Sub-Saharan Africa	Middle East & North Africa
1	C > 2.00	C > 2.00	1	C > 2.00	C > 2.00
2	E > 2.00	E > 2.00	2	E > 2.00	E > 2.00
3	A > 2.00	A > 0.50	3	D = 2.00	A > 0.50
4	D > 1.00	D < 0.50	4	A < 2.00	D < 0.50
5	B > 0.50	B < 0.50	5	B > 0.50	B = 0.00

Source: Author's computation (2015) based on WDI data, published by World Bank
Notes: Scores greater than unity (*RCA* >1) reveal a comparative advantage, while scores less than unity ($0 \leq RCA < 1$) reveal a comparative disadvantage.

A – signifies Food Export of the region,

B – signifies Agricultural Raw Materials Export of the region,

C – signifies Fuels Export of the region,

D – signifies Ores and Metals Export of the region, and

E – signifies Manufactures Export of the region.

Table B: Intervals of Revealed Comparative Advantage (RCA#)

Sub-Saharan Africa	**Average Value, 1995-2004**					**Average Value, 2006-2012**		
	Very High	**High**	**Low**	**Very Low**	**Very High**	**High**	**Low**	**Very Low**
A	A					A		
B			B				B	
C	C				C			
D		D			D			
E	E				E			
Middle East & North Africa								
A			A				A	
B				B				B
C	C				C			
D				D				D
E	E				E			

Source: Author's computation (2015) based on WDI data, published by World Bank

Notes: A – signifies Food Export of the region,

B – signifies Agricultural Raw Materials Export of the region,

C – signifies Fuels Export of the region,

D – signifies Ores and Metals Export of the region, and

E – signifies Manufactures Export of the region.

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Foreign Direct Investment, GDP Growth and Trade Liberalization: Evidence from Pioneering ASEAN Members

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This paper revisits the argument on the contentious causality relationship between net FDI inflows and GDP among the pioneering Association of Southeast Asian Nations (ASEAN-5) members using data from 1970 till 2013. Although two-way correlations exist between these two variables in these countries, a careful analysis of these relationships using the fully modified ordinary least squares (FMOLS) regressions and the Vector Error Correction (VEC) model shows that causality exists only with on Thailand but the relationship is negative. The evidence from Thailand shows that GDP growth drives FDI outflows more than attracting FDI inflows. The results of all other members were not significant.

Keywords: Foreign direct investment, GDP, trade, tariff deregulation, ASEAN

JEL Classification: F14, F15, F21, F63

1. Introduction

Governments have aggressively promoted inflows of foreign direct investment (FDI) to stimulate economic growth (UNCTAD, 2014). The extant literature, (which supports a positive role by governments to attract FDI), posits that it will be an important source of scarce capital, technology transfer, demonstration effect and competition (Caves, 1974; Rasiah, 1995). However, some governments have targeted national firms to stimulate economic growth on the grounds that FDI could crowd out national firms by flooding the domestic market with their sales,

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poaching human capital, and other resources, and at the same time cause balance of payment problems through imports of goods and services and repatriation of profits (Amsden, 1991). Despite such arguments, most countries (including the formerly closed communist nations of China (until 1978), Vietnam (until 1986), Cambodia (until 1992) and Laos (until 1992) have already begun promoting FDI (Rasiah and Schmidt, 2009).

While the positive arguments on FDI have convincingly outweighed those of the critics (Rasiah, 1995; Dunning, 2005), the empirical support has remained contested. On the one hand, South Korea and Taiwan, two of the dynamic economies that became developed in one generation drove rapid growth largely through national firms (though, these firms benefited strongly from technology licensing and subcontract linkages with multinationals (Amsden, 1989; Chang, 1995; Wade, 1990). On the other hand, the industrialization thrusts of Singapore and Malaysia have largely been propelled by FDI (Rasiah, 1995; Rodan, 1990; Rasiah and Schmidt, 2009). Because a number of instruments deployed by South Korea and Taiwan are no longer regarded as possible following the introduction of the trade-related intellectual property rights (TRIPS) and trade-related investment measures (TRIMs) agreement of the World Trade Organization that was formed in 1995, governments have targeted FDI as a major source of both scarce capital and embodied technology (UNCTAD, 2014). The pioneering members of the Association of Southeast Asian Nations (ASEAN), i.e. Indonesia, Malaysia, the Philippines, Singapore and Thailand are no different.

An assessment of the determinants of FDI inflows among the ASEAN economies is also useful because all five countries have undergone liberalization. The major watershed in this process is the establishment of the ASEAN Free Trade Area (AFTA) in 1992 (ASEAN, 2015). While the pioneering ASEAN members and Brunei were behind its original formation, the transition economies of Cambodia, Laos, Myanmar and Vietnam became members subsequently. We confine the analysis in this paper to the pioneering members only because of their longer experience with liberalization and FDI inflows than the transition economies.

Therefore, this paper seeks to analyze the determinants of net FDI inflows in the five pioneering ASEAN members using time series and panel data. The subsequent parts of the paper is organized as follows.

Section 2 reviews past work on FDI inflows into the ASEAN economies. Section 3 presents the methodology and data used in the paper. Section 4 analyzes the results while Section 5 presents the conclusions.

2. Significance of FDI Inflows

All the ASEAN-5 countries have reduced tariff rates to a maximum of 5% by 2008. Thus, it is important to examine if the fall in the common effective preferential tariffs (CEPT) and most favoured nation (MFN) tariff rates have had a bearing on GDP growth, FDI and trade. A common development from the AFTA process is the bigger market that has resulted from the AFTA process. While the common market and efforts to coordinate investment and trade flows has emerged among these countries, such collaboration often broke down during moments of crisis. The Asian financial crisis of 1997-98 is one example where economic collaboration declined (Rasiah, 2001). Also, member countries still attempt to compete to attract FDI from abroad. The competition has become stiffer since the emergence of China and India as growth nodes in the regional economy. Furthermore, the high growth rate of inter-ASEAN FDI inflows of the late 1980s and 1990s tapered off following the ASEAN-China and ASEAN-India trade collaboration initiatives. Table 1 indicates a slight drop in the share of FDI in Gross Fixed Capital Formation (GFCF) in 2005 due to competition from other countries. The average growth rates of FDI in ASEAN-5 suffered a negative growth from 2001 to 2004 before showing positive growth again in the year 2005.The Asian Financial Crisis and fierce competition from China and India during the period after AFTA implementation had caused a decrease in FDI inflows.

Table 1: FDI/GFCF, ASEAN-5, 1970-2013 (%)

Year	1970	1975	1980	1985	1990	1995	2000	2005	2010	2013
ASEAN-5	2.41	6.19	5.88	4.37	12.04	12.19	21.46	19.23	16.64	20.79

Source: Author's compilation from UNCTAD and IFS, various years.

Table 2 shows that the ASEAN-5 managed to enjoy positive growth in FDI inflows, GFCF and GDP from 1970 to 1997 due to cheap labor and low production costs. After 1997, FDI inflows and GDP have experienced slower growth rates. While the Asian financial crisis started the slow down the persistence of slow growth can also be attributed to the exhaustion of labour reserves in Malaysia and Thailand, and the emergence of Cambodia, Myanmar, Laos and Vietnaam (CMLV).

Table 2: FDI, GFCF and GDP, Mean Growth Rates, ASEAN-5, 1970- 2013(%)

Five year periods	**FDI**	**GFCF**	**GDP**
1971-1975	25.97	10.13	19.36
1976-1980	17.42	8.62	14.04
1981-1985	-8.39	5.95	0.98
1986-1990	33.95	7.30	11.33
1991-1995	14.15	6.46	10.61
1996-2000	-0.88	6.19	-5.63
2001-2005	10.97	11.53	9.04
2006-2010	30.29	33.23	25.72
2011-2013	18.57	22.01	14.90
Ten Year			
1971-1980	20.37	12.46	18.81
1981-1990	13.20	14.31	4.87
1991-2000	7.11	13.50	3.32
2001-2013	23.67	16.81	5.73

Source: Authors' compilation from UNCTAD, World Bank and IFS, various years.

While FDI inflows into the ASEAN-5 have fallen following the Asian financial economic crisis and structural change, it is important to analyze the endogenous effect of FDI on economic growth. Does increased liberalization bring about endogenous growth effects among the ASEAN-5?

Net FDI to the ASEAN-5 increased rapidly before AFTA implementation over the period 1961 to 1990. These economies benefited from the effective of China, the CLMV economies and India to FDI until the 1990s. Data in the period 1961-1990 show that among the ASEAN countries, the largest private FDI inflows went to Singapore, (42.7%) followed by Malaysia (27.6%), Thailand (13.7%), Indonesia (10.5%) and the Philippines (5.5

%) (Table 3). Except for Indonesia, which faced a political fallout in 1998-2001, net FDI inflows remained positive in the remaining ASEAN-5 over the period 1990-2013. These figures rose even more sharply since the 1990s with Singapore, Thailand and Malaysia recording the highest net inflows with the sharpest growth in 2013. The volume of FDI inflows in ASEAN in the 1980s was 4.3 times that of the 1970s. Among the individual countries, the growth has been the fastest in Thailand (7.9 times), followed by Singapore, Philippines, Malaysia, and Indonesia (2.0 times).

Table 3: Net FDI Inflows, ASEAN-5, 1961-2013 ($Millions)

Year	Indonesia	Malaysia	Phililippines	Singapore	Thailand	ASEAN-5
1961-80	2,163	4,453	452	3,728	1,186	11,982
1981	133	1,265	172	1,675	288	3,533
1982	225	1,397	16	1,298	189	3,125
1983	292	1,261	105	1,085	348	3,091
1984	222	797	9	1,210	400	2,638
1985	310	695	12	809	162	1,988
1986	258	489	127	1,533	261	2,668
1987	385	423	307	2,696	182	3,993
1988	576	719	936	2,710	1,082	6,023
1989	682	1,846	563	3,963	1,727	8,781
1990	961	2,958	530	4,489	2,236	11,177
1991	1,482	3,998	544	4,887	2,013	12,924
1992	1,777	5,183	228	2,204	2,113	11,505
1993	2,004	5,005	1,238	4,686	1,804	14,737
1994	2,109	4,341	1,591	8,550	1,366	17,957
1995	4,346	4,178	1,478	11,535	2,067	23,601
1996	6,194	5,078	1,517	9,682	2,335	24,806
1997	4,677	5,136	1,222	13,752	3,894	28,681
1998	-240	2,163	2,287	7,313	7,314	18,837
1999	-1,865	3,895	1,247	16,577	6,102	25,956
2000	-4,550	3,787	2,240	16,484	3,365	21,326
2001	-2,977	553	195	15,086	5,067	17,924
2002	145	3,203	1,542	6,401	3,341	14,632
2003	-596	2,473	491	11,941	5,232	19,541
2004	1,896	4,624	688	21,026	5,860	34,094
2005	8,336	3,924	1,664	18,090	8,055	40,069
2006	4,914	7,690	2,707	36,923	9,454	61,688
2007	6,928	9,071	2,918	47,733	11,326	77,976
2008	9,318	7,572	1,340	12,200	8,538	38,968
2009	4,877	114	2,064	23,821	4,853	35,729
2010	15,529	10,885	1,070	55,075	9,103	91,662
2011	20,564	15,119	2,007	48,001	2,468	88,159
2012	21,200	9,733	3,215	56,659	12,894	103,701
2013	23,281	11,582	3,737	64,793	14,305	117,698

Source: International Monetary Fund, International Financial Statistics Yearbook 1991 (Washington, D.C., 1991), World Bank (2013).

Although net FDI inflows to Indonesia recorded an absolute contraction in 1998-2001, it is obvious that FDI inflows to the ASEAN-5 over the period 1961-2013 has been impressive. Besides, all five countries show strong conviction to attract FDI (ASEAN, 2015). Hence, using these countries as a laboratory, we examine we examine causality relationships between FDI and GDP growth.

3. Causality Relationship between GDP and FDI

In this section we review past research examining causality issues between GDP and FDI in general, with a focus on the pioneering ASEAN-5 members. In so doing, we also review the robustness of the data used, models deployed and length of the empirical series.

The intensity of FDI in an economy is normally measured by the ratio of FDI inflows over the Gross Fixed Capital Formation (GFCF). FDI inflows are considered to be a major stimulant of economic growth, and hence, it will be useful to examine if the AFTA process has stimulated greater FDI inflows into the ASEAN-5. Borensztein et al. (1998) examined the relationship between FDI and economic growth in 69 developing countries over the period spanning from1970 to 1989. They found that FDI has a positive impact on economic growth, but that the nexus is partly dependent on the availability of human capital in the host country. Li and Liu (2005) found similar results from a sample of 84 countries over the period 1970-1999. Obwona (2001),as well as Bengoa and Sanchez-Robles (2003) suggested that, for FDI to have a positive impact on economic growth, the host country must have macroeconomic and political stability, policy credibility, and an increase in the openness of their economy. Coe (1997) found a positive association between FDI and economic growth, but suggested that the host country should have attained a sufficient level of development to help it to reap the benefits of higher productivity.

Alfaro (2003) found that FDI inflows into three different sectors of the economy (primary, manufacturing and services) exert different effects on economic growth. He found that FDI inflows into the manufacturing sector give a positive effect on economic growth. A one percent increase in FDI in the manufacturing sector leads to a 1.7% increase in manufacturing GDP growth.

From purely the standpoint of capital scarcity, the importance of FDI should be higher in the developing countries rather than the developed countries because of their inability to generate internal savings to finance development (Brecher and Bhagwati, 1981). There is evidence to suggest that FDI is one of the most effective ways by which developing economies can integrate with the rest of the world as it provides not only capital, but also technology and management know-how necessary for restructuring the firms in the host countries (Rasiah, 1995; Pradhan, 2006). Also, FDI usually helps to achieve developmental goals by solving the savings-investment gap (Vadlamannati et al., 2009). Indeed, empirical data from Rasiah (2010) shows that Southeast Asia's economic growth has been strongly driven by FDI. Wang (2009) found it his assessment of the nexus between FDI and economic growth in a sample of 12 Asian countries over the period 1987-1997 that FDI in the manufacturing sector had a significant positive impact on economic growth. Meanwhile, Choe (2003) found bi-directional causality between FDI and growth for a sample of 80 countries over the period 1971-1995, but suggested that the effect is more apparent from economic growth to FDI. Chowdhury and Marvrotas (2005) examined the causal association between FDI and growth from Chile, Malaysia and Thailand. They find unidirectional causality from economic growth to FDI in Chile and a two-way causation between the two in Malaysia and Thailand.

However, Zhang (2007) tested the FDI economic nexus using countries in East Asia and Latin America but found that FDI caused GDP growth in some countries while it was the other way around in some countries. Furthermore, Carkovic and Levine (2002) analyzed the relationship between FDI and economic growth in a sample of 72 countries and found that FDI does not exert any independent influence on economic growth in either developed or developing countries. Also, Duasa (2007) found no causal relationship between FDI and economic growth in Malaysia, but suggested that FDI does contribute to stability of growth. These findings show that the nexus between FDI and economic growth is far from straightforward (Vu and Noy, 2009). It differs from country to country and even within countries over different time periods.

The two-way link between FDI and economic growth stems from the fact that higher FDI inflows stimulate economic growth in the host country. Consequentially, higher economic growth in the host countries attracts more FDI. The empirical evidence on the relationship between

FDI and economic growth, however, provides very contradictory results. Karimi and Yusop (2009) found co-integration between FDI and economic growth in Singapore and Thailand, both at the individual level, and in a panel of five ASEAN countries. The results confirm that FDI and economic growth share a long run relationship in the ASEAN countries, which indicates that there is possibility of a causal relationship occurring between FDI and economic growth. Moreover, the existence of no co-integration between the two variables in Indonesia, Malaysia and the Philippines does not mean the absence of a causal relationship or any relationship in the short run. Among countries whose economic growth and FDI inflows do not move together in the long run (i.e. co-integration), they may affect each other in the short run. Therefore, we can develop the null hypothesis that economic growth is a function to FDI inflows. Additionally, an assumption can be made that economic growth has a positive relationship with FDI.

Most published works examine the relationship, either between the GDP and exports, GDP and FDI, or exports and FDI. Despite their interrelationships (Bhagwati and Srinivasan 1975; Krueger, 1980) relatively few published empirical work deal with causal relations between the three variables simultaneously among a group of countries, while even fewer works have used panel data VAR causality analysis techniques.

Several papers on individual country studies have examined the Granger causality direction of GDP, FDI and trade. For example, Liu, Burridge and Sinclair (2002) found bidirectional causality between each pair of real GDP, real exports and real FDI for China using seasonally adjusted quarterly data from 1981 to 1997. Kohpaiboon (2003) found that, in export promotion (EP) regime, there is unidirectional causality from FDI to GDP for Thailand using annual data from 1970 to 1999. Alici and Ucal (2003) found only unidirectional causality from exports to output for Turkey using seasonally unadjusted quarterly data from 1987.1 to 2002.4. The empirical literature is summarized by Lewer and Van den Berg (2003),in which the results are remarkably consistent, not only in terms of a positive association between the openness of economies and higher economic growth but also about the magnitude of the effect.

Dritsaki (2004) found bidirectional causality between real GDP and real exports, unidirectional causality running from FDI to real exports, and

FDI to real GDP for Greece, using annual International Monetary Fund (IMF) data from 1960 to 2002. In addition, Ahmad, et al., (2004) found unidirectional causality from exports to GDP and FDI to GDP for Pakistan using annual data from 1972 to 2001. Cuadros, Orts, and Alguacil (2004) found unidirectional causality running from real FDI and real exports to real GDP in Mexico and Argentina, and unidirectional causality running from real GDP to real exports for Brazil using seasonally adjusted quarterly data for the three countries between the late 1970s to 2000. Chowdhury and Mavrotas (2006) found unidirectional causality running from GDP to FDI for Chile and bidirectional causality running between GDP and FDI for Malaysia and Thailand using data from 1969 to 2000.

Makki and Somwaru (2004) found a positive impact of exports and FDI on GDP using data from 66 developing countries averaged over a ten year period of 1971-1980, 1981-1990 and 1991-2000 by introducing an instrumental variable. Wang, Liu, and Wei (2004) used panel data analysis on 79 countries from 1970-1998 and found that FDI was relatively more beneficial to high-income countries, while international trade was more important to low-income countries. However, they did not address the stationarity of the variables to avoid spurious conclusions and did not apply the panel data causality analysis. Also, as Basu, Chakraborty, and Reagle (2003) had pointed out, the above two works only looked at one-way determinants of FDI through regression analyses, rather than at two-way causal linkages between GDP, exports, and FDI, and hence, are not strictly robust.

Nair-Reichert and Weinhold (2000) found that the Holtz-Eakin causality tests show FDI, and not exports, causes GDP using data from 24 developing countries between 1971 and 1995 and applying mixed fixed and random (MFR) effects models. Hansen and Rand (2006), using data for 31 countries from 1970-2000 and the neoclassical growth model, found a strong bidirectional causality relationship between FDI ratio (FDI/GDP) and GDP. However, they did not take into account exports. Moreover, this paper covered too many countries with different stages of development, and thus, the results may have been affected by the problem of missing variables and endogeneity. Hsiao and Hsiao (2006) examined the Granger causality relationship between GDP, exports, and FDI among eight rapidly developing East and Southeast Asian economies (four newly industrialized economies, three ASEAN

economies, and China) using panel data from 1986 to 2004. They did not find systematic causal relationships among the three variables of GDP, exports and FDI at the individual country level.

Meanwhile, the panel data causality test results of Hsiao and Hsiao (2006) revealed that FDI has unidirectional effects on GDP directly and indirectly through exports, and there also existed bidirectional causality between exports and GDP among the ASEAN countries. In doing so, he found panel data analysis to be superior to time series analysis. Using this method Cho (2005) and Hsiao (2006), applied the panel data causality analysis on nine countries and found only a strong unidirectional causality running from FDI to exports among the three variables. In Cho's model, however, GDP growth is examined using the Malmquist productivity index. However, statistical data released by the IMF in 2009 indicated that the entire group of the pioneer ASEAN members enjoyed significant GDP growth rates (see Table 2.1).

It light of a lack of consensus from past evidence, it will be interesting to analyze again the relationship between economic growth, AFTA-based tariff deregulation and FDI inflows in the ASEAN-5 where there is a long enough data series to deploy the Vector Error Correction Model (VECM) model proposed by Engle and Granger (1987).

4. Methodology and Data

To investigate the causal relationship between FDI and its determinants in the ASEAN-5, we consider the following multivariate model:

$$fdi_t = (gdp_t, exp_t, imp_t, tn\text{-}t_t) \quad (1)$$

Where *fdi, gdp, exp,imp and tn-t* refers to net foreign direct investment, growth, exports, import (variables are in real terms), and *tn-t* is the tariff rate. However, for the empirical examination, all variables are transformed into a log-linear form. As argued by Engle and Granger (1987) and Granger (1988), the vector error correction (VEC) model is the best econometric model available to analyse causality issues between a dependent variable, and one or more independent variables. However, it is most appropriate when there is panel data. Hence, we deploy this model to evaluate the impact of tariff deregulation and net FDI inflows on GDP.

The study deployed annual time series data for the ASEAN-5, namely, Malaysia, Indonesia, Thailand, Philippines, and Singapore over the period 1970 to 2013 (44-year observations). Data was collected from the United Nations Conference on Trade and Development (UNCTAD), World Development Indicators, World Bank and ASEAN secretariat data base. Data on *fdi, gdp, exp, imp* are measured in constant 2005 US dollars using GDP deflators, while the data for *tn-t* from 1970- 1992 i.e. the period prior to the introduction of AFTA takes the value of zero as this is the period before AFTA was formed, while data from 1993 to 2013 on mean tariff rates are compiled from the ASEAN secretariat data base.

5. Results and Discussion

Prior to testing Granger causality, time series properties of the variables have to be examined to ascertain the order of integration. We conducted the stationarity test base on country-by- country case and followed by panel data test. This can let all the parameters to vary across countries, at the same time maintaining the assumption of common structure (Hansen and Rand, 2006). There are several methods for unit root tests. For this study, we deployed the Augmented Dickey Fuller (ADF) unit root test (Dickey and Fuller, 1981) for the individual countries, and for the panel data (Levin, Lin and Chu, 2002; Maddala and Wu, 1999; Choi, 2001; Breitung, 2000; Hadri, 2000; Im, Pesaran and Shin, 2003) The results of the ADF tests for the individual countries are presented in Table 4. As can be observed all the five variables are non-stationary in the level, i.e. $I(0)$. The data series become stationary after the first difference, i.e. $I(1)$. Moreover, Table 5 presents the panel unit root test of the six different types of statistics confirming the rejection of the null hypothesis of non stationarity in the series at the 1% and 5% significance level.

Having examined the orders of integration and found that all the series follows $I(1)$ process, the next step is to find out whether or not the variables under consideration have a long run equilibrium relationship. For this, we deployed the Johansen and Juselius (1990) test for the individual countries, and the Pedroni (1999) cointegration test for the panel data, which permit cross sectional interdependency of distinct individual effects (Lee et al., 2008). Table 6 presents the results of the individual country cointegration tests. As indicated from the Johansen cointegration test results, the null hypothesis of no long run relationship

is rejected for all the five countries at the 5% and 10% significance levels. The cointegration relationship for Malaysia and Indonesia appear weak when compared to Thailand, Philippines and Singapore. The results of the Pedroni (1999) heterogeneous panel data cointegration test provides strong evidence of a long run equilibrium relationship between the variables at the 1%, 5% and 10% significance level (Table 7). Thus, the rejection of the null hypothesis of no long run equilibrium relationship among the variables in Tables 3 and 4 implies the co-movement of the variables over time.

Table 8 presents the long run elasticities of each of the five countries and the ASEAN-5 as a whole using the Fully Modified Ordinary Least Squares (FMOLS) method proposed by Phillip and Hansen (1990) and the Pedroni (2000) for the heterogeneous cointegrated panel. The relationship between *gdp* and *fdi* of Malaysia, the Philippines and Singapore is positive and statistically significant. Whereas the same relationship was negative and significant for Thailand, while not significant for Indonesia. The panel regressions for the ASEAN-5 as a whole was significant, but negative at the 10% level.

The relationship between *exp* and *fdi* is positive for the Philippines and Singapore. However, this relationship was not significant for Malaysia, Indonesia and Thailand, and the ASEAN-5 as a whole. The relationship between *imp* and *fdi* was positive and statistically significant for Malaysia, Indonesia and Thailand, and ASEAN-5 as a whole but was not significant for the Philippines and Singapore.

The coefficient of *tn-t* is positive and statistically significant in Malaysia, the Indonesia, Philippines, and Thailand, and ASEAN-5 as a whole. It was not significant for Singapore. This implies that increased *tn-t* would lead to an increase in *fdi*, which suggests the importance of domestic markets. This is possible in a number of large industries among the ASEAN-5 as domestic markets was the initial attraction for the relocation of automobile assemblers in Indonesia, Malaysia, the Philippines and Thailand. Consequently, these results pave the way for the estimation of causal relationship among the variables, which is undertaken in the next section.

Accordingly, confirmation of cointegrating relations does not mean causality among the variables. Thus, we conducted Granger-causality

test based on a VECM framework with one lag period as proposed by Engle and Granger (1987) to investigate the causal relationship between foreign direct investment (*fdi*), economic growth (*gdp*), exports (*exp*), imports (*imp*) and tariff (*tn-t*) among the ASEAN-5. According to Granger (1988) a significant value of *t*-statistics of the error correction term signify long run causality, while the significance of the *F*-value of the coefficients in the short run shows the direction of causality. Table 9 presents the estimated results of the Granger causality test for the individual countries.

Unidirectional causality was observed from the results running from Δ*gdp* to Δ*fdi* (*p*-value=0.0288) in the case of Thailand.In view of this, we conclude that our results support the hypothesis that Δ*gdp* Granger-cause Δ*fdi* inflow in Thailand, i.e. increase in *gdp* causes an increase in *fdi* inflow. However, no causality either short run or long run was observed with Indonesia, Malaysia, Singapore and Thailand. Hence, causality only exists between Δ*gdp* and Δ*fdi* running from the former to the latter. Taking the negative sign of the coefficient from Table 5, we can then say *gdp* growth leads to a fall in net FDI. This evidence is supported by the higher pace of growth of FDI outflows over FDI inflows since 2000 suggesting that Thailand's GDP has reached a high level to generate strong FDI outflows from the country. Indeed, FDI inflows to and outflows from Thailand reached USD10.7 billion and USD12.9 billion respectively in 2012 compared to USD8.5 and USD4.1 billion respectively in 2008 (UNCTAD, 2014: 206).

Conversely, Table 10 presents the panel causality test whereby a long run causality is observed, which indicate a rejection of one period lagged error correction term (ect_{t-1}) in the Δ*fdi* equation. The significance of the ect_{t-1} implies that the shock introduced by the system converging to the long run equilibrium is moving at a moderate speed of 38% (-0.376) in the Δ*fdi* equation. Apart from this, causality does not hold in the rest of the results.

Table 7 presents the *F*-test results of the panel data VECM Granger causality test for the ASEAN-5 for both short run and long run. Starting with the short run, we can observe that no short run causality exists between the variables in both *fdi*, *gdp*, *exp*, *imp* and *tn-t* equations, which means that all the *p*-values corresponding to the short run coefficients are insignificant. Therefore, we conclude that causality does

not exist in the ASEAN-5 panel data. Since all the countries have in place generous incentives to attract FDI, the lack of causality could be a consequence of a sluggish macroeconomic environment faced by these economies. Turning to the long-run causal relationship, the *t*-values corresponding to *fdi* and *tn-t* equation are negative and significant at the 5% and 1% levels. This supports the long run causality relationship between *fdi*, *tn-t* and the variables for the ASEAN-5 panel as a whole. The long run causality also affirmed that variables are cointegrated in the long run. However, no long run causality is detected in the *gdp, exp* and *imp* equations.

Table 4: ADF Unit Root Test, ASEAN-5

Variable	**Malaysia**		**Indonesia**		**Thailand**		**Philiphines**		**Singapore**	
***I*(*d*)**	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**	***I*(0)**	***I*(1)**
fdi	-1.715	-6.527***	-1.737	-5.084***	-1.323	-4.219**	-2.202	-3.645**	-1.576-	-6.543***	*I*(1)
gdp	-1.687	-6.599***	-1.691	-6.540***	-1.685	-6.593***	-1.704	-6.582***	-1.650	-6.594***	*I*(1)
exp	-1.772	-6.405***	-1.673	-6.652***	-1.720	-6.411***	-1.689	-6.718***	-1.616	-6.561***	*I*(1)
imp	-1.766	-6.363***	-1.659	-6.601***	-1.645	-6.506***	-1.738	-6.348***	-1.684	-6.656***	*I*(1)
tn-t	-2.189	-6.474***	-2.189	-6.474***	-2.189	-6.474***	-2.189	-6.474***	-2.189	-6.474***	*I*(1)

Notes: *** and ** Indicates 1% and 5% significance level. All variables are in logarithmic form.
Source: Computed by authors

Table 5: Panel Unit Root Test, ASEAN-5

Variable	LLC	B	IPS	ADF-Fisher	PP-Fisher	HADRI
At level, I(0)						
fdi	-0.581(0.280)	-0.335(0.368)	-0.092(0.463)	8.352(0.594)	2.689(0.987)	6.008(0.000)***
gdp	0.369(0.644)	-0.665(0.252)	1.361(0.913)	2.994(0.981)	3.044(0.980)	5.780(0.000)***
exp	0.361(0.641)	-0.505(0.306)	1.322(0.906)	3.073(0.979)	2.914(0.983)	5.795(0.000)***
imp	0.362(0.641)	-0.574(0.282)	1.309(0.904)	3.099(0.979)	2.901(0.983)	5.795(0.000)***
tn-t	1.009(0.843)	-3.552(0.863)	-0.042(0.483)	7.271(0.699)	8.560(0.574)	5.799(0.000)***
At first difference, I(1)						
fdi	-9.642(0.000)***	-7.725(0.000)***	-7.971(0.000)***	75.079(0.000)***	122.976(0.000)***	-0.240(0.595)
gdp	-15.405(0.000)***	-13.730(0.000)***	-12.221(0.000)***	115.463(0.000)***	117.071(0.000)***	-0.593(0.723)
exp	-15.131(0.000)***	-13.551(0.000)***	-12.131(0.000)***	114.447(0.000)***	116.163(0.000)***	-0.679(0.751)
imp	-15.168(0.000)***	-13.476(0.000)***	-11.981(0.000)***	112.700(0.000)***	113.936(0.000)***	-0.672(0.749)

Notes: *** Indicate significance at the 1% level. *P*-values are in parenthesis. LLC, B, IPS denotes Levin, Lin and Chu (2002), Breitung (2000) and Im, Pesaran and Shin (2003). ADF Fisher chi-square and PP Fisher chi-square indicate Maddala and Wu (1999) respectively.
Source: Computed by authors

Table 6: Johansen Cointegration Test, ASEAN-5

Hypothesis	**Malaysia Trace statistics**	**Indonesia Trace statistics**	**Thailand Trace statistics**	**Philipines Trace statistics**	**Singapore Trace statistics**
=0	88.462*(87.31)	106.278**(87.31)	104.529**(87.31)	101.080**(87.31)	96.877**(87.31)
r≤1	50.608 (62.99)	66.032* (62.99)	55.032 (62.99)	48.173 (62.99)	50.104 (62.99)
r≤2	27.568 (42.44)	33.611 (42.44)	34.113 (42.44)	23.729 (42.44)	21.868 (42.44)
r≤3	11.017 (25.32)	13.169 (25.32)	16.581 (25.32)	10.598 (25.32)	10.486 (25.32)
r≤4	4.657 (12.25)	6.201 (12.25)	7.536 (12.25)	4.596 (12.25)	4.121 (12.25)
	Max-eigen value statistics	Max-eigen value statistics	Max-eigen value statistics	Max-eigen value statistics	Max-eigen value statistics
r=0	37.854*(37.52)	40.245*(37.52)	49.496**(37.52)	52.907**(37.52)	46.773**(37.52)
r≤1	23.040 (31.46)	32.420* (31.46)	20.918 (31.46)	24.444 (31.46)	28.235 (31.46)
r≤2	16.550 (25.54)	20.441 (25.54)	17.532 (25.54)	13.130 (25.54)	11.382 (25.54)
r≤3	6.360 (18.96)	6.968 (18.96)	9.044 (18.96)	6.002 (18.96)	6.365 (18.96)
r≤4	4.657 (12.25)	6.201 (12.25)	7.536 (12.25)	4.596 (12.25)	4.121 (12.25)

Note: ** and * indicate significance at 1% and 5% levels. *r* indicates the number of cointegrating vectors. The critical values [*C(5%)*] for the cointegration test are in parenthesis.
Source: Computed by authors

Table 7: Pedroni Heterogeneous Panel Data Cointegration Test, ASEAN-5

Test statistics	**Statistics**	***P*-value**
Within dimension		
Panel *v*	1.458*	0.072
Panel *ρ*	-3.503***	0.000
Panel PP	-6.651***	0.000
Between dimension		
Panel ADF	0.000	0.000
Group *ρ*	-1.635**	0.051
Group PP	-6.905***	0.000
Group ADF	-6.598***	0.000

Notes: ***, ** and * indicate rejection of null hypothesis of no cointegration at the 1%, 5% and 10% significance levels.
Source: Computed by authors

Table 8: FMOLS results, ASEAN-5**,** *Dependent variable: fdi*

Countries	**Estimated**		**Coefficients**	
	gdp	*exp*	*imp*	*tn-t*
Malaysia	0.636(2.406)**	-0.132(-0.334)	0.447(2.156)**	0.023(0.00)***
Indonesia	0.054(0.827)	-0.782(0.321)	1.698(0.080)*	0.019(2.300)**
Thailand	-2.134(-2.398)**	0.582(0.646)	2.490(2.129)**	0.034(1.755)*
Philippines	0.401(2.860)***	1.103(3.303)***	0.299(0.641)	0.040(3.206)***
Singapore	0.375(2.860)***	0.606(6.477)***	0.082(0.628)	0.000(0.291)
Panel	-0.520(-1.838)*	0.433(1.298)	1.066(2.979)***	0.027(3.422)***

Notes: ***, ** and * indicate significance at 1%, 5% and 10% levels. Figures in parentheses refer to t- statistics .
Source: Computed by authors

Table 9: Individual Country VECM Granger Causality Test

Country	**Short run**		**Long run**		**(*p*- value)**	**(*t*-value)**
Variables	**Δ*fdi***	**Δ*gdp***	**Δ*exp***	**Δ*imp***	**Δ*tn-t***	**ect_{t-1}**
Malaysia, VECM (3)						
Δ*fdi*	-	0.086	0.021	0.031	0.003	-0.192
		(0.768)	(0.882)	(0.858)	(0.950)	(-0.366)
Δ*gdp*	0.004	-	0.012	0.0197	0.008	-0.099
	(0.947)		(0.909)	(0.888)	(0.928)	(-0.178)
Δ*exp*	0.008	0.015	-	0.003	0.014	-0.177
	(0.928)	(0.901)		(0.953)	(0.902)	(-0.321)
Δ*imp*	0.006	0.018	0.011	-	0.010	-0.132
	(0.933)	(0.890)	(0.919)		(0.919)	(-0.246)
Δ*tn-t*	0.916	0.232	0.010	0.216	-	0.675
	(0.657)	(0.629)	(0.919)	(0.641)		(0.560)
Indonesia, VECM (3)						
Δ*fdi*	-	0.350	0.091	0.062	0.023	-0.242
		(0.839)	(0.955)	(0.969)	(0.998)	(-0.398)
Δ*gdp*	0.004	-	0.005	0.003	0.019	-0.101
	(0.997)		(0.997)	(0.998)	(0.990)	(-0.158)
Δ*exp*	0.050	0.137	-	0.087	0.010	0.080
	(0.975)	(0.933)		(0.957)	(0.994)	(0.127)
Δ*imp*	0.042	0.079	0.023	-	0.009	0.023
	(0.979)	(0.961)	(0.988)		(0.995)	(0.038)
Δ*tn-t*	3.494	0.209	2.285	1.549	-	3.782
	(0.174)	(0.900)	(0.319)	(0.460)		(3.265)
Thailand, VECM (1)						
Δ*fdi*	-	7.096	0.996	1.754	0.314	-3.132
		(0.028)**	(0.607)	(0.41)	(0854)	(-1.107)
Δ*gdp*	0.017	-	0.006	0.008	0.011	-0.044
	(0.991)		(0.996)	(0.995)	(0.994)	(-0.039)
Δ*exp*	0.068	0.063	-	0.072	0.061	0.161
	(0.966)	(0.968)		(0.964)	(0.969)	(0.141)
Δ*imp*	0.068	0.083	0.027	-	0.040	0.055
	(0.966)	(0.959)	(0.986)		(0.980)	(0.050)
Δ*tn-*	1.385	1.553	4.302	0.785	-	7.772
	(0.501)	(0.459)	(0.116)	(0.675)		(3.711)
Philippines, VECM (1)						
Δ*fdi*	-	0.578	0.152	1.090	0.118	-0.008
		(0.749)	(0.926)	(0.579)	(0.942)	(-0.186)
Δ*gdp*	0.004	-	0.103	0.104	0.013	-6.36E-0
	(0.997)		(0.949)	(0.949)	(0.993)	(-0.001)
Δ*exp*	0.018	0.217	-	0.154	0.014	-0.001
	(0.990)	(0.896)		(0.925)	(0.992)	(-0.140)
Δ*imp*	0.004	0.163	0.157	-	0.042	0.001
	(0.997)	(0.921)	(0.924)		(0.978)	(0.223)
Δ*tn-*	0.157	2.527	3.044	1.888		-0.006
	(0.924)	(0.283)	(0.218)	(0.389)	-	(-0.730)
Singapore, VECM (1)						
Δ*fdi*	-	0.052	0.029	0.280	0.013	-1.081
		(0.974)	(0.985)	(0.869)	(0.993)	(-0.378)
Δ*gdp*	0.003	-	0.050	0.015	0.027	-0.327
	(0.998)		(0.974)	(0.992)	(0.986)	(-0.117)
Δ*exp*	0.005	0.033	-	0.062	0.092	-0.581
	(0.997)	(0.983)		(0.969)	(0.954)	(-0.212)
Δ*imp*	0.029	0.011	0.029	-	0.054	-0.625
	(0.985)	(0.994)	(0.985)		(0.973)	(-0.219)
Δ*tn-*	0.982	0.902	0.204	0.610	-	-2.120
	(0.611)	(0.637)	(0.902)	(0.736)		(-0.345)

Note: Figures in parenthesis for short-run coefficients are p-values, and long run coefficients are t-statistics; ** refer to 5% significance level Source: Computed by authors

Table 10: Panel Data VECM Granger Causality Tests

ASEAN-5			**Short run (*p*- value)**			**Long run (*t*-value)**
Variables	**Δ*fdi***	**Δ*gdp***	**Δ*exp***	**Δ*imp***	**Δ*tn-t***	**ect_{t-1}**
Δ*fdi*	-	0.3422	1.015	0.695	0.429	-0.376**
		(0.8427)	(0.602)	(0.706)	(0.806)	(-2.171)
Δ*gdp*	0.013	-	0.057	0.032	0.059	0.010
	(0.993)		(0.971)	(0.983)	(0.970)	(0.055)
Δ*exp*	0.030	0.231	-	0.026	0.236	-0.020
	(0.984)	(0.890)		(0.986)	(0.888)	(-0.109)
Δ*imp*	0.086	0.224	0.022	-	0.072	0.050
	(0.957)	(0.894)	(0.988)		(0.964)	(0.270)
Δ*tn-t*	3.538	2.538	0.274	2.755	-	-1.100
	(0.170)	(0.281)	(0.871)	(0.252)		(-2.639)

Notes: ** indicate 5% significance level.
Source: Computed by authors

6. Conclusions and Policy Implications

This paper examined if a causal relationship existed between FDI, trade, GDP and tariffs in the ASEAN-5 of Indonesia, Malaysia, Philippine, Singapore and Thailand. In the first step, we tested the variables order of integration using the individual country and panel series. All the variables were not stationary at level $I(0)$, but were stationary when first differenced ($I(1)$. Second, both time series and panel cointegration tests support the existence of a unique long run equilibrium relationship between FDI, trade, GDP and tariffs. Third, the existence of a cointegrating relationship allowed us to deploy the Granger causality test based on the VECM framework.

When analyzed by individual countries, unidirectional causality was found from GDP to FDI in Thailand at the 5% level, but no causality, neither unidirectional nor bidirectional were found in Indonesia, Malaysia, Philippine and Singapore. Equally, the panel causality test suggests no short run causality, but a long run causality in the FDI equation is observed with a moderate speed of adjustment of about 38% when converging to the long run equilibrium. Also, the negative coefficient in Thailand's FMOLS regression shows that GDP growth drives net FDI but one where it fuels more outflows than inflows. Hence, GDP growth in Thailand reduces net FDI inflows.

The lack of causality between net FDI, and exports, and imports in all the countries suggest that the propellants of net FDI in these countries are not driven by trade. The same thing can also be said between net FDI inflows and GDP in Indonesia, Malaysia, the Philippines and Thailand. Quite clearly other factors are more important in explaining GDP growth in these countries. Thus, future studies should examine if other dynamic factors, such as human capital development, R&D expenditure, industrial policies, and diffusion of knowledge from abroad are key stimulants of economic growth in these countries. After all, Johnson (1982), Amsden (1989, 1991), Wade (1990), and Saxenian (2006) have shown succinctly that these factors were instrumental in the rapid economic growth rates achieved by Japan, South Korea and Taiwan.

Hence, having used arguably the most robust econometric methodology it can be argued that there existed no causal relationship between net FDI, and GDP, and trade in four of the five ASEAN-5 with only

Thailand demonstrating the existence of causality running from GDP to net FDI inflows. Also, in this relationship GDP growth stimulates greater FDI outflows than FDI inflows so that the relationship between these variables is negative.

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The Potential Advantages and Synergies of an EU-Turkey Cooperation in Science, Technology and Innovation

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The Turkish economy has shown remarkable economic performance over the last decade. Currently, it is the 18th largest economy in the world. To increase its competitiveness and avoid the 'middle-icome trap', Turkey set research and development as a priority area for the next decade, with the ambitious goal of reaching 3% of GERD/GDP by 2023. Despite several controversies about the EU accession process in general, the EU is still the best partner for Turkey to reach these goals. Turkey is an active member of the European research area. It is an associated member of the RDI Framework Programmes since 2002, it participated in and coordinated various scientific projects, policy-coordination actions, mobility programmes and won grants for excellent researchers. In the Turkish national STI strategy the three vertical and six horizontal axes consist of various scientific areas like ICT, Energy, Defence, Water, Food, which have been also set as priority areas in the European H2020 programme. We would like to focus in our article on possible synergies between priority areas, as well as on the role of SMEs in the innovation chain, which are enjoying a special attention in both Horizon 2020 and in Turkish national science, economic and innovation policy.

Keywords: Turkey, European Union, Horizon 2020, STI policy

JEL: F42, H52, I23, O14, O32

1. Introduction

The study focuses on the possibility and potential of cooperation in science, technology and innovation (STI) between the European Union and Turkey. One of the main problems the emerging Turkish economy has to face in the coming decade is to reach the status of a high-income

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economy. To reach this goal it would be of utmost important to increase the country's STI potential. We are going to give an overview on the current Turkish STI system, on the future visions, and on the results in an international comparison. While Turkey is still well behind the EU average in these areas, it has huge potential and ambitious plans to close the gap. Since the EU is still the best partner for this purpose, we examine the broader terms of EU-Turkey relations to see the framework of cooperation between the EU and Turkey. Finally, we try to outline the areas of cooperation between the EU and Turkey in STI to detect possible advantages and synergies.

2. Innovation and Economic Development

The significance of innovation in economic growth has been introduced by Schumpeter (1950), who characterized innovation as the process of "Creative Destruction", as "industrial mutation," which "incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one." (Schumpeter, 1950, p.83). Narula (2003) uses innovation also in a more general sense: innovation is anything novel, it is the change in knowledge, ability and techniques required to produce goods and services of higher and better quality. He closely connects innovation to science and technology, which on the one hand represent the cumulative stock of innovations but on the other hand are advanced through innovation. He defines technology as the application of scientific knowledge for practical aims while science provides us with more generic knowledge, which may or not may generate products and services. The importance of science policy issues in being acknowledged to have strategic importance for national competitiveness and economic security has already been mentioned by Partha and David (1994).

In academic literature, the concept of a national innovation system emerged in the 1980s (Freeman, 1987; Lundvall, 1992; Nelson, 1993; Patel and Pavitt, 1994). It rests on the premise that understanding the linkages among the actors involved in innovation – private enterprises, universities and public research institutes – is the key to improve technology performance. Innovation and technical progress are the results of a complex set of relationships among actors producing, distributing and applying various kinds of knowledge. The most overarching definition comes from Metcalfe (1995), who describes the

national innovation system as a "set of distinct institutions which jointly and individually contributes to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies."

The importance of collaboration is also the key message of Renda (2015). In her article she draws the conclusion that investing in research and development (R&D) is not going to be a sufficient strategy unless large and small companies are able to develop effective symbiotic relationships, they are supported by the university system, by public or private funding sources, they are demanded by a sufficiently large market, and facilitated by an innovation-oriented government.

Carayannis and Korres (2013) emphasise that technological change not only determines growth but also affects international competition and modernization within an economy. According to their concept development is understood as the process of economic transformation brought about by innovation. Innovation as well as science and technology have been recognized as a major source of competitiveness for nations and regions alike. The key determinant of their efficacy is the quality and quantity of entrepreneurship-enabled innovation that supports the link between university basic and applied research and the market, via technology transfer and commercialization mechanisms including government-university-industry partnerships and risk capital investments. In their book they conclude that a long-term strategy with the aim of developing regional knowledge economies must combine local bottom–up approaches with global or European top–down ones.

Europe maintains ambitions for building its future growth and prosperity on innovation. But Europe's performance on innovation, especially on business innovation lags behind its main competitors. This can be mainly attributed to the lack of young innovative companies especially in innovation-based growth sectors. According to Veugelers and Cincera (2015) this could be counterbalanced by a European-wide general innovation policy aimed at improving the environment for innovation. To tackle specific barriers, external financing should be guaranteed for

highly innovative projects through public funding and by leveraging private risk funding.

Some authors find that European Framework Programmes are the adequate solutions for the previously mentioned deficiencies of Europe. They were able to provide stability and growth, both in terms of funding as well as in terms of a political message that placed a high priority on science and technology (Frietsch et al, 2015; Zarbá et al, 2014). Kalisz and Aluchna (2012) even declare that the three pillars of Horizon 2020 – excellent science, industrial leadership and societal challenges – appear much more in line with the needs of potential innovators and entrepreneurs than past Framework Programmes. As a result governments and science policy need to address large-scale societal challenges that market forces are unlikely to tackle by themselves and they have to create a fertile environment for entrepreneurship by tailoring regulation to the needs of innovation. And the involvemenzt of an newly emerging and dynamic economy may be a benefit for the EU to reach these goals.

3. Turkey, an Emerging Economy of Europe

The performance of the Turkish economy over the past decade has been rather impressive, judged both by its own historical standards and by the performance of the region as a whole. (Öniş *et al.*, 2013, p.1415)

As a consequence of the 2001 economic crisis, deep and comprehensive reforms started. The implementation of the reforms was supported by the extended stand-by facility of the International Monetary Fund, but similar, if not even more important factors behind the success were the increasing European political support after 2002, and the forming of a new government by the reform-oriented, moderate Islamic AK party. The results of crisis management were convincing. The average economic growth remained over 6% from 2002 to 2007, and was able to return to this level after 2009 again. The chronically high inflation rate, a major sign of economic imbalances for decades, was reduced to one-digit levels. The stable macroeconomic environment and the prospects of closer integration to the EU encouraged foreign investments, the level of FDI grew from yearly $1-2 billion to $10-20 billion, flowing mostly into export-oriented manufacturing (Taymaz *et al.*, 2009). The competitiveness of exports was improved by the depreciation of the

currency in the first years. Exports became more diversified, not only in their product structure, but concerning target-countries as well. After the growing importance of European exports in the period 2002 to 2007, the post-crisis period lead to an increasing share of neighbouring regions (Middle East, CIS countries, Balkans), not only in trade, but in investment relations as well.

Turkey has started to shift from an economy largely based on agriculture and on an abundant low-skilled labour force used mainly in textile sector towards an industrial economy. Turkey is today a major European automotive producer, a world leader in shipbuilding, and a significant manufacturer of electronics and home appliances e.g. TV, white goods (OECD, 2012).

In electronics especially the home appliance sector developed dynamically, where domestic producers (Vestel, Beko) are prominent representatives of the exports. Turkish products are not the top quality brands, rather low and medium price products, but there is a demand for these products both on the domestic markets, and in neighbouring regions (e.g. in the Balkans).

In vehicle production, several multinationals (Ford, Renault, Fiat, Hyundai, Toyota, Honda, Opel, Mercedes, MAN) brought part of their production capacity to Turkey, largely due to the customs union agreement with the EU allowing a free export of products to the European Single Market. In bus production, domestic brands (Otokar, BMC, Temsa) are dominating.

Despite its rapid growth after the crisis in 2001, the Turkish economy falls short of expectations with respect to global competitiveness (Turkish Industrial Strategy Document, 2010, p.12). Particularly with the integration of China and India into the global economy, it no longer seems to be possible for Turkey to be able to rely upon cheap labour to get ahead in the competitiveness. Increasing Turkish competitiveness requires the creation of an efficiently functioning market mechanism, an attractive investment environment and institutionalization. Companies have to be able to sustain themselves through a highly skilled workforce (ibid.).

In the post-war era, many countries have managed to fairly rapidly reach middle-income status, but few have gone on to become high-income economies. Rather, after an initial period of rapid ascent, many countries have experienced a sharp slowdown in growth and productivity, falling into what has been called a "middle-income trap."[3]

Turkey is well aware of this. As the Turkish Finance minister, Mehmet Simsek points on it in his article in the Wall Street Journal (Simsek, 2014), despite the progress, Turkey still faces great challenges in its effort to escape the middle-income trap. Success will require sound macroeconomic policies and additional structural reforms, and a supportive global economic environment is necessary, too. Turkey's top reform priorities are, however, to enhance the quality of the country's workforce by improving the quality of education, to make progress in labour-market flexibility and to boost productivity through technological advancement (ibid.).

4. Turkey's Scientific Landscape and Future Plans

In 2014, with a total GDP of 799,5 billion USD, Turkish economy ranked 18th in the list of world economies[4]. Vision 2023, initiated in 2004 for the 100th Anniversary of the Turkish Republic in 2023 would like to see Turkey as one of the 10 largest economies in the world, and to reach this goal it formulates recommendations and ambitious targets on the fields of economy, health, energy and tourism. To increase the technological and innovative capacity of the country, the Vision sets the targets to raise GERD (gross domestic expenditure on R&D)//GDP to 3%, and BERD (Business enterprise expenditure on R&D)/GDP to 2%. The number of FTE researchers should be 300 000, 180 000 of these should work in the private sector.

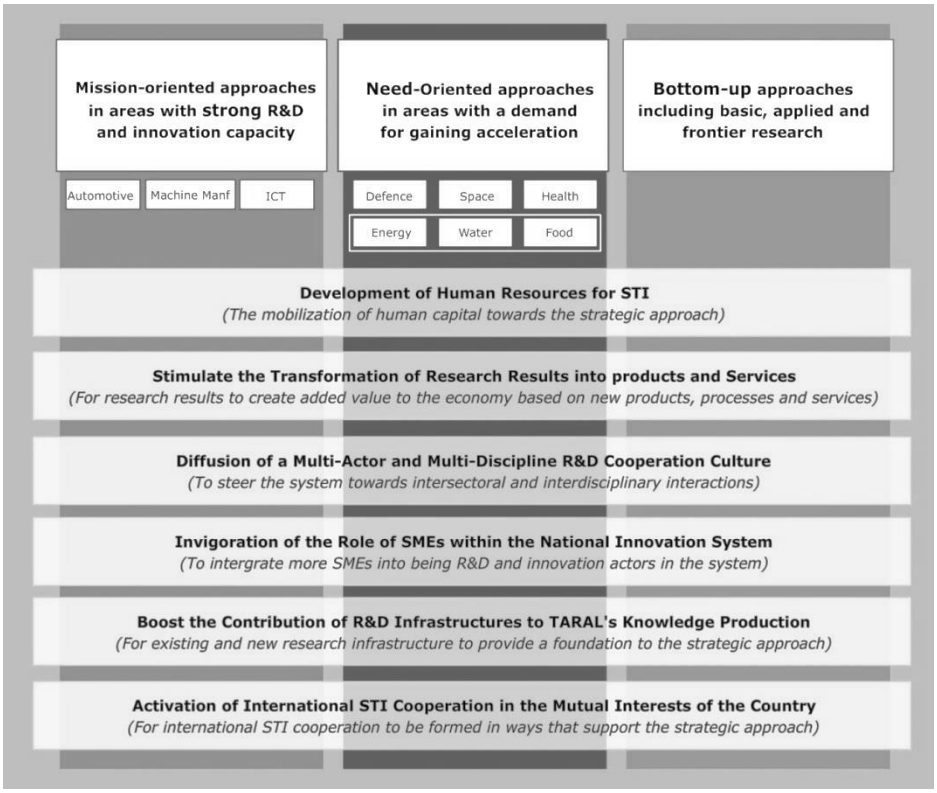
This general vision on STI should be implemented by more concrete plans, like the National Science and Technology Policies Implementation Plan for 2005-2010 (BTP-UP) and the National Science,

[3] World Bank estimates that of 101 middle-income economies in 1960, only 13 became high income by 2008 (Agénor et al, 2012) Actually, the growth patterns of the remaining countries do not conform to one clear pattern that can be easily characterized as a "trap." Still, the "MIC Trap" concept is useful for guiding policy discussions. (Im – Rosenblatt, 2013)

[4] Worldbank statistics

Technology and Innovation Strategy 2011-2016 (UBTYS). UBTYS is a fundamental strategy document comprising of Turkey's STI vision, priorities, and main objectives for a six year period. It was mainly focusing on disseminating culture of multilateral and multidisciplinary RDI cooperation, stimulating sectoral and regional RDI dynamics, encouraging SMEs to become stronger actors within the national innovation system, and enhancing the contribution of research infrastructures to the knowledge creation capacity of TARAL[5]. UBTYS consisted of three vertical and six horizontal axes, which all serve the vertical ones.

Figure 1: Strategic Framework of the National STI Strategy, 2011-2016



Source: TÜBITAK Turkish scientific programmes and strategies

[5] The "Turkish Research Area" (TARAL) initiative was launched in 2004 with inspiration from the ERA. TARAL, a platform for public, private and NGO stakeholders to coordinate future R&D priorities and collaboration, is aimed to be integrated with the ERA.

As it can be seen from Figure 1, the three vertical axes are devoted to three different approaches: Mission-oriented approaches, with strong R&D and innovation capacity cover the automotive industry, machine manufacturing and ICT. Need-oriented approaches in areas with a demand for gaining acceleration, mainly coming from the society are Energy, Water, Food, Health, Defence and Space. On the three areas Energy, Water and Food three working groups have been established to prepare national RDI strategies on these fields. The third approach is targeted at bottom-up initiatives including basic, applied and frontier research.

Devoted to the first horizontal pillar of UBTYS, the S&T Human Resources Strategy was accepted in 2010. The strategy tries to increase the quantity and quality of human resources for Science and Technology by providing better research environment and by improving researchers' skills and experiences partly via mobility schemes.

Although one of the main STI targets of BTP-UP – to reach 150 000 FTE R&D personnel by 2013 – has not been reached, new, even more ambitious targets of Vision 2023 are on the horizon: the number of FTE researchers should be 300 000 and 60% of them should work for the industry. As a result, the strategy does not only have the aim to increase the number of researchers but it has to improve the sectoral and occupational distribution, too.

Turkey's 2023 target is to reach 500 billion dollars of export volume and to be a country manufacturing and exporting national automobile, aircraft, ship and satellites. The Turkish Industrial Strategy Documents[6] were prepared with the long-term vision of becoming the production base of Eurasia in medium and high-tech products (Turkish Industrial Strategy Document, 2010). In addition to this long-term vision, the overall objective of the industrial strategy is to increasing the competitiveness and efficiency of Turkish industry by transforming the industry towards a structure where mainly high-tech products with high added value are produced, which has qualified labour and which at the same time, is sensitive to the environment and the society (idib., p.49). The main means to reach these objectives are to increase the weight of

[6] Turkish Industrial Strategy Document (2011-2014) and Turkish Industrial Strategy (2015-2018).

mid- and high-tech companies and sectors, and to introduce high added-value products in low-tech sectors.

Eight horizontal industrial policy areas have been identified: Investment and business environment, International Trade and Investment, Skills and Human Resources, SME's Access to Finance, Technological Development of Companies, Infrastructure Sectors like telecommunication, energy or transport, Environment and Regional Development. The main sectoral areas were the automotive, the machinery, the white goods, the electronics, the textiles and clothing, the food and finally the iron and steel sector.

The Tenth Development Plan (2014-2018) of Turkey also sets the framework for Science, Technology and Innovation for the coming years. The Plan formulates concrete developments and targets. On the basis of the plan the primary aim of R&D and innovation policy is „contributing to increase of technology and innovation activities with a private sector focus and get benefits from these activities, to commercialization of results of R&D activities via constituting an innovation based ecosystem, and to achievement of high global competitive power with branded technology products." (The Tenth Development Plan, 2014, p.86)

Table 1: Developments and Targets in R&D and Innovation

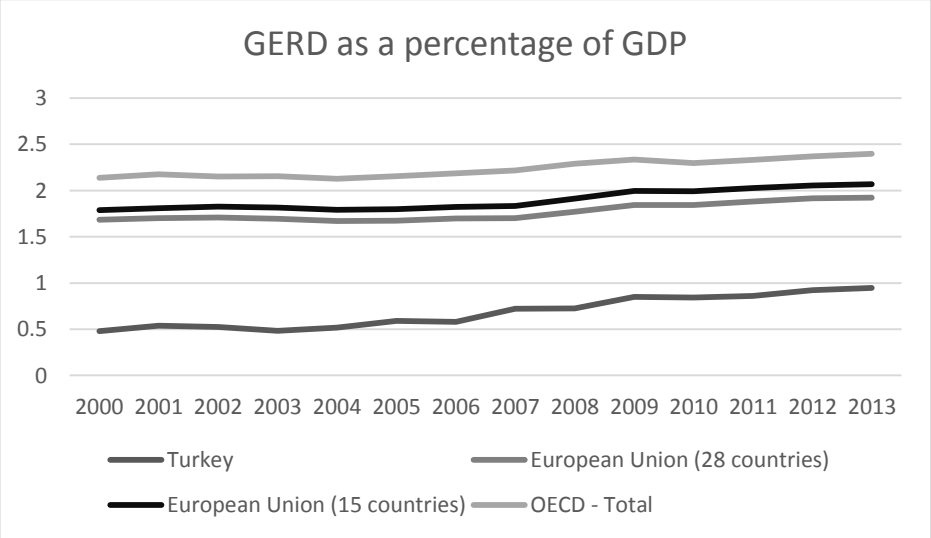
	2006	**2011**	**2013**	**2018**
Share of R&D Expenditures in GDP (%)	0,6	0,86	0,92	1,8
Share of Private Sector in R&D Expenditures (%)	37	43,2	46	60
Number of FTE R&D Personnel	54 444	92 801	100 000	220 000
Number of FTE Researchers	42 663	72 109	80 000	176 000
Share of Private Sector in R&D Personnel (%)	33,1	48,9	52	60

Source: 2006 and 2011 data are from TURKSTAT. 2013 and 2018 data are estimates of the Tenth Development Plan.

As seen in the table above the original plans for 2013 set in the National Science and Technology Policies Implementation Plan for 2005-2010 (BTP-UP), the share of R&D Expenditures in GDP (2%) and the number of FTE R&D personnel (150 000) – had to be modified. The new estimations made by the Tenth Development Plan have been over fulfilled though: GERD/GDP in 2013 was 0,95%, the number of FTE R&D Personnel was about 113 000.

OECD Science and Technology Indocators show that Turkey still lags behind the EU or the OECD average, nevertheless almost all the indicators show a stable and significant growth since 2000.

Figure 2: GERD as a Percentage of GDP in Turkey, in EU15 and EU 28 and in the OECD

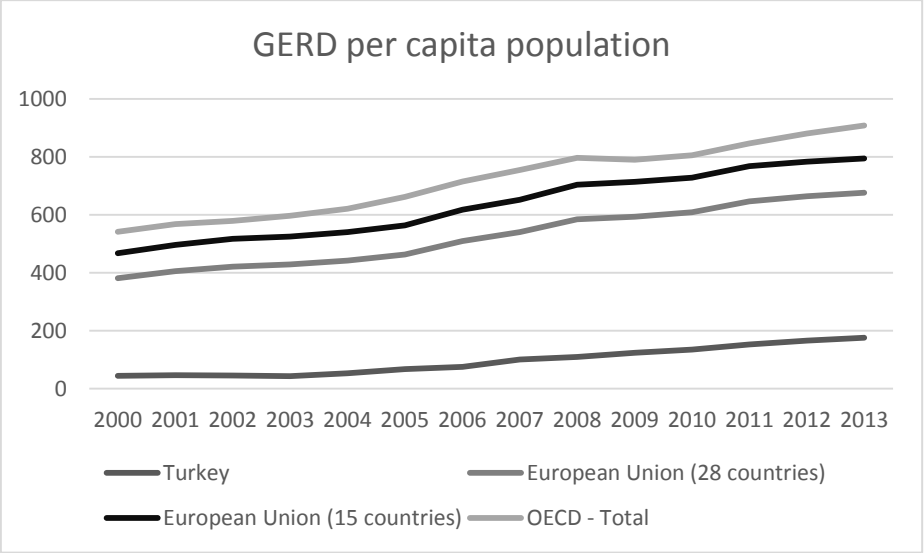


Source: OECD, Science and Technology Indicators

As mentioned above, Turkey – similarly to the Europe 2020 target - has the ambitious goal to reach 3% GERD/ GDP in the next decade. Currently this indicator of Turkey stands at 0,95%[7], but with an impressive average yearly growth of 17% between 2003 and 2013.

[7] According to the latest data (2013) the EU 15 is slightly above 2% (2,06%), with the new member states deteriorating the EU28 aggregated data to 1,92%. Both the EU and

Figure 3: GERD per Capita Population in Turkey, in EU15 and EU 28 and in the OECD



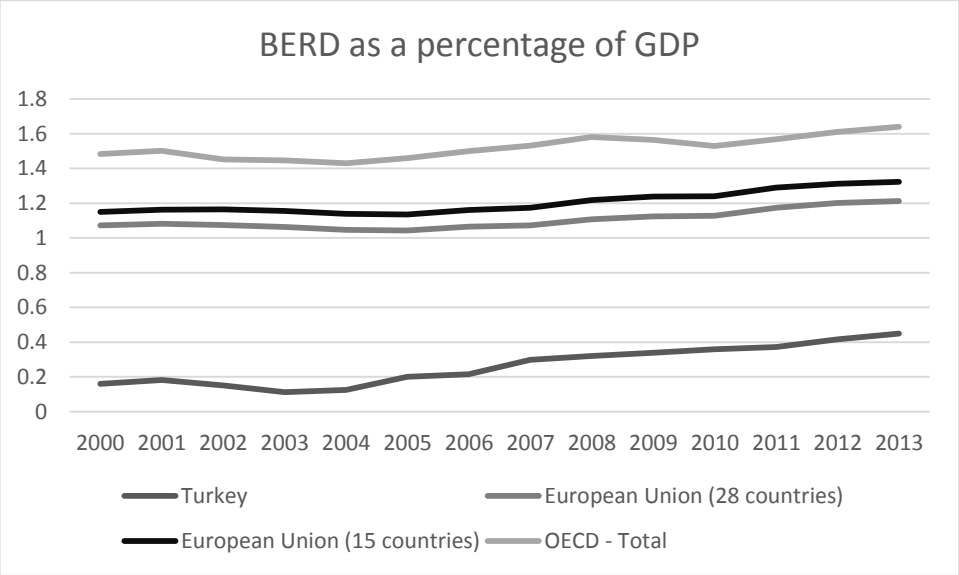
Source: OECD, Science and Technology Indicators

Turkey has a large[8] and growing population, which makes the difference in terms of GERD per capita even more significant. Nevertheless a stable growing tendency is also to be observed in these statistics.

Turkey have already failed to fulfil the objective of reaching the 3% GERD/GDP set by the Lisbon Strategy for 2010, and Turkey is also far from the wishful 2% of the Ninth Development Plan for 2013.

[8] Based on the national census in 2014 it is about 77 695 904 persons

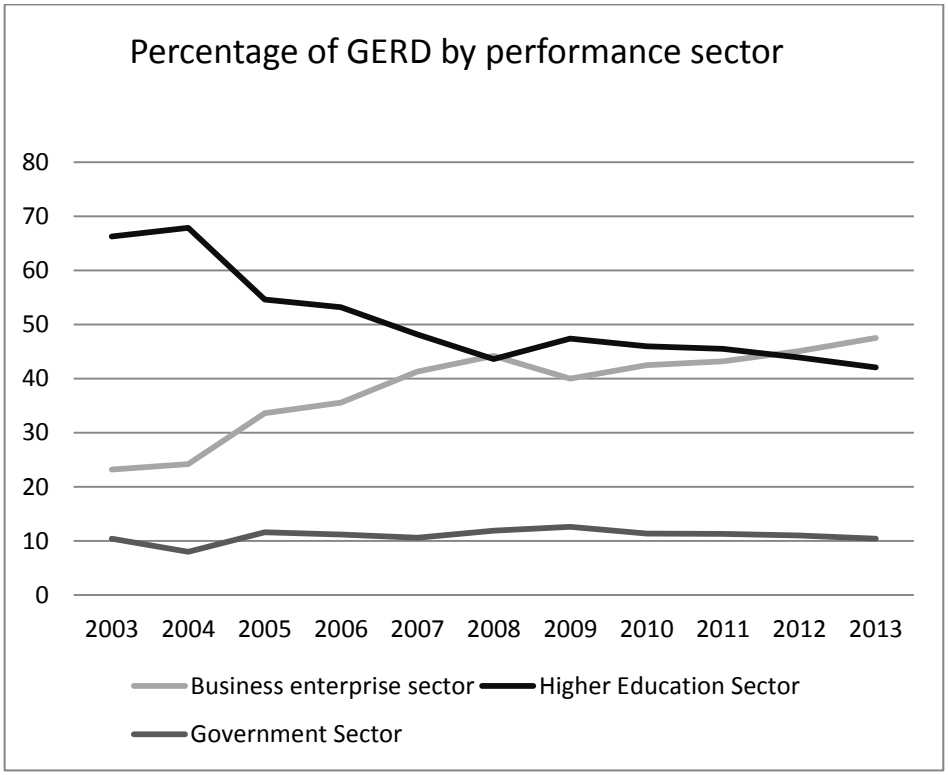
Figure 4: BERD as a Percentage of GDP in Turkey, in EU15 and EU 28 and in the OECD



Source: OECD, Science and Technology Indicators

The active involvement of the business sector both in carrying out and in funding Research and Development is also a target shared by the EU and Turkey. The so called Business enterprise expenditure on R&D (BERD) should amount to 60% of the total GERD and should reach 2%, if we take into consideration the 3% GERD targets. Turkey, with its current level of 0,45% is relatively close to the 60% proportion but very far from the 2% general BERD goal. Even if we take into consideration its current pace of growth, reaching this target does not seem to be realistic. Nevertheless the changing tendency between the business sector and the higher education sector is a remarkable phenomenon (Figure 5), which can be the result of increased support for the business sector.

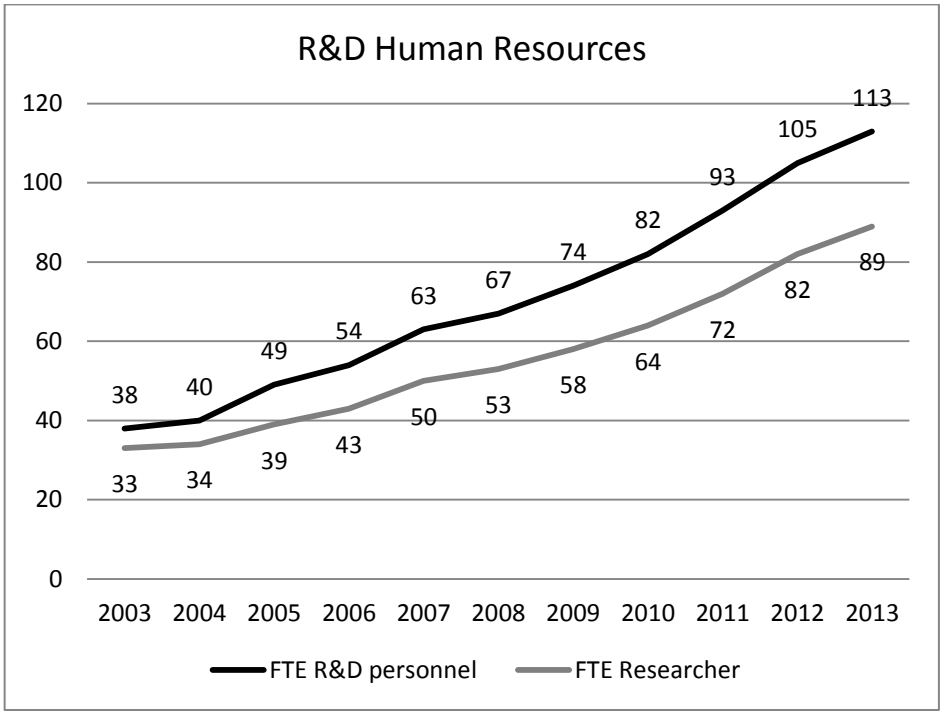
Figure 5: Percentage of GERD by Performance Sectors in Turkey



Source: TÜBITAK Scientific, Technological and Innovation Statistics

Statistics on human resources is another hot-topic in the future plans for Turkey. As it can be seen on the below figure, the original goals of the BTP-UP – 180 000 FTE researchers for 2013 – could not be reached but the estimations of the 10th Development Plan's – 80 000 FTE researchers – could be easily fulfilled.

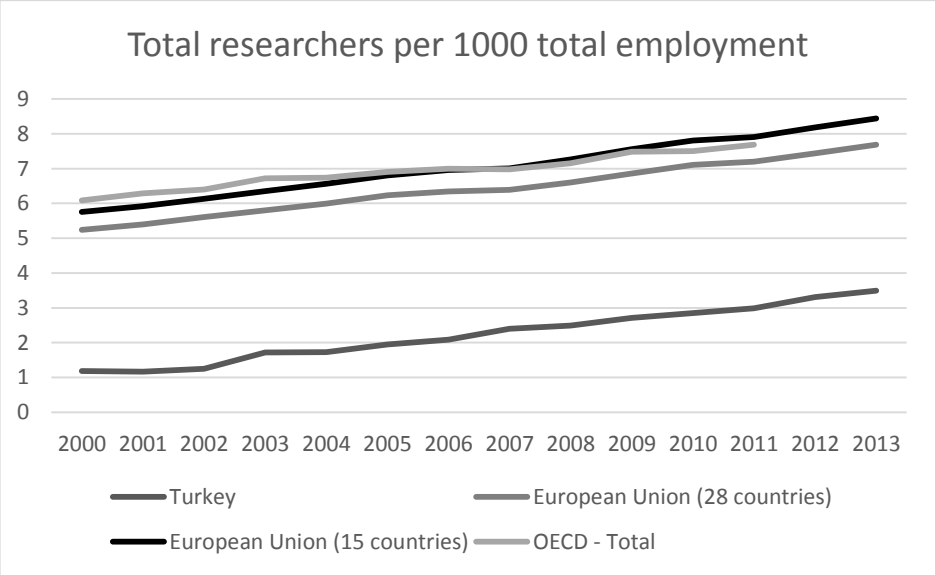
Figure 6: R&D Human Resources in FTE in Turkey (Number x 1000)



Source: TÜBITAK Scientific, Technological and Innovation Statistics

If we want to compare the human resources development in Turkey with data in the EU and the OECD countries, we can see a similar trend to the ones in GERD and BERD: lower initial levels and rapid growth is characteristic for Turkey. The Full Time Equivalent (FTE) number of researchers increased from 38 000 to 113 000 between 2003 and 2013.

Figure 7: Total Researchers per 1000 Total Employment in Turkey, EU15/28 and OECD



Source: OECD, Science and Technology Indicators

Due to the large population and the low employment rate[9] of Turkey simple comparison of the above data – total researchers per 1000 total employment – might be misleading though. Such interpretations, which only emphasise the quick growth compared to the previous year or period, do not mention the originally low standards. The pace of growth in European and OECD countries might seem slower but there is hardly any difference in real growth between these country groupings and Turkey, so the original differences hardly diminish. Nevertheless quick and balanced growth is a positive phenomenon, which can ensure the stable development of the Turkish innovation-based economy.

And the best partner to reach these goals is obviously the European Union. The framework used by the European Union in preparing

[9] According to the latest OECD data from 2015 employment is slightly above 50% in Turkey, compared to the EU 65,3 % and the OECD 66,1% average data. (http://stats.oecd.org/viewhtml.aspx?datasetcode=STLABOUR&lang=en) This is mainly due to the low employment of women – only 30% of women are employed in Turkey, which is about half of the EU average (60%). Almost the same percentage of men are employed in Turkey and in the EU (69% vs. 70%).

industrial policies makes important contributions to the strategy determination process of Turkey, both in terms of content and methodology. With the Lisbon Strategy and H2020, the Union intends to make Europe attractive for investment and employment, and to set targets focusing on knowledge and innovation for growth. The question is, how much Turkey and the EU are able (and ready) to cooperate.

5. Turkey-EU relations[10]

The relations between the European Union are full of ambiguities. Since its creation in 1923, Turkey showed an eager wish to belong to the European nations. Turks adopted deep reforms in its constitutional, political and economic structure to be able to start accession negotiations with the EU in 2005. The negotiations started a decade ago already, still, while Croatia was able to finish the process and join the EU in this time period, in case of Turkey the process is still open. The idea of enlargement is not popular in Europe, especially not if it is concerning Turkey. Nowadays, the EU plays for time in enlargement, while Turkey becomes more and more frustrated.

Being not clearly a European country, Turkeys inclusion to the integration process in the 1960s came rather from political motives, influenced also by the U.S. strategic interests under Cold War circumstances. The reluctance of Europe was visible in the 1990s, when Turkey was not accepted as a candidate, but also recently, since the beginning of accession negotiations. For a long time, the main arguments against Turkish accession were summarized with the words ’too big, too poor and too Muslim’.

The accession negotiation process with Turkey started in 2005, and came to a near stalemate situation by 2010. Until now, negotiations had been opened in fourteen chapters, but only one[11] was provisionally

[10] Partly based on Szigetvári, 2014

[11] The acquis in Chapter 25 – Science and Research – as laid down in Title XVIII of the Treaty requires the Member States to ensure the necessary implementing capacities to pursue the Community objectives and activities in the field of research and technological development, including adequate staffing. The Member States also need to adhere to and to implement specific Science and Research objectives and activities as developed by the open method of coordination. The acquis in this Chapter does not require transposition of EU rules into the national legal order. (Screening Report Turkey, 2006)

closed, while most of the others are blocked: eight by the EU Council in 2006, for Turkey's rejection to open its ports and airports to traffic from Cyprus, five by France in 2007, while Cyprus froze six further chapters in 2009.

There are many reasons, however, why the EU should be interested in cooperating with Turkey. Besides regional political issues and Turkey's increasing role as an energy hub, the changing global environment, its role in the current migration flows and Turkey's economic potentials are also among them. Of course the Turkish economy is still very much depending on the European engine, but with its more diversified export structure (both concerning goods and partners) and its increasing domestic demand, the dependency from Europe is decreasing, which gives Turkey a greater manoeuvring room vis-a-vis Europe. The participation of Turkey on the G-20 meetings means that the country's regional and global profile has grown since it first evinced a desire to join the EU, which gives Turkey a further impetus to negotiate more on equal terms with the EU.

In 2012, the European Commission has launched a so called 'positive agenda' towards Turkey. In its framework "working groups" were created to accelerate the process of alignment of Turkey with EU policies and standards. As Enlargement Commissioner Stefan Füle said: „its aim is to keep the accession process alive and put it properly back on track after a period of stagnation, which has been a source of frustration on both sides." (European Commission, 2012) According to official explanation, this initiative is not replacing the existing process but provides a new momentum to Turkey's accession process (ibid.).

In 2013, the approach initiated by the positive agenda has turned out to be the most promising tool which ends up in positive results, strengthening both sides readiness for further cooperation. In case of the accession process, the two sides deal fundamentally on an unequal base. The candidate country has to adopt the European „acquis", and can negotiate only on temporary derogations. Maybe the most important difference by the positive agenda is that there are equal partners negotiating on issues of mutual interest.

EU-Turkey relations have a deep complexity, but both sides are well aware of the necessity of cooperation. And the area of science, research

and innovation is one of the fields where cooperation may be mutually advantageous. As Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science said on 4th of June 2014, when Turkey signed the Association Agreement to Horizon 2020: "Turkey is a much valued partner. Its dynamic business environment is a perfect test bed for the development of innovative products and services – making cooperation a win-win for researchers and enterprises on both sides."[12]

6. Possibilities for Cooperation: Advantages and Synergies in EU and Turkish Priorities

We have already reflected on parallel issues between the STI targets of the EU and Turkey. If we look at the R&D-innovation objectives of Europe 2020 – inherited from the Lisbon Strategy – we can see similarities with Vision 2023 goals like the target of reaching 3% of GERD/GDP to be invested in R&D and innovation. Compared to the employment target of 75% of the 20-64 year-olds in Europe, Turkey is less ambitious, they want to achieve 55% employment, but on the other hand a very ambitious 5% unemployment rate. As for the climate change and energy priority, while Europe aims at 20% of energy from renewables, Turkey intends to reach the 30% level; both Turkey and Europe want to increase their energy efficiency by 20%. Not mentioned in Vision 2023 but it is an interesting comparison that current drop-out rate in Europe is 12,8%, Europe2020 target is 10% while this number in Turkey is almost 40%. There is also a huge difference in the enrolment to tertiary education: EU is characterized by a current level of 35,8% and with a target of 40% for 2020. Turkey has a current level of 18%. Sustainable growth in the number of research personnel does not seem to be realistic without a proper educational system. The fifth target of Europe2020 about fighting poverty and social exclusion can not be compared with the economic targets of Vision 2023, which focuses rather on economic growth and on the very ambitious goal of becoming one of the 10 largest economies of the world.

[12] http://europa.eu/rapid/press-release_IP-14-631_en.htm

Table 2: Europe2020 Objectives for Growth, Jobs and Societal Challenges

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**EU average**
	Turkey							
Employment rate of the population aged 20-64	48,2	48,2	48,4	47,8	50	52,2	52,8	**68,4**
GERD/GDP	0,58	0,72	0,73	0,85	0,84	0,86	0,92	**2,07**
Greenhouse emission, 1990=100	187	203	196	198				**83**
Share of population, finished tertiary education	11,9	12,3	13	14,7	15,5	16,3	18	**35,7**
Share of population (18-24) with maximum lower secondary education	48,8	46,9	45,5	44,3	43,1	41,9	39,6	**12,7**
Share of population at risk of poverty or exclusion	72,4							**24,8**

Source: European Commission (2014d)

As far as the activity of Turkey in the EU's R&D programs is concerned, Turkey has been an associated member in EU Framework Programmes for Research and Development since 2002; it also signed the Association Agreement to Horizon 2020 on 4th of June 2014. In his presentation about Turkey's participation in Framework Programme 7 Robert-Jan Smits, Director General of DG Research and Innovation on behalf of EU highlighted the strong participation of Turkish scientists in Marie Skłodowska Curie Actions, in the Research for the benefit of SMEs instrument as well as in the thematic fields ICT and Environment (Smits, 2014). As it can be seen in Table 3, on the basis of the seventh FP7 Monitoring Report the number of successful applicants in Turkey was 1122 with a funding of 165 million Euro.[13] The success rate of Turkish researchers was around 16,1%, which is below the EU average (21,6%). It is remarkable that the success rate of Candidate and Associated countries was even higher than the one of the EU28 countries (21,9%). The difference is even more conspicuous if we have a look at the success rates in retained EU contribution: compared to the 19,2% EU average Turkey had a success rate of 7,2%. Candidate and Associated countries are close to the EU average again with a success rate of 18,7%.

Table 3: Number of Applicants in Retained Proposals and Corresponding Success Rate for the 7-year Period

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**	**Rate**
Turkey	141	119	183	206	200	182	91	1122	16,1%
EU	19242	12412	17592	15174	17493	19031	11454	112398	21,6%
Candidate& Associated	1583	1221	1730	1455	1543	1699	1072	10303	21,9%

Source: European Commission (2015) Seventh FP7 Monitoring Report

[13] Due to a number of still running projects, this amount might further increase.

Table 4: Number of Requested EU Financial Contribution in Retained Proposals (in € million) and Corresponding Success Rates

	2007	2008	2009	2010	2011	2012	2013	Total	Rate
Turkey	25,15	16,32	24,04	21,33	30,04	37,09	11,39	165,4	7,2%
EU	5881	4340	5306	4999	5705	6794	4261	37289	19,2%
Candidate& Associated	482	442	599	484	513	722	417	3658	18,7%

Source: European Commission (2015) Seventh FP7 Monitoring Report

Research Organisations were the most active applicants (25,41%) closely followed by Public Bodies – mainly TÜBITAK[14] (22,22%). The Higher Education sector (16,02%) and Private business – SMEs – were responsible for another third of the applications. The top 5 participants were TÜBITAK, the Middle East Technical University, Koç University, Bilkent University and Sabanci University (Smits, 2014).

7. Synergies and Possibilities in H2020

Horizon 2020 is the new Framework Programme for Research and Development of the European Union for the period 2014-2020. For this seven-year period H2020 has a budget of around 80 billion Euro.

Turkey has published a Position Paper on Horizon 2020 in June 2012. Generally speaking they welcomed the new programme and highlighted the similarities with their National Science, Technology and Innovation Strategy (2011-2016). Nevertheless they emphasised the importance of SMEs in the economies of both the EU and Turkey and mentioned the relative importance of capacity building compared to scientific

[14] TÜBITAK is one of the leading institutions in the STI policy system in Turkey since 1963. It is an autonomous institution that is governed by the Science Board. TÜBITAK contributes to the advancement of S&T and innovation in Turkey via its research, development and innovation (RDI) funding and performing functions.

excellence for Candidate Countries, which can not benefit from the Structural Funds. This comment has not been finally taken into consideration by the EU but the new IPA II (Instrument for Pre-accession Assistance) can be also used for scientific capacity building purposes.

TÜBİTAK's EU Framework Programmes National Coordination Office (NCO) is taking actions in order to enable Turkey to benefit from Horizon 2020 to the highest extent. In this context, researchers will be supported for their travels, organization of events, writing projects, and pre-evaluations of the proposals. Besides, successful Turkish researchers in Horizon 2020 Programme will also be financially awarded by TÜBITAK. The next table summarises the similarities, synergies and adaptation techniques of Turkey with the three main pillars of Horizon 2020.

Table 5: Synergies between Horizon 2020 and Turkish STI Policy Programmes/Strategies

Horizon 2020	**Turkey**
Pillar I.: Excellent Science: reinforce and extend the excellence in RDI (25,3 B €)	New policy tool to improve the quality and impact of scientific publications – articles in high impact factor journals are rewarded
I.1: European Research Council (ERC) - ERC starting grants - ERC consolidator grants - ERC advanced grants	ERC Principal Investigator Support Programme for - project writing - pre-evaluation - interview trainings Above Threshold Awards (Reserve list 12000€ etc.) ERC Success Award - 25000 € + budget x 9% - 30000 € + budget x 9% - 35000 € + budget x 9%
I.2: Future and Emerging Technologies (FET) - FET Open (mainly on ICT) - FET Proactive - FET Flagships (Human Brain, Graphene)	ICT is one of the Mission-oriented areas of UBTYS
I.3: Marie Skłodowska-Curie actions (MC) Individual Fellowships (IF) European Fellowships (EF) Global Fellowships (GF) Research and Innovation Staff Exchange (RISE)	MSCA Pre-Evaluation Support programme Above Threshold Awards (above 80 scores) TÜBITAK Science Fellowship Grant Programmes (BIDEB) - Fellowship for Visiting Scientists and Scientists on Sabbatical Leave (2221) - Reintegration Research Fellowship Programme (2232) - Co-Funded Brain Circulation Scheme (2236) - Graduate Scholarship Programme for International Students (2215) - Research Fellowship Programme for Foreign Citizens (2216)
I.4: European Research Infrastructures, including e-Infrastructures	E-Government and e-Infrastructures – SCST – 2013 Turkey is member of ESFRI (European Strategy Forum on Research Infrastructures), Ministry of Development is working on a roadmap 108 research infrastructures activated, 65 being developed + 97 advanced research centres
Pillar II: Industrial Leadership: focus on innovation and the private sector	Turkish Industrial Strategy Document: „to make Turkey the production base of medium and high technology products in Eurasia.”

Horizon 2020	**Turkey**
II.1: Leadership in Enabling and Industrial Technologies ICT Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology Space	 Automotive industry, machine manufacturing and ICT are the three mission-oriented research areas in UBTYS Space is one of the Need-oriented areas in the second pillar of UBTYS
II.2: Access to risk finance	Industry Oriented Support Programme of TÜBITAK on Venture Capital (1514)
II.3: Innovation in SMEs – SME Instrument (from idea to market)	Individual Entrepreneurship Support Programme (1512) with a very similar structure to the SME instrument: idea – prototype – commercialization
Pillar III: Societal Challenges Health, Demographic Change and Wellbeing Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy Secure, Clean and Efficient Energy Smart, Green and Integrated Transport Climate Action, Environment, Resource Efficiency and Raw Materials Europe in a changing world - Inclusive, innovative and reflective societies Secure societies – Protecting freedom and security of Europe and its citizens	 Health, Food, Water, Energy and Security (Defence) are five areas of the second pillar of UBTYS The National Food, Water and Energy R&D and Innovation Strategies 2011-2016 have been accepted by SCST and are coordinated by TÜBITAK The Turkish Energy Efficiency Strategy (2012-2023) has been adopted

Source: European Commission Horizon2020 Programme official website http://ec.europa.eu/programmes/horizon2020/, TÜBITAK Turkish scientific programmes and strategies http://www.tubitak.gov.tr/en, Gölükcü, 2015, Karatas, 2015

EU member states and Associated Countries of the Framework Programmes foster the successful participation of their scientific community in Horizon 2020 by providing various support mechanisms. There are three major types of support structures: countries might apply EU priorities and funding schemes in their own national support system. The second mechanism is built on giving professional advice and support during the application procedure. The third option is that the national government provides funds to motivate researchers for the application. The Turkish government applies a mixture of these three mechanisms. National Contact Points under TÜBITAK are mainly responsible for giving information and advice during the proposal preparation. The other two forms are used in various ways connected to the main pillars of Horizon 2020.

As Excellence remained an important pillar of Horizon 2020, and both OECD and the Innovation Union have criticized Turkey because of its low performance on innovation and excellent research, some new policy tools have been developed to achieve better results. Two important programmes of the Excellent Science pillar are the Grants of the European Research Council (ERC) and the mobility programmes of the Marie Skłodowska-Curie Actions. On the one hand TÜBITAK facilitates applicants in both schemes by providing project-writing, pre-evaluation and interview support and training possibilities, which makes the project-preparation phase more successful. Another tool is the Above Threshold Award, which provides financial support for highly evaluated but in the final round not selected proposals. Such a scheme reduces the risk of application and increases the possibilities to receive financing. Most excellent researchers are the target group for the so called ERC Success Awards, which tops up ERC grants with an additional national budget, giving even more scientific freedom and possibilities for the best scientists. There are Turkish mobility schemes, which are developed in line with MSC Actions. They mainly facilitate the reintegration of Turkish scientists or offer a possibility to international visiting scientists to carry out research in Turkey.

Future and Emerging Technologies, Enabling and Industrial Technologies as well as the thematic fields of the Societal Challenges are reflected in the national priorities of the Turkish science policy, more concretely in the vertical pillars of the National Science, Technology and Innovation Strategy. European targets and priority areas

have been taken into account while the National Food, Water and Energy R&D and Innovation Strategies have been developed for 2011-2016.

Turkey is not only a member country of ESFRI, the European Strategy Forum on Research Infrastructures, but national decisions about new infrastructures are also made in accordance with the guidelines of the Forum.

The SME instrument is a new tool in the second pillar of Horizon 2020. It gives support to small and medium-sized enterprises to develop and commercialise their innovative ideas in three phases. TÜBITAK 1512, a support programme for individual entrepreneurs is a very similar initiative in four stages. In the first stage a feasibility study has to be developed and submitted in both programmes. In the second phase – in the second and third stage in the Turkish system – the real work is carried out by the realisation of the innovative project idea. At the end of this stage the prototype has to be ready for commercialisation, which is facilitated in the last stage. This is a progressive funding scheme, where you can only apply for the next phase if you have accomplished the previous one with success. Using the Turkish model can be a very good test bed for local SME-s to cope with higher competition on the EU level.

Table 6: TÜBITAK 1512 - Support Programme for Individual Entrepreneurs

	Applicant	**Duration**	**Type of support**	**Budget (€)**	**Output**
Stage 1: from idea to project	entrepreneur	-	entrepreneurship training, coaching	-	Project proposal
Stage 2: start-up, technology	entrepreneur	12 months	100% grants and coaching	max. 47000	Prototype, demo etc.
Stage 3: Advanced R&D project support	corporation	18 months	75% grants	max. 238000	Commercial prototype
Stage 4: Commercialisation	corporation	12 months	Brokerage event, access to venture capital	-	Marketed product

Source: ERAWATCH Turkey-Specific Information

8. Conclusions

Turkey has the ambitious goal to become one of the 10 largest economies in the world. In order to realise this ambition, further investment in RDI is necessary. The STI target of 3% GERD/GDP seems to be a precondition for the economic targets of Vision 2023. And in spite of its impressive growth, the current levels of GERD and BERD are still far away from Vision 2023 goals. Becoming one of the largest economies of the world means also internationalisation, openness and networking with the rest of the world. In addition to Turkey's strong relations to the USA and to the MENA region, Europe is the main partner not only in economic but also in scientific terms.

Taking into account previous tendencies and current efforts Turkey has good chances to increase its participation in Horizon 2020 compared to previous Framework Programmes. It already has a lot of experience and a strong NCP support on the field of Marie Skłodowska Curie actions, so an active participation is very likely on this field. Due to massive support for excellence, an increased number of applications and winning proposals for ERC grants are to be expected.

The Individual Entrepreneurship Support Programme can be a good test bed for Turkish SME-s to apply successfully in the SME instrument. New strategies on Food, Water and Energy help to build up local excellence and facilitate the participation in international consortia on these three Societal Challenges.

Nevertheless there are still some challenges for Turkey to cope with:

I. Developing and implementing a Smart Specialisation Strategy could support more focussed programme building and funding, which would enhance economic growth and international cooperation on these selected areas.

II. Strengthening capacity building on a national level with the use of IPA II funds by investing in universities, national research centres and infrastructures.

III. Further encouraging knowledge transfer from academia to industry.

IV. Supporting scientific excellence by encouraging patent applications and international scientific co-publications in high impact factor journals.

V. Constant monitoring and impact assessment of current programmes by developing indicators and monitoring systems.

Existing programmes, strategies and funding schemes already cover all these challenging areas and Vision 2023 targets might give another impetus to further growth in RDI investments on the side of the government. Nevertheless it is of crucial importance that these investments should not only be reflected in improving statistics but also in real structural changes. Scientific excellence can not be achieved by solely facilitating the number of patent applications and the publication in high impact-factor journals. Excellence is much more a bottom-up, organic process, which is built upon a well-developed education system, on stable government policy and a transparent and effective support system.

Turkey is a large emerging market economy with steadily growing performance indicators. Nevertheless the coming years will show if Turkey is able to become from an agriculture and labour-intensive industry-based economy, built on cheap low-skilled labour force to a highly competitive, innovation and technology-based economy. Focused, efficient and properly monitored investment in STI and international cooperation are the only ways to achieve the ambitious goals of Vision 2023.

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Are Shariah-Compliant Structured Products Able to Withstand Global Financial Shocks? A New Perspective on the Performance of Shariah-Compliant Structured Investment-Linked Plans in Malaysia

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Islamic structured product is a shariah-compliant asset class that is considered as an innovation in the financial market. In view of the increasing presence of Islamic finance in the global financial scenario, research on Islamic structured product has captured substantial interests among the investment community searching for new alternatives, particularly during uncertain market conditions. This study aims to serve as one of the pioneering empirical references for investors to evaluate Islamic structured investments, and for the regulators to strengthen the regulatory framework for such products in order to continuously protect investors' interests and provide a conducive environment for further growth of the Islamic finance industry.

Keywords: Islamic finance, structured products, investment-linked, financial crisis

JEL Classifications: E44, E52, G21, G32

1. Introduction

Structured products have been getting fast attention from both retail and institutional investors as one of the investment alternatives in the Malaysian capital market. Apart from its key feature of "principal guarantee" upon maturity, structured products are well sought-after for its flexibility as these are tailor-made products with its investment performance linked to specific underlying assets such as security, index, currency, commodity or a combination of any of these, based on the risk and return profile of the investors.

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With this development, it is not surprising to witness the emergence of Shariah-compliant structured products in the Malaysian capital market, with the Islamic financial institutions such as banks and mutual fund managers taking the opportunity to meet the demand from Shariah-compliant investors by offering structured investments products through the issuance of structured deposits and structured unit trust funds. Interestingly, Takaful (Islamic insurance) operators have also been taking similar initiatives to attract retail and institutional contributors by offering structured investment-linked plans that comply with the Shariah requirements. Prior to the 2007/2008 global financial crisis, several of these products have received impressive take-up by the Takaful participants. Given the complexity of structured products and economic vulnerability of the global financial market post-crisis, this paper aims to explore the ability of the Shariah-compliant structured products in offering better investment returns as compared to the generic type of investments.

In view of the relatively recent nature of Islamic structured products and the role of Malaysia as the leader in Islamic finance industry, this research intends to increase the awareness on Islamic structured products and describe the evolution of these products in Malaysia. It provides an assessment of the impact of the global financial crisis in 2007/2008 on a specific segment of the Islamic financial market, that is by examining the performance of Shariah-compliant structured investment-linked plans offered by Takaful operators in Malaysia during the crisis. This research aims to serve as one of the pioneering empirical references for investors to evaluate the Islamic structured investments, and for the regulators to strengthen the regulatory framework for such products in order to continuously protect investors' interests and provide a conducive environment for further growth of the Islamic finance industry.

The following section provides a brief discussion on the nature and basics mechanisms of structured products including the risks associated with the products. Section 3 discusses the evolution of the Islamic structured product with a specific focus on Shariah-compliant structured investment-linked plans offered by Takaful operators in Malaysia. The performance analysis, which includes data and methodology employed, together with a discussion on the findings is presented in section 4.

Section 5 concludes the paper by highlighting the major findings of the study and provides suggestions for future research.

2. Structured Investment Products

2.1 What Are Structured Products?

Structured products were initially introduced in Malaysia in 2007 in the form of structured deposits offered by the local and foreign banks. With ample liquidity in the financial system, low and stable interest rate environment together with developing derivatives market, structured deposits become one of the most innovative banking products to offset the return from the low-interest rate environment. In view of the perceived high-risk nature in the use of derivatives for structured products, regulatory bodies have been vigilant in regulating investments associated with structured products. Prior to the issuance of specific guidelines on structured products, there are several guidelines issued by the central bank of Malaysia, Bank Negara Malaysia (BNM), in regulating the use of derivatives to structure an investment product[3].

Accordingly, in December 2003, the Securities Commission of Malaysia (SC), the authority that is responsible for regulating the Malaysian capital market issued the *Guidelines on the Offering of Structured Products*[4] which stipulate criteria that must be met with regard to any issuance, offer for subscription, or makes an invitation to subscribe structured products. By definition, the SC defines structured product as any investment product that falls within the definition of securities under the SC Act 1993 which provides the holder with an economic, legal or other interest in another asset (the underlying asset[5]) and derives its value by referring to the price or value of the underlying asset.

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[3] The relevant guidelines include *'Investment Linked to Interest Rate Derivatives – Sept 2002', 'Guidelines on New Product Approval Requirements – March 2003'* and *'Investment Linked to Derivatives – May 2003'*

[4] Revised edition dated 27 April 2007

[5] Underlying asset means any security, index, currency or other combination of such assets (Securities Commission, 2007, Guidelines on the Offering of Structured Products – Revised Edition)

By the same definition, BNM together with the Association of Banks in Malaysia (ABM) highlighted two main features of structured investments[6] being:

i) a fixed term investments which may be held to maturity depending on the features of the products. Redemption before maturity may result in investors losing part of the returns and/or principal;

ii) can either be a principal protected or non-principal protected structured investment. The risks involved in non-principal structured investments are much greater than principal protected structured investments as there is no guarantee on the amount of money the investors will receive even if it is held to maturity.

ISRA (2011) on the other hand defines structured product as below[7]:-

> *"Structured products are investment instruments specially created to meet specific needs that cannot be met from the standardised financial instruments available in the markets. Structured products can be used as an alternative to a direct investment; as part of the asset allocation process to reduce risk exposure of a portfolio; or to utilise the current market trend."*

Due to their complexity, structured products used to be available only to institutional and high net-worth investors. However, as investors become more sophisticated and well-informed on various investment options, risk profiles have increased, hence basic asset classes of the money market, equities and bonds are no longer adequate to meet the ever growing needs and return expectations of these investors. Together with the regulatory liberalisation in Malaysia, structured products are now accessible to the general investors via several structured investments such as structured deposits, structured unit trust funds and even structured investment-linked insurance plans.

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[6] As highlighted in Structured Investment Info Guide – First edition. 1 February 2007. http://www.bankinginfo.com.my

[7] International Shariah Research Academy for Islamic Finance (2011) *Islamic Financial System – Principles and Operations*, pp. 610

In terms of returns to investors, it is important to note that the returns on structured products vary, usually are not guaranteed, and highly dependent upon the performance of the underlying assets during the investment period (BNM and ABM, 2007). The stipulated coupon will only be paid if certain conditions are satisfied and/or maintained over the life of the investment. To a certain extent, losses may incur should the performance of the underlying assets differ from the initial expectation or if investment is withdrawn before maturity.

In Malaysia, some of the common structures offered are the interest rate-linked notes and equity-linked notes where the underlying or reference assets are the interest rates and listed equity, respectively. The performances of these interest rate-linked and equity-linked structured products are thus dependent on the performance of the respective underlying assets. Other structures available as outlined by the SC include the bond-linked notes, index-linked notes, currency-linked notes, commodity (contracts) linked notes and credit-linked notes.

2.2 How Do Structured Products Work?

The most appealing feature of a structured product is its flexibility and tailored investment approach (BNP Paribas, 2010). For example, structured product is able to offer investors full or partial capital protection coupled with an index linked performance for yield enhancement. Understanding how this is made possible with the use of derivatives particularly options is essential in order to comprehend the mechanism and risks embedded in the investment.

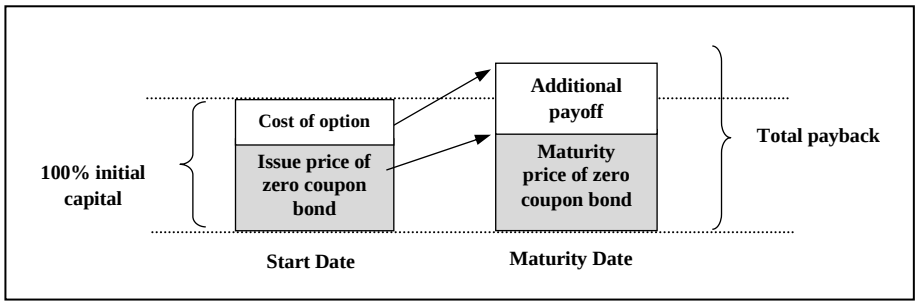
According to BNP Paribas (2010), structured product is normally comprised of two parts:

(a) a **fixed income security**, typically a zero coupon bond, which protects part or all of the invested principal at maturity;

(b) an **option-like instrument**, which provides a payoff in addition to the fixed income payments. This additional payoff is linked to the performance of an underlying asset, given specific conditions, and takes the form of either regular coupons or a one-off gain at maturity.

Hence, upon maturity, the zero coupon bond will be redeemed at par and provides investor with the capital protection or some may refer to as "principal guarantee", whereas the option, which offers investors' participation into the underlying asset, an index for example, pays out the performance should it meets all the specific condition outlined earlier in the structure (Figure 1).

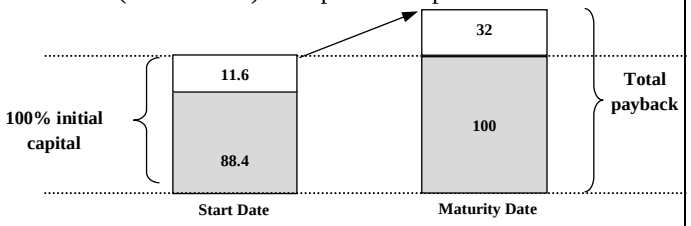
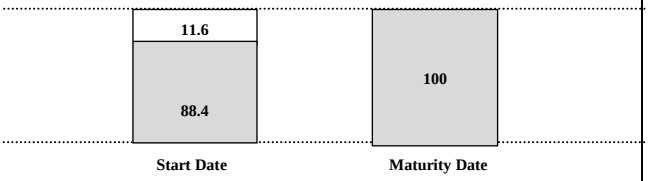
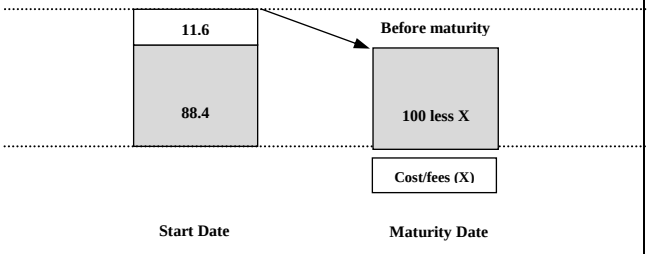
Figure 1: Mechanisms of Structured Product



With reference made to BNP Paribas (2010) and BNM and ABM (2007) on the modus operandi of the structured products, Table 1 below illustrates the structure of an index linked notes. Typically, this technique is applicable to all structured products with the difference mainly on the type of underlying assets selected.

Table 1: Illustration of Index-Linked Notes

A 5-year capital protected structured product with index linked performance exposure	
Initial investment	RM100,000
Underlying asset	FBM Kuala Lumpur Composite Index (FBMKLCI)
Structure	The RM100,000 initial investment is taken as 100 in percentage form by the structure provider, with full amount to be paid to investor upon maturity. Assuming a five-year Malaysian Government Securities (MGS) yields 2.5% p.a., hence a five-year zero coupon bond is worth 88.4, i.e. 100 in five years is worth 88.4 now. This leaves the structure provider with 11.6 (100 – 88.4) to purchase an option on the FBMKLCI and pay for administration costs and commission.

	Suppose a five-year FBMKLCI option costs 12, and adding 2 for administration and management fee costs, the investor will benefit from an 80% [i.e. (11.6 – 2) / 12] participation in the FBMKLCI upside, while having 100% protection on capital at maturity.
Payback upon maturity	<u>Optimistic Scenario</u> If FBMKLCI goes up by 40% over the 5-year investment period, the investor will obtain a return of 32% of the initial investment (80% x 40%) on top of the capital.  <u>Pessimistic Scenario</u> If FBMKLCI is down by 30% after 5 years, the investor will receive only the initial capital at maturity. 
Early redemption	Withdrawal or cancelation of investment prior to maturity will result in investors receiving less than the initial capital due to the cost or fees payable to the structure provider. 

Source: BNP Paribas (2010) and BNM and ABM (2007).

2.3 Risks Associated with Structured Products

According to Hasan (2010), structured products have no resemblance to any particular asset class or any standardised financial instruments, where some investment managers believe that it provides return profiles that are distinct from another form of investments. In other words, structured products can be designed for risk averse investors with the capital protection element, but at the same time, aiming at investing in risky assets which are normally intended for risk taker investors. Accordingly, a number of risk factors are associated with structured products that should be fully comprehended by investors as explained in Table 2 below.

Table 2: Risk Factors Associated with Structured Products

Risk factors	Details
Coupon income risk	The risk of obtaining lower return or even zero, as compared to the returns generated from traditional deposits or fixed income securities with similar credit quality and maturity, should the underlying asset do not meet the predetermined conditions during the life of the investment.
Credit risk	The risk of losing part or the entire investment capital as the capital protection feature is dependent upon the credit quality of the issuer, which is normally evaluated and rated by local and international rating agencies. As credit ratings reflect the independent opinion of the rating agencies, it is not a guarantee of credit quality. In the case of default, an investor may lose all or part of the principal as well as any accrued interest.
Liquidity risk	Early redemption may deter the whole structure of the structured product which may cause the resale price to be lower than the purchase price. Even though secondary market exists for the underlying assets and instruments used to ensure capital protection upon maturity, there is no guarantee that there exist a wholesale market where these instruments can be traded easily.
Call risk	As most structure may be called by the issuers prior to its maturity, investors may face reinvestment risk or risk of losing higher interest deposits or investments.
Exchange rate risk	Value of investments denominated in foreign currencies is subject to fluctuation in the currency market

Source: Maybank Investment Guide – Structured Products

In view of such risks, the structured investment brochure produced jointly by BNM and ABM in 2007 have meticulously listed down a checklist to be considered by the investors in order to ensure that they are well informed before making any commitments on structured investments.

3. Islamic Structured Products

With the innovation of structured products that are well accepted by the Malaysian investors, there exist growing needs for Islamic structured products among the investors that are shariah-observant as well as for those investors who would like to diversify their portfolios. While having basically similar mechanisms as the conventional structured products, the Islamic structured products use only the permissible Shariah compliant contracts.

3.1 Shariah Contracts Used in Islamic Structured Products

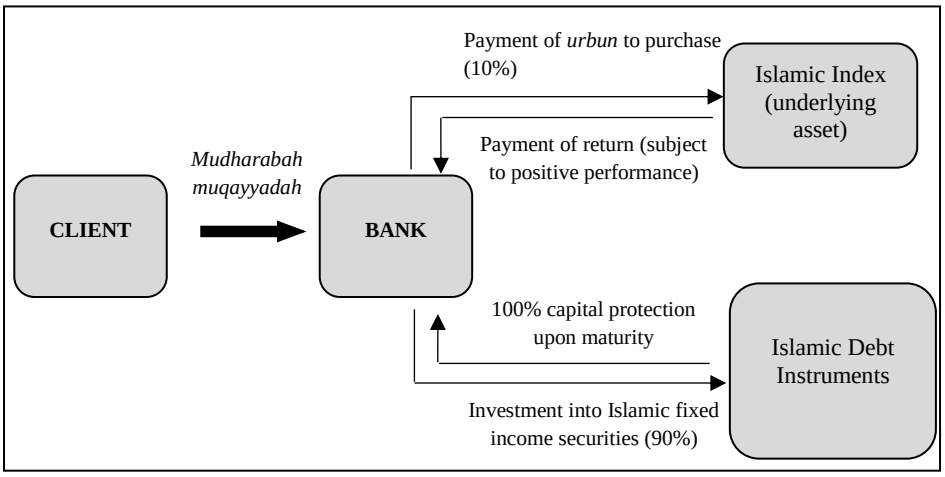
With reference to the relevant guidelines issued by the regulators, Shariah advisors together with industry practitioners have held comprehensive discussions in the effort to endorse structured products that are strictly compliant to the Shariah principles. Hence, countless conferences and workshops have been conducted in order to educate the public and address the issues in relation to the Islamic structured products.

Hasan (2010) highlighted that the most important element in designing the Islamic structured products lies on the nature of the contract. As with any Islamic finance products, Islamic structured products must adhere to the fundamental guidelines in Islamic finance such as free from *ribawi* elements, no *gharar* or gambling features, and must be fair and just to the parties of the contracts. There is also the need for continuous *ijtihad* in determining the nature and scope of the contracts.

Accordingly, the Shariah contracts to be utilised can be in the form of sale-based contract (like *murabaha* or *tawarruq*), participatory contract (like *mudaraba* and *musharaka*) or agency appointment for investment purpose (*al-wakalah bi al-istithmar*). As the use of option to provide exposure to the underlying assets is not possible in forming the Islamic structured product, the Islamic solution in the form of promise (*al-waad*)

and *urbun* (earnest money) have been widely used[8]. Figure 2 below illustrates one of the most common structure used under the Islamic structured product in Malaysia.

Figure 2: Islamic Index Restricted *Mudharabah* (*Mudharabah Muqayyadah*) Structured Investment-i



Source: Securities Industry Development Corporation (SIDC), the training and development arm of Securities Commission Malaysia.

3.2 Islamic Structured Products in the Market

As with the conventional structured product, the Islamic structured products were initially in the form of structured deposits, with prominent products such as Maybank Structured Islamic Deposit (Stride-i), CIMB Islamic All-Stars Global Restricted Mudharabah Structured Investment-i, Bank Islam *An-najah* NID-i and many more.

In addition, it is also observed that a number of new launches of Shariah-compliant structured unit trust funds and investment-linked plans have taken place in the Malaysian capital market, especially before

[8] For a comprehensive discussion on structuring Islamic structured products, please refer to Hasan, A., (2010). Islamic Structured Products: Issues and Challenges. Chapter 11 of *Current Issues in Islamic Banking and Finance, Resilience and Stability in the Present System*. World Scientific Publishing Co. Pte. Ltd, Singapore, pp. 189-228

the global financial market was stunned by the derailing impacts from the US subprime crisis in 2007/2008. As shown in Table 3 below, structured products in the form of Shariah-compliant unit trust funds and investment-linked plans with different kind of structures and underlying assets have managed to garner impressive take-up from the investors with the closing fund size of not less than RM100 million in 2007.

3.3 Shariah-Compliant Structured Investment-Linked Plans

With regard to the investment-linked Takaful plans, the year 2007 had witnessed the Takaful operators' commitment to remain competitive and stay abreast with the rapid development of the Islamic finance industry by introducing new Takaful products that would match the current market demand and appetite of the investors. Amidst the US financial market turmoil leading to the 2007/2008 global financial crisis, it was also observed that the Malaysian investors had found comfort in capital protected investments. As such, the Takaful operators have introduced investment-linked plans that combine both protection and investment tailored to provide the element of structured products offering the opportunity of capital protection upon maturity and yield enhancement based on the performance of the specific underlying assets.

Typically, a Shariah-compliant investment-linked plan is a single contribution plan[9] with fixed term of maturity. In order to incorporate the structured product features into the investment-linked plan, Takaful operators collaborate with a structure provider, normally a banking institution. The inclusion of the structured product element will then allow the Takaful operators to offer protection on the initial investment capital plus some potential returns subject to the performance of the underlying assets. This arrangement is similar to the illustration in Figure 2 and can be in the form of any Shariah contracts as specified earlier.

Other features of the investment-linked fund as guided by the "*JPI/GPI 33 – The Guidelines on Investment-linked Business*" issued by BNM

[9]Single-contribution plan is a one lump-sum contribution (payment) for Takaful products, as oppose to regular-contribution plan which can be either monthly, quarterly, semi-annually or annually. For further details, please refer to http://www.insuranceinfo.com.my/choose_your_cover/secure_your_future/investmentlinked_insurance.php?intPrefLangID=1

detailing out the Takaful coverage plan, the breakdown of contribution, fees applicable, penalties imposed for early redemption and other related matters must still be adhered to by the Takaful operators in offering the structured investment-linked plans. As shown in Table 3, there are two Shariah-compliant structured investment-linked plans offered to the general public namely the Takaful Global Giant by CIMB Aviva Takaful Berhad and HLTM Takaful Capital Protection Investment-linked by Hong Leong MSIG Takaful Berhad, being the first few Shariah-compliant investment-linked plans offered in Malaysia.

4. Performance of Shariah-Compliant Structured Investment Linked Plans

Previous studies examining the performance of investment-linked plans appear to be very scarce. Apart from the recent nature of the industry, an intuitive explanation to this is that investment-linked plans are regarded to be more of an insurance (coverage) plan, rather than an investment instrument plan. As such, the investment performance is treated only as a side income where the policy holders or participants (for Takaful) are expected to benefit more from the insurance/takaful coverage, i.e. death benefit, disability and critical illness. Notwithstanding that, a study undertaken by Noor (2009) provides some preliminary background on the available Shariah-compliant investment-linked offered by Takaful operators in Malaysia but is more focused on the use of the contracts from the Shariah perspective.

In the context of performance analysis, it is important to highlight that the investment-linked plan is linked to the unit price of an investment fund, hence the total value of the plan fluctuates with the movements in the unit price. For the purpose of evaluating the performance of Shariah-compliant structured investment-linked plan, it is essential to understand that the total value of the plan is also based on the investment fund which consists of the value of the fixed income instrument plus the performance of the underlying assets. Similar to the unit trusts funds, the prices of the investment-linked plans are also published daily in the newspaper for monitoring purposes.

Given that the valuation of the investment-linked plans resembles that of the unit trust funds, standard performance analysis can be undertaken by

referring to the methodology normally used to assess the performance of unit trust funds. Based on the seminal work of McDonald (1974) who utilises the pioneered methods of the Treynor Index, Sharpe Ratio and Jensen Alpha in measuring portfolio performance of United States of America's mutual funds, the use of these methods have grown extensively. By means of adjusting the return to the appropriate risks, these measures have been widely used as it could rank the portfolios on the basis of realized performance, as well as taking into account the selectivity and timing abilities of the fund managers. In addition, a newer method of risk-adjusted performance measuring in percentage terms was later introduced by Modigliani and Modigliani in 1997.

Similar approaches have also been undertaken for examining the unit trusts performance in Malaysia. A number of issues were addressed with regards to risk-return performance (see for example, Shamsher and Annuar, 1995; Shamsher, Annuar and Taufiq, 2000), selection and market timing (Annuar, Shamsher and Ngu, 1997), performance of Islamic and conventional funds across different economic conditions (Fikriyah, Taufiq and Shamsher, 2007; Onur, Ed and Ajay, 2007) and many more. With that, it is of interest to evaluate the performance of the Shariah-compliant structured investment-linked plans by referring to the appropriate measure previously used to measure the performance of unit trust funds.

4.1 Data and Methodology

With regards to the performance analysis of the Shariah-compliant structured products, this study provides a new perspective on the performance of Shariah-compliant structured investment-linked plans by means of a case study. A 3-year and 5-year Shariah-compliant structured investment-linked plans in Malaysia offered by Hong Leong MSIG Takaful Berhad[10] and CIMB Aviva Takaful Berhad[11] respectively are selected for the case study. The 3-year plan, HLTM Takaful Capital Protection Investment-linked (CPIL) which was launched on October 2007 garnered RM100 million at the closing and put forward the expected

[10] Previously known as Hong Leong Tokio Marine Berhad.
[11] Previously known as Commerce Takaful Berhad.

return of 15% per annum based on the back-testing[12] of the underlying assets. On the other hand, the 5-year Takaful Global Giant (TGG) was launched in June 2007 with the closing fund size of RM500 million. Monthly data from October 2007 to October 2010 for the CPIL are used, while for the TGG, the data cover from July 2007 to December 2011[13].

The return on the FTSE Bursa Malaysia Kuala Lumpur Composite Index (FBMKLCI) serves as a market benchmark, while the risk free rate is proxied by the three month BNM Treasury bills. In consideration of the changes in the Malaysian economic conditions as a result from the recent global financial crisis sparked in 2007, the data is divided into two periods in order to assess the impact of the crisis to the performance of the selected investment plans. The two periods are during the crisis (2007-2008) and post crisis of (2009-2010) and (2009-2011) for CPIL and TGG, respectively.

4.1.1 Measurement of performance

It is important to note that the selected plans will be evaluated individually in view of the different investment period. Essentially, these plans will be assessed whether they are able to provide the yield enhancement as compared to the traditional capital protected investment instruments such as fixed deposits or fixed income securities with similar term of maturity. The vulnerability of the plans will also be examined in view that the investment period encompasses the trying times of the 2007/2008 global financial crisis.

In this study, the risk-adjusted performance measure introduced by Modigliani and Modigliani in 1997 (hereafter referred to as M squared) is the most suitable methodology to measure the risk-adjusted performance of the respective CPIL and TGG. The advantage of M-squared over the standard techniques of Treynor, Sharpe and Jensen is that it reports the risk-adjusted performance of a fund as a percentage, which is easier for the lay investors to comprehend and to compare

[12] Back-testing is the process of evaluating a strategy, theory, or model by applying it to historical data (http://en.wikipedia.org/wiki/Backtesting) accessed on 14 April 2012

[13] The maturity date for TGG is on 26 July 2012. The analysis on TGG will be since its inception month of July 2007 up to December 2011.

against the return of other investment assets. The formula for calculating the M squared is as follows:-

$$\text{M squared} = \frac{R_i - R_f}{\sigma_i} * \sigma_m + R_f$$

where R_i, mean return on fund *i*; R_f, mean risk-free rate of return (3-month BNM treasury bills); σ_i, standard deviation of returns for fund *I*; and σ_m, standard deviation of returns for the market as represented by FBMKCLI.

Table 3: Shariah-Compliant Structured Capital Protected Funds Launched in 2007

No	Name of Fund	Fund Type*	Fund Owner	Structured Provider**	Fund Structure	Fund Tenor (Years)	Fund Size (RMm)	Expected Return#	Inception Date
1	Islamic All-Stars Global Restricted Mudharabah Structured Investment-i	UT	CIMB	CIMB	Restricted Mudharabah with the returns being referenced to Islamic Global Giants Structured Product issued by CIMB	5	300	Year 1: 8.00% p.a. Year 2: 8.50% p.a. Year 3: 9.00% p.a. Year 4: 9.50% p.a. Year 5: 10.00% p.a.	24 Jan 2007
2	ING Baraka Capital Protected I	UT	ING Funds Berhad	SGAM	Urbun concept with exposure into SGAM Al Baraka Index	3	516	19.18% p.a.	9 May 2007
3	Takaful Global Giant	ILP	CIMB Aviva Takaful Berhad	CIMB	Restricted Mudharabah with the returns referenced to the 5-year Islamic Global Giants Structured Product*** issued by CIMB	5	500	Year 1: 6.00% p.a. Subsequent years of up to 7.50% p.a.	27 July 2007
4	ING Baraka Capital Protected II	UT	ING Funds Berhad	SGAM	Urbun concept with exposure into SGAM Al Baraka Index	3	600	19.55% p.a.	30 July 2007

Table 3: Shariah-Compliant Structured Capital Protected Funds Launched in 2007

No	Name of Fund	Fund Type*	Fund Owner	Structured Provider**	Fund Structure	Fund Tenor (Years)	Fund Size (RMm)	Expected Return[#]	Inception Date
5	HLTM Takaful Capital Protection Investment-linked (CPIL)	ILP	Hong Leong MSIG Takaful Berhad	Citibank	Murabahah and Wa'ad concept with exposure into European and Japanese real estate investment trusts (REITs)	3	100	15% p.a.	19 Oct 2007
6	Prudential Shariah FX Fund	UT	Prudential	Prudential	Urbun concept with exposure into Shariah-compliant stocks which are linked to a set of foreign currencies	3	300	21% over 3 years or 7% p.a.	15 Aug 2007
7	ING Baraka Commodities Capital Protected	UT	ING Funds Berhad	SGAM	Urbun concept with exposure into 30 stocks from basic materials and oil & gas sectors	3	300	88.9% over 3 years or 29.3% p.a.	02 Oct 2007

Notes:
*UT = Unit Trust; ILP = Investment-linked Product. ** SGAM = Societe Generale Asset Management – now known as Amundi; CIMB = CIMB Islamic Bank Berhad; Prudential = Prudential Fund Management Berhad. *** Consists of selection of Shariah-compliant stocks from the emerging and global stock markets. [#] All expected returns are based on back testing with a specified range of period. Past performance is not indicative of future performance.

Sources: Respective product brochures, performance reports, newspapers and websites

4.2 Results and Discussion

The average return for the selected plans, risk-free asset and market proxy together with the related standard deviation are presented in Table 4 below with Panel A refers to TGG and Panel B for CPIL. For the whole investment period under review, both TGG and CPIL managed to record positive monthly average returns of 0.0549 percent and 0.0891 percent, respectively. While the average returns turned negative during the crisis, the turnaround of positive return post crisis may be due to the improvements of the underlying assets performance for both plans. The risk of the TGG is also observed to fluctuate during the crisis with higher standard deviation of 4.1801 recorded as compared to other periods. This is similar to the risk of the market proxy being the FBMKLCI as it recorded the highest standard deviation during the period of crisis. However, this is not the case for CPIL as very less movement is recorded for the price throughout the crisis period. Hence, the risk of the fund appeared to be stable throughout its investment period.

Based on this information, M-squared is computed to assess on the risk-adjusted performance for TGG and CPIL. Both TGG and CPIL recorded negative risk-adjusted performance of 0.1148 percent and 0.4693 percent, respectively for the whole investment period, while positive performance was only achieved post the global financial crisis. Given that these plans are a fixed term to maturity plans, not only the negative performances indicate the inferiority of the plans against the market, it also shows that the expected yield enhancement from the structured products element did not materialize. An intuitive explanation is that the 2007/2008 global financial crisis may have eroded the values of the underlying assets for these plans given that the negative performance was largely recorded during the crisis. Nevertheless, the positive performance in the post-crisis period reflects that the funds are quick to recover to register positive performance despite the prolonged market downturn and uncertainties in the global financial crisis.

A similar result is also obtained by assessing the non-risk-adjusted return for both plans. For example, the CPIL matured at the price of RM1.03092 on 18 October 2010, generated a return on investment of 3.092 per cent over the three year investment period as compared to its initial price of RM1.00. As for the

TGG, the price was recorded at RM1.0145 on December 2011, indicating a return of 1.45 percent since its inception. These returns are much smaller than the yearly average return of the low-risk traditional deposits[14] that commonly yield 3.46 per cent and 3.346 per cent over the respective investment periods for CPIL and TGG.

With very limited yield enhancement generated for the 3-year CPIL, the participants of the plan have benefited only from the Takaful coverage and their initial investment capital at maturity. The TGG which is maturing in July 2012, have also shown relatively poor performance as compared to the market and traditional deposits for the investment period under review. As such, despite the flexibility and tailor-made features of the structured products embedded into the Shariah-compliant structured investment-linked plans, they are not excluded from the negative impacts arising from the recent global financial crisis.

Table 4: Summary of Average Return, Risk and M-Squared Risk-Adjusted Return

Panel A: TGG						
	Average Return			**M squared**		
	All	**During**	**Post**	**All**	**During**	**Post**
R_i	0.0549	-0.2327	0.1908	-0.1148	-0.3955	0.1181
R_f	0.2304	0.2847	0.2048			
$R_i - R_f$	-0.1755	-0.5174	-0.0140			
σ_i	2.3770	4.1801	0.5897			
σ_m	4.6765	5.4956	3.6522			
Panel B: CPIL						
	Average Return			**M squared**		
	All	**During**	**Post**	**All**	**During**	**Post**
R_i	0.0891	-0.2961	0.3342	-0.4693	-2.8777	0.7541
R_f	0.2223	0.2831	0.1837			
$R_i - R_f$	-0.1333	-0.5792	0.1505			
σ_i	0.9617	0.9228	0.9232			
σ_m	4.9915	5.0362	3.4989			

Notes: 'All' refers to the whole investment period under review, while 'During' and 'Post' refer to during crisis (2007-2008) and post crisis (2009-2010) and (2009-2011), respectively for CPIL and TGG.

[14] Refer to the 12-month fixed deposits rate offered by the investment bank as compiled by Bank Negara Malaysia.

5. Conclusion

This paper aims to assess the impact of the recent financial crisis in a new perspective, by examining the performance of Shariah-compliant structured investment-linked plans offered by the Takaful operators in Malaysia. With the growing interests on the structured products by the investors, financial institutions in Malaysia have been aggressive in offering both conventional and Islamic structured products in the various forms of investments such as structured deposits, structured unit trusts funds and structured investment-linked plans. In order to assist the understanding of this newly innovative investment instrument in Malaysia, the foundation of structured products, the evolution of the Islamic structured products together with the modus operandi are highlighted in this study.

By means of case study on the first two Shariah-compliant structured investment-linked plans offered by Takaful operators in Malaysia, this paper discovers that the risk-adjusted returns calculated by using Modigliani and Modigliani (1997) are inferior to the return from the market. In addition to that, the calculated non risk-adjusted returns also indicate inferior performance of these plans as compared to the return from the traditional deposits during similar investment period for the respective plans. Hence, the flexibility and tailor-made features of structured products embedded into the Shariah-compliant structured investment-linked plans was not able to withstand the negative impacts arising from the 2007/2008 global financial crisis.

This study is an initial effort to evaluate the performance of structured products by assessing the Shariah-compliant structured investment-linked plans in Malaysia during the recent global financial crisis. It is hoped that this study could serve as a reference for investors on evaluating the structured products. In addition, more educational programs on the risks associated with investment into structured products is hoped to be conducted by the regulators and industrial practitioners in order to continuously protect the investors' interests. With more Shariah-compliant structured investment-linked plans being offered after 2007, this research could be extended to include these new plans to strengthen the deductions on the performance of structured products in Malaysia. The evaluation on the performance of other types of structured investment products may also be an interesting area of research in the future.

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