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EDITORIAL NOTE

This year's fourth Issue of *the Journal of Economic Cooperation and Development* – December 2017 is dealing with trends in the major economic indicators of the OIC countries in the light of economic development, trade, human capital and Waqf Institutions, encompassing the global, regional and national developments in the OIC member countries. In this connection, in this issue, we are pleased to choose seven main articles those analyse the effects of information asymmetry in voluntary lock-up provisions and performance of IPOs, trade divergence and trade convergence, motivational factors of female entrepreneurs in *de facto* states, asymmetry in causality between economic growth and energy consumption, ICTs reduction of youth unemployment in MENA countries, nonlinear effects of human capital on TFP and antecedents and outcome of Waqif's trust in Waqf institutions.

The first article deals with a lock-up provision that restricts insiders from selling or disposing of a certain portion of their shares for a prescribed period. Despite allegations that mandatory lock-up provision results in a loss of its signalling property, the presence of the voluntary element in its actual conduct suggests that the lock-up could still serve as an effective signalling mechanism for issuers. The article also postulates that a higher voluntary lock-up ratio signals the commitment of major shareholders to overcome the potential of moral hazard issues.

The second article uses a panel exports/imports gravity model to investigate Iran's trade pattern with its 50 top trading partners from Europe and Asia under sanctions. The main purpose of this study is to find out how Iran's trade pattern has been changed by sanctions. The empirical evidence revealed a significant negative effect of sanctions on Iran-EU bilateral trade, while it has a positive impact on trade between Iran and the Asian countries.

The third article examines the important growth of the body of literature on entrepreneurship, including female entrepreneurship, in developing countries. It also shows that a very small number of developing countries have no legal status as a sovereign entity, and operate within a *de facto*

framework. It sets out to identify a number of developing nations with *de facto* status, including the Turkish Republic of Northern Cyprus, the Republic of Kosovo, and Palestine. In detail, the motivational factors of entrepreneurs in these *de facto* states will draw attention to the possible links between the entrepreneurs of these regions, as well as comparisons to other developing nations.

The fourth article is to investigate the causation linkage between economic growth and electricity consumption as an indicator of energy consumption in the Turkish economy between year 1967 and 2014. Test results imply that there is a bi-directional causality between economic growth and electricity consumption. Moreover, an increase in electricity consumption does not affect economic growth positively but a decrease in consumption of electricity induces a decrease in economic growth. On the other hand, economic growth affects electricity consumption in both positive and negative shocks.

The fifth article examines the impact of Information and Communication Technologies (ICTs) on youth unemployment in MENA countries. Results show that fixed telephones and internet have a negative and significant effect on youth unemployment, on both aggregate and gendered levels. The results also indicate that for both aggregate and the gendered levels of youth unemployment in the MENA region, the impact of mobile phones is found to be negative but it is not significant.

The sixth article is meant to investigate the nonlinear relationship between TFP growth rate and human capital in 8 ASEAN countries over the period from 1990 to 2014. Using two-way fixed-effect Benhabib-Spiegel model, this study finds that human capital, denoting the innovation term, is negatively related with TFP growth rate. Meanwhile, the catch-up term, denoted by the interaction between human capital and the technology gap, has a positive effect on TFP growth rate.

The seventh and last article is undertaken to determine the ability of Waqf institutions toward influencing Waqif's trust and commitment. While board opportunism negatively affects trust, communication and accountability are found to have a positive association with Waqif's trust. Trust is also found

to have a positive impact on commitment. The established model does not consider social, economic and psychological dimensions that might determine Waqif's trust and commitment toward public Waqf institutions.

We will continue to give special attention to those papers which deal with the potentials for and possibilities of promoting and expanding economic and technical cooperation among developing countries as well as policy-oriented research papers which analyse successful economic development strategies and implementations in OIC Member Countries. I hope that this fine collection of articles will be a valuable resource for our readers and will stimulate further research. I would like to express my deep thanks and appreciation to the authors, referees and to all other contributors to this issue of the Journal of Economic Cooperation and Development.

Amb. Musa KULAKLIKAYA
Editor-in-chief

Voluntary Lock-Up Provisions and Performance of IPOs: Effects of Information Asymmetry¹

Rasidah Mohd-Rashid², Ruzita Abdul-Rahim, Norliza Che-Yahya and
Ahmad Hakimi Tajuddin

A lock-up provision restricts insiders from selling or disposing of a certain portion of their shares for a prescribed period. In Malaysia, most firms usually lock-up a higher portion of their shareholding than what is legally required. Despite allegations that mandatory lock-up provision results in a loss of its signaling property, the presence of the voluntary element in its actual conduct suggests that the lock-up could still serve as an effective signaling mechanism for issuers. This study postulates that a higher voluntary lock-up ratio signals the commitment of major shareholders to overcome the potential of moral hazard issues. Consequently, investors would be attracted to subscribe to IPOs once the risks were less evident and higher returns could still be expected. This study employs a data set from a sample of 373 IPOs listed on Bursa Malaysia from 2000 to 2012 to examine the impact of voluntary lock-up ratio on the initial returns of IPOs in the presence of information asymmetry. The findings demonstrate that voluntary lock-up ratio is significantly positive in influencing initial returns. Further analysis reveals that voluntary lock-up ratio is more consistent with signaling risk than with the quality of IPOs.

Keywords: Voluntary lock-up ratio, initial returns, signaling theory, IPOs, quantile

1. Introduction

The enforcement of lock-up provision (also known as share moratorium) on issuers of initial public offerings (IPOs) aims to prevent substantial shareholders (referred to as “promoters” in Malaysia) from selling or

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disposing of their shares for a specified period following a listing. One of the reasons for having the share moratorium guideline in Malaysia is to avoid excessive selling by insiders after the IPOs are listed, as such action is most likely to have an adverse impact on the IPO price. Therefore, the mandatory lock-up provisions implemented in May 1999 on major shareholders (or promoters) of IPO issues was mainly to avoid such an adverse effect. While there is sufficient empirical evidence on the effect of lock-up agreement in other developed markets, specifically the UK, the US, and Australia, the implementation is voluntary. Therefore, investors from developing markets, specifically Malaysia, cannot make their investment decisions based on the findings in these markets.

In Malaysia, one may argue that the mandatory nature of the lock-up provision makes it a norm, and therefore should no longer play a significant role in IPO investment decisions. Nonetheless, our preliminary observation shows that although IPO issuers are legally required to lock 45 percent of the shareholding, most of them lock-up higher percentages. In short, despite the mandatory lock-up provision, the voluntary elements in the lock-up ratio show insiders' commitment to, and significant economic interest in, the firms. Furthermore, since such a decision implies that insiders are willing to bear the opportunity cost of foregoing a quick profit during the IPO listing, it shows that the voluntary component of the lock-up ratio carries an important signal about IPOs.

In Malaysia, the relationship between lock-up provision and initial returns was examined by Wan-Hussin (2005), who employed the blocked portion of directors' shares to measure the lock-up ratio. His study covered the period before the commencement of the mandatory lock-up regime on May 3, 1999. However, a recent study by Mohd Rashid et al. (2014) found that the lock-up period is significant in explaining initial returns but not the lock-up ratio. Given the different findings, the present study pioneers an examination of the role of lock-up provision from the voluntary aspect of its implementation, during the period when mandatory lock-up was in effect. Specifically, this study is different from previous ones (Wan-Hussin, 2005; Mohd Rashid et al., 2014) in that it segregates the lock-up provision into voluntary and mandatory portions.

This study adopts the argument presented by Courteau (1995), who extended the signaling model of Leland and Pyle (1977) to examine insiders' reliance on IPO lock-up as a signaling mechanism. According to Courteau (1995), insiders of a high-quality firm would more likely agree to a longer lock-up period, despite the potential opportunity costs of holding onto an undiversified portfolio. Rationally, insiders would not adhere to the lock-up agreement unless and until they foresaw that the accrued benefits offset the costs. In similar vein, Grinblatt and Hwang (1989) suggested that high-quality firms gauge their prospects by divesting only a small portion of their total shares at IPOs. Retaining or locking up a larger percentage of their shares would validate their belief in better prospects or the higher quality of their firms. Such a positive signal would normally attract favorable market reaction through higher prices upon listing. Accordingly, the optimistic signal results in positive initial returns.

Nonetheless, the positive relationship between lock-up and initial returns could also serve as a signal of risk. Brav et al. (1999) cautioned that both lock-up ratio and lock-up period reveal the risk-bearing capacities of IPO issuers. This is because they reckon firms with higher information asymmetry tend to commit to a longer lock-up period and higher lock-up ratio, which subsequently leads to deeper IPO underpricing. The argument that voluntary lock-up ratio signals risk is also consistent with a recent finding by Gao and Siddiqi (2012), who showed that firms with a longer lock-up period have greater agency problems and poor long-term performance. Mohan and Chen (2001) also reported a similar positive relationship between lock-up period and initial returns in developed markets. They believe that as a longer lock-up period alludes to uncertainty of the firm's value, a deeper underpricing is required to obtain full subscription of the IPOs. Drawing from this argument, this study contends that insiders in high-risk firms are more likely to agree to voluntarily commit to a larger percentage of shares to be locked up (than the minimum requirement of 45% under the 1999 Equity Guidelines).

Effective May 3, 1999, the Securities Commission (SC) of Malaysia imposed a standard requirement of a moratorium on the disposal of shares by IPO promoters, amounting to 45% of the enlarged issued and paid-up capital of the company for at least one year from the date of listing (Securities Commission, 1999). Several amendments to the

provision denote stricter enforcement of the regulations. While the continuous concerns of the market regulator suggest the need for empirical studies, there are allegations that once the lock-up provision is enforced, committing to it becomes a normal activity, such that it loses its signaling property. In this respect, the Malaysian IPO market is unique because issuers in this market generally voluntarily lock-up a larger proportion of their shares than the stipulated amount. In short, the presence of a voluntary element in the implementation of lock-up provision in this market could still serve as an effective signaling mechanism for issuers.

This study attempts to bridge the gap in Malaysian IPO literature by examining the role of voluntary lock-up ratio in explaining the initial returns of IPOs in the presence of information asymmetry. Signaling content is more prominent in an environment characterized by severe information asymmetry (Carter and Manaster, 1990; Leland and Pyle, 1977; Riley, 1979; Spence, 1976). This argument is consistent with Eldomiaty (2008), who postulates that developing markets have higher information asymmetry than developed markets. Since this study focused on a single market, the extent of information asymmetry was captured through an intra-IPOs mechanism. This study grouped the IPOs based on their market capitalization (Fama and French, 1993) to identify IPO firms operating in an environment of high information asymmetry (smaller firms) and those that do not (bigger firms). Previous studies by Goergen et al. (2006), Beatty and Ritter (1986), and Barclay and Smith (1995) conjectured that small firms have high information asymmetry compared to large firms, which are normally more established and therefore, information is more widely available. Furthermore, the use of quantile regression in examining the influence of voluntary lock-up ratio on different quantiles of initial return is another contribution of this paper.

The structure of the rest of this paper is as follows: Section 2 reviews relevant studies to provide a theoretical and empirical basis for hypothesis development. Section 3 discusses the data and methodology, while Section 4 presents and discusses the results. Finally, Section 5 provides the conclusion, limitations, and implications of the results.

2. Literature Review

Lock-up provision in Malaysia is mandatory, yet its voluntary elements could provide an important signal to investors, as it reflects the commitment of major shareholders to hold a certain portion of shares for a prescribed period (Arthurs et al., 2009; Hakim et al., 2012). Courteau (1995) formulated a voluntary lock-up model on the premise that issuers are able to signal the future outlook of their companies through the voluntary element involved in the lock-up provision. She contended that insiders of high-quality firms are more likely to agree to a longer lock-up period. In such situations, insiders agree to retain their shares, and thus have to hold on to an undiversified portfolio. This implies that restricting the sale of stocks for a longer period imposes a cost to them. Given that the commitment to lock-up represents a cost, only insiders of firms of high quality would agree to lock for a longer period. On the other hand, insiders of low-quality firms would opt for shorter lock-up periods because they would be unwilling to bear the cost of committing to a longer lock-up period.

Similar to Courteau (1995), Brav and Gompers (2003) suggested that given the adverse selection problem, both mandatory and voluntary lock-up provisions serve as a commitment device to gain the trust of investors and thereby induce them to subscribe to new shares at the IPO offering. In a similar vein, Nowak (2004) reaffirmed that the mandatory prohibition of share disposal is a signal to the public that the IPO issuers are committed to the well-being of all shareholders. Recently, Ramírez et al. (2011) also claimed that the lock-up provision is costly for insiders; nevertheless, it provides a positive signal on the firm's value. In contrast, voluntary lock-up goes a step further by also signaling the quality of the issuers. According to Nowak (2004), IPO firms have incentives to commit to voluntary lock-up conditions for signaling reasons. To a certain extent, his finding is consistent with his assertion as it shows that towards the expiry of the lock-up period, an adverse price reaction is considerably higher for a voluntary lock-up arrangement than a mandatory lock-up arrangement.

This argument is further supported by Grinblatt and Hwang (1989), who concurred that high-quality firms tend to signal their confidence through the retention of a larger portion of total shares. Assuming the market is efficient, such a positive signal would rationally trigger a favorable

market reaction by increasing the IPO price upon its listing. Consequently, there is a positive relationship as the good signal voluntary lock-up ratio sends results in higher initial returns.

However, the opposite relationship could arise if investors perceive the good-quality signal as low risk. The risk-return trade-off hypothesis indicates that such IPOs offer lower initial returns. Goergen et al. (2006) noted that small and young firms, which reflect characteristics of high uncertainty in Germany and France, tend to commit to longer lock-up periods and retain a higher proportion of the shares. However, the authors did not find evidence that these firms signal superior quality, despite insiders holding their shares for a longer period than the mandatory requirement. Recently, Yung and Zender (2010) also confirmed that firms with the moral hazard problem tend to lock in their shares for a longer period. Based on this study, high-risk firms would not only agree to a longer lock-up period but also for a larger lock-up ratio. This reflects an additional commitment that emanates from a voluntary decision of insiders in the firms.

With respect to the signaling hypothesis, it is crucial to note that signaling is more prevalent in an environment in which there is acute asymmetric information. In the context of an IPO, there would be information asymmetry and limited information made available to the public (Carter and Manaster, 1990; Leland and Pyle, 1977). Although IPO issuers are legally required to disclose their full information in the prospectus, pre-IPO owners tend to misrepresent the information (Riley, 1979; Spence, 1976). Investors, therefore, would usually search for other good signals that might be relevant to determine the firm's value (Downes and Heinkel, 1982; Spence, 1976). Ritter and Welch (2002) explained that rational investors have to be assisted to mitigate their fears about the "lemon" problem since they know that issuers are always better informed than investors.

Based on the arguments and evidence presented, the present study hypothesizes that:

- H1: Voluntary lock-up ratio has a positive influence on the initial returns of IPOs.
- H2: Information asymmetry moderates the positive influence of voluntary lock-up ratio on initial returns.

3. Research Methodology

The sample for this study is selected from IPOs listed on Bursa Malaysia (formerly known as the Kuala Lumpur Stock Exchange) between 2000 and 2012; that is, after the implementation of the mandatory lock-up provision that took effect on May 3, 1999. Data sources include websites of Bursa Malaysia and the Securities Commission, companies' annual reports and prospectuses, Datastream and the Star on-line. This study excludes special types of offers and IPOs with missing data and extreme outliers to avoid less meaningful outcomes. The final sample consists of 373 IPOs, representing 78 percent of the total IPOs issued during the study period. In order to incorporate the effects of information asymmetry, the samples for this study are sorted into three portfolios based on the Fama and French (1993) size factor, i.e., market capitalization of the issuing firms and then size of the IPOs' issues to test robustness. The proposition that firms' size proxies information asymmetry is consistent with the common association between smaller and younger firms, and a higher information asymmetry between insiders and outsiders, as stated by Goergen et al. (2006) and Barclay and Smith Jr., (1995). The dependent variable, initial returns (*IROPEN*), is calculated as follows;

$$IROPEN_i = \frac{(P_i^{OPEN} - P_i^{OFFER})}{P_i^{OFFER}} \quad (1)$$

Where P^{OPEN} is opening price on the first listing day; and P^{OFFER} is the offer price of the IPOs. This study employs a cross-sectional regression model in the following form:

$$IR_i = \alpha + \beta_1 VLR_i + \beta_k \sum_{k=1}^K CV_{i,k} + \varepsilon \quad (2)$$

Furthermore, to get a more complete picture of various distributions, we examine the impact of voluntary lock-up ratio in different quantiles of IPO initial return. This study employs the quantile regression approach proposed by Koenker and Bassett Jr (1978). In estimating the standard error for quantile regression, this study uses Chamberlain's bandwidth and the Epanechnikov kernel function, as suggested by Pagan and Aman (1999) that could minimize the mean integrated squared error. Another method of quantile regression is using the bootstrap if the study sample

has heteroskedasticity. However, the quantile regression of heteroskedasticity errors is not present.

To examine the moderating effect of information asymmetry, an interaction variable ($VLR * MKTCAP$) is introduced into the basic model in Equation (2).

$$IR_i = \alpha + \beta_1 VLR_i + \beta_2 (VLR * MKTCAP)_i + \beta_k \sum_{k=1}^K CV_{i,k} + \varepsilon \quad (3)$$

Where VLR is the voluntary lock-up ratio, which is the difference between the actual and mandatory lock-up ratio³; α is the intercept; β is the estimated coefficient, and ε is the error term. CV_k is a set of variables from $k = 1, \dots, K$ which are controlled for in this model due to their significant influence on initial returns, as documented in previous studies (Bradley and Jordan, 2002; Mohd-Rashid et al., 2013a; Mohd Rashid et al., 2013b; Su and Fleisher, 1999). Variable k includes $MKTCAP$ (*Total number of shares outstanding post IPO x Offer Price*) to proxy for the supply of IPOs. OSR is the oversubscription ratio, which proxies demand for IPOs. $DPRIV$ is the dummy, and equals one for an IPO issued with private placements and zero otherwise, which proxies for institutional investor participation (Che-Yahya et al., 2014). $RISK$ of the IPO is calculated as the reciprocal of the offer price, $MKTCON1$ equals $(PI^{LISTING} - PI^{OFFER})/PI^{OFFER}$ where PI is the price index of the EMAS index and $MKTCON2$ equals $(PI^{LISTING} - PI^{3 \text{ months prior to offer}})/PI^{3 \text{ months prior to offer}}$. Finally, the interaction term is the product of VLR and $MKTCAP$.

4. Results and Discussion

Figure 1 illustrates the trend of the voluntary lock-up ratio and initial returns of Malaysian IPOs between 2000 and 2012. It is pertinent to note that as argued in an earlier section, voluntary lockup ratio remains prevalent in the practice of Malaysia lock-up provision. The highest voluntary lock-up ratio was reported in the category of initial return higher than 100 percent (11%). On average, the voluntary lock-up ratio was 8 percent, ranging from the highest voluntary lock-up ratio of 38.53

³ The portion of voluntary lock-up ratio is further confirmed by checking the shareholdings of the affected shareholders in the prospectus against those reported in the first annual report after the IPO was listed.

percent to nil. The highest voluntary lock-up ratio recorded was for D&O Ventures Berhad, an IPO listed in 2004.

Table 1 presents the profiles of the variables employed in this study. As shown in Table 1, the average voluntary lock-up ratio shows that most of the issuers intentionally lock-up higher ratio either as a commitment device signaling the quality of the IPO or to offset the uncertainty of the issuers. The increasing trend of the voluntary lock-up ratio that coincides with the increasing trend of initial return of IPOs motivates this study to further examine the significance of the voluntary lock-up ratio in explaining the initial return. It is also worth noting that the results of the Wilcoxon Z-score for the low versus high initial return categories indicate that all the variables have a significant difference except for the private placements. The preliminary result also suggests that each of the selected variables in this study behaves differently in influencing initial returns.

Table 2 (Panel A) reports the estimated coefficients obtained from the regression analysis after correcting for autocorrelation, using the Newey-West procedure and remedying heteroskedasticity problems using the White Heteroskedasticity test. The regression models also passed the Ramsey Reset test of model specification. The coefficient of the VLR indicated a positive and significant effect of voluntary lock-up ratio on initial returns and hence, the first hypothesis is not rejected. This finding is consistent with the study by Courteau (1995), who claimed that insiders could use voluntary lock-up as a signaling device. The positive relationship probably proves that when insiders lock up more than the mandated proportion, investors interpret it as a signal on the future prospects of the firms. Therefore, the signal triggers investors' willingness to pay a higher price for the IPOs (Allen and Faulhaber, 1988; Grinblatt and Hwang, 1989; Welch, 1989). Similarly, Grinblatt and Hwang (1989) suggested that the positive signal indicates more investors are attracted into the IPO market, and the reaction accordingly pushes the price up upon listing. This finding is also consistent with Nowak (2004), who asserted that voluntary lock-up not only signals commitment, but also indicates the quality of the underwriter. Since risk in Table 2 is barely significant, the voluntary lock-up ratio could reflect either signaling commitment or the firm's quality, and in turn be construed as lower risk. Although the finding appears consistent with the quality-signaling hypothesis, further analysis is required to identify

whether a signal of risk could also lead to a positive relationship between these variables.

In examining the second hypothesis, this study adds an interaction variable constructed from the product of market capitalization and voluntary lock-up ratio (Eq. (3)) in Table 2 (Panel A). To ensure the interaction variable can be interpreted and fulfills the assumptions of the multiple regression, the interaction model uses the centering method, as suggested by S.Aiken and West (1991). This would avoid the multicollinearity problem. The coefficient of the interaction variable is significant and negative in explaining initial returns such that the second hypothesis is accepted. The result implies that the effect of voluntary lock-up ratio on initial returns depends on the level of information asymmetry. Comparing the coefficient of voluntary lock-up ratio in the regression model that includes the interaction effect, we find that the coefficient of the latter is higher than the former. This reflects that information asymmetry enhances the effect of voluntary lock-up ratio on initial returns. It is also important to note that in the interaction model, the coefficient of risk improves its significance. This finding indicates that the signaling content of voluntary lock-up is more prevalent in firms with high information asymmetry than low information asymmetry.

This study also used the quantile regression method to examine Equation (2) at 3 quantiles, namely the 25th, 50th and 75th. The quantile regression in Table 3 provides us information on the impact of voluntary lock-up ratio at different levels of initial returns. Based on the findings in Table 3, the results show that there is a significant positive relationship between voluntary and initial returns in all three quantiles. To ease the discussion, we will focus on the finding of the main variable – the voluntary lock-up ratio. By comparing the finding in different quantiles, the coefficient on voluntary lock-up ratio at the 25th quantile is higher than the median and 75th quantile. The finding suggests that the positive impact of voluntary lock-up ratio is stronger in lower initial returns. This finding seems to be consistent with our argument that firms with higher information asymmetry tend to hold higher voluntary lock-up ratio in order to entice investors to subscribe to the IPOs. However, voluntary lock-up provision does not seem to help in alleviating the uncertainty from the perspective of investors.

To examine the second hypothesis, this study repeats the regression of Equation (2) on sub-samples of large and small firms to gauge the role of lock-up in explaining initial returns of IPOs at different levels of information asymmetry, as shown in Table 4 (Panel B). According to Brav and Gompers (2003), firms with a higher moral hazard problem lock up their shares for a longer period or hold a larger portion of their shares as a form of commitment. Based on the results in Table 4 (Panel A), the voluntary lockup ratio appears to have a slightly greater influence on initial returns in the sub-sample of firms with high information asymmetry. This finding is also further supported in Table 4 Panel (B), where for the robustness test we use size (supply) of the IPO as another proxy for firm's size. Both findings in Panel A and Panel B in Table 4 show that voluntary lock-up ratio is significant and has a greater influence on firms with higher information asymmetry. This finding marginally supports the proposition by Brav and Gompers (2003) that firms with a high degree of uncertainty tend to hold a large portion of the shares during the lock-up period. Similar to the results of the interaction model, the role of risk is more significant in the small firms' sub-sample than that of the large firms.

Based on the evidence thus far, the voluntary lock-up ratio indicates either the signaling quality or risk of the IPO firms. Signaling of quality could be verified if a higher voluntary lock-up ratio results in increased demand for the IPO (Arthurs et al., 2009). As posited by Courteau (1995), quality signaling is evident from the effect of lock-up ratio on demand. When demand for quality IPOs is high, the bid on the price has to be exceptionally high to allure shareholders who are reluctant to sell their IPOs, which subsequently increases initial returns. Although demand (OSR) consistently plays a significantly greater role than risk in explaining initial returns, the indifference in its role throughout the samples only suggests that, *ceteris paribus*, the greater demand imposes additional pressure on the price of IPOs. In order to verify the quality versus risk signaling hypothesis, Table 5 (Panel A) reports profiles of firms in low versus high voluntary lock-up ratio (VLR) sub-samples. The results indicate that IPOs with high VLR exhibit risk which is only slightly higher than IPOs with low VLR. Nonetheless, high VLR IPOs report significantly higher demand and considerably higher initial returns.

Although the evidence so far has tended to support the signaling quality hypothesis, the high demand could be due to the small supply of those IPOs. Although small supply could reflect quality if it is due to a large proportion of retained shares, it could be interpreted otherwise when the high VLR IPOs are issued by small firms with high information asymmetry and uncertainty. As such, a voluntary lock-up ratio reflects the issuer's commitment to hold the shares as a form of insurance to minimize uncertainty of the IPOs after listing. This is in line with Goergen et al. (2006) and Brav and Gompers (2003), who stated that small and nascent firms, which normally have a greater level of uncertainty, hold on to a larger proportion of their shares. As observed in Table 5 (Panel B), voluntary lock-up ratio is significantly higher for IPOs of small firms than big firms. Small firms also report significantly higher initial returns, investor demand, and risk while at the same time offering smaller IPOs. The high initial returns compensate for the higher risks, and the high demand could be due partly to the involvement of institutional investors (via private placements). Overall, the findings are more lenient towards associating the positive impact of the voluntary lock-up ratio with risk rather than quality signaling.

5. Conclusion and Implications

This paper examines the role of voluntary lock-up ratio in explaining initial returns. Employing a data set from 373 IPOs issued by firms listed on Bursa Malaysia between January 2000 and December 2012, this study hypothesizes that the voluntary component of Malaysian IPOs' lock-up ratio is significantly positive in influencing initial returns. Further analysis indicates that the effect of voluntary lock-up provision on initial returns is stronger by having an interaction with information asymmetry as a proxy based upon the size (market capitalization) of the IPO firm. The finding supports the view of the role information asymmetry serves in influencing the relationship between voluntary lock-up ratio and initial returns. Furthermore, using quantile regression, the finding suggests that the influence of voluntary lock-up ratio on initial returns is stronger in the lower initial return quantile. In addition, the finding shows that the voluntary lock-up ratio is higher for IPOs of small firms with a greater degree of uncertainty, and that this leads to higher initial returns among IPOs of small firms. In other words, IPOs are more deeply underpriced to compensate investors for bearing greater risks. Segregating the IPO sample into high and low voluntary lock-up

ratio, this study finds that higher voluntary lock-up ratio is associated with IPO-issuing firms that are significantly smaller and have high information asymmetry. Evidently, the risk of the smaller IPO firms is also higher than that of the larger firms. This strengthens our supposition that voluntary lock-up ratio is more lenient towards signaling risk than the quality of the IPO. As far as quality signaling of the voluntary lock-up ratio is concerned, higher voluntary ratio IPOs tend to be in greater demand. Nonetheless, small firms commonly issue IPOs that are of significantly higher risk than those of large firms. The high demand could be attributable to the involvement of institutional investors. It could also be due to the limited supply of these IPOs.

This study's findings have several important implications. Investors should take cognizance of voluntary lock-up ratio and/or issuers who commit to hold a higher proportion of shares, as this increases investors' chances of obtaining initial returns on IPOs. Regulators have to carefully determine the lock-up provision levels (in the Equity Guidelines), since it has proven to be a factor that is priced by the market. Future research could validate the finding that voluntary lock-up ratio signals risk by examining the long-term performance of IPO firms. Secondly, alternative measures of risks could ensure the robustness of the results. Future studies could also re-examine the effects of information asymmetry. Although this issue is prevalent in developing markets, there is no solid evidence to show that signaling content is stronger in IPOs with higher information asymmetry. The inability to reveal such evidence could stem from two reasons. First, due to the difference in information asymmetry, it might be difficult to share information among companies operating in the same setting or environment. Although accessibility to information among larger firms is better than among smaller firms, information concerning the companies remains somewhat limited, given that IPOs are the first avenue for companies to go public. Second, the proxy of information asymmetry employed in the present study (i.e. size or market capitalization) might not be sufficient to capture the differences in firms' information asymmetry. Moreover, the effect of voluntary lock-up provision has to be examined further, taking into account other elements of the IPO market. Finally, the fact that the models' adjusted R-squared variable is only about 32 percent and the intercepts of the models are consistently significant, means that more factors need to be considered in explaining initial returns.

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APPENDIX

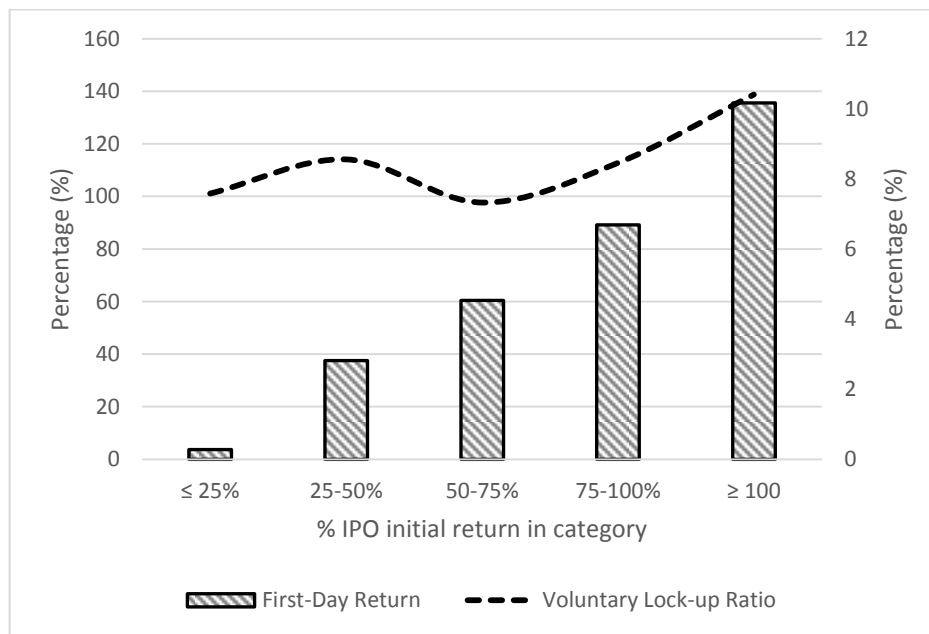
Figure 1: Yearly voluntary lockup ratio (VLR) and initial return (IROPEN)

Table 1: Descriptive Statistics for the variables of the research

Initial Returns in Each Category (%)	IPO Characteristics (Mean)						Wilcoxon (Z Score) $\leq 25\% - \geq 100\%$
	$\leq 25\%$ (N=226)	25-50% (N=70)	50-75% (N=26)	75-100% (N=22)	$\geq 100\%$ (N=29)	All IPOs (N=373)	
DPRIVATE	0.77	0.72	0.92	0.63	0.65	0.76	-1.413
PROCEED (RM mil)	235.9	354.41	157.80	166.18	154.91	152.03	-3.947**
PRIV (RM mil)	230.12	170.47	233.84	156.18	173.9	21.76	-0.226
IROPEN	3.73	37.63	60.49	89.16	135.62	29.35	-8.767***
OSR	16.40	38.89	50.71	64.80	75.28	30.45	-5.626***
RISK	1.54	1.52	2.44	1.95	2.25	1.68	-1.777**
VLR	7.58	8.55	7.32	8.45	10.40	8.02	-2.416***
MKTCON1	-0.06	1.32	2.71	-0.03	2.12	0.56	-2.067***
MKTCON2	2.80	4.27	5.06	8.43	12.36	4.31	-3.447***
MKTCAP. (RM Million)	713.9	133.36	595.81	673.87	652.77	470.04	-3.6336***

Note: DPRIVATE = dummy for issue with private placement, PRIV = private placements, PROCEED= total amount offer, IROPEN= initial return offer to open, OSR= demand, RISK= reciprocal offer price, VLR= voluntary lockup ratio, MKTCON1= market condition during IPO, MKTCON2= market condition prior IPO and MKTCAP= market capitalization.

Table 2: OLS regression of the Voluntary Lock-up Ratio on the Initial Returns and Interaction Effect

Independent Variables	Panel A		Panel B	
	Coefficient	t-statistics	Coefficient	t-statistics
VLR	0.0037	2.4046**	0.0038	2.1832**
DPRIVATE	-0.1549	-4.8690***	-0.1548	-4.1650***
LNMKTCAP	-0.0396	-3.0627***	-0.0494	-3.4954***
MKTCON1	0.0132	4.9576***	0.0133	4.7665***
MKTCON2	0.0045	4.5119***	0.0045	3.9133***
OSR	0.0027	8.6867***	0.0027	7.1821***
RISK	0.0190	1.6553*	0.0173	2.3970**
LNMKTCAP*VLR			-8.1063	-3.1915***
C	0.8855	3.4879***	1.0653	4.0599***
Adjusted R-squared		0.3291		0.3298
F-statistic		27.0771***		23.883***
Durbin-Watson stat		1.7168		1.7257
VIF range		1.1-1.4		1.1-1.4
Jarque-Bera residual		10.5585***		11.4456
RAMSEY RESET (F-statistic)		0.8416		0.4227

Notes: ***, **, * indicate significance at 1%, 5% and 10% respectively (N=373).

Table 3: Quantile Regressions of the Voluntary Lock-up Ratio on the Initial Returns

Independent Variables	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
	25 th Quantile		50 th Quantile		75 th Quantile	
VLR	0.0016	1.8302*	0.0022	1.6928*	0.0033	1.6741*
DPRIVATE	-0.0357	-1.4673	-0.1065	-4.1060***	-0.2923	-4.8836***
LNMKTCAP	-0.0232	-1.7536*	-0.0312	-3.3034***	-0.0562	-5.2494***
MKTCON1	0.0021	2.3528***	0.0025	2.5557***	0.0045	4.2133***
MKTCON2	0.0087	3.0376***	0.0109	4.0893***	0.0143	3.3581***
OSR	0.0022	8.3367***	0.0032	9.7577***	0.0031	6.3212***
RISK	-0.0084	-0.5652	0.0097	0.7045***	0.0222	1.7489*
C	0.0016	1.7548*	0.0022	1.6928***	0.0033	6.1050***
Pseudo R-squared		0.1268		0.2059		0.2484
Observations		373		373		373

Notes: ***, **, * indicate significance at 1%, 5% and 10% respectively. Chamberlain's bandwidth and Epanechnikov kernel function estimation is use for quantile regressions.

Table 4: OLS regression of sub-samples of size factor

Dependent variables: IROPEN										
Panel A (Market Capitalization)										
Ind. Variables	Big Firms = Low IA			Small Firms = High IA			Panel B (Total Size of Issues)			
	Coefficient	t-statistics		Coefficient	t-statistics		Big Firms= Low IA	Small Firms= High IA		
VLR	0.0042	2.9107***		0.0044	2.9379***		0.5641	2.5667***	0.5841	2.6356***
DPRIVATE	-0.1343	-4.0102***		-0.1357	-4.0587***		-19.9423	-4.1465***	-19.9458	-4.0971***
DSIZE	-0.0579	-2.0920**		0.0085	0.2265		-10.4449	-2.9173***	8.1897	1.8148*
MKTCON2	0.0043	3.7390***		0.0044	3.8225***		0.5957	3.6339***	0.6413	3.7830***
MKTCON1	0.0129	4.5449***		0.0131	4.5405***		1.6817	3.8493***	1.6941	3.9317***
OSR	0.0027	6.94245***		0.0028	7.2559***		0.4132	6.1127***	0.4242	6.3762***
RISK	0.0235	1.8717*		0.0285	2.0138**		3.4074	1.8553**	3.4657	1.9528**
C	0.1471	4.0581***		0.1145	3.5382***		21.3248	4.1955***	14.8793	3.3498***
Adjusted R-squared		0.3190			0.3120			0.3370		0.3325
F-statistic		25.8983***			25.1064***			28.0192		27.4786
Durbin-Watson stat		1.6917			1.6785			1.9500		1.9355
VIF range		1.1-1.5			1.1-1.9			1.1-1.2		1.0-1.3
Jarque-Bera residual		9.3278***			8.7643***			8.8212***		10.4564***
RAMSEY RESET (F-statistic)		0.4232			1.0595			0.8287		0.7164

Notes: ***, **, * indicate significance at 1%, 5% and 10% respectively (N=373).

Table 5: Profiles of IPOs based on voluntary lockup ratio and firms size

	High VLR (Mean)	Low VLR (Mean)	High vs Low (Z score)	Small Firms (Mean)	Big Firms (Mean)	Small vs Big (Z score)
VLR (%)	18.77	0.02	-13.611***	9.40	7.08	-3.395***
PRIVATE (%)	47.08	41.46	-1.035	64.18	36.38	-6.101***
PROCEED (RM Million)	54.36	422.07	-5.682***	10.29	471.38	-12.407***
IROPEN (%)	36.60	15.61	-4.037***	39.43	14.14	-4.978***
OSR (ratio)	35.13	18.20	-2.840***	43.26	13.57	-5.968***
RISK (%)	1.79	1.56	-1.178	2.75	0.99	-10.213***
MKTCON1 (%)	0.11	0.44	-0.268	1.15	0.25	-1.460
MKTCON2 (%)	1.80	6.08	-2.281**	3.89	2.78	-0.613
MKTCAP (RM Million)	194.55	1,260.76	-4.331***	41.54	1,425.54	-12.933***

Notes: ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Categorization into sub-samples is based on voluntary lock-up ratio and market capitalization. Since the data are not normally distributed, the present study applies the non-parametric Mann-Whitney U to test for differences between two groups.

Iran's Trade Modification Under Sanctions: An Evidence of Trade Divergence and Trade Convergence Through the Gravity Model

Ehsan Rasoulinezhad¹

This paper uses a panel exports/imports gravity model to investigate Iran's trade pattern with its 50 top trading partners from Europe and Asia under sanctions. The empirical data are obtained from each of the 50 Iran's trade partners over the period 2006 to 2015. The main purpose of this study is to find out how Iran's trade pattern has been changed by sanctions. The empirical evidence revealed a significant negative effect of sanctions on Iran-EU bilateral trade (by an average of 38.1% on the Iran's export to the EU and 45.8% on the Iran's import from the EU), while it has a positive impact on trade between Iran and the Asian countries (by an average of 92.3% on the Iran's import from the Asian countries and by 77.4% on the Iran's export to these countries). Totally, these findings proved that the imposition of sanctions related to the Iran's nuclear program pushed the foreign trade policy of this country towards the Trade Convergence (TC) with Asia (Asianization) and Trade Divergence (TD) from the EU (Europeanization).

Keywords: Sanctions; Trade Convergence (TC); Trade Divergence (TD); Gravity trade model; Iran.

1. Introduction

A historical review of economic sanctions shows that sanctions imposing by countries may affect the trade pattern of a target country. It is widely believed that imposed sanctions raise trade costs in target or sanctioned country which would be a limitation for trade development of the country. However, to decrease the trade cost, a sanctioned economy may modify its trade direction from the sanctioning countries (Those countries who impose sanctions against a target country) to the rest of the world. This modification of trade direction is one of the most

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popular anti-sanctions policies in countries who suffer under economic sanctions. Furthermore, modification of trade direction under economic sanctions may lead to Trade Divergence (TD) and Trade Convergence (TC). These two concepts are defined for the first time in this research. We consider TD and TC as the results of sanctions on the trade pattern of a target country- TC means trade volume of the target country with a group of nations goes up over a period of time, while TD appears when trade volume between sanctioned country and a group of nations decreases over time.

Iran is one of the most Asian economies affected by various rounds of sanctions imposed by different nations, particularly the US and the EU. The history of imposing sanctions against Iran dates back to the oil nationalization of this country in 1951 and the last round of serious sanctions against this country started in response to the Iranian nuclear program in January 2006 and stopped in July 2015 when Iran and the P5+1 signed an international agreement, called the Joint Comprehensive Plan of Action (JCPOA). Over the period 2006-2015, Iran tried to imply the modification of trade direction from the sanctioning countries, particularly the EU (we call this trade shift: de-Europeanization) to the rest of the world, particularly Asia (we call this trade strategy: Asianization) in order to reduce the negative effects of sanctions on its trade flows. In other words, the last round of sanctions against Iran led to the TD of Iran from the EU (de-Europeanization) and the TC of this country with Asia (Asianization).

Although the trade flow of Iran has drawn some attention from researchers such as Fahimifard (2013), Suvankulov and Guc (2012), Soori and Tashkini (2012), Taghavi and Hosein Tash (2011), Esmaeili and Pourebrahim (2011) and Kalbasi (2002), the author did not find any study considering the effects of sanctions on Iran's bilateral trade with the EU and Asian countries through a gravity model.

Since there has not been any study to investigate empirically what happened for the Iran's trade pattern under the nuclear program sanctions, in this paper, we attempt to use a gravitational model of international trade to investigate the bilateral trade pattern between Iran - 25 EU member states and Iran-25 Asian countries during the period 2006 to 2015. The choice of these countries in this study is based on the

ranking of most Iran's regional trade partners by IRICA (The Islamic Republic of Iran Customs Administration). Therefore, investigating the bilateral trade pattern between Iran and these countries in Asia and the EU can highlight the existence of the TC (Iran's trade policy of Asianization) and the TD (de-Europeanization) under sanctions. According to the increasing imposition of economic sanctions in the world economy, the results of this study would be expected to be useful for all sides of sanctions: sanctioned country, sanctioning nations and the rest of the world.

Our main hypotheses based on the objective of our research are as follows:

HI:

H0: The sanctions against Iran led to the TD of this country from the EU (de-Europeanization).

H1: The sanctions against Iran did not lead to the TD of this country from the EU (Europeanization).

HII:

H0: The sanctions against Iran led to the TC of this country with Asian countries (Asianization).

H1: The sanctions against Iran did not lead to the TC of this country with Asian countries (de-Asianization).

2. Overview of sanctions against Iran

Iran is one of the largest economies in the MENA¹ region and the Islamic world based on its nominal GDP (367.098 billion \$ in 2013), member of N-11 (Eleven countries with a high potential to become a large economy) and 18th economy in the world (based on her PPP in 2013). The economy of Iran has experienced various long-run nasty sanctions since 1951 when Iran nationalized its oil industry till the unprecedented nuclear program sanctions imposed by the United Nations and Western countries from 2006 up to 2015 when the Joint Comprehensive Plan of Action (JCPOA) on the nuclear program of Iran

1- Middle East and North Africa.

was signed by Iran and P5+1. According to this agreement, Iran restricted its nuclear program in exchange for the energy, trade and financial sanctions relief.

Generally, the history of the imposition of sanctions against Iran dates back to the 1951- Iran's Oil Nationalization when due to the trying of this country to nationalize its oil reserves which were under control of the Anglo-Iranian Oil Company, the western countries imposed economic sanctions on Iran and prevented purchases of Iranian crude oil on the international markets (Katoozian, 1993). The next noticeable sanctions were imposed by the USA for the reason of the Hostage Crisis after the Islamic revolution of Iran in 1979. The main sanctions by the USA were freezing Iranian government assets in the United States and preventing oil imports from Iran to the USA. Furthermore, Iran experienced another round of sanctions by the western countries during the Iraq-Iran war in 1980-1988 and in 1996 when the USA approved the package of the Iran and Libya Sanction Act (ILSA) which restricted international firms doing business with Iran and Libya. The last round of economic sanctions begun when the UN security council passed a number of resolutions in 2006 concerning the nuclear program of Iran. The sanctions related to the Iran's nuclear program have been developed since 2010/2011 by the western countries, particularly the EU and the USA, which multiplied the pressure on the Iran's economy.

Reviewing the history of imposing various sanctions on Iran depicts that over the years, this country could increase its speed of adoption and domestic capacity under any global restrictions. In other words, despite the negative effects of sanctions, economy of Iran survived among all these embargoes and improved efficiency of its response to the international pressures. The overall Iran's economic policies and strategies in response to the sanctions are directed by the Iran Resistive Economy Method (IREM). IREM's principles direct Iran to go to reach a higher level of resource allocation efficiency, increase the capacity of national productions, and improve the business climate to turn the sanctions into economic opportunity.

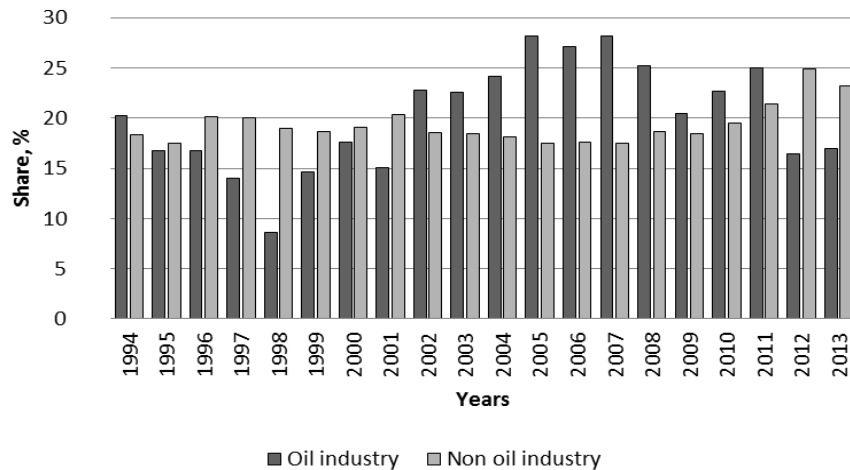
Historically, since the beginning of 2000s, Iran has performed and developed various strategies such as the Oil Stabilization Fund (OSF) establishment, FDI liberalization, fuel basket liberalization, trade partner

diversification, import substitution, national support for domestic strategic industries, expansion of private sector capacity etc., to strengthen and promote its economic stability and capacity under any unpredictable circumstances like sanctions. To harmonize all these anti-sanctions policies, the IREM for the first time was introduced in 2009 (Jabalameli and Rasoulinezhad, 2012) and its completed version with the main principles were announced by the Iran's supreme leader in 2013.

Among several IREM principles such as knowledge-based economy, improving total factor productivity, increase transparency of financial matters, trade is considered as one of the most important features of IREM. Hence, under various strategies of IREM (e.g. import-substitution strategy, promoting exportable goods, increasing regional and international economic collaboration and promoting domestic strategic products), Iran tried to mitigate the negative consequences of sanctions on its trade flows.

One of the main results of the above strategies of IREM can be highlighted by the contributions of oil and non oil industries to the Iran's GDP. Despite the consideration of oil industry as the magnitude sector of the Iran's economy, due to the several sanctions, the oil industry experienced a declining share from near 27% in 2006 by roughly 17% of GDP in 2013. The following figure shows the contribution of oil and non-oil industries to the Iran's GDP during 1994–2013. As shown in Figure 1, the share of the oil industry started to decrease from 2006/7, while this country tried to improve its non oil industries in order to reduce its dependency on oil revenues and as a result, the contribution of non-oil industries to GDP of this country gradually increases over the period 2006-2013.

Figure 1. Share of oil and non oil industries in GDP of Iran during 1994–2013, %



Source: Authors' compilation from the Central Bank of Iran

Another noticeable result is the shift of Iran's trade partners in the way that Iran gradually began to expand her trade with Asian nations and reduce trade relations with the European Union members. Generally, we can express there has been the Trade Convergence with Asia (Asianization) and the Trade Divergence with the EU (de-Europeanization) under sanctions. In the case of foreign trade direction, Iran has switched its relations from European region towards Asia. The shift of Iran's trade was caused mainly by imposition of the numerous sanctions as well as by GDP growth of some Asian nations such as India and China. Historically, in the early of 2000s, Iran focused on trade with European countries, particularly Germany, but since 2006, Iranian exports to various Asian countries such as Japan, China, India and South Korea have been expanded due to the imposition of nuclear-related sanctions against Iran and also considerable potential of the Asian markets. Furthermore, Iran has found some new markets such as Iraq, Afghanistan and Pakistan for its non-oil products. The following table reports the trade growth between Iran and five Asian countries, i.e. UAE, India, China, Turkey and Taiwan in 2006 and 2013. It can be seen that the volumes of Iran's exports and imports to/from these nations have noticeably grown between 2006 and 2013. In addition, a remarkable point here is that the growth of Iran's exports to these five Asian countries is higher than her imports from them. It can be a sign of improving the export capacity of Iran under sanctions.

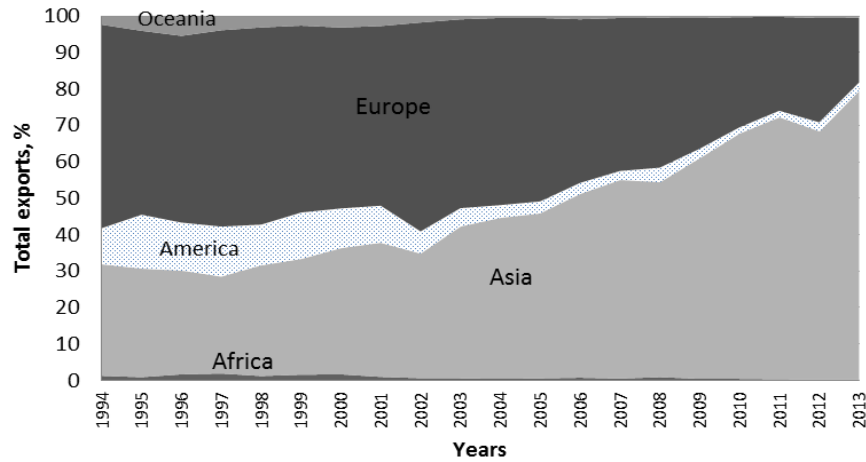
Table 1: Bilateral trade between Iran and some Asian countries in 2006 and 2013 (Million \$)

Countries	Iran's Exports			Iran's Imports		
	2006	2013	Growth, %	2006	2013	Growth, %
UAE	1728.11	4210.12	143.6	9349.48	10625.62	13.6
India	836.64	2623.82	213.6	1440.22	2047.79	42.1
China	1053	5513.18	423.5	2752.82	8181.44	197.2
Turkey	326.08	1477.73	353.1	889.52	4551.15	411.6
Taiwan	125.79	250.6	99.2	390.05	492.25	26.2

Source: Authors' compilation from the Central Bank of Iran

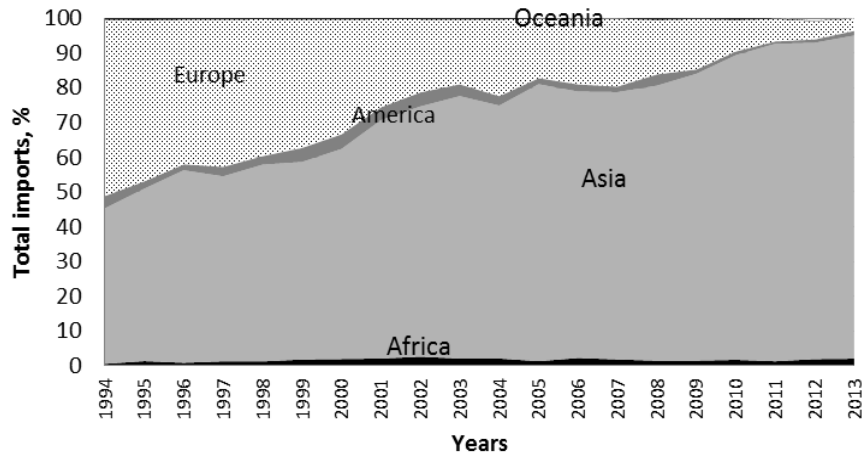
To compare the trade direction changes of Iran over the years, Figure 2 and 3 are presented. These figures represent the trade shift of Iran in both cases of imports and exports. As it can be seen from the figures, Iran has reduced its imports from Europe and ramped up its purchasing from Asian nations. This shift similarly has been performed in regard to the Iran's exports and thus Iran's share of imports of Asia has risen up over the period of 1994 to 2013. However, as we mentioned before, the intensification of Iran's exports to Asia in 2006 was the response to the remarkable increase and expansion in imposing horrific sanctions against Iran. Since 2006, Iran gradually has replaced the European oil consumers with several new oil and gas importers in Asia. Over time, Asian countries have become generally larger buyers of Iranian energy and non energy goods than the European region.

Figure 2: Total exports to Iran during 1994–2013, %



Source: Authors' compilation from the IRICA.

Figure 3: Total imports from Iran during 1994–2013 (in %)



Source: Authors' compilation from the IRICA.

3. Literature review

In this section, we divide the related literature into three strands of study: (i) consideration of sanctions' effects on foreign trade of a certain country; (ii) investigation of the effects of sanctions using the gravity-

trade theory; and (iii) exploring the effects of sanctions on Iran's trade flows.

The first strand of literature attempted to find out how sanctions affect trade flows of a sanctioned or sanctioning country. Dollery (1993) attempted to make a survey on effects of sanctions against South Africa by using a general equilibrium analysis. The research results indicated that for small developing economies, trade sanctions have a greater share of the sectoral burden on the labor-intensive exportable sector. Barrett (1997) explored the strategy of trade sanctions in international environmental agreements. He found that the credible threat to impose trade sanctions may be capable of sustaining full cooperation in the supply of the public goods. In a study, Tian and Whalley (2010) discussed the relationship between trade sanctions, financial transfers and BRIC economies participation in global climate change negotiations by using a general equilibrium model. Their results showed that only very high tariffs of over a hundred percent by all other countries could induce participation by BRIC economies. Lamotte (2012) had an attempt to find out the effects of wars and sanctions on trade in the case of the former Yugoslavia. His findings revealed a negative relationship between sanctions and trade. Moreover, the effect of the sanctions on trade flows is more significant than the impact of war. Venkuvienė and Masteikiene (2015) studied the impact of economic sanctions against Russia on the Central and Eastern European (CEE) countries business environment through literature analysis and synthesis. They concluded that in the CEE the most suffered production sectors from the Russian sanctions is the dairy sector, following by the meat sector. Aalto and Forsberg (2016) investigated Russia's geo-economy under the economic sanctions. They showed that the sanctions significantly hamper new greenfield projects in Russia's emerging energy provinces. Moreover, low oil prices since mid-2014 shape existing fossil fuels trade more than the sanctions, which have no impact on Russia's arms exports.

The conclusion of most of the mentioned studies in the first strand is that economic sanctions influence trade flows between countries.

In the second strand of the study, the authors concentrated on investigation of sanctions' effects through the gravity-trade theory. Van Bergeijk (1992) tried to investigate the effects of diplomatic climate on

the bilateral trade flows of 40 countries in the year 1985. His findings proved the hypothesis that political cooperation and hostility among countries shape the pattern of international trade. Hafbauer et al. (1997) investigated sanctions' effects through a gravity model for 88 countries in three different years of 1985, 1990 and 1995. Their results revealed negative impact of sanctions on bilateral trade flows by nearly 90%. In other study, Caruso (2003) analyzed the impact of international economic sanctions on trade between the US and 49 target countries through a gravity model over the period 1960-2000. The estimation results showed a large negative impact of sanctions on bilateral trade. Yang et al. (2004) applied a gravity trade model to explore the findings of economic sanctions. Their main results proved that success of sanctions is most easily achieved when pre-sanction relations between sender and target are cordial or neutral. In other research, Yang et al. (2009) developed the gravity trade model used by Yang et al. (2004) to investigate whether the EU is an alternative market for nations when they are confronted with the US sanctions. The findings revealed that after the imposition of sanctions by the US, the EU gradually captured trade flows from the sanctioned nations. Lastly, Mehchy et al. (2015) had an attempt to find out how sanctions affected Syrian exports between 1995 and 2010. The major result of their gravity-trade estimation expressed that sanctions and the deterioration in institutional factors have reduced Syria's export potential by more than 70%.

Considering the studies in the second strand, it can be concluded that the gravity trade model is a convenient method to find out the effects of sanctions on trade flows.

The last strand of research consists of studies about the effects of sanctions on Iranian economy, particularly its trade flows. Torbat (2005) presented the case study of Iran to explore the effectiveness of the US unilateral trade and financial sanctions. His major results expressed that the unilateral import sanctions on the fungible crude oil have been ineffective. Schott (2012) had an attempt to provide background and history of economic sanctions on Iran and focused on the effectiveness of the sanctions as well. He concluded that coalition and cooperation of sanctioning nations are important to maintain the effectiveness of the sanctions against Iran's trade flows. Shirazi et al. (2016) examined the effects of sanctions in the three years of 2012, 2013, and 2014 using a

fixed effect gravity model. Their major finding is that the effects against Iran have had a significant and negative effect on the amount of export and the Iran's export flows has fallen annually by 33 percent in average. In other study, Setayesh and Mackey (2016) investigated the effects of sanctions on Iran's public health. Their main results showed that the limitation on medical imports due to the sanctions created vital domestic shortages of medical products which forced the country to import of medicines that are of lower or questionable quality. Moreover, Lanchovichina et al. (2016) applied a global general equilibrium simulation model to find out the effects of lifting sanctions on Iran with and without strategic responses. Their findings revealed that Iran benefits the most with average per capita welfare gains ranging from close to 3 percent and furthermore, Iran's crude oil exports to the EU recover to half their preembargo level. Haidar (2016) explored the relationship between sanctions and export deflation in Iran over the period 2006-2011. His estimation results concluded that two-thirds of the Iranian export volume deflected towards the non-sanctioning countries. Gharehgozli (2017) used the synthetic control method to estimate the effect of international trade on Iran's economy. The results showed that the Iran's economy, particularly its GDP and trade, suffered a hit of more than 17% in the period between 2011 and 2014. .

Overall, it can be seen that there has not been a serious attempt to examine the Trade Convergence or Trade Divergence of Iran under sanctions pressure. Hence, this paper would provide new and useful results for policy makers and scholars.

4. Data description and methodology

4.1 Dataset description

This study covers bilateral trade between Iran and its trade partners consist of 25 EU member countries (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Hungary, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the United Kingdom), and 25 Asian countries (Afghanistan, Bangladesh, China, India, Indonesia, Iraq, Japan, Kuwait, Lebanon, Malaysia, Nepal, Oman, Pakistan, Philippines, Singapore, South Korea, Syria, Taiwan,

Tajikistan, Thailand, Turkey, Turkmenistan, the UAE, Uzbekistan and Vietnam) over the period 2006 to 2015. The variables used in this study comprise import and export flows between Iran and the countries in thousand U.S. dollars, GDP in thousand U.S. dollars, geographical distance between capital cities of Iran and the trade partners in kilometers, urbanization growth in Iran and trading partners, the composite trade intensity (CTI) in percent, GDP weighted average of distance as a proxy for Multilateral Resistance Term (MTR) , accession to the WTO and sanctions as dummy variables. The source of the data on import and export flows is IRICA. The data on GDP and primary data to calculating CTI are collected from the World Bank and the World Economic Outlook Database (IMF, 2015). Data for distance between countries were gathered from the GeoDist database (CEPII, 2015) .

Furthermore, all the time-variant series level are transformed in to natural logarithms, based on the advantages of this form than using the level of variables (Wooldbridge, 2013).

Table 2:The variables of model

Variables	Definition	Unit
<i>Import</i>	Import flows between Iran and trade partners	Thousand US \$
<i>Export</i>	Export flows between Iran and trade partners	Thousand US \$
<i>Y</i>	GDP in Iran and trade partners	Thousand US \$
<i>URB</i>	Urbanization growth in Iran/urbanization growth in trade partner	%
<i>DIS</i>	Distance between capitals of Iran and trade partners	Kilometers
<i>REMO</i>	Multilateral Resistance Term (MRT)	-
<i>CTI</i>	The CTI in Iran/ the CTI in trade partner	%
<i>WTO</i>	Dummy variable capturing a value of one if Iran and a trading partner belong to the WTO	Dummy (0/1)
<i>Sanctions</i>	Dummy variable taking a value of one if there are sanctions against Iran	Dummy (0/1)

4.2 Model specification

Following Baldwin and Taglioni (2011), we can theoretically represent the gravity trade model in a CES form as:

$$v_{od} = \left(\frac{P_{od}}{P_d}\right)^{1-\sigma} E_d; \quad \sigma > 1 \quad (1)$$

In Eq. (1), V_{od} denotes the expenditure in country-d, P_{od} represents the consumer price in nation-d, P_d shows the nation-d CES price index and σ indicates the elasticity of substitution, while E_d is the nation-d consumer expenditure.

Considering the profit maximization exercise of producers based in nation-o and Dixit-Stiglitz monopolistic competition, we have:

$$v_{od} = n_o p_{oo}^{1-\sigma} \frac{\tau_{od}^{1-\sigma}}{P_d^{1-\sigma}} E_d \quad (2)$$

Where V_{od} represents the aggregate value of the bilateral trade flow from nation-o to nation-d and n_o indicates the mass of nation-o.

By means of some assumptions based on Baldwin and Taglioni (2011), our gravity equation is:

$$v_{od} = \tau_{od}^{1-\sigma} E_d Y_o \frac{1}{P_d^{1-\sigma}} \frac{1}{\Omega_o} \quad (3)$$

In this gravity equation, P_d and Ω_o indicate the nation-d CES price index and nation-o market potential index, respectively. Furthermore, we can call $P_d^{1-\sigma} \Omega_o$ as the MTR (Multilateral Trade Resistance) term. Nation-d's economic size is a proxy for E_d , while Y_d is proxied with nation-o's economic size. τ can be proxied with bilateral geographical distance.

Besides the theoretical formation of our gravity model, we have to develop an econometric gravity equation based on our theoretical background. The earliest form of the gravity model which was introduced by Tinbergen (1962) has the following structure:

$$\ln \text{Export}_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln \text{DIS}_{ij} + \varepsilon_{ij} \quad (4)$$

Where the export volume of country i to j ($\ln \text{Export}_{ij}$) has a relationship with the GNP in country i (Y_i) and in country j (Y_j), meanwhile the distance between countries i and j (DIS_{ij}) as a proxy for transportation cost.

Despite a vast number of developing gravity model of Tinbergen (e.g. see Chen and Wall (1999); Anderson and Wincoop (2003) and Guttman and Richards (2004), Rasoulinezhad and Kang (2016), Popova and Rasoulinezhad (2016) and Rasoulinezhad (2016, 2017)), we use a gravity model with some new variables in order to analyze bilateral trade flows between Iran and trade partners in the EU and Asia to find out the effects of sanctions on Iran's trade pattern.

Moreover, while in the prior gravity models scholars always used simple trade openness, we substitute it with the composite trade intensity (CTI) which was introduced by Squalli and Wilson (2006) and is calculated as follows:

$$CTI_i = \frac{n(X+M)_i^2}{GDP_i \sum_{j=1}^n (X+M)_j} \quad (5)$$

In the above equation, X+M denotes the trade of a country. It should be noted that the common trade openness formula comprises a one-dimensional measures of trade openness, while CTI contains both the relative position of country's trade flow compared to its economic size and also the importance of country's trade flows to global trade flows (Elmorsy, 2015).

In addition to the CTI, our gravity model consists of the variable Multilateral Resistance Term (MRT) which was firstly represented by Anderson and Wincoop (2003) in a gravity model with a CES structure as:

$$x_{ij} = \frac{y_i y_j}{y^w} \left(\frac{t_{ij}}{\pi_i p_j} \right)^{1-\delta} \quad (6)$$

Where x_{ij} indicates nominal export from country i to trade partner j , y_i shows nominal income of country i and y^w denotes world income ($=\sum_j y_j$). δ represents the elasticity of substitution across goods and t_{ij} is international trade costs. According to the Anderson and Wincoop (2003)'s argument, π_i and p_j are multilateral resistance variables. According to Baier and Bergstrand (2007), GDP weighted average of distance from trading partners can be used as a proxy for the multilateral resistance term.

Comprising only the time-variant variables (variables that change over the time) the gravity trade models in the cases of export and import flows can be formulated as follows, as:

$$\begin{aligned} \ln export_{ijt} &= \delta_1 + \delta_2 \ln(Y_{it}Y_{jt}) + \delta_3 \ln CTI_{ijt} + \delta_4 \ln urb_{ijt} \\ &\quad + \delta_5 REM_{ijt} + \varepsilon_{ijt} \\ \ln import_{ijt} &= \delta_1 + \delta_2 \ln(Y_{it}Y_{jt}) + \delta_3 \ln CTI_{ijt} + \delta_4 \ln urb_{ijt} + \\ &\quad \delta_5 REM_{ijt} + \varepsilon_{ijt} \end{aligned} \quad (7)$$

Where Export and Import denote export and import flows between Iran (country i) and a trading partner (country j) at specific time t, respectively. $Y_{it}Y_{jt}$ represents the economy size of Iran and trading partner j at time t. Moreover, urb_{it} shows urbanization growth, while REM and CTI indicate the MTR and composite trade intensity at time t, respectively.

The above gravity equation only comprises time-variant variables, while it consists some time-invariant variables (variables that do not change over the time), i.e. distance, WTO and sanctions:

Time-invariant variables:

$$\delta_6 \ln DIS_{ij} + \delta_7 sanctions + \delta_8 WTO + \varepsilon_{ijt} \quad (8)$$

Here, Dis_{ij} shows the geographical distance between capital cities of Iran (country i) and a trading partner (country j). Meanwhile, variables sanctions and WTO are dummy variables which are captured binominal variables. Variable “sanctions” takes a value of 1 if there are sanctions against Iran or takes 0 otherwise and WTO captures a value of 1 if Iran or its trading partner belongs to the WTO.

Based on the theoretical framework of the gravity model of international trade, it is expected that economy size (GDP) would have positive impacts on trade volume and accelerate trade flows growth between Iran and trading partners. It is also expected that the coefficient of the openness level (CTI) and urbanization growth may be positive. In the case of MTR (REM), trade volume may be enhanced for the higher multilateral resistance of the exporter i. In regards to the time-invariant

variables, the coefficient of DIS is expected to bear a negative sign as geographical distance shows the transportation cost between Iran and a trading partner. Since due to the imposed sanctions by the EU, we expected that the sign of sanctions would be negative in trade flows of Iran with Europe, while it would have a positive sign in trade flows of Iran with Asian trade partners. Furthermore, since accession to the WTO may create a new trade opportunities, the coefficient of WTO in our model would be expected to bear a positive sign.

5. Estimation results and discussion

5.1 Panel-Based Cross-section Dependence Test

In panel data analyzing, cross-section dependence test that shows whether the sample data are cross sectional dependent or independent, should be applied before stationary test of variables. Otherwise, following Breusch and Pagan (1980), the estimation results are more likely in biased and inconsistent situation. Considering the time and cross sections in our study, the Pesaran residual cross-section dependence (CD) test is computed as follows:

$$CD = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^N \sum_{j=i+1}^N \sqrt{T_{ij}} \hat{\rho}_{ij} \quad (9)$$

Table 4 reports the results of the CD Persaran test. It can be seen that the null hypothesis (No cross-section dependence in residuals) can be strongly rejected at the 5% level. It implies that all series have strong evidence for cross-sectional dependence.

Table 4: Pesaran (2004)'s CD test results

Case	Variables	Pesaran's CD test	Prob.
Iran- EU trade	LExport	16.71	0.00
	LImport	19.35	0.00
	LYY	33.69	0.00
	LCTI	36.95	0.00
	LURB	18.52	0.00
	LREM	27.03	0.0
Iran- Asian countries trade	LExport	18.68	0.00
	LImport	20.02	0.00
	LYY	39.48	0.00
	LCTI	45.12	0.00
	LURB	23.84	0.00
	LREM	26.15	0.00

Source: Authors' compilation from Eviews 9.0

It should be mentioned that the result of the cross-section dependence test guides us to select a proper panel unit root test. Considering our CD test result that depicts cross-sectional dependence of our series, the most proper unit root test is the cross-sectionally augmented ADF (Pesaran, 2007).

5.2 Panel-Based Unit Root Tests

In order to determine the stationarity of all the underlying time series data in a cross sectional dependent panel, we carry out the CADF panel unit root test (Pesaran, 2007) for the variables at levels and first differences.

Pesaran(2007) for a panel with N cross-sectional units and T time series observations, suggests a simple linear heterogenous model as:

$$Y_{i,t} = (1 - \delta_i)\mu_i + \delta_i Y_{i,t-1} + u_{i,t} \quad i = 1, \dots, N \quad t = 1, \dots, T \quad (10)$$

And suggests a test based on the t-ratio in the following cross-sectionally ADF regressions:

$$\Delta Y_{i,t} = a_i + b_i Y_{i,t-1} + c_i \bar{Y}_{t-1} + d_i \Delta \bar{Y}_t + \epsilon_{i,t} \quad (11)$$

In the above equation, $\bar{Y}_t = \frac{1}{N} \sum_{i=1}^N Y_{i,t}$ and $\Delta \bar{Y}_t = \frac{1}{N} \sum_{i=1}^N \Delta Y_{i,t}$. Furthermore, $\epsilon_{i,t}$ indicates the regression error.

By applying this unit root test through the software, the results are calculated as:

Table 5: Panel unit root test results

Case	Variable	Pesaran's CADF	H0	Stationary
Iran- EU trade	LExport	20.08 [0.62]	Accept	No
	D(LExport)	259.00[0.00]	Reject	Yes
	LImport	18.53-0.88]	Accept	No
	D(LImport)	320.63[0.00]	Reject	Yes
	LYY	24.12[0.59]	Accept	No
	D(LYY)	201.52[0.00]	Reject	Yes
Iran- Asian countries trade	LCTI	25.43[0.71]	Accept	No
	D(LCTI)	285.09[0.00]	Reject	Yes
	LURB	23.74[0.79]	Accept	No
	D(LURB)	327.58[0.00]	Reject	Yes
	LREM	18.32[0.66]	Accept	No
	D(LREM)	185.17[0.00]	Reject	Yes
Iran- Asian countries trade	LExport	26.80 [0.61]	Accept	No
	D(LExport)	198.08[0.00]	Reject	Yes
	LImport	19.69[0.85]	Accept	No
	D(LImport)	201.64[0.00]	Reject	Yes
	LYY	18.11[0.88]	Accept	No
	D(LYY)	271.01[0.00]	Reject	Yes
Iran- Asian countries trade	LCTI	20.73[0.75]	Accept	No
	D(LCTI)	198.53[0.00]	Reject	Yes
	LURB	28.04[0.51]	Accept	No
	D(LURB)	221.18[0.00]	Reject	Yes
	LREM	19.48[0.66]	Accept	No
	D(LREM)	201.83[0.00]	Reject	Yes

Note: Numbers in brackets represent p-values

Source: Authors' compilation from Eviews 9.0

The reported p-values in the above table imply that all the series are non-stationary at levels (means accepting the null hypothesis representing that the series contain a panel unit root) and stationary (rejecting the null hypothesis) at their first difference which stands for the integration at I(1).

5.3 Long-run relationships

Considering the results of the panel-based unit root test, the Pedroni panel cointegration test can be applied to find out whether there is any long-run equilibrium relationship between the series (Nasre Esfahani and Rasoulinezhad (2016), Taghizadeh Hesary et al. (2015), Saboori et al. (2017) and Taghizadeh Hesary et al. (2017)). The results are reported in Table 6. From the results, by considering all the panel, group and weighted statistics, it indicates that the most statistics have p-value less than 0.05 and hence, the majority of the all statistics tests can significantly reject the H_0 of no cointegration at the 5% significance level. In sum, it can be concluded that there is an evidence of a long run relationship between variables in all our four models.

Table 6: Pedroni Panel Cointegration Test results

Case	Model		Statistic	Prob.	Weighted statistic	Prob.
Iran- EU trade	Model I (Export-based gravity model)	Panel v-statistic	-0.13	0.55	-3.34	0.99
		Panel rho-statistic	3.97	1.00	-2.45*	0.00
		Panel PP-statistic	-0.49	0.30	-3.97*	0.00
		Panel ADF-statistic	-4.49*	0.00	-4.27*	0.00
		Group rho-statistic	5.46	1.00	-	-
		Group PP-statistic	-3.81*	0.00	-	-
		Group ADF-statistic	-4.47*	0.00	-	-
	Model II (Import-based gravity model)	Panel v-statistic	1.53**	0.06	0.79	0.21
		Panel rho-statistic	-4.36*	0.00	-2.81*	0.00
		Panel PP-statistic	-5.81*	0.00	-4.74*	0.00
		Panel ADF-statistic	-5.13*	0.00	-4.55*	0.00
		Group rho-statistic	-2.20*	0.01	-	-

Iran- Asian countries trade		Group PP-statistic	-5.56*	0.00	-	-
		Group ADF-statistic	-5.31*	0.00	-	-
	Model I (Export-based gravity model)	Panel v-statistic	2.05*	0.02	-0.78	0.78
		Panel rho-statistic	-1.73*	0.04	-0.34	0.36
		Panel PP-statistic	-6.76	0.00	-4.20*	0.00
		Panel ADF-statistic	-7.38*	0.00	-4.81*	0.00
		Group rho-statistic	0.69	0.75	-	-
		Group PP-statistic	-6.23*	0.00	-	-
		Group ADF-statistic	-5.98*	0.00	-	-
	Model II (Import-based gravity model)	Panel v-statistic	1.05	0.14	0.51	0.30
		Panel rho-statistic	-2.89*	0.00	-2.02	0.02
		Panel PP-statistic	-4.36*	0.00	-3.97*	0.00
		Panel ADF-statistic	-3.94*	0.00	-4.27*	0.00
		Group rho-statistic	-1.64*	0.05	-	-
		Group PP-statistic	-4.49*	0.00	-	-
		Group ADF-statistic	-4.91*	0.00	-	-

Note: (*) indicates statistical significance at the 5% level.

Source: Authors' compilation from Eviews 9.0

5.4 Panel-Gravity trade Model Estimation

Considering the existence of a long-run relationship between series in all our gravity equations, the three panel data estimation approaches, i.e. fixed effect (FE), random effect (RF) and fully modified OLS (FMOLS) are applied to explore the coefficients of our all variables. Since there is not a common view to the efficiency of estimation methods of panel co-integration (e.g. see, Pedroni (1996, 2001) recommends the fully

modified OLS (FMOLS) estimator. Cheng and Wall (2005) and Anderson and Wincoop (2003) suggest the fixed effects (FE) or Soren et al. (2014) propose the random effects (RE))we apply all the three panel estimators (FE,RF and FMOLS) to estimate the coefficients. It should be mentioned that the coefficients for the time-invariant variables can not estimated by the FE estimator. The findings are reported in Table 7.

Table 7: The Panel-Gravity trade model estimations

-	-	Variables	FE	RF	FMOLS
Iran- EU trade	Model I (Export-based gravity model)	LYY	0.35(0.00)	0.24 (0.01)	0.35 (0.00)
		LCTI	0.39(0.00)	0.41 (0.00)	0.43 (0.02)
		LURB	0.10 (0.02)	0.18 (0.01)	0.13 (0.00)
		LREM	0.31 (0.00)	0.29 (0.00)	0.26 (0.00)
		LDIS	-	-0.49 (0.00)	-
		SANC	-0.50 (0.00)	-0.41 (0.00)	-0.53 (0.00)
		WTO	0.66(0.01)	0.56(0.00)	0.61(0.00)
	Model II Import-based gravity model)	LYY	0.38 (0.00)	0.27 (0.02)	0.35 (0.00)
		LCTI	0.24 (0.00)	0.21 (0.00)	0.29 (0.00)
		LURB	0.20 (0.01)	0.18 (0.00)	0.24 (0.00)
		LREM	0.24 (0.00)	0.19 (0.00)	0.26 (0.03)
		LDIS	-	-0.64 (0.00)	-
		SANC	-0.63 (0.00)	-0.58 (0.00)	-0.63 (0.03)
		WTO	0.78(0.00)	0.67(0.00)	0.71(0.01)
Iran- Asian countries trade	Model I (Export-based gravity model)	LYY	0.98 (0.00)	0.83 (0.00)	0.28 (0.03)
		LCTI	0.41(0.01)	0.35 (0.00)	0.48 (0.00)
		LURB	0.49 (0.00)	0.43 (0.00)	0.36 (0.00)
		LREM	0.31 (0.01)	0.28 (0.00)	0.37 (0.00)
		LDIS	-	-1.46 (0.01)	-
		SANC	0.56(0.00)	0.55 (0.00)	0.61 (0.01)
		WTO	0.51(0.02)	0.53(0.00)	0.51(0.00)
	Model II Import-based gravity model)	LYY	0.72 (0.00)	0.85 (0.00)	0.81 (0.00)
		LCTI	0.55(0.00)	0.49 (0.00)	0.59 (0.01)
		LURB	0.38 (0.00)	0.46 (0.01)	0.50 (0.00)
		LREM	0.44 (0.0)	0.40 (0.01)	0.47 (0.00)
		LDIS	-	-1.49 (0.00)	-
		SANC	0.63 (0.03)	0.66 (0.01)	0.73 (0.00)
		WTO	0.64(0.00)	0.68(0.00)	0.60(0.00)

Source: Authors' compilation from Eviews 9.0

Iran-EU trade pattern:

In the case of the Iran-EU trade pattern, it is clear that the basic features of three panel-cointegration gravity model estimations are very similar. The estimation results of the export-based gravity model of Iran-EU

trade confirm that GDP, trade openness (the composite trade index), urbanization growth, WTO and MTR have a significant positive impact on export of Iran to the EU, while geographical distance negatively influences on the export volume. Moreover, as we predicted, sanctions against Iran decrease the export volume of this country to the EU member states. This result proves the Trade Divergence (TD) or Iran's trade policy of de-Europeanization under sanctions. The estimation findings of "Model II" for the import pattern of Iran from the 25 EU member states depict that economic size, trade openness (the composite trade index), urbanization growth, WTO and MTR accelerate the import volume growth of Iran from the 25 EU member states, while similar to the first model estimation result, geographical distance and sanctions have a significant negative impact on the import volume. Again, this result in the case of import of Iran from the EU supports the Trade Divergence (TD) or Iran's trade policy of de-Europeanization under sanctions.

Iran-Asia trade pattern:

In the case of Iran's bilateral trade with the 25 Asian countries, the results in the case of export volume of Iran to the 25 Asian countries reveal that a 1% increase in the joint GDP in Iran and the 25 Asian countries, raises the export volume by approximately 0.70%. Trade openness and urbanization growth have a less positive influence on the Iran-Asian countries' export volume. The results show that the export flows from Iran to these 25 Asian countries are boosted up about 0.41% and 0.42% with a 1% increase in the CTI and urbanization growth, respectively. Moreover, the effect of the sanctions (SANC) on Iran's export volume to the Asian countries is positive and significant which supports the existence of the Trade Convergence (TC) or Iran's trade policy of Asianization under sanctions. Besides, accession to the WTO and MTR have a positive effect on Iranian export pattern to the Asian nations. In the case of Model II (Import-based gravity trade model), the coefficients' signs are similar to the previous gravity model (Export-based gravity trade model). A 1% increase in the joint GDP, CTI, urbanization growth and REM raises the import volume of Iran from the 25 Asian countries by approximately 0.79%, 0.54%, 0.44% and 0.43%, respectively.

Further discussion on time-invariant variables' coefficients:

The findings of models estimations provide evidence of a significant negative effect of sanctions on Iran –EU member states' bilateral trade (both in export-based and import-based gravity trade model). The coefficient of SANC is estimated at an average of 43% [=Exp(-0.56)-1] by FE estimator, compared to an average of 39 % [=Exp(-0.49)-1] by FE and 44% [=Exp(-0.58)-1] by FMOLS. This indicates that trade volume decreases by nearly 42%¹ when the sanctions are imposed against Iran.

In regards to the positive effect of sanctions on Iran-Asian countries' bilateral trade, it can be calculated that the trade volume increases about 82.2% [=Exp(0.60)-1] by FE, 82.2% [=Exp(0.60)-1] by RE and 95.4% [=Exp(0.67)-1] by FMOLS. As an average of findings by these three estimators, trade volume between Iran and the 25 Asian countries would increase by 86.6%²

In the case of distance as a proxy of transportation cost, the negative sign of its coefficient, estimated by random effect (RE), represents that geographical distance has a negative impact on export and import volumes between Iran and the EU member states and Asian countries. A 1% increase in this variable decreases the exports and imports volumes between Iran and the 25 EU member states by nearly 0.49% and 0.58%, respectively, while by 1% increase in geographical distance leads to a reduction of export and import volumes between Iran and 25 Asian countries by about 1.46% and 1.49%, respectively.

The estimations results of WTO prove the positive role of the accession to this organization in accelerating trade flow growth between nations. In the case of Iran-EU bilateral trade pattern, the coefficients revealed an increase of export and import volumes between Iran and the 25 EU trading partners by about 84% [=Exp((0.61)-1] and 105.4% [=Exp(0.72)-1], respectively. Considering the estimation results in the case of Iran-Asia bilateral trade, it can be said that export and import volumes increase by approximately 66.5% [=Exp(0.51)-1] and 89.6% [=Exp(0.64)-1], respectively, when an Asian trading partner of Iran is a member of the World Trade Organization (WTO).

1- It is calculated as the average of 43%, 39% and 44%

2 It is calculated as the average of 82.2%, 82.2% and 95.4%

6. Concluding remarks

This study was an empirical attempt to investigate whether the imposition of sanctions against Iran pushed this country toward the Trade Convergence with Asia (Asianization) and the Trade Divergence to Europe (de-Europeanization). To this end, we analyzed the impacts of GDP, CTI as a proxy for trade openness, urbanization growth, the MTR, distance, WTO and sanctions on Iran – EU member states and - Asian countries bilateral trade in a gravity theory of international trade from 2006 to 2015. To achieveing better results, we considered gravity model for exports and imports, separately.

Our estimation results are in line with the opinion of Fidrmuc (2009) about similarity of estimators' results for panel co-integration. Our results reveal that the basic features of gravity model estimations are very similar across all three estimators, i.e. FE, RE and FMOLS.

Considering the results from the analysis of the gravity models, we can conclude that:

- In regards to Iran's export to the EU, the results revealed the positive influence of economic size, trade openness, urbanization growth, the MTR and accession to the WTO, while the estimations showed that imposing sanctions against Iran decreased the exports volume of this sanctioned country to the EU by nearly 38.1%.
- In the case of Iran's import from the EU, the estimations results proved the positive impact of economic size, trade openness, urbanization growth, the MTR and accession to the WTO, while the results expressed that imposition of economic sanctions against Iran reduced Iran's import from the EU by approximately 45.8%.
- A comparison of the export-based and import-based gravity models of trade between Iran and the EU indicates that the negative effect of economic sanctions on the import volume of Iran is larger than the impact on export volume of this country to the EU.

- The estimation results for the Iran's export pattern to the Asian countries supported the positive relationship between economic size, trade openness, urbanization growth, the MTR and WTO with the Iran's export volume to the Asian countries, while the results showed the negative impacts of sanctions and geographical distance on the Iran's export flows to the Asian nations.
- In regarding to the Iran's import pattern to the 25 Asian nations, the coefficient signs are similar to the case of previous export-based gravity model. While GDP, trade openness, urbanization growth, the MTR and WTO positively affected the Iran's import volume from the Asian nations, the imposition sanctions against Iran and geographical distance deaccelerated the Iran's import volume from the 25 Asian countries.
- A comparison of the import-based and export-based gravity models of Iran-Asia trade flows proved that the positive effects of sanctions on Iran's import from the Asian countries (nearly 92.3%) are larger than the positive effects of this variable on the export volume of this country from the Asian nations (about 77.4%).
- The imposition of sanctions in related to the Iran's nuclear program pushed the foreign trade policy of this country towards the Trade convergence to Aisa (Asianization) and away from Europeanization (the Iran's Trade divergence from the EU).

Following the empirical results and conclusions, we can recommend that the imposition of sanctions against a country generally can not have a harsh effect on its trade flows. Because the target country can find new markets with new trade opportunities. It means that the target country can reshape its trade pattern from the sanctioning nations toward the non-sanctioning countries. This fact can create the Trade divergence and Trade convergence of the target country under sanctions. We can draw the attention of sanctioning countries to this issue that sanctions can not be an efficient policy in the long-run. Hence, it can be recommended that these nations have to find a substitution for the policy of imposition economic sanctions. Moreover, sanctioned country can rapidly reshape

their trade patterns and try to catch up to non-sanctioning countries and go to reach to the divergence from sanctioned nations.

To sum up the paper, it can be expressed that since there are a vast number of other factors such as geopolitical concerns, trade risks , tariffs and pricing, visa procedures and transports which were not considered in our models,the author suggests future researches with a larger data about these factors giving a better result and fewer errors.

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The Motivational Factors of Female Entrepreneurs in *de facto* States: Planning for an Uncertain Future

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The body of literature on entrepreneurship, including female entrepreneurship, in developing countries is growing. A very small number of developing countries have no legal status as a sovereign entity, and operate within a *de facto* framework. Inside these regions, while dealing with complex economic and political issues, individuals still need to set up enterprises and develop their businesses, which then increases the economic growth of these stateless regions. This paper sets out to identify a number of developing nations with *de facto* status, including the Turkish Republic of Northern Cyprus, the Republic of Kosovo, and Palestine, and it will highlight the issues for entrepreneurs in these regions, especially issues for female entrepreneurs within heavily patriarchal societies.

Through an extensive literature review, as well as data from a previous mixed methods research study in North Cyprus, the paper seeks to underscore the issues for entrepreneurs in *de facto* states. In detail, the motivational factors of entrepreneurs in these *de facto* states will be emphasised, drawing attention to the possible links between the entrepreneurs of these regions, as well as comparisons to other developing nations. These three *de facto* regions have high Muslim populations, and the possible implications of this will also be uncovered.

Key words: *de facto* states, female entrepreneurship, entrepreneurship motivation, policy development

Introduction

The political upheavals of the twentieth century have led to the creation and declaration of a number of states, which so far, are not wholly recognised by the international community, and are thus referred to as

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de facto states. Inside these regions, while dealing with extremely complex economic and political issues, individuals still need to find a way to earn a living, and for a large proportion of these citizens entrepreneurship is the only way to find a way through their exasperating problems. This entrepreneurship "against all odds" increases the economic growth of these stateless regions. Many of these entrepreneurs will be women, which brings added problems and issues to the creation of their enterprise, as these regions tend to be highly patriarchal in makeup. The body of literature on entrepreneurship, including female entrepreneurship, in developing countries is growing. However, there are few studies of entrepreneurship in *de facto* states, which this paper seeks to address.

The paradox of *de facto* states

De facto is a Latin term referring to the existence of a entity that has no legal capacity. It is used to describe a number of regions or territories worldwide, *de facto* states, which for various reasons are not legal states, and are not member states of the United Nations. Some of these *de facto* states are mostly accepted in the wider world, such as Taiwan and Kosovo, while others are more obscure (Abkhazia, Sahrawi Arab Democratic Republic). The paradox is that while these states are not recognised, within them is a population with the same human needs and desires as other areas of the globe. Many people within these *de facto* states become entrepreneurs, some of them rise to be billionaires, and the unrecognised state leans on these entrepreneurs to bring forth economic growth. Trading as a *de facto* state can be extremely difficult, with economic embargoes put in place, yet each year many nascent entrepreneurs move into business ownership regardless of the overwhelmingly complicated economic situation they may find themselves operating within.

In this paper we will focus on the Turkish Republic of Northern Cyprus (TRNC), Kosovo and the Palestinian Territories, as they are geographically fairly near to each other, and the population of region is predominantly Muslim. The population of each is also small, shown in Table 1 below. The Turkish Republic of Northern Cyprus was declared a republic in 1986 after partition from the Greek Cypriots in 1974, and is only recognised by Turkey. After declaring independence from Serbia in 2008, Kosovo is recognised by 112 nations, but not all countries. The

State of Palestine declared independence in 1988, but was not unilaterally accepted by the international community as a nation. However, more recently, it has had its status upgraded by the United Nations to non-member observer status. The *de facto* status of these regions means they are not eligible to apply for loans from the International Monetary Fund of the World Bank, which means that entrepreneurship becomes even more important as a factor for economic development.

Table 1: *De Facto* State population

<i>De Facto</i> State	Population
Republic of Kosovo	1,859,203
Palestinian Territories	2,731,052
Turkish Republic of Northern Cyprus	265,100

Source: CIA (2015); Hatay (2007)

This paper seeks to highlight the issues for entrepreneurs in these *de facto* states, especially the concerns of female entrepreneurs who are operating within heavily patriarchal societies.

An extensive literature review of entrepreneurship in the three *de facto* states will set the stage for an analysis of entrepreneurship in the regions, to seek out similarities and to note the differences brought forward. There may be similarities with other developing nations and possible links will be sought. A previous mixed methods research study from North Cyprus will be investigated to determine relationships between entrepreneurs in these *de facto* states, especially the difficulties encountered by female entrepreneurs.

Finally, the objective of this paper is to suggest public policy for *de facto* states. This is an important issue, as one of the problems with non-recognised regions is their government's complacency with regard to policy making.

Motivation of entrepreneurs

Motivations for both male and female entrepreneurs is an important factor, as understanding entrepreneurship motivation as a push or pull effect can greatly enhance understanding of the aspects of entrepreneurship in a region. Some researchers believe the factors that fuel self employment are the product of our enterprise culture (the pull view), while others think it is the result of globalization and restructuring economies (the push view). The push factor also will have a different significance according to the country and culture that the entrepreneur lives in. In this paper, it could be assumed that for all three *de facto* states the entrepreneurs would be of the pull type, as they are building their enterprises inside extreme economic conditions.

The Council for Foreign Relations promote the idea that there should be facilitation for the entrepreneur to gain access to markets, with the ideas of matching sellers to buyers internationally (Tzemach Lemmon, 2012), but of course for our entrepreneurs in these *de facto* nations, this is not possible due to international embargoes.

Entrepreneurs in North Cyprus, Kosovo and the Palestine

In the Turkish Republic of North Cyprus (TRNC) 56% of the working age population are working (Thompson, 2005). Nearly all the private sector organizations are small to medium size enterprises (95%), and 88% of employees employed in the private sector are employed by these small and medium sized enterprises (Tanova, 2003). A large majority, 80% of SMEs are sole-ownership or family-owned businesses (Güven Lisaniler, 2004).

The *push* factor for entrepreneurs is reduced by the fact the Government sector is an attractive employer, with high wages and lucrative benefits. As well as the above economic factors, the entrepreneur can experience problems in access to information. This makes it difficult for any entrepreneur to expand or develop their enterprise (Güven-Lisaniler, 2004). The sum total of all the above factors pertaining to the Turkish Cypriot community's economy is that there are severe restrictions in opportunity for entrepreneurs. Despite all the barriers to entrepreneurship in North Cyprus, the rate of female entrepreneurship stands at 33%, high by European standards (Howells & Krivokapic-Skoko, 2009).

In Kosovo, 80% of employment is provided by small and medium sized enterprises. Kosovo depends on its entrepreneurs as a base for economic activity (Solymosy, 2005), and in acknowledging the importance of this, the Kosovo Government have already created a Private Sector Strategy Plan, aiming to create an SME friendly business environment, promote entrepreneurial culture and increase the competitiveness of SMEs (Oberholzner, 2014). Similar to the TRNC, the retail and service sectors dominate the makeup of SMEs (Oberholzner, 2014). The rate of female entrepreneurship in Kosovo is 13%, rising to 35% in some service sectors (Oberholzner, 2014). The importance of small and medium sizes enterprises to the economic growth of Kosovo was established by the researcher Gërgjaliu-Thaçi (2012), where she highlights the significant growth in the numbers of SMEs in Kosovo since 2001.

Female entrepreneurship in the Occupied Palestinian Territories has the poorest rate in the world, at a rate of 3.4% for average female early-stage entrepreneurship (compared to 16% for the male population) (Abdullah & Hattawy, 2014). Most of the female entrepreneurship is retail and services, with some manufacturing (Abdullah & Hattawy, 2014). Even though the female entrepreneurship is low, it has seriously assisted the economic makeup by creating 5.6 % of total employment in the area.

Issues for female entrepreneurship in North Cyprus, Kosovo and the Palestine

While little of the funding for post-conflict regions is specifically aimed at women, it is essential that women take part in the economic development that is necessary following an era of conflict. While men and boys go off to war, it is the women who are left behind to support their families, and this can be vital for the survival of the entire communities left behind (Nadgrodkiewicz, 2010). After the conflict, women are often seen as the most trusted within the community, as they were not the perpetrators of war or conflict, and they can help in the moves towards reconciliation (Nadgrodkiewicz, 2010).

Only 6% of business owners in Kosovo are women, with most women having enterprises in retail and services (Purrini, 2011). There are some women involved in the manufacture of textiles, dairy products,

vegetable preservation, bakeries, traditional carpets and wedding gowns, with smaller numbers owning enterprises in agriculture (Purrini, 2011).

The Center of Arab Women for Training and Research (established in 1993 in Tunisia) conducted research in the Arab nations of Lebanon, Yemen, Egypt, and Tunisia, and the occupied territories of Palestine of both working women and women who had started their own enterprises. In the in-depth interviews they conducted, some interesting factors were identified about Arab women in their enterprise endeavours. Many of the successful female entrepreneurs were wholeheartedly supported by their husbands, in spite of opposing social pressure (Jabre et al., 1997). Female entrepreneurs in the Palestinian Territories complain that once they have started an enterprise, they cannot compete with cheap imports from Israel (Al Botmeh, 2013). Agricultural and Horticultural entrepreneurs in North Cyprus face the same problems with cheap imports from Turkey.

Female entrepreneurs in the Palestinian Territories also seem to have harsher patriarchal mores subjected onto them. Qazzaz et al. (2005) cite many instances of female entrepreneurs being harassed by family and neighbours to close down their businesses as they were unfitting. The women here also face barriers in being exploited by merchants, and in not being able to negotiate with government bodies such as local councils (Qazzaz et al., 2005).

Female entrepreneurship in the Palestinian Territories endures similar difficulties to female entrepreneurship worldwide, difficulties with financing, lack of knowledge and skills, and limitations on the professions and businesses deemed suitable for women. Unlike the TRNC and Kosovo, female entrepreneurship in the Palestinian Territories has stagnated (Al Botmeh, 2013). Retail is the main industrial sector selected by the Palestinian female entrepreneur, with teaching services coming second (Qazzaz et al., 2005), which is similar to the TRNC and Kosovo.

High interest rates are a barrier to entrepreneurship in current day Kosovo, and the market is new and the banks have not yet become competitive (Gërgjaliu-Thaçi, 2012). The informal economy in Kosovo is very strong, and this is undermining the security of casual workers, as well as much needed funds not being paid into social security. The

TRNC began some time ago to wipe out this informal economy, and with regards to illegal immigrant workers by the imposition of fines through new legislation in 2006, and they have been quite successful (Güven Lisaniler, 2013; Hatay, 2007). However, labour legislation in Kosovo is very flexible, and this is seen as a great advantage (Gërgjaliu-Thaçi, 2012). Kosovo also benefits from low taxes and low custom duties (Gërgjaliu-Thaçi, 2012), whereas the TRNC entrepreneur suffers from business taxes and high custom duties.

Motivation of entrepreneurs in these regions

While many authors would argue that entrepreneurship in transition economies would be from necessity, it is interesting to see that in our selected *de facto* states this is not the case. In a large research study in North Cyprus, most entrepreneurs reported they were pulled into entrepreneurship, from wanting to work for themselves, to lifestyle entrepreneurship where they simply wanted to run a business to get out of the house (Howells & Krivokapic-Skoko, 2009). Similarly, in Kosovo, the main reason given for creation of the enterprise is spotting the opportunity (Karsniqi et al., 2011). Abdullah & Hattawy (2014) report that female entrepreneurship in the Palestine is PUSH, with necessity given as the most overwhelming reason for starting an enterprise, unlike men who displayed PULL entrepreneurship with opportunity seized. In fact, total lack of income was cited as the motivation to start an enterprise by many of the female entrepreneurs interviewed by Qazzaz et al. (2005).

For the female entrepreneur in the Palestine, the push factor is a large factor for some women in the region, who turn to enterprise in order to feed and clothe their children after family tragedies, illnesses, or simply economic hardship (Jabre et al., 1997). Typically, some of the women were encouraged by their fathers, business owners themselves. Other women eventually brought their husbands round to see the positive aspects of their enterprise, and now these men support their wives' decisions and business ownership (Jabre et al., 1997).

Despite the difficult economical situation in the Turkish Republic of Northern Cyprus, most entrepreneurs are pulled into entrepreneurship, drawn by the desire to be their own boss, to earn extra profits, but also by more esoteric reasons such as “*to have a social life*”, or “*because I*

enjoy it’, which leads us to understand Turkish Cypriot entrepreneurship as a lifestyle choice (Howells & Krivokapic-Skoko, 2009).

Creating policy for entrepreneurship in *de facto* regions

While the *de facto* states mentioned above have no international legal status, it is still imperative that the entrepreneurs in these regions create enterprises, contribute towards economic development, and lead their countries forward towards possible political solutions for their non-recognition. In order to encourage and facilitate entrepreneurship in a region, there are many policies that can be adopted by both national and local government, as well as agencies and private institutions. Some of the suggestions below have already been put in place, while others are only ideas. The policy ideas have been grouped in major areas.

Government Policy Initiatives

Some of the relevant recommendations from the Palestinian Economic Policy Research Institute (PEPRI) include:

- ensuring the equality of women in all aspects of running their enterprises
- preparation of plans to promote female entrepreneurship
- child care provision
- tax exemptions and incentives for small businesses
- formation of a long term national strategy to enable and promote female entrepreneurship
- assistance in the form of government programs

(Abdullah & Hattawy, 2014).

Entrepreneurs in the TRNC complain that the economic embargoes stifle their growth, and this is an area where the government should do their utmost to bring their nation into the wider world. In Cyprus this means

solving the Cyprus Problem, but sadly recent initiatives towards a reconciliation between the two sides have broken down. In preparation for possibly joining the European Union, for some time, the TRNC have been aligning their laws with EU law, anticipating a time when the EU *acquis* can be enforced.

The income tax system and the valued add tax system need restructuring to be more favourable to entrepreneurs. Also, regulations need to be applied to shrink the size of the informal economy, but in a way that entrepreneurship is still encouraged. Customs duties must be lowered, to allow TRNC entrepreneurs fair competition in the market place. The TRNC has very few medium sized businesses; with many entrepreneurs in this survey reluctant to expand due to excessive costs and paperwork needed to employ more staff (Howells & Krivokapic-Skoko, 2014).

Policies on Education and Training

The Council for Foreign Relations (Tzemach Lemmon, 2012) stress that entrepreneurs in "fragile states" lack the ability to access loans or create business records and that much should be done to create access to skills and networking.

The recommendations from the recent report of PEPRI include:

- reformations within the education system to remove the negative image of vocational education
- develop training courses to increase their entrepreneurial abilities
- development of a public/private partnership to link enterprise to vocational training

(Abdullah & Hattawy, 2014).

Two specific agencies work with entrepreneurs in the Palestinian Territories for skills training and access to business networks. This is an important recommendation for any developing nation, as women often lack networking skills, or they simply don't know where to start. From this aspect it is essential that any development in training for entrepreneurs should also include "programs to develop networking skills and access to markets" (Tzemach Lemmon, 2012).

The Council for Foreign Relations add that all training programs should be tailored to the levels of the entrepreneurs, and that later each training course should be monitored and evaluated to ensure that they are working correctly (Tzemach Lemmon, 2012).

So far, there has been very little training of entrepreneurs in the TRNC, through government or NGO schemes. There has been, however, EU funding of €5,000,000 since 2004 given to many small and medium sized enterprises in the region (EU, 2013).

Public and private services should be encouraged to provide training, and aim to reach all areas of the community. This would mean specific training courses being taken out to rural areas, so that the whole community can take advantage of the training. One important factor is an initiative to explain the bureaucratic processes needed to register a new business to nascent entrepreneurs. Training for government staff and agencies can be tailored so that they are more responsive to women's needs. Mentoring could be adopted as a form of training, by using a women's entrepreneurship initiative, with funding to encourage more women into entrepreneurship.

Finance and Funding for Entrepreneurs

The problems of female entrepreneurs obtaining finance is an often discussed topic in the body of literature (Carter et al., 2001; Coleman, 2000). It seems inevitable that in strongly patriarchal societies women will find it difficult to obtain finance from a private financial institution to start her enterprise.

The PEPRI recommendations include:

- direct credit and favourable treatment for female entrepreneurs
- publication of credit rates and other information to build female borrower's confidence

(Abdullah & Hattawy, 2014).

The Council for Foreign Relations also support:

- business training with access to finance
- financial products specifically aimed at women including loans based on customer contracts
- business matchmaking services to be introduced

(Tzemach Lemmon, 2012).

Recommendations for the Private Sector

In developing nations governments have limited funds, and while they may wish to give financial support to nascent entrepreneurs, they may not be able to afford to do so, and this is why it is imperative that the private sector should be involved in initiatives for promoting and supporting entrepreneurship.

The PEPRI recommendations include:

- awareness raising campaigns and programs for the empowerment of women
- advice and information from experts for female entrepreneurs
- creation of women cooperatives

(Abdullah & Hattawy, 2014).

In some aspects, the TRNC is ahead of their fellow concerned entrepreneurs in Kosovo, as the Turkish Cypriot Chamber of Commerce already have tight dialogue with the Republic of Cyprus Chamber of Commerce, often embarking on joint ventures and publicity, including the making of informative films. Each Chamber strongly believes that a reconciled Cyprus will make a far more economically strong Cyprus. The Turkish Cypriot Chamber of Commerce formed their own SME Development Unit in January 2015 (TCCC, 2015) in order to promote entrepreneurship in the region, and currently have an EU funded project to promote cooperation between entrepreneurs of both the Turkish Cypriot and Greek Cypriot community.

An interesting recommendation put forward by the Council for Foreign Relations is to create, through the use of technology, sharing of up to date best practices for entrepreneurs to develop and be confident in their actions (Tzemach Lemmon, 2012). If this were to be created, it would allow the sharing of ideas and information internationally.

A strategy suggested by Skoko, Wright and Santa, (2010) to move the Saudi economy away from petroleum involves entrepreneurs being encouraged to diversify, with an emphasis on products and services that can be exported. This could be used in the TRNC, to broaden the entrepreneurial base away from the main economy drivers of tourism, education and construction.

Establishing a Council for Entrepreneurship

With the aim of raising the public profile of entrepreneurship as a key growth issue for the economy, in the 2010 GEM report on entrepreneurship in Saudi Arabia, Skoko, Wright and Santa (2010) suggest a national body with board members selected from the policy community, business associations, universities, and development organisations. Careful consideration to the importance of entrepreneurship to the development of an economy in transition should be given, and a government would be well placed to create an entrepreneurship council, as suggested by Skoko, Wright and Santa (2010).

One Stop Shops

The processes for registering a company and the necessary bureaucratic paperwork could be simplified, including reducing regulations and reducing the cost of registration, as suggested by Skoko, Wright and Santa (2010), in the 2010 GEM report on the state of entrepreneurship in the Kingdom of Saudi Arabia. If a more favourable environment were created, such as “one stop shops” for everything from initial information through to help registering the company, entrepreneurship may be seen as more attractive by the nascent entrepreneurs (Skoko, Wright & Santa, 2010).

The TRNC has already created an Agency for Business Registration (2002), which resulted in a Centre for Business Services, from January

2013, with the purpose of allowing the entrepreneur to register as a business along with any other formalities such as VAT or import/export certificates, with transparency, and all under one roof. The TRNC and Palestinian Territories would do well to introduce a similar scheme.

Improving the Infrastructure

In the TRNC, many entrepreneurs complain about the very poor infrastructure of the region, and this is an item that national and local government must address if they wish the economy to grow and flourish. While tourism is an important part of the economy, it is not the only dimension to the economy, and other aspects must be explored to not become dependent on one facet of the economy. Again, many of the entrepreneurs in the study commented that the tourism market was not large enough to accommodate their aspirations (Howells & Krivokapic-Skoko, 2014).

As post war *de facto* regions, Kosovo and the Palestinian Territories would also benefit from an improvement in infrastructure. By infrastructure, we refer to the virtual infrastructure of communications technology, as well as roads, electricity and water. While Kosovo is rich in rivers and has a good water supply, the TRNC and Palestine have limited water resources. In order to alleviate water shortages in the TRNC, a water pipeline system bringing water from Turkey has been built (Haun, 2014).

In addition to the above, there are other recommendations that are difficult to implement, but are still a necessity. Purrini (2011) suggests that empowerment for women is paramount, as women in these post war regions are absent from the decision making structures, especially women in rural areas. Purrini (2011) relates that in Kosovo in particular there are problems with women having access to land, and any land they might have been accustomed to using can be lost with male controlled inheritance laws, and this in turn makes it difficult to gain access to finance, as the banks require collateral to make loans to the female entrepreneur. Kosovo society is particularly patriarchal, scoring very low on the UNDP Gender Development Index at 0.76, the lowest score in the Balkans (Purrini, 2011). Ramadani et al. (2015) note that female entrepreneurship in Kosovo is a tiny proportion of the entrepreneurship

in the region, yet while these businesses tend to be micro businesses, they bring in a good profit for their proprietors.

Conclusion

It is well known that entrepreneurship is a very important factor in creating economic growth in a developing nation. In a non-recognised countries such as the TRNC, Kosovo, or the Palestinian Territories, it is imperative that governments acknowledge and understand the importance of entrepreneurship and the role it plays in economic development. Effort must be put into funds and policies to improve the infrastructure of these regions which will in turn support the development of entrepreneurship. It is also important that governments seek specialist advice with regards to economic development and entrepreneurship and create policies that attempt to bring about entrepreneurship and foreign investment.

The government in Kosovo has created plans to encourage female entrepreneurship, but their plans have only involved some training schemes, and it is imperative that government policy drafts become a reality to enhance the female entrepreneurs access to finance, which is probably the largest barrier to female entrepreneurship there (Ramadani et al., 2015).

Understanding the nuances of entrepreneurship in North Cyprus would allow the government to shape policy and training to take advantage of the nascent entrepreneurs in the region to build a strong private sector to pull the TRNC into a strong economic state. Compared to other European nations, the level of female entrepreneurship is high in North Cyprus, women are estimated to be 33% of the entrepreneurs in the region (Howells & Krivokapic-Skoko, 2009). Turkish Cypriots have been shown to have high entrepreneurial exposure (Krivokapic-Skoko & Howells, 2012), making them ideal candidates as nascent entrepreneurs. They are also predisposed to be pulled into entrepreneurship, making them ideal candidates to be trained and encouraged and mentored from nascent entrepreneurship into real, live entrepreneurship.

These policies for encouraging and supporting entrepreneurship could be useful throughout the small number of *de facto* states in the world, encouraging the governments within these regions to be pre-emptive in

securing a holistic and transparent system for nascent entrepreneurs to follow. With specific government policies and training programs, more of the population could be encouraged to make successful enterprises, which in turn would help strengthen the economy.

As highlighted by Ramadani et al. (2015), governments need to make actual concrete action plans not just "virtual" plans. It is too easy for a non-recognised government to be unconcerned with policies for entrepreneurship, especially in creating special training schemes or strategies for female entrepreneurship. They can argue, that with very limited funds, they cannot stretch to implementing their policies. However, without a strong base of private business ownership, and encouragement of the whole community to be entrepreneurs, a developing nation can neglect its opportunity for economic growth. They need to be ready to trade globally, once their particular political issues are resolved and they become a recognised state. The policy recommendations above would assist in this transformation.

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Is There Any Asymmetry in Causality between Economic Growth and Energy Consumption?*

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The aim of this study is to investigate the causation linkage between economic growth and electricity consumption as an indicator of energy consumption in the Turkish economy between year 1967 and 2014. In this regard, we employ recently developed asymmetric causality analysis developed by Hatemi-J and Roca (2014) which allows testing asymmetric relations. Test results imply that there is a bi-directional causality between economic growth and electricity consumption. Moreover, an increase in electricity consumption does not affect economic growth positively and but a decrease in consumption of electricity induces a decrease in economic growth. On the other hand, economic growth affects electricity consumption in both positive and negative shocks. Results imply an asymmetric causation linkage between economic growth and energy consumption in the Turkish economy.

Keywords: Economic Growth, Energy Consumption, Asymmetric Causality, Turkey.

JEL Classification: C32, O41, Q43.

1. Introduction

The relation between the amount of energy usage and economic growth highly debated among researchers since 1970s (Hu and Lin, 2013: 76). The motivation in investigating such a relation is to better understand whether economic growth induces energy consumption increase or

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economy of a country grows as a consequence of energy consumption. By doing so, policymakers will be able to design energy policies to promote economic growth and/or to provide energy sources to sustain economic growth.

Designation of the right energy policy in the context of development projects is crucial for especially Turkey, an energy dependent country. The share of energy import in total import volume is about 25% and the ratio of energy deficit to GDP which measures the energy dependency of a country is about 6-7 % (World Bank, 2014: 1). Moreover, the ratio of annual energy deficit to total trade deficit is 58 %.

In the light of the statistics provided by World Bank (2014), implementation of energy conservative policy would reduce energy dependency and current account deficit. But it would hurt growth performance of the Turkish economy, in the case of existence of a causality relation running from energy consumption to economic growth, growth hypothesis is valid. On the other hand, it would not affect growth path of the economy if there is a causation linkage running from economic growth to energy consumption, conservation hypothesis is valid. In this case energy conservative policies have little adverse or no effect on economic growth (Nazlioglu, 2014: 315).

There are two more options in possible relation between the variables. The bi-directional causality between variables can be explained by feedback hypothesis. According to feedback hypothesis, negative energy shocks and/or energy conservation policies may be associated with a decrease in output growth, a growth in economy stimulates energy consumption (Hatemi-J and Irandoust, 2005: 88). Neutrality hypothesis claims that there is no interaction between variables (Wolde-Rufael, 2005: 1108). Thus there is no need to coordinate to policies aiming sustainable economic growth and planning energy sources.

Although there is a vast literature related to the topic, there is no consensus between them. According to Kayhan et al. (2010: 170), conflicting results may come from country or time period investigated as well as methodology differences. On the other hand, existing literature does not take asymmetries in the relationship between variables into account and this may be an important reason of inconclusiveness in the literature.

Existing studies analyze the relation symmetrically and claim an increase in one of them increase other or vice versa. But the relation may be asymmetric. To say that, an increase in economic growth may reduce energy consumption due to technological innovation which saves energy requirement and/or R and D development as a consequence of economic growth. This would indicate a negative relation between economic growth and energy consumption. Moreover, while a positive shock in economic growth induces increases in energy consumption, a negative shock in the same variable may not reduce energy consumption because of existing production setup. In this regard, it is important to identify whether there is an asymmetric relation between variables as well as direction of causation linkage.

In this study, we analyze the re-investigate the relation economic growth and energy consumption in the Turkish economy between years 1967 and 2014 by employing Hatemi-J and Roca (2014). By doing so, we will be able to find possible negative and asymmetric relation between variables. Results would help to better understand the relation to construct development policies while providing most efficient energy policies. Also we will be able to contribute the literature by employing an asymmetric causality test.

In the following section, literature is summarized. In the third section, model and data employed are presented. After the methodology identified in the fourth section, empirical results are interpreted in the fifth section. In the final section, results are concluded and policy implications are presented.

2. Literature Review

In the literature, it is possible to classify studies into four groups in the context of possible relation between energy consumption and economic growth, conservation, growth, feedback and neutrality hypothesis. We can classify the studies according to geographical location of countries also. By doing so, inconclusiveness among the analyses may be seen clearly. Initial study of Yu and Choi (1985), they find uni-directional causality from energy consumption to economic growth for Filipinas located in Asia. In latter studies, Masih and Masih (1996) for India, Masih and Masih (1997) for South Korea, Chang et al. (2001) for

Taiwan, Shiu and Lam (2004) for China, Yemane (2004) for Shanghai, Narayan and Singh (2007) for Fiji Island reach similar results.

Contrariwise relation is found by Masih and Masih (1996) for Indonesia, Yu and Choi (1985) for South Korea, Cheng and Lai (1997) for Taiwan and Soytas and Sari (2003) for South Korea. The feedback hypothesis is supported for Asian economies by Asafu-Adjaye (2000) for Thailand, Glasure (2002) and Oh and Lee (2004) for South Korea, Hwang and Gum (1992) for Taiwan, Squalli (2007) for Iran and Qatar, Meng and Niu (2015) for China.

A number of studies analyze the African economies to understand the relation between economic growth and energy. Belloumi (2009) and Odhiambo (2009) indicate that there is a causation linkage from energy consumption to economic growth in Tunis and Tanzania. Ziramba (2015) supports them in the case of South Africa. Contrary to findings of Belloumi and Odhiambo, Wolde-Rafael (2006) claim reverse relation in Cameroon, Ghana, Nigeria, Senegal, Zambia and Zimbabwe. The same study finds bi-directional causality implying feedback hypothesis for Egypt, Gabon and Morocco and non-causality implying neutrality hypothesis for Algeria, Congo, Kenya and South Africa. Bildirici (2013) also finds bi-directional causality for Gabon, Guatemala and Ghana. Bildirici (2012) reports similar results for Algeria, Egypt, Morocco, Nigeria, South Africa, Sudan, Togo, Tunisia and Zimbabwe.

Cheng (1997) is one of the initial studies investigating Brazil economy. The study finds no linkage between them in Brazil. On the other hand, Soytas and Sari (2003) finds bi-directional causality for Argentina. Akarca and Long (1980) and Yu and Hwang (1984) finds neutrality hypothesis is valid for United States of America. In the latter study of Narayan and Prasad (2008), similar results are obtained for U.S. and Mexico economies.

The studies investigating European economies have conflicting results similar to literature. Kayhan et al. (2010), Narayan and Prasad (2008) and Hatemi-J and Irandoust (2005) find uni-directional causality from energy consumption to economic growth in Romania, Iceland, Italy, Portugal, Slovakia and Sweden. Hondroyannis (2002) for Greece and Aktas and Yilmaz (2008) for Turkey find bi-directional causality supporting feedback hypothesis. On the other hand, Yu and Choi (1985)

for Poland and United Kingdom and Narayan and Prasad (2008) for Belgium, Denmark, France, Germany, Ireland, Luxemburg, New Zealand, Norway, Poland, Spain, Sweden, Switzerland and Turkey find non-causality indicating the existence of neutrality hypothesis.

The studies about the Turkish economy have conflicting results too. Asafu-Adjaye (2000), Soytaş and Sari (2003 and 2007), Altınay and Karagöl (2005) and Aslan (2014) claim uni-directional causality running from energy consumption to economic growth in the Turkish economy. On the other hand, Karagöl et al. (2006), Halicioğlu (2007), Lise and Monfort (2007) Karanfil (2008), Bayat et al. (2011) and Kula (2014) find evidences implying reverse relation contrary to Asafu-Adjaye (2000), Soytaş and Sari (2003 and 2007). Doğan (2015) finds results supporting feedback hypothesis for Turkey. Finally, Altınay and Karagöl (2004), Aktas and Yılmaz (2008) and Narayan and Prasad (2008) find that neutrality hypothesis is valid for the Turkish economy.

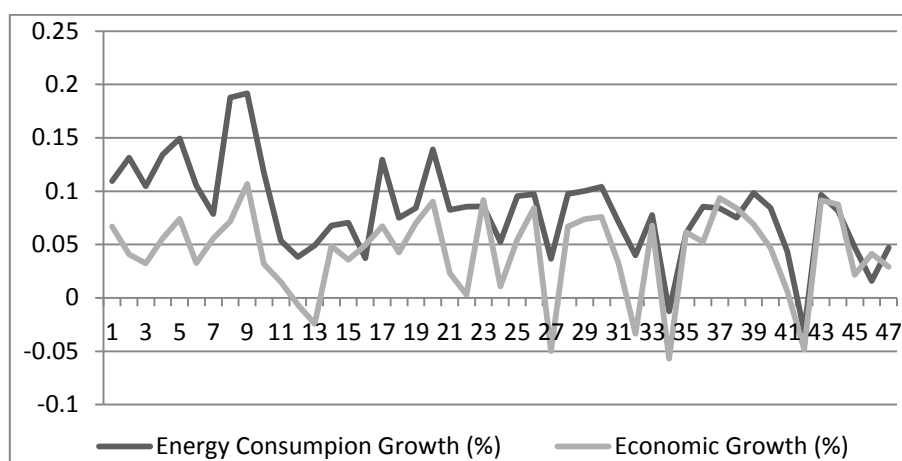
There is a small number of studies investigating asymmetry between economic growth and energy consumption in the literature. One of them belongs to Hatemi-J and Uddin (2012). They analyze the output – energy consumption relation in such a way by employing asymmetric causality test employed in this study. They find that a negative energy consumption shock will cause a negative shock in the output per capita will also decrease. But such a causal impact for positive shocks is not found. Arouri et al. (2014) employ the same method to find possible asymmetry in the French economy and find uni-directional causality running from negative output shocks to negative energy consumption shocks.

3. Data and Model

According to Balat (2009) the Turkish economy one of the emerging market economies invests into energy sector in order to satisfy constantly increasing energy demand. Also energy import dependency still continues. Annual energy demand growth rate is approximately 6 % during the last decade where the Turkish economy has experienced high growth rate and the average growth rate of the same period is approximately 5 %. Energy demand increases more than economic growth. In the light of this explanation, relationship between economic growth and energy consumption is crucial. In the figure 1, it is possible

to see the trend of economic growth and energy consumption in terms of electricity (Gwh).

Figure 1: Annual Growth of Electricity Consumption and Economic Growth (%)



In order to test interactivity between hikes in both variables, we use annual gross domestic product (GDP) variable in order to measure economic growth and electricity consumption in order to measure energy consumption growth (EC) between years 1967 and 2014. The data belonging to electricity consumption is obtained from the Turkish Statistical Institute database and it is measured in the form of Gwh. On the other hand, gross domestic product series with constant prices is obtained from International Financial Statistics database published by International Monetary Fund. We use natural logarithms of all variables to not to live heterojedusticity.

Table 1: Descriptive Statistics of Variables

	Mean	Max	Min	Standart Dev.	Skewness	Kurtosis	Jarque-Bera
EC	10.67	12.24	8.56	1.08	-0.286	1.928	2.952 (0.228)
GDP	3.83	4.78	2.81	0.57	-0.048	1.853	2.646 (0.266)

Note: Value in parentheses shows probability value.

According to descriptive statistics, standard deviation value which is an indicator of volatility is high in the series of energy consumption compare to economic growth series. Also skewness coefficients show that both series are skewed to left. Kurtosis coefficients indicate that both variables are flattened. According to Jarque-Bera test, the null hypothesis claiming series are distributed normally is accepted.

4. Methodology

The basic idea in asymmetric causality test developed by Hatemi-J and Roca (2014) is to investigate causality in different shock types and to determine if causality differs due to shock type. P_{1t} and P_{2t} is two co-integrated variables (Hatemi J, Roca, 2014; 7)

$$P_{1t} = P_{1t-1} + \varepsilon_{1t} = P_{1,0} + \sum_{i=1}^t \varepsilon_{1i} \quad (1)$$

and

$$P_{2t} = P_{2t-1} + \varepsilon_{2t} = P_{2,0} + \sum_{i=1}^t \varepsilon_{2i} \quad (2)$$

t is $t=1,2,\dots,T$, $P_{1,0}$ and $P_{2,0}$ constant terms, $\varepsilon_{1i}, \varepsilon_{2i} : iid(0, \sigma^2)$.

Positive and negative changes in each variables are $\varepsilon_{1i}^+ = \max(\varepsilon_{1i}, 0)$, $\varepsilon_{2i}^+ = \max(\varepsilon_{2i}, 0)$, $\varepsilon_{1i}^- = \min(\varepsilon_{1i}, 0)$ ve $\varepsilon_{2i}^- = \min(\varepsilon_{2i}, 0)$, respectively.

We estimate results as $\varepsilon_{1i} = \varepsilon_{1i}^+ + \varepsilon_{1i}^-$, $\varepsilon_{2i} = \varepsilon_{2i}^+ + \varepsilon_{2i}^-$. So,

$$P_{1t} = P_{1t-1} + \varepsilon_{1t} = P_{1,0} + \sum_{i=1}^t \varepsilon_{1i}^+ + \sum_{i=1}^t \varepsilon_{1i}^- \quad (3)$$

$$P_{2t} = P_{2t-1} + \varepsilon_{2t} = P_{2,0} + \sum_{i=1}^t \varepsilon_{2i}^+ + \sum_{i=1}^t \varepsilon_{2i}^- \quad (4)$$

The accumulation of positive and negative shocks in each variable are

$$P_{1t}^+ = \sum_{i=1}^t \varepsilon_{1i}^+, \quad P_{1t}^- = \sum_{i=1}^t \varepsilon_{1i}^-, \quad P_{2t}^+ = \sum_{i=1}^t \varepsilon_{2i}^+ \text{ and } P_{2t}^- = \sum_{i=1}^t \varepsilon_{2i}^-, \text{ respectively}$$

(Hatemi J, Roca, 2014: 8). $P_t^+ = (P_{1t}^+, P_{2t}^+)$ vector is used in order to test causation linkage between positive shocks. For detailed information about optimal lag length selection and bootstrap processes please see Hatemi-J (2003, 2008) and Hatemi J and Roca (2014), respectively.

5. Empirical Findings

In order to see dynamic relationship between variables, VAR (vector autoregression) model is built. Initially, it is crucial to identify stationary of series to solve the spurious regression problem. In order to find whether series contain unit root we employ Dickey-Fuller (1981, hereafter ADF) unit root test.

Table 2: ADF (1979, 1981) Unit Root Test Results

Level		Variables	ADF	First Difference	Variables	ADF
		EC	-4.203 (0) [0.00]***		EC	-4.416 (0) [0.00]***
	Constant	GDP	-0.704 (0) [0.83]		GDP	-6.903 (0) [0.00]***
		EC	-1.473 (0) [0.82]		EC	-5.526 (0) [0.00]***
	Constant+Trend	GDP	-3.384 (0) [0.06]*		GDP	-6.841 (0) [0.00]***

Notes: ***, ** and * shows stationary of series in different significance levels %1 (0.01), %5 (0.05) and %10 (0.1), respectively. Values in parenthesis show optimal lag length according to Schwarz information criteria. Values in brackets indicate probability values. For ADF test, Mac Kinon critical values are -3.485, -2.885, -2.579 for model with constant and -3.483, -2.884, -2.579 for model with constant and trend 1 %, 5 % and 10 %, respectively.

According to ADF results, energy consumption variable has no unit root in the model with constant and economic growth variable has no unit root in the model with constant and trend in their level values. On the other hand, they have unit root in the model with constant and trend and in the model with constant, respectively. Due to probability of long run memory in both variables, we employ differentiated series in order to find optimal lag length in VAR model. In the light of these results, we choose optimal lag length as two where there is no autocorrelation problem.

Before we present results of asymmetric causality analysis, conventional Granger causality test results are presented in the table 3 in order to compare them. According to results, there is no causation linkage between variables and support neutrality hypothesis.

Table 3: Conventional Granger Causality Test Results

Direction of Causality	Chi-sq	Probability
EC=>GDP	4.0513	0.1319
GDP=>EC	1.1638	0.5588

In conventional causality analyses, test statistics are calculated for a single period. So the test statistic obtained implies for just a single direction of causal linkage. In the theory of economics, discussions about positive and negative shocks affect economy due to cyclical factors. Moreover, interactions between variables may differentiate due to type of change. Causality test developed by Hatemi-J and Roca (2014) finds the causation linkage mentioned above. The null hypothesis of the test claims non causality between variables. In the decision phase, MWALD test statistics is compared to critical values in different significance level. If MWALD test statistics is bigger than critical values; that means there is a causation linkage between shocks and alternative hypothesis is accepted.

Table 4: Hatemi-J and Roca (2014) Asymmetric Causality Test Results

Direction of Causality	MWALD	1% Bootstrap Critical Value	5% Bootstrap Critical Value	10% Bootstrap Critical Value
$(EC)^+ \nRightarrow (GDP)^+$	0.042 (0.837)	8.394	4.630	3.078
$(EC)^+ \nRightarrow (GDP)^-$	1.572 (0.796)	9.278	5.154	3.864
$(EC)^- \nRightarrow (GDP)^-$	9.742 (0.0)***	11.052	4.078**	3.646*
$(EC)^- \nRightarrow (GDP)^+$	5.782 (0.01)**	9.124	4.843**	3.263*
$(GDP)^+ \nRightarrow (EC)^+$	4.989(0.026)**	10.489	6.029	3.729*
$(GDP)^+ \nRightarrow (EC)^-$	4.964 (0.03)**	9.233	4.325**	3.107*
$(GDP)^- \nRightarrow (EC)^-$	4.785 (0.02)**	10.458	4.585**	3.431*
$(GDP)^- \nRightarrow (EC)^+$	2.241 (0.142)	9.504	4.874	2.746

Not: $\nRightarrow$ shows null hypothesis where there is no causality. Values in parenthesis show asymptotic probability values. ***,** and * show 1 %, 5 % and 10 % significance levels, respectively. The number of bootstrap iterations is 10.000.

According to results presented in table 4, the causation linkage running from negative energy consumption shock to positive and negative economic growth shocks in 5 % and 1 % significance levels, respectively. On the other hand, a positive shock in energy consumption does not affect economic growth either positive or negative.

Positive and negative economic growth shocks affect energy consumption positively and negatively, respectively. Moreover, energy consumption may decrease as a consequence of economic growth shock.

As a result, there is a bi-directional causality between economic growth and energy consumption. This is consistent with Asafu-Adjaye (2000), Soytaş and Sari (2003 and 2007). Dogan (2015). Different from these studies we find an asymmetry in the relation running from energy consumption to economic growth. While economic growth variable affects energy consumption in either case, energy consumption can affect economic growth only in the case of negative shock. So, the causation linkage from energy consumption to economic growth exists in negative shocks.

6. Conclusion

Despite there is a vast literature related to interactivity energy and economy, there is no consensus among economists how they affect each other. Existing studies are classified into four groups. First group of studies imply economic growth affects energy consumption, second group claims opposite. Third group studies support feedback hypothesis which there is a bi-directional causality. According to last group of studies imply neutrality hypothesis indicating non-causality between variables.

The reason of divergence in the literature may be a consequence of the empirical method employed in analyses as well as variables used and/or period investigated. In this study, we employ asymmetric causality analysis developed by Hatemi-J and Roca (2014) which can capture causation linkage in the case of different shocks in each variable. By employing the method we aim to show asymmetries as a contribution to existing literature. In this regard, we analyze the Turkish economy between years 1967 and 2014 and use annual energy consumption and economic growth data.

Although conventional Granger causality analysis imply neutrality hypothesis, results obtained from asymmetric causality analysis show that bi-directional causality between variables and it is consistent with the studies of Asafu-Adjaye (2000), Soytaş and Sari (2003 and 2007). Dogan (2015). But the asymmetry is found in the relation running from energy consumption to economic growth. While an energy consumption reduction reduces economic growth, an increase in energy consumption does not increase economic growth. The results mean that asymmetric behavior exists in the energy consumption of the Turkish economy. The conventional concept means that energy conservation policies may harm economic growth, if there is a uni-directional causality running from energy consumption to economic growth, vice versa. The findings obtained from asymmetric causality test support the former view, but the reverse does not occur. So, if a policymaker implements energy consumption policies to stimulate economic growth, it will not work.

In the light of these results, economic growth would increase energy demand. Therefore energy policy has to be designed to sustain and increase energy sources in the following years of the Turkish economy. The situation might be similar for emerging economies which have no energy sources like oil, natural gas and etc. On the other hand, a decrease in energy consumption would decrease economic growth performance of Turkey. It is concluded that the Turkish manufacturing sector is sensitive to energy shortage. In any energy policy application such as energy conservation policies and/or higher taxing in energy sector would reduce energy consumption induces slowdown in economic growth.

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Do ICTs Reduce Youth Unemployment in MENA Countries?

Ebaidalla Mahjoub Ebaidalla¹

This paper examines the impact of Information and Communication Technologies (ICTs) on youth unemployment in MENA countries. The study employs a dynamic panel data for a sample of 17 countries, over the period 1995-2012. We investigate the effect of ICTs on total, male and female youth unemployment. The empirical results show that fixed telephones and internet have a negative and significant effect on youth unemployment, on both aggregate and gendered levels. The results also indicate that for both aggregate and the gendered levels of youth unemployment in the MENA region, the impact of mobile phones is found to be negative but it is not significant. The paper ends with some recommendations that aim to improve the employability of young workers in MENA countries, benefiting from the diffusion of ICT facilities in the region.

Keywords: ICTs, Youth unemployment, MENA countries

JEL Classification: C23, J21, J23.

1. Introduction

The effect of Information and Communication Technologies (ICTs)² on unemployment has been an interesting topic that raised considerable debate in the literature. A huge body of empirical studies point out that ICT innovations enhance productivity and efficiency, provide access to new markets and services, create job opportunities, generate new activities, and in turn improve employment (Smolny (1998) and Vivarelli and Pianta (2000)). On the other hand, a number of researchers

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² ICT refers to any activity involves gathering, processing, storing and presenting information. While the common use of ICTs tends to refer to the modern technologies like mobile phone and internet, the term ICT is also include the more traditional communication media such as radio and television.

argued that ICTs lead to jobs loss and increases in the unemployment rates (e.g. Brouwer et al., 1993; Machin et al., 1991).

In the last two decades, MENA countries have experienced an intensive use of technologies and communication equipments, such as computers and mobile phones. The recent statistics also show that MENA region has one of the highest rates of using ICTs in the world (ITU World Telecommunication/ICT Indicators database, 2014). For example, the ratio of mobile cellular subscriptions is more than 100 percent in MENA countries, implying that each person has more than one mobile phone. In addition, MENA embodies a large number of internet users among other regions.

On the other hand, the MENA region has a large number of young people, which accounts for more than 40% of the total population. Although young population could be a potential demographic asset for the region, youth employment is a critical development challenge that faces all the MENA countries. Indeed, among the major regions of the world, MENA countries hold the highest rate of youth unemployment. According to International Labor Organization's (ILO) statistics of 2013, the youth unemployment rate in MENA region was about 24%, which is approximately twice the global average. In the context of such 'youth bulge' (the increase in the proportion of 15-to-24-year-olds in the total population) in the MENA countries, ICT diffusion would be useful to expand the production base and to provide more job opportunities for youth in the region. In addition, policies that motivate utilization of ICTs for the sake of promoting economic growth and employability will be crucial.

Moreover, gender disparity in labor markets and education is a dominant phenomenon in MENA countries. Thus, understanding the gender-specific impact of ICT would be useful. Therefore, beside the aggregate effect of ICT, this study investigates whether ICT reduces female versus male youth's unemployment rates. Furthermore, understanding the gender-differentiated youth unemployment impacts of ICTs would help in guiding effective strategy that promotes gender equality.

Against this background, this paper contributes to the ongoing literature on ICT and youth unemployment in three main ways. First, the paper

will contribute to the existing literature; as to the best of my knowledge, there are no empirical studies on the impact of ICTs on youth unemployment in MENA countries. Second, it investigates the impact of ICTs on both aggregate and gendered levels of youth unemployment. Finally, the paper highlights the effect of some economic, demographic, institutional and natural resources variables on youth unemployment in MENA countries.

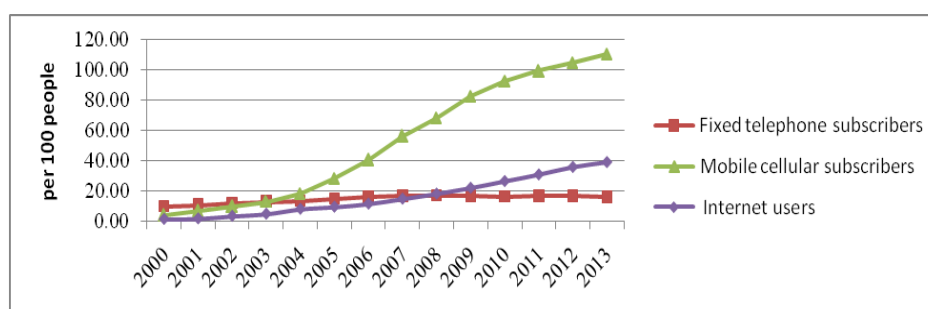
The remainder of this paper is organized as follows. The next section outlines some stylized facts about ICT development and youth unemployment in MENA countries. Section three reviews the theoretical and empirical literature on the impact of ICTs on employment. Section four outlines methodology and data used in the study. While section five presents the empirical results, section six concludes with some policy implications.

2. Evolution of ICT and Youth Unemployment in MENA Countries: Some Stylized Facts

2.1. The trend of ICTs in MENA

Before analyzing the impact of ICT penetration on youth unemployment in MENA countries, it is useful to highlight the situation of ICTs in the MENA region. In the past twenty years, MENA countries have witnessed a tremendous diffusion of ICTs in all aspects of life. Figure 1 shows the trend of ICT facilities during the period 2000-2013.

Figure 1: Trend of ICTs in MENA region

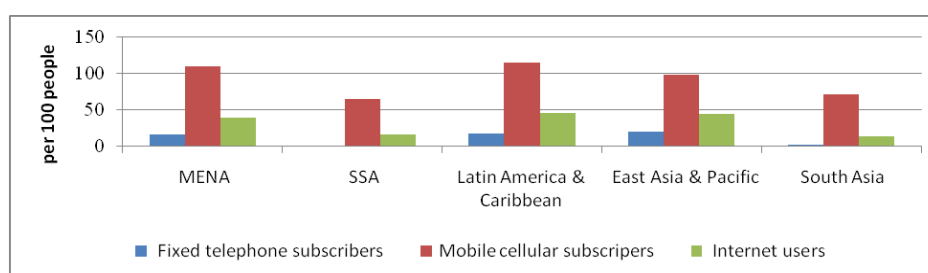


Source: ITU World Telecommunication/ICT Indicators database

Figure 1 indicates that the number of mobile phone subscribers has increased remarkably, owing to the global communication revolution. As illustrates in the figure, the number of mobile cellular subscribers in the MENA countries has augmented from about six subscribers in 2000 to more than 100 in 2013. The number of internet users also has increased from about two users in 2000 to 16 users per 100 people in 2013. Regarding the fixed telephone lines, the figure reveals that the number of telephone subscribers has remained constant over such period and fluctuated around the average of 15 lines per 100 people.

According to ITU World Communication Statistics (2014), MENA countries reported a high rate of using ICTs facilities like mobile phones and internet, in comparison to other regions of the world. Figure 2 shows the distribution of fixed telephone, mobile subscriptions and internet users among the developing regions. As indicated in Figure 2, MENA region reported the second largest number of mobile subscribers, after Latin America and Caribbean. This could be attributed to the huge flow of foreign direct investment into MENA countries, which is mainly directed to communication and services sectors. Regarding the number of internet users, the figure reveals that MENA countries exhibit high rate of internet users, estimated to be about 40 users in 2013. Similar to other developing countries, it can be indicated that the number of fixed telephone in MENA countries is low.

Figure 2: Fixed telephone, Mobile Subscriptions and Internet Users per 100 people (2013)

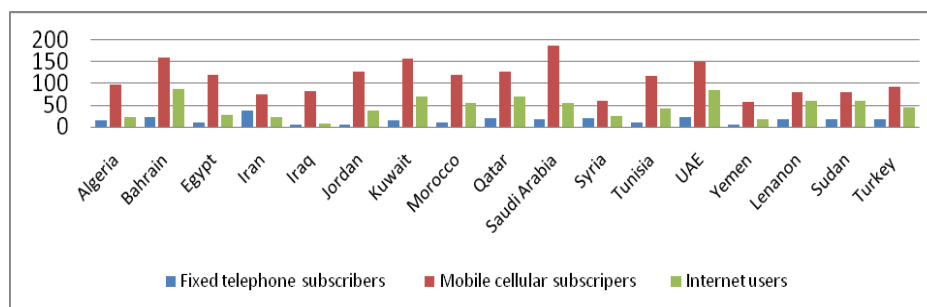


Source: ITU World Telecommunication/ICT Indicators database

Regarding the distribution of ICT services in the MENA region, Figure 3 shows that there is a variation in the usage of ICTs from one country to another. As the Figure illustrates, the Gulf Cooperation countries

(GCC) have the highest rate of using mobile, fixed phones and internet services in the region. For example in Bahrain, Kuwait and Saudi Arabia, the number of mobile cellular subscribers is more than 150 per 100 people. The rate of using internet also is higher in GCC compared to non GCC. For some non-Gulf states like Egypt and Jordan, the usage rate of mobile phones is also high. However, the number of fixed telephone and internet users in non GCC is relatively low. Therefore, this implies that GCC undergo a huge ICTs usage in the last decade.

Figure 3: Fixed telephone, Mobile Subscriptions and Internet in MENA countries (2012)



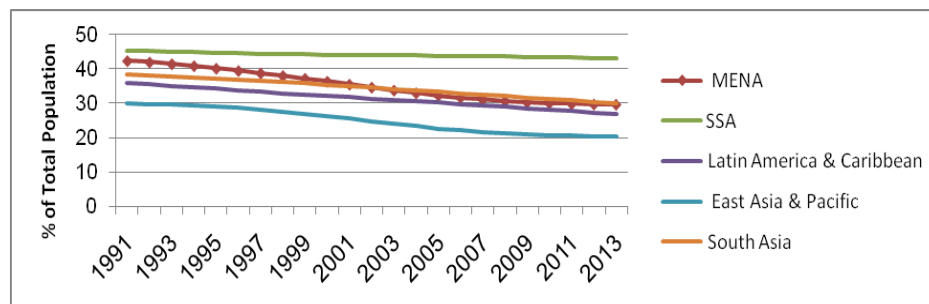
2.2. Youth Unemployment in the MENA: An Overview

During the past 20 years, MENA countries have undergone remarkable demographic transformations, in terms of population growth, fertility rate, migration as well as the age structure of the population (Ebaidalla, 2014). All these have had a significant impact on labor markets and employment in the region. Recent statistics show that MENA countries suffer from high and persistent unemployment rates (United Nations, World Population Prospects, 2010). Official estimates point out that about 12 million workers, or around 11.5% percent of the MENA labor force, were unemployed in 2013 (World Bank, 2014). Youth unemployment is also very high, estimated at 24% in 2013 (ILO, 2014). This chronic problem of unemployment may be responsible for the unfavorable economic performance and low development outcomes as well as political instability in MENA.

Recent estimates of ILO (2014) indicate that MENA countries host the fastest-growing and most youthful population in the world. It indicates that more than 20 percent of MENA's population are between the ages

of 15 and 24 and over 40 percent under 15 (World Bank, 2013). Thus, the size of the youth population represents a potential human resource for the present and future development of the region. The high youth rate makes the situation of unemployment in general even more critical and difficult as such a population structure has prompted the need to restructure the labor market in order to create more jobs and is expected to pose more pressure in the future, as demand for jobs in MENA countries will continue to rise (Ebaidalla, 2014). Figure 4 below presents data on the population under 15 in the developing regions.

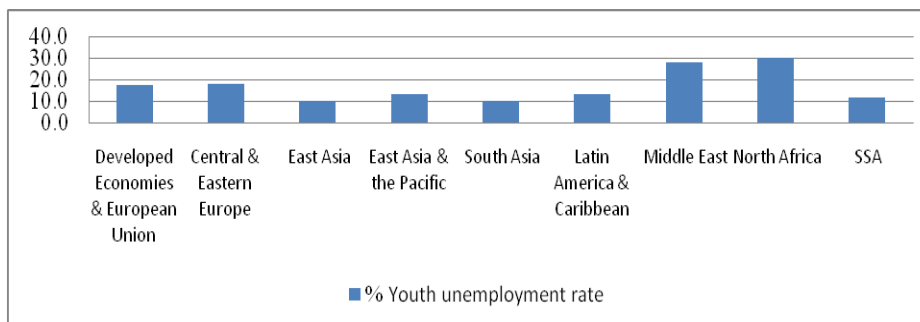
Figure 4: Young People (under 15 year) as % of Total Population (1991-2013)



Source: World Bank's Development Indicators

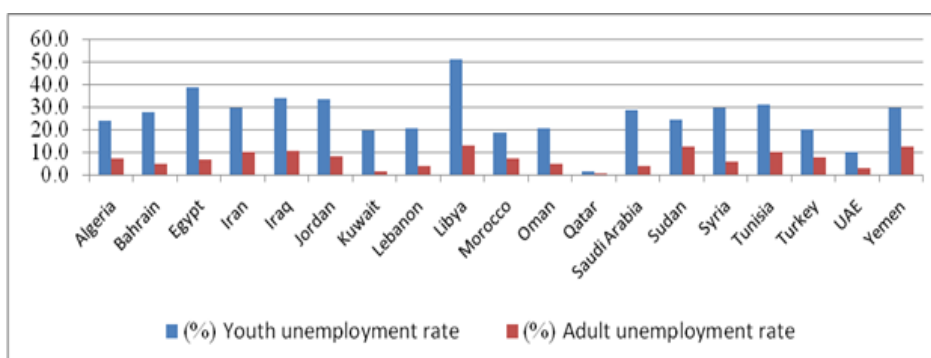
Figure 4 shows that MENA countries hold a high rate of youth under 15 year, after Sub-Saharan Africa and South Asia. The figure also indicates that for most developing regions of the World, the trend of youth population has declined between 1980 and 2010. Even for MENA region the trend has decreased remarkably in last decade. This implies a persistence of the problem of youth unemployment in the next decades. However, the high youth population ratio in MENA region indicates a high share of youth in the total labor force, which causes MENA to face the highest rate of youth unemployment in the world.

Figure 5 shows the situation of youth unemployment in the most developing regions. As indicated, the rate of youth unemployment is high in all developing regions. The Figure also indicates that Middle East and North Africa (i.e. MENA) have the highest rate of youth unemployment, exceeding the rates in the populous regions like East and South Asia.

Figure 5: Youth Unemployment Rate by Region- Latest Data

Source: ILO (KILM)

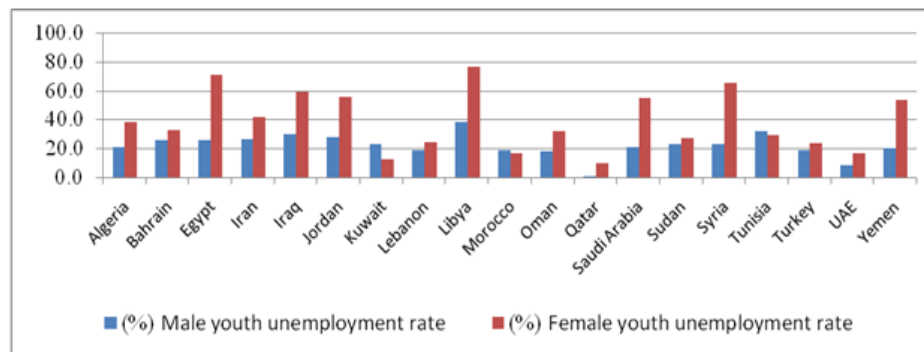
Regarding the distribution of youth unemployment in the MENA region, the statistics show that there is a variation in the level of youth unemployment from one country to another. As indicated in Figure 6, the rate of youth unemployment varies from 7% in Qatar to about 51% in Libya. Moreover, the rate of youth unemployment is much higher than the adult unemployment rate, in most of the MENA countries is double, in some countries like Bahrain, Egypt and Jordan even more than triple. In fact, in most of the MENA countries the ratio of youth to adult unemployment is considered among the highest rates in the world. This situation has attributed to many factors including the high unemployment ratio in the youth cohort compared to the total population besides the weak absorptive capacity of the MENA economies.

Figure 6: Youth and Adult Unemployment in MENA- Latest Data

Source: Adapted from KILM ILO database

In accordance with the distribution of youth unemployment according to gender in the MENA region, Figure 7 below indicates that females suffer over-proportionally as reflected by the high ratio of male to female youth unemployment. The figure also shows that more than 60% of the female labor force aged 15-24 is unemployed in Egypt, Libya and Syria. Also about half of the youth female labor forces are without jobs in Iraq, Jordan, Saudi Arabia and the Yemen. The high rate of female youth unemployment in the MENA countries is attributed to low skills and experience of women. In addition, MENA countries are dominated by some norms and traditions, which prevent women from work, besides early marriage and low education attainment.

Figure 7: Youth Unemployment in the MENA Region by Gender



Source: Adapted from KILM ILO database.

Given the fact that MENA countries are experiencing a huge boom of ICT revolution with sizable numbers of young people, it is necessary to understand the effect of ICT facilities on youth unemployment. This would guide an appropriate strategy that helps in harnessing ICT revolution to improve the employability of young people in MENA countries

3. ICT Innovations and Employment: A Literature Review

A huge body of empirical studies has emerged in the last decades to investigate the effect of ICT on economic performance in both developing and developed countries. However, most of the research has focused on the effect of ICTs on economic growth and development, but the unemployment impact of ICT has received little attention. In this

section, we briefly review the theoretical and empirical studies about the influence of ICT innovations on unemployment.

In the literature, there is a long debate on the effects of ICTs and innovations on employment (see Vivarelli (2012) and Vivarelli and Pianta (2000)). Some empirical studies reveal a positive effect of ICT on employment (e.g., Entorf and Pohlmeier, 1990; Smolny, 1998) while others indicate that ICTs have a negative effect on employment (e.g.s Brouwer et al., 1993; Machin et al., 1991).

The view of the positive impact of ICT innovations on unemployment is based on the compensation theory developed by Karl Marx (1961). This theory postulates a number of market compensation mechanisms that are triggered by technological change itself and which can counterbalance the negative effects that emerge from labor-saving impact of technological innovations (Vivarelli, 1995 and 2007). First, innovations may create additional employment in the capital goods sector. That is, while some technologies displace workers in the labor intensive industries, others create new jobs in the capital sectors where the new machines are produced (Vivarelli, 2007). Second, the compensation impact may channel via a reduction in prices, meaning that technologies lead to a decrease in the unit costs of production; in turn, decreasing prices create a new demand for products and also additional production and employment. Third, new technologies provide opportunities for unemployed workers via creating new investments. That is, in a competitive world, it is observed that during the gap between the decrease in costs due to technological progress and the consequent fall in prices, extra profits may be achieved by the innovative entrepreneurs. These profits are invested and new production and new jobs are thus created. Fourth, the direct effect of labor-saving technologies may be compensated within the labor market through a decrease in wages. According to the neoclassical framework, with free competition and full substitutability between labor and capital, a decrease in wages leads to an increase in the demand for labor. Finally, the loss of jobs due to the process of new technologies may be compensated for by new products. This indicates that technical change and ICT innovation can create new products that develop new economic branches and create additional jobs (Vivarelli, 2007).

Based on the above arguments, many empirical studies confirmed the compensation theory, and argued that technology exerts a positive impact on employment, since it allows for the development of entirely new goods or increases the productivity of existing ones (e.g., Freeman et al,1982; Freeman and Soete, 1987 and 1994; Vivarelli and Pianta, 2000). For example, Whitley and Wilson (1982) used a multi -sectoral dynamic model to investigate the employment impact of technological change based on the compensation framework. They estimated the employment levels in 1990 for most sectors of the British economy and found that technology innovation promotes the employment level and compensates the initial job losses due to the adoption of innovation. Among the compensatory forces, the mechanism via a decrease in prices is found to be the more effective, accounting for more than 50% of compensation of the initial labor displacement.

In the same vein, Meyer-Krahmer (1992) examined the employment effect of technology adopted for a sample of 51 German sectors covering the entire economy in the 1980s. The author measured technology innovation by research and development (R&D) spending and purchase of R&D knowledge. His results support the view that technological progress implies overall labor-saving effects; yet important sectoral differences emerge: while purchased R&D involves job losses in industries like textile, clothing and electronic equipment, in house R&D stimulates the demand for labor in sectors like chemicals and computer industries.

Simonetti et al., (2000) employed a simultaneous equations macroeconomic model to investigate the direct labor-saving effect of innovation processes. They applied different compensation mechanisms to examine the job-creating impact of product innovation. Using data for four countries, namely the US, Italy, France and Japan, over the period 1965-1993, the authors pointed out that the more effective compensation mechanisms were "via decrease in prices" and that "via increase in incomes," especially in European countries till the mid-1980s.

Nevertheless, the theory of compensation has been criticized in explaining the counterbalancing of initial labor-saving effect of process innovation. Most of the critiques emphasized the inefficient role of the main mechanisms of compensation. For instance, the mechanism "via decrease in prices" does not hold in the reality since decreasing prices

reduce demand and more than counterbalance the initial decrease in the aggregate purchasing power. Also, this mechanism relies on Say's law and does not take into account that demand constraints might occur. In addition, the effectiveness of the mechanism "via decrease in prices" depends on the hypothesis of perfect competition; thus, if an oligopolistic regime is dominant, the whole compensation would not hold (Viverelli, 2012). Second, the compensation mechanism "via new investments" is based on Say's law, which assumes that the accumulated profits due to innovation are entirely and immediately translated into additional investments. However, according to Keynesian views about Say's law, there is doubt about the full effectiveness of this compensation mechanism. Moreover, the intrinsic nature of the new investments does matter; if these are capital-intensive, compensation can only be partial. Finally, the mechanism "via decrease in wages" contrasts with the Keynesian theory of effective demand. On the one hand, a decrease in wages can induce firms to hire additional workers, but - on the other hand - the decreased aggregate demand lower employers' business expectations and so they tend to hire less workers (Vivarelli, 2007).

Empirically, a few studies have supported the evidence of a negative relationship between ICT innovations and employment. For example, Brouwer et al. (1993) examined the influence of innovation on growth rates of employment in 859 Dutch manufacturing firms during the period 1983–1988. They found that employing advanced innovation has a slight negative impact on employment. Likewise, Machin et al. (1991) using the 1984 British Workplace Industrial Relations Survey, find a negative relationship between ICTs adoption and employment. Moreover, Zimmermann (1991) found similar results using microdata from 16 German industries, concluding that technological change was one of the determinants of the employment decrease in Germany during the 1980s.

The above discussion has made clear that the literature on the impact of technology and innovations on employment is intensive and diverse. Some empirical evidence confirms the view that technologies and innovations exert a positive impact on employment. On the other hand, a number of empirical studies points out that ICTs have negative effect on employment. These conflicting results could be attributed to the difference in measurements of ICT innovations, model specifications

and the type of data used. To overcome these limitations, this paper has many contributions to existing literature compared to previous studies. First, unlike the previous studies that used a single indicator for ICT diffusion, this paper uses three measures of modern ICTs, which are the numbers of fixed telephone, mobile and internet users. Second, a wide range of empirical studies uses sectoral and micro data, this study uses cross-country data. Third, most of empirical studies have focused on the advanced countries and there is a little research attention given to this issue in the developing regions, particularly MENA countries. Fourth, to overcome the problem of potential endogeneity that may arise due to correlation between the explanatory variables and error term, the study uses the GMM dynamic panel data. Finally, the study examines the gender specific impact of ICTs on youth unemployment, as male and female are differentiated obviously in the MENA region.

4. Methodology and Data

4.1. Model Specification

To investigate the effect of ICTs diffusion on youth unemployment in MENA countries, the study employs a panel data method. The specification of unemployment model used in our analysis will follow the previous empirical studies on youth unemployment such as, Choudhry et al. (2012), Anyanwu (2013) and (2014). However, our model is extended by ICT variables to capture the effect of ICT on youth unemployment. Thus, the model to be employed in the analysis could be specified as follows:

$$YU_{it} = \beta_0 + \beta_1 YU_{i,t-1} + \beta_2 X_{it} + \beta_3 ICT_{it} + \mu_{it} \quad (1)$$

$$\mu_{it} = \eta_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Where YU_{it} is the youth unemployment in country i at time t . $YU_{i,t-1}$ is the lagged value of youth unemployment, X_{it} is the set of the control variables, and ICT_{it} is the set of ICT variables. Finally, μ_{it} is the general disturbance term which includes, η_i is an unobserved country-specific effect, λ_t is a time-specific effect, and ε_{it} is the error term.

The control variables involve all factors that are hypothesized to influence the youth unemployment, such as economic, demographic and

institutional factors. Therefore, the control variables include: per capita GDP, inflation rate, domestic investment, foreign direct investment (FDI), trade openness, education level and fertility rate. We add also the bureaucracy quality to capture the institutional quality effect, since efficient institutions are conducive to labor productivity and growth (Acemoglu et al., 2004). In addition, to capture the effect of oil exports on youth unemployment, the paper uses oil export variable, which measured as a share of oil exports to total exports. Finally, the ICT variables include the fixed telephone subscriptions, mobile cellular subscriptions and number of internet users. These variables reflect the ICT development. The definition and sources of variables used in the study are presented in Appendix I. In addition to the full sample estimation, we estimate the model of equation (1) for two sub-samples: female and male youth unemployment.

According to the theoretical and empirical literature, the impact of per capita GDP is expected to be negative, as an increase in country's income will reduce the employment level. The inflation rate would be negative, since there is negative association between the unemployment rate and inflation, as suggested by Philips (1958). The impact of domestic and foreign investment is expected to be negative, as investment would create more jobs for young people. The coefficients of trade openness and education are expected to be negative. The effect of fertility rate also is expected to be positive, because an increase in the fertility level raises the number of young people, and hence their unemployment rates. The bureaucracy quality coefficient is expected be negative, since countries with bad institutions tend to suffer from unfavorable labor conditions and, hence, high rate of youth unemployment. This is also supported by several studies on economic growth, which assume that good institutions are necessary for labor and human capital progress (e.g., Acemoglu et al., 2004). Finally, the expected signs of ICT variables are inconclusive, as there is no consensus in the literature regarding the impact of ICT innovations on unemployment.

4.2. Estimation Approach

To examine the effect of ICTs on youth unemployment in MENA countries, the paper employs a dynamic panel model based on the Generalized Method of Moments (GMM), developed by Arellano and Bond (1991). The dynamic method of GMM has many advantages over the traditional panel data methods such as, fixed effects and random effects models. First, the GMM model considers the time series dimension of the data and thus it accounts for the short run effect. Second, it includes the non-observable country specifics. Finally, GMM model treats all the explanatory variables as endogenous variables, hence it overcome the problem of endogeneity that may result from the correlation between the error term and the lagged dependent variables.

Empirically, there are two types of GMM models that have been commonly used in estimating panel regressions: the first-difference GMM estimator, developed by Arellano and Bond (1991) and the system GMM estimator which developed by Arellano and Bover (1995) and Blundell and Bond (1998). However, the recent literature has shown that there are some possible statistical problems associated with the adoption of first-difference GMM estimator (Bond et al., 2001). According to Blundell and Bond (1998), the System GMM estimators will be derived from the estimation of a system of two simultaneous equations: one in levels (with lagged first differences as instruments) and the other in first differences (with lagged levels as instruments). However, one possible problem that might be arising when adopting the GMM system is the invalidity of the lagged differences of the explanatory variables as instruments. Therefore, we examine the validity of the instruments by two tests: the Sargan test of over-identifying restrictions and the Arellano and Bond (AB) test of serial correlation. Furthermore, to justify the adoption of the GMM method the study tests the endogeneity problem, applying Durbin (1954), Wu (1974) and Hausman (1978) endogeneity tests.

4.3. Data Sources

The study used annual data for a sample of 17 MENA countries over the period 1995-2012. The data on employment and economic variables are gathered from several sources including International Labor Organization (ILO), the World Bank's development indicators and IMF Financial Statistics (IFS). Data on institutional quality (bureaucracy

quality) is collected from the International Country Risk Guide (ICRG) statistics³. Finally, data on mobile subscriptions and internet users are obtained from ITU World Telecommunication/ICT Indicators database.

The summary statistics of the variables used in the study are presented in Appendix II. It is clear that the total, male and female youth unemployment rate varies across countries. The result of descriptive statistics also shows that female youth unemployment is high and varies greatly in comparison to total and male unemployment. The standard deviation of per capita GDP is relatively high, implying high income inequality across MENA countries. Interestingly, the standard deviation of mobile subscriptions is high, indicating a disparity in using mobile phones in the MENA region.

5. Empirical Results and Discussion

The estimation results of equation (1) using the GMM method for total, male and female youth unemployment are presented through Table 1 to 3. For the purpose of robustness and sensitivity analysis, the youth unemployment equation is estimated in the context of four model specifications, reflecting all proxies of ICT as described in equation (1).

First, the results of GMM estimation for the total youth unemployment are provided in Table 1 below.

³ The International Country Risk Guide (ICRG)' political stability indicators comprises 12 institutional measures - government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality.

Table 1: GMM-System Estimation: Total Youth Unemployment

Dependent Variable: Total Youth Unemployment				
Variable	Model 1	Model 2	Model 3	Model 4
Constant	7.675** (2.54)	8.632** (2.145)	7.911** (2.345)	9.098* (1.98)
Youth unemployment (-1)	0.543*** (12.23)	0.345*** (15.20)	0.428*** (13.50)	0.324*** (10.19)
Real per capita GDP	-0.108** (-2.43)	-0.089** (-2.76)	-0.054* (-1.79)	-0.0976** (-2.60)
Inflation	-0.019 (-1.21)	-0.022 (-1.45)	-0.031 (-1.51)	-0.056* (-1.71)
Domestic investment	-0.176*** (-3.87)	-0.201*** (-3.67)	-0.212*** (-3.65)	-0.256*** (-3.87)
FDI	-0.071 (-0.91)	-0.092 (-0.76)	-0.043 (-0.47)	-0.025 (-0.79)
Trade openness	0.012 (0.23)	0.043 (1.34)	0.076 (1.20)	0.070 (0.89)
Education	0.764** (2.76)	0.645** (2.06)	0.532** (2.05)	0.790** (2.24)
Fertility	-0.053 (-0.71)	0.067 (0.79)	0.081 (0.97)	-0.076 (-1.08)
Bureaucracy	-0.253 (-0.86)	-0.119 (-0.65)	-0.225 (-0.89)	-0.187 (-1.05)
oil export	0.256 (1.23)	0.167 (1.42)	0.086 (1.25)	0.054 (1.11)
Fixed telephone	-0.127* (-1.89)			-0.123** (-2.28)
Mobile subscriptions		-0.032 (-0.89)		-0.076 (-0.53)
Internet users			-0.087* (-1.79)	-0.054** (-2.43)
Observations	306	306	306	306
Sargan Over-identification Test	2.426 (0.765)	2.313 (0.801)	1.952 (0.976)	2.782 (0.587)
Durbin–Wu–Hausman Test	0.987 (0.042)	1.231 (0.024)	1.073 (0.030)	1.065 (0.031)
AB- test for AR(1)	-4.318 (0.000)	-5.120 (0.000)	-4.326 (0.000)	-6.324 (0.000)
AB- test for AR(2)	1.098 (0.598)	1.237 (0.512)	1.301 (0.436)	1.563 (0.378)

Notes: Figures in Parentheses are t-statistics

***, ** and * denotes significance at the 1, 5 and 10 percent level

The estimation is two steps System GMM, instruments used in the analysis are the first lagged difference and the second lagged level of dependent and explanatory variables.

Durbin–Wu–Hausman and Sargan tests are asymptotically chi-sq distributed, with p values reported in brackets.

The results show that the Sargan and Arellano-Bond tests indicate that all the regressions do not suffer from any problem with the instruments, and there are no second order serial correlation problems in the estimated models. The Durbin–Wu–Hausman test statistic also rejects the null hypothesis that all regressors are exogenous at any reasonable degree of confidence. Thus, we conclude that there is an endogeneity problem among the variables and this constitutes a suitable justification for using the GMM method.

The results of GMM revealed that all the variables carry their expected signs, except trade openness, education and fertility. The results also show that most of estimated coefficients are statistically significant. The results show that the per capita GDP has a negative and significant impact on youth unemployment, implying that improvement of economic situation reduces youth unemployment in the MENA countries. This result supports the Okun's Law, which suggests a positive relationship between income and employment. This finding also confirms the fact that high income countries in MENA like Gulf States have low rates of youth unemployment in the region. Contradicting with the Philips Curve' hypothesis, the coefficient of inflation is found to be negative but it is not significant. In addition, the results reveal that the coefficient of domestic investment is negative and significant, implying that a country with high rate of investment tends to suffer from low rate of youth unemployment. This finding is in line with many empirical studies (e.g. Anyanwu, 2014 and Choudhry et al., 2012).

Unexpectedly, the effect of foreign direct investment is found to negative but it is not significant, suggesting that FDI has no important role in reducing youth unemployment in MENA countries. This finding supports the fact that most of FDI flow into MENA is a resource seeking, directed toward extractive sector like oil industry which employs a few number of worker. The impact of trade openness is positive but it is not statistically significant, implying that the trade openness has no significant effect on youth unemployment. Therefore, we conclude that economic environment plays a crucial role in explaining youth unemployment in the MENA countries. This also implies that the demand side of labor market has an important influence on youth unemployment in MENA region.

Contradicting to our prior expectations, the coefficient of education is found to be positive and statistically significant, suggesting a positive relationship between education level and youth unemployment. This result

suggests that there is a mismatch between education and demand for labor in MENA region. This result could be attributed to the high education attainment in MENA countries in comparison to other regions. Moreover, the results of the GMM model indicate that the coefficient of fertility is negative but it is not significant. Furthermore, the results reveal that the impact of bureaucracy quality is found to be negative⁴. Finally, the coefficient of oil exports is negative but it is not significant.

Regarding the impact of ICT on youth unemployment, the coefficients of fixed telephone subscriptions in column 2 and 5 are negative and significant as expected, implying that the usage of telephone lines discourage youth unemployment in the MENA countries. In addition, the coefficients of mobile phone subscriptions in column 3 and 5 are negative but it is not statistically significant. Finally, the coefficients of internet in column 4 and 5 are found to be negative and significant, confirming our expectations. These results suggest that the boom of ICT in MENA countries during the last decade has played a significant role in reducing youth unemployment. Indeed, ICT offers several jobs for youth, including telephones maintenance and distribution as well as internet services. In addition, internet service facilitates exchange of information in the labor market, hence matching between demand and supply of labor, and eventually reduces youth unemployment.

Second, the results of the male youth unemployment model are presented in Table 2. Similar to the analysis of total youth unemployment, the results in Table 2 indicate that the Sargan and Arellano-Bond tests reveal that all the regression models do not suffer from any problem with the instruments and second order serial correlation. The result of Durbin–Wu–Hausman statistic also rejects the null hypothesis that all regressors are exogenous at any reasonable degree of confidence. Like the analysis of the total youth model, the results of male youth in Table 2 show that most of control variables carry their expected signs. Unlike the total youth analysis, the results of male youth indicate that the coefficients of foreign direct investment (FDI) are significant in the most estimated models, implying that FDI in MENA provide jobs opportunity for young male.

Interestingly, the results indicate that all ICT variables are negative and statistically significant, except, mobile phone, confirming the results of the

⁴ Bureaucracy quality index is scaled from zero to six. Higher scores indicate more bureaucracy quality.

total youth unemployment. These findings suggest that ICT diffusion has a negative impact on youth male unemployment in the MENA countries.

Table 2: GMM-System Estimation: Male Youth Unemployment

Dependent Variable: Male Youth Unemployment				
Variable	Model 1	Model 2	Model 3	Model 4
Constant	10.256** (2.54)	9.331** (2.02)	10.022* (1.86)	11.123* (1.91)
Youth unemployment (-1)	0.331*** (12.02)	0.418*** (14.09)	0.278*** (13.89)	0.281*** (14.18)
Real per capita GDP	-0.089** (-2.89)	-0.065*** (-3.23)	-0.134*** (-3.56)	-0.087** (-2.20)
Inflation	-0.024 (-0.98)	-0.034 (-1.27)	-0.028 (-0.79)	-0.018 (-0.79)
Domestic investment	-0.089*** (-3.20)	-0.097*** (-3.31)	-0.077*** (-3.23)	-0.080*** (-3.10)
FDI	-0.001 (-1.24)	-0.008* (-1.67)	-0.005* (-1.79)	-0.013** (-2.30)
Trade openness	0.026 (0.16)	0.037 (0.22)	0.027 (0.15)	0.028 (0.16)
Education	0.312* (1.89)	0.319* (1.93)	0.271 (1.04)	0.337* (1.84)
Fertility	-0.438 (-1.25)	-0.345 (-1.08)	-0.219 (-1.45)	-0.326 (-1.29)
Bureaucracy	0.087 (0.73)	0.123 (0.87)	0.189 (0.63)	0.183 (1.04)
oil exports	0.067 (1.08)	0.098 (0.89)	0.068 (0.65)	0.099 (1.11)
Fixed telephone	-0.534** (-2.88)			-0.634** (-2.89)
Mobile subscriptions		-0.029 (-0.92)		-0.075 (-1.14)
Internet users			-0.136** (2.67)	-0.165** (2.03)
Observations	306	306	306	306
Sargan Over-identification Test	3.871 (0.403)	3.078 (0.578)	3.230 (0.512)	3.241 (0.500)
Durbin–Wu–Hausman Test	1.023 (0.053)	1.123 (0.048)	0.987 (0.067)	1.234 (0.039)
AB- test for AR(1)	4.234 (0.000)	5.234 (0.000)	5.112 (0.000)	4.672 (0.000)
AB- test for AR(2)	0.850 (0.512)	0.834 (0.532)	0.912 (0.467)	0.756 (0.598)

Notes: Figures in Parentheses are t-statistics

***, ** and * denotes significance at the 1, 5 and 10 percent level

The estimation is two steps System GMM, instruments used in the analysis are the first lagged difference and the second lagged level of dependent and explanatory variables.

Durbin–Wu–Hausman and Sargan tests are asymptotically chi-sq distributed, with p values reported in brackets.

Finally, the estimation results of equation 1 for female youth unemployment are presented in Table 3.

Table 3: GMM-System Estimation: Female Youth Unemployment

Dependent Variable: Female Youth Unemployment				
Variable	Model 1	Model 2	Model 3	Model 4
Constant	15.435*** (2.01)	9.123** (2.20)	10.431 (1.26)	13.089** (2.29)
Youth unemployment (-1)	0.342*** (10.43)	0.456*** (14.29)	0.521*** (14.15)	0.409*** (12.59)
Real per capita GDP	-0.034*** (-3.45)	-0.043*** (-3.12)	-0.089*** (-3.76)	-0.065*** (-3.18)
Inflation	-0.045 (-0.91)	-0.076 (-0.98)	-0.112 (-1.09)	-0.0765 (-1.31)
Domestic investment	-0.067** (-2.12)	-0.081** (-2.23)	-0.075** (-2.87)	-0.063** (-2.18)
FDI	0.013 (0.65)	-0.076 (-0.98)	-0.043 (-0.78)	-0.034 (-0.91)
Trade openness	-0.132 (-1.10)	-0.097 (-1.07)	-0.078 (-1.14)	-0.045 (-1.05)
Education	0.543 (1.21)	0.321 (1.12)	0.345 (1.05)	0.731 (1.21)
Fertility	-0.231 (-0.97)	-0.543 (-0.87)	-0.601 (-0.79)	-0.876 (-0.76)
Bureaucracy	0.432 (0.76)	0.573 (0.54)	0.601 (0.61)	0.309 (0.56)
oil export	0.078 (1.24)	0.062 (1.19)	0.076 (1.12)	0.065 (1.41)
Fixed telephone	-0.231** (-2.42)			-0.341** (-2.19)
Mobile subscriptions		0.034 (0.67)		0.082 (0.72)
Internet users			-0.082** (-2.51)	-0.057** (-2.30)
Observations	306	306	306	306
Sargan Over-identification Test	3.231 (0.362)	2.921 (0.463)	2.532 (0.521)	3.021 (0.410)
Durbin–Wu–Hausman Test	0.924 (0.039)	0.976 (0.034)	0.850 (0.046)	0.820 (0.055)
AB- test for AR(1)	5.012 (0.000)	5.452 (0.000)	5.312 (0.000)	4.783 (0.000)
AB- test for AR(2)	1.121 (0.522)	1.115 (0.528)	1.201 (0.509)	1.491 (0.489)

Notes: Figures in Parentheses are t-statistics

***, ** and * denotes significance at the 1, 5 and 10 percent level

The estimation is two steps System GMM, instruments used in the analysis are the first lagged difference and the second lagged level of dependent and explanatory variables.

Durbin–Wu–Hausman and Sargan tests are asymptotically chi-sq distributed, with p values reported in brackets.

The results of the female youth analysis show that the estimated models do not suffer from any problems with the instruments and serial correlation, as indicated by Sargan and Arellano-Bond tests. The Durbin–Wu–Hausman test statistic also confirms the existence of endogeneity problem among the variables of regressions. Like the previous analyses of total and male youth, most of the variables in Table 3 bear the expected signs. Unlike the analysis of total and male youth unemployment, the results of female youth reveal that the coefficient of education is positive but it is not significant, suggesting that education has no impact of female youth unemployment in MENA countries. This finding could be explained by low rate of female school enrollment in comparison to male youth. This also indicates gender inequality in education and labor market, which is obvious phenomenon in MENA countries. Interestingly, the coefficients of ICT variables are negative as expected, confirming the analysis of male and total youth unemployment. Specifically, the magnitude of ICT coefficients in female youth unemployment model is less than their counterparts in male youth model. This result implies that male youth in MENA benefits more from ICT diffusion than female youth, suggesting a symptom of gender disparity in access to ICT facilities in MENA region.

Overall, the negative coefficients of ICT variables indicate that technological process in the MENA region reduces youth unemployment, since new technologies may increase productivity and generate new activities that absorb the unemployed workers. The results also indicate that ICT facilities have a negative effect on both aggregate and gendered levels of youth unemployment in MENA. Therefore, these findings suggest that the boom of information and communication technologies in the MENA region could contribute effectively to economic growth and development via fixing the problem of youth unemployment in the region.

6. Conclusion and Policy Implications

Motivated by the huge ICT boom and high rates of youth unemployment in MENA countries, this study examines the effect of ICTs on both the aggregate and gendered levels of youth unemployment in MENA countries. The study applied dynamic panel data model based on the GMM system method for a sample of 17 MENA countries, over the period 1995-2012. The empirical results show that per capita GDP, domestic investment, FDI, inflation rate and institutional quality exert a negative impact on youth employment. The results also show that the education rate has a positive and significant effect on youth unemployment in MENA countries. Interestingly, the coefficients of ICT variables are found to be negative, indicating that ICT penetration in MENA reduces the unemployment rate of total male and female youth. Specifically, the effect of fixed telephone and internet is found to be negative and significant. Moreover, the results revealed that for total male and female youth, the impact of mobile phone subscribers is negative but it is not significant, implying an inefficient role of mobile phone in reducing youth unemployment in MENA. Furthermore, the effect of ICT on male youth unemployment is found to be higher than the impact on female youth unemployment, indicating a gender variation in the response of youth unemployment to ICT facilities.

Based on the above findings, many policy implications can be drawn, aiming at utilizing the potential of ICT to improve the employability of young people in MENA countries. Since a large proportion of the population of MENA countries is youth, serious efforts should be exerted to enhance the access of youth to ICT facilities and innovations. First and foremost, access of youth to ICTs in terms of internet and broadband should be at the top of the development agenda of MENA countries. Besides, improving technical education and ICT skills should be paid a great attention from policymakers in such a way that eases the entering of young people into the labor market. In addition, policies that enhance gender equality in access to ICT facilities should be adopted to improve the employability of both males and females in MENA countries. Moreover, foreign direct investment should be directed to ICT infrastructure that provides significant job opportunities for young people. Furthermore, innovation legislation also should be revised to encourage participation of young people in innovation and ICT industries. Finally, modern ICT facilities, like e-government, should be adopted to enhance bureaucracy quality and transparency so as to improve the employability of young people.

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Appendices

Appendix I: Description and Sources of Variables used in the Regression Analysis

Variable	Definition	Source
Youth unemployment	Measured as the proportion of the labor force that does not have a job and is actively looking and available for work. Youth refers to persons aged 15-24 years.	ILO, Key Indicators of Labor Markets (KILM)
Real per capita GDP	GDP per capita based on purchasing power parity (PPP)	World Bank's World Development Indicators
Inflation Rate	Annual inflation rate measured by the change in consumer price index.	IMF Financial Statistics and World Bank's World Development Indicators
Domestic Investment	Measured by the ration of gross capital formation to GDP	
FDI	Measured by the ratio of foreign direct investment to GDP	
Trade Openness	Measured by the ratio of (Exports +Imports) to GDP	IMF Financial Statistics and World Bank's World Development Indicators
Fertility Rate	Measured by births per woman	United Nations, World Population Prospects and World Bank's World Development Indicators.
Education	Measured by ratio of total secondary enrolment to the population	World Bank's World Development Indicators
Bureaucracy Quality	Bureaucracy quality, measures autonomy from political pressure and strength and expertise to govern without drastic changes in policy or interruption in government services. (scale from zero to six)	International Country Risk Guide (ICRG), (2010)
Mobile subscriptions	Mobile cellular subscriptions per 100 people	World Telecommunication/ICT Indicators database (2014)
Internet Users	Internet users per 100 people	World Telecommunication/ICT Indicators database (2014)

Appendix II: Summary Statistics of Sample Data

Variable	Mean	Std. Dev.	Minimum	Maximum
Total youth unemployment	24.15	11.45	0.8	53.1
Male youth unemployment	21.13	10.17	0.2	51.2
Female youth unemployment	35.43	19.04	2.5	77.4
Real per capita GDP	10998.75	14888.43	484.69	60290.18
Inflation	12.16	28.17	-16.11	387.31
Domestic investment	23.33	7.50	7.90	46.87
FDI	2.42	3.58	-5.11	33.56
Trade openness	79.56	32.20	14.77	173.29
Education	6.31	1.79	1.67	9.79
Fertility	3.31	1.09	1.82	7.57
Bureaucracy	1.78	0.61	0	3
Fixed telephone	13.25	8.68	0.248	33.92
Mobile subscriptions	42.90	48.42	0.007	193.45
Internet users	14.23	19.14	0.006	88

Appendix III: List of Countries Considered for the Study

No	Country Name	No	Country Name
1	Algeria	10	Qatar
2	Bahrain	11	Saudi Arabia
3	Egypt	12	Sudan
4	Iran	13	Syria
5	Iraq	14	Tunisia
6	Jordan	15	Turkey
7	Kuwait	16	UAE
8	Libya	17	Yemen
9	Morocco		

Nonlinear Effects of Human Capital on TFP: Evidence from Eight ASEAN Countries

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The purpose of this paper is to investigate the nonlinear relationship between TFP growth rate and human capital in 8 ASEAN countries over the period from 1990 to 2014. Using two-way fixed-effect Benhabib-Spiegel model, this study finds that human capital, denoting the innovation term, is negatively related with TFP growth rate. Meanwhile, the catch-up term, denoted by the interaction between human capital and the technology gap, has a positive effect on TFP growth rate. This study further uses threshold-seeking procedure proposed by Hansen (1999) and finds that there are two thresholds in the innovation term and a single threshold in the catch-up term, i.e. in terms of human capital.

1. Introduction

Since 1960, East Asian countries and regions such as Hong Kong, Singapore and Taiwan have experienced a huge growth; while other countries of South East Asian had also shown a persistent growth (Park, 2012). Meanwhile, Park (2012) indicated that the 12 Asian countries' national incomes were 12% of the world's total in 1995 and 20% in 2006. Besides, according to the World Bank's World Development Indicator (WDI, 2013), during the period from 1981 to 2011, the average growth rate of five Asian countries (Indonesia, Malaysia, Philippines,

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Thailand, Vietnam) was 5.379%; much more than that of OECD countries during the corresponding period. Prior to this, the so-called “Asia’s Miracle” took the Western world by surprise; but later suffered from many incredulous attitudes mainly owing to the input-driven growth and the over-planned market. In fact, as for “Asia’s Miracle”, Krugman (1994) emphasized that the sustainable economic growth should be sourced from the progress of total factor productivity rather than the input-driven growth.

Nelson and Phelps (1966) theoretically indicated that the growth rate of total factor productivity (hereafter written as TFP) mainly relies on implications of domestic innovation and imitation from the technological frontier. For developing countries, the speed of convergence to the technological frontier is actually a catch-up process which heavily depends upon the level of human capital. Based on the endogenous growth model led by Romer (1986) and Lucas (1988), studies concerning the effect of human capital upon economic growth are continuously undertaken. Human capital, as an important carrier of knowledge and technology progress, does not only play a crucial role in impelling the economic growth but is considered as the leading force to aiding developing countries in catching up with developed countries. In the neoclassical growth theory, human capital is regarded as a factor input incorporated into the production function. Naturally, the existence of the relationship between economic growth and human capital is quite understandable. The alternative thought, instead of seeing human capital as a factor input, there is a notion that human capital mainly contributes to economic growth through two channels (Aghion and Howitt, 1990; Benhabib and Spiegel, 1994). The first is that human capital decides the level of capacity of technological innovation (Romer, 1990), and the second one is about technology diffusion (Nelson and Phelps, 1966). Both the mentioned channels worked through the technological transmission mechanism.

However, empirical evidences indicate that human capital does not significantly affect growth, even though theoretically it is quite clear

(Sunde and Vischer, 2011; Zaman, 2012). Generally, there are two types of testing results. The first one indicates a weak relationship between human capital and economic growth (Benhabib and Spiegel, 1994; Vandenbussche, 2006; Zaman, 2012; Delpachitra and Dai, 2012; Stöllinger, 2013); and the second one proves a positive relationship between the two (Mankiw et al., 1992; Bowlus et al., 2005; Krammer, 2008; Emmanuel et al., 2014). Similar to the empirical results that contradict the theoretical expectation in the relationship between human capital and economic growth, the effect of human capital upon TFP growth rate does not empirically meet the theory either. For example, Miller and Upadhyay (2002), Kumar and Kober (2012) and Danquah and Ouattara (2014) found no association between human capital and TFP growth.

In light of inconclusive empirical evidences, this study attempts to contribute to the existing literature in the following aspects. First and foremost, this study attempts to contribute to the existing literature of measuring TFP growth rate for ASEAN countries by using a newly extended growth-accounting method proposed by Feenstra, et al. (2013) and Inklaar and Timmer (2013). This method, compares the information across countries (Inklaar and Diewert, 2016), and does not impose a production function (e.g. the Cobb-Douglas function). Second, the benchmark model in this study is based on the Logistic technology diffusion model put forward by Benhabib and Spiegel (2005). Unlike the widely used confined exponential model proposed by Benhabib and Spiegel (1994), which is identifying absolute technology convergence to the technological frontier, the former would allow the occurrence of absolute divergence within technological followers under a certain condition, which better fits the reality. Third, literature seldom investigates the effects of human capital upon TFP growth rate using the panel threshold estimation proposed by Hansen (1999) for ASEAN countries. If the level of human capital meets a certain requirement in achieving sufficient technology diffusion, the pulling effects sourced from leader countries would be effective (Benhabib and Spiegel, 2005). Otherwise, the gap between the leader and the followers would not be

narrowed; meaning that the follower countries could not catch up with the leader countries, and therefore, club convergence would ultimately emerged. The study will give the influences of different intervals in terms of innovation term denoted by human capital and the catch-up term split by the threshold(s) found on the growth rate of TFP. Therefore, not only does this study fills in the void in the literature but also systematically analyzes nonlinear-type effects of the human capital on the TFP growth for ASEAN countries.

This paper is organized as follows. Section 2 presents the literature review. Section 3 introduces the theoretical framework, relative model specifications. Section 4 displays empirical findings, and section 5 concludes.

2. Literature Review

Nelson and Phelps (1966) proposed a hypothesis of technology-driven growth that posits education will generate a positive effect when technology keeps on progressing. This hypothesis has two parts. First, the growth in the current technology frontier represents the pace of technological advances. TFP growth rate of a nation would depend on the implications of those technological advances and the distance between the current technology level and the frontier. The second part of the hypothesis indicates that the speed of convergence to the technology frontier is determined by the human capital level. In the framework of Nelson-Phelps technological diffusion, Benhabib and Spiegel (1994) generalized the catch-up model by incorporating the idea of Romer (1990), which assumes that human capital takes charge in the determinate role of the technology innovation; and thereby directly affecting TFP growth rate. Benhabib and Spiegel (1994) indicated that absolute convergence would exist in the TFP growth across different economies; and even though different countries hold their own economic characteristics such as initial human capital level and technological level, technology diffusion would help the following countries to catch up with the advanced technology frontier at balanced

growth path. However, Basu and Well (1998) argued that absolute convergence for those followers may not be valid, for advances in technology cannot be applied immediately when the technological gap between the follower and the leader is overlarge. Thus, Benhabib and Spiegel (2005) proposed the logistic exponential technology diffusion model which allows the possibility of club convergence.

Serranito (2014) applied TFP growth rate from the PWT 8.0 to examine multiple effects sourced from the human capital by using logistic diffusion model for African and Middle-East countries from 1970 to 2010. Using the generalized method of moments (hereafter written as GMM) panel estimation, the author found that; firstly, the interacting variables (human capital and technology gap) representing the catch-up term negatively influenced TFP growth rate; hence, supporting the convergence hypothesis. Second, the human capital is positively associated with the growth rate of TFP. In addition, following the idea of Aghion et al. (2005) the author incorporated technology gap into the model and proved that absolute convergence does not exist in those countries of low technological level.

Cheng et al. (2013) also made use of the TFP growth rate from the PWT 7.0 and logistic diffusion model to examine the importance of human capital to technology growth for 16 Asian countries over the period of 1970 to 2009. Through the random effect model, the findings showed that the catch-up term is expected to negatively correlate with TFP growth rate; but unexpectedly, the human capital has a negative and significant effect upon the growth rate of TFP. Furthermore, the authors took into account the composition of human capital and individually examined both the relationships between educational attainments (primary, secondary and tertiary level) and the corresponding catch-up terms and TFP growth rate. The results showed that the biggest effect of the innovation term is from the tertiary education, and that of the catch-up term from the secondary education. Madsen et al. (2010) also emphasized on the importance of technology imitation for developing countries by using the confined exponential technology diffusion model.

Similar to the estimation results of the innovative capacity in the paper of Cheng et al. (2013), Madsen et al. (2010) gave no positive evidence in regard to the effect of technology innovation on TFP growth rate for developing countries.

Di Liberto et al. (2011) regressed the Mankiw et al.'s (1992) model with the consideration of Islam (1995) by using methods such as least square dummy variable model (LSDV), as well as Kiviet-corrected LSDV and GMM for robustness. They also examined the existence of technology convergence through the utilization of logistic model for 76 countries from 1960 to 2003. The empirical findings indicated that there was no TFP convergence to the leader country (the U.S.) for the majority of countries all around the world. In addition, the hypothesis of positive effects sourced from a certain level of human capital was not empirically supported. The authors mentioned that one possible explanation for the both results is that the TFP leader (the U.S.) is distancing itself away from the followers. Sawada et al. (2012) also examined technology convergence worldwide using logistic diffusion model. The difference is that Sawada et al. (2012) supported the existence of technology catch-up for the majority of a sample of 85 countries. It is worth noting that they did not only take the human capital as the medium interacting with the technology gap but also considered foreign direct investment (hereafter written as FDI), external trade and technology cooperation aid.

Stöllinger (2013) examined how technology innovation and imitation function in the production function by using a panel of 76 nations over the period from 1980 to 2009. The author obtained the TFP level by the means of Cobb-Douglas growth function in the tradition of Hall and Jones (1999), and the innovation term was represented by the ratio of gross expenditure on R&D over the aggregate output. Except for expected effects generated by the variables like physical capital and labor force, the interests of this paper were not satisfied. The innovation term was negative and insignificant in 4 of 5 specifications and the catch-up term was positive; which means all countries will fall into the technology convergence club. Also, Stöllinger (2013) found the

existence of non-linearity effect in the catch-up term by using the panel threshold estimation proposed by Hansen (1999); and thereby dividing different regimes of human capital and expected influences on economic growth.

3. Methodology

3.1 Model Specification

To investigate the relationship between TFP growth and human capital, this study will firstly follow the Benhabib and Spiegel's (2005) logistic technology diffusion to examine the existence of the catch-up effect (technology diffusion) . Meanwhile, as human capital is the main channel to TFP growth, the effect of the innovation term in 8 ASEAN countries is another interest in this study. Thus, the model in this study will be briefly discussed as below:

$$\Delta \log A_{it} = \beta_1 H_{it} - \beta_2 H_{it} \left(1 - \frac{A_{it}}{A_{mt}} \right) + \Gamma X'_{it} + \delta_t + \eta_i + \varepsilon_{it} \quad (1)$$

where, the term of $\Delta \log A_{it}$ denotes the TFP growth rate in the i^{th} country respectively at the t^{th} period. H_{it} is human capital denoting the innovation term, and its interaction term, $H_{it} \left(1 - \frac{A_{it}}{A_{mt}} \right)$, represents the catch-up term. Then, the variable vector contains relative control variables, denoted as $X'_{i,t}$. Correspondingly, Γ is a vector of coefficients of control variables. In addition, as the panel model is considered, δ_t and η_i are fixed effects in terms of years and countries.

When the human capital reaches a specific level, it will make the catch-up effect work for the following countries within the process of technology diffusion. Unlike the traditional way of building up the threshold value such as exogenously separating samples into different

regimes by means of subjective consideration (Borensztein et al., 1998) and the group-specific dummies (Xu, 2000); endogenously estimating the threshold value in the basis of Hansen (1999) will be much more reliable statistically (Fu and Li, 2009). Thus, by using the threshold seeking procedures proposed by Hansen (1999), the human capital level will be divided into several regimes; and thereby generating the non-linear catch-up effects when the technology gap is multiplied with different human capital regimes. The threshold regression model for panel data will be expressed as follows (taking an example of the single threshold model):

$$\Delta \log A_{it} = \beta_1 H_{it} + \Phi_1 I(H_{it} \leq \gamma) \left(1 - \frac{A_{it}}{A_{mt}}\right) + \Phi_2 I(H_{it} > \gamma) \left(1 - \frac{A_{it}}{A_{mt}}\right) + \Gamma X'_{it} + \delta_t + \eta_i + \varepsilon_{it} \quad (2)$$

$$\Delta \log A_{it} = \Psi_1 H_{it} I(q_{it} \leq \gamma) + \Psi_2 H_{it} I(q_{it} > \gamma) - \beta_2 H_{it} \left(1 - \frac{A_{it}}{A_{mt}}\right) + \Gamma X'_{it} + \delta_t + \eta_i + \varepsilon_{it} \quad (3)$$

where, $I(\cdot)$ is the indicator function in both equations and the term γ in the bracket of the indicator function is the threshold value of the selected variable. In the Eq. (2), given that there is a single threshold being found, the technology gap will be splitting into two groups in accordance with the threshold of human capital. Similar to Eq. 2, the Eq. (3) particularly concentrates on the innovation term affecting the mechanism of TFP growth in the framework of the threshold regression in terms of human capital itself.

3.2 Variable Selection and Calculation

3.2.1 Dependent Variable: TFP Growth Rate Measurement

The representation of TFP growth rate is given by the left side of Eq. (2),

$\Delta \log A_{it}$. The following algebraic identities are given by:

$$\frac{A_i(t)}{A_i(t)} = \frac{d \log A_i(t)}{dt} = \frac{A_i(t+1) - A_i(t)}{A_i(t)} = \frac{A_i(t+1)}{A_i(t)} - 1$$

TFP growth rate is an interest to this study. Its measurement will partly be used to measure the TFP level across countries or over time in PWT

8.1. Obviously, algebraic identities show that the TFP level, $\frac{A_i(t+1)}{A_i(t)}$, is

the focal point. According to Inklaar and Timmer (2013) and Feenstra et al., (2013), firstly, the TFP level is defined as:

$$\frac{TFP_{jt}}{TFP_{jt-1}} = \frac{GDP_{jt}}{GDP_{jt-1}} / Q_{j,t,t-1} \quad (4)$$

where, $\frac{TFP_{jt}}{TFP_{jt-1}}$, the TFP level is obtained by calculating the

combination of inputs in real terms such as real gross domestic product (hereafter written as GDP) and real capital stock at constant national price (2005 = 1) over observed periods. More importantly, $Q_{j,t,t-1}$ is the Törnqvist index of factor endowments, which is given by:

$$Q_{j,t,t-1} = \frac{1}{2}(\alpha_t + \alpha_{t-1}) \left(\frac{L_{jt}}{L_{jt-1}} \frac{H_{jt}}{H_{jt-1}} \right) + \left[1 - \frac{1}{2}(\alpha_t + \alpha_{t-1}) \right] \left(\frac{K_{jt}}{K_{jt-1}} \right) \quad (5)$$

where, L_{jt} , H_{jt} and K_{jt} are respectively representing the number of employed labor, human capital and real capital stock. All elements, except for the labor share, α_t or α_{t-1} , where its data may not be available for every country, could be easily found in the many databases.

No matter which method of measuring TFP growth rate or level is taken into account, to approximate capital stock will be a common prerequisite.

With no doubt, the widely-used perpetual inventory method (hereafter written in PIM) makes efforts to estimate the capital stock with depreciation rates varying across countries and over time. Basically, the formula of the PIM will be given by:

$$K_t = (1 - \delta_t)K_{t-1} + I_t \quad (6)$$

where capital stock depends upon three components, namely, δ_t , the depreciation rate, K_{t-1} , the capital stock at previous period, and I_t , the investment is usually measured by the gross capital formation. Even though PWT 8.1 also provides the series of real capital stock over time or across countries from 1950 to 2011, it is not appropriate for this study in terms of capital stock measurement for the researching period of this study which ranges from 1990 to 2014. In addition, initial capital stock, which plays a crucial role in estimating the rest of capital stock, would be totally different from the one used in existing data in PWT 8.1. Meanwhile, PWT 8.1 uses the initial capital/output ratio to calculate the initial capital stock (like Eq. 8). This study follows the way proposed by Harberger (1978), i.e. approximating the initial capital stock by considering the sum of the investment growth rate at the balanced-growth path and the depreciation rate as the denominator (like Eq. 7).

$$K_0 = \frac{I_0}{g + \delta} \quad (7)$$

$$K_0 = Y_0 \times k \quad (8)$$

After obtaining capital stock using the method described above, together with other elements, Törnqvist index of factor endowments, $Q_{j,t,t-1}$, can be calculated.

3.3.2 Independent Variable: Catch-up term Measurement

The catch-up term in the model is denoted by the interaction of human capital and the technology gap, $H_{it} \left(1 - \frac{A_{it}}{A_{mt}}\right)$. Apparently, the term $\frac{A_{it}}{A_{mt}}$

is represented by the ratio of TFP level of technological followers over that of the leader country. Thus, comparable information across countries in terms of output, inputs as well as corresponding price data is very important in obtaining accurate technology gap. This study will carry out method similar to the TFP measurement mentioned in previous subsection. The core function is given by:

$$\frac{TFP_{it}}{TFP_{USAt}} = \frac{GDP_{it}}{GDP_{USAt}} / Q_{iUSAt} \quad (9)$$

where the difference between Eqs. 4 and 9 is that the dominator in Eq. 9 becomes the U.S instead of one-period-lagged follower countries themselves in Eq. 4. In view that technology gap does only measure the technological distance to the frontier, the price effects upon the sequences of GDP are not taken into account. Meanwhile, Törnqvist index of factor endowments, Q_{iUSAt} , will be expressed as:

$$Q_{iUSAt} = \frac{1}{2}(\alpha_{it} + \alpha_{USAt}) \left(\frac{L_{it}}{L_{USAt}} \frac{H_{it}}{H_{USAt}} \right) + \left[1 - \frac{1}{2}(\alpha_{it} + \alpha_{USAt}) \right] \left(\frac{K_{it}}{K_{USAt}} \right) \quad (10)$$

With regard to capital stock, it will be obtained through the PIM approach, following the way proposed by Harberger (1978) to deal with the initial capital stock as mentioned above. Then, by simply multiplying human capital with the difference between 1 and the technology gap, the catch-up term is obtained.

3.4. Data Description

The appropriate measurement of human capital can be bewildering. This is because biasness probably caused by the way of estimating the human capital is considerably influential to the whole investigation (Wößmann, 2003); which would be more serious when considering that “human capital is generally poorly proxied” (Teixeira & Fortuna 2010). By now, it is still premature to conclude on the standard measurement for human capital. There are many proxies for human capital, such as school enrolment rates, educational attainment, adult literacy rates and

international test scores and so on (Teixeira 2005). Due to data availability, school enrolment and adult literacy rates have also been widely entered into the production growth model. However, Teixeira & Fortuna (2010) indicated that these two proxies are not suitable to be the measure of human capital stock for they are flow indicators. The last one (international test score) is limited to its availability and coverage for countries. Education, which usually takes charge on the important role of human capital formation both in “specific” and “general” points of view, is extensively being used as the measure of human capital. However, educational attainment is criticized for of its ignorance of quality (Wößmann, 2003). This study uses educational attainment from Barro & Lee (2013) database as a proxy of human capital. This is because it overcomes measurement error to some extent and takes into account the issue of the homogenous mortality rate, as criticized by Cohen & Soto (2007) compared with the Barro & Lee's (1993) data.

Data for other parameters estimation and model specification are mainly sourced from two databases, namely PWT 8.1 and the WDI 2016. The labor share, α_t , and the depreciation rate, δ_t , were collected from PWT 8.1. Both are time- and country- specific. However, this variation in labor share is not available for Cambodia, Laos and Vietnam. The assumptions of the labor share value within existing literature are based upon the considerations to the country's circumstances (Kim and Lau, 1994; Harrison, 1996; Delpachitra and Pham Van Dai, 2012). According to Delpachitra and Dai's (2012) assumptions for selected ASEAN country, the labor shares for these three countries are assumed to be 0.6. Except for FDI, other variables, such as the labor force, urbanization, openness in trade, real GDP per capita as well as gross capital formation and so on, are all sourced from WDI 2016. FDI is an exception because its data are unavailable for some countries over the entire observed periods. FDI inward stock collected from World Investment Report 2016 is used as a proxy for FDI. Table 1 presents definitions, the way of calculation as well as descriptive summaries for all variables.

Table 1: Descriptive statistics

Variable	Definition	Calculation	N	Mean	St.d
TFP	TFP Growth rate	a newly extended growth-accounting method developed by Feenstra, et al., (2013)	192	-0.003	0.03
HC	Education attainment	Data from Barro-Lee, (2010) dataset	192	6.258	2.18
Pri	Primary education	Percentage of population with primary education from Barro-Lee, (2010)	192	41.729	14.86
Sec	Secondary education	Percentage of population with secondary education from Barro-Lee, (2010)	192	29.172	14.17
Ter	tertiary education	Percentage of population with secondary education from Barro-Lee, (2010)	192	10.073	9.29
Catch-up	Technology gap with HC	$H_{it} \left(1 - \frac{A_{it}}{A_{mt}} \right)$	192	2.240	2.60
Catch-up (primary)	Technology gap with Primary education	$pri_{it} \left(1 - \frac{A_{it}}{A_{mt}} \right)$	192	21.348	17.38
Catch-up (secondary)	Technology gap with secondary education	$sec_{it} \left(1 - \frac{A_{it}}{A_{mt}} \right)$	192	10.044	13.21
Catch-up (tertiary)	Technology gap with secondary education	$ter_{it} \left(1 - \frac{A_{it}}{A_{mt}} \right)$	192	2.799	6.32
Gov	Government expenditure	the share of government consumption in real PPP-GDP	192	0.089	0.03
Openness	Openness in trade	the sum of exports and imports in real PPP-GDP	192	1.351	0.91
Ur	Urbanization	the share of non-rural population in total population	192	0.450	0.25
FDI	FDI inward stock	the share of inward FDI stock in real PPP-GDP	192	0.502	0.59

4 Empirical Finding

4.1 Two-way Fixed-Effect Estimation

Table 2: Panel estimation of the growth effect of Human Capital and its composition

VARIABLES	Panel model (1)	(2)	(3)	(4)
HC	-0.0141*** (0.005)			
Catch-up	0.0191*** (0.004)			
Primary education		0.0005 (0.000)		
Catch-up(primary)		-0.0001 (0.000)		
VARIABLES	Panel model (1)	(2)	(3)	(4)
Secondary education			-0.00193** (0.001)	
Catch-up(secondary)			0.0029*** (0.001)	
Tertiary education				0.0011 (0.001)
Catch-up(tertiary)				0.0045*** (0.002)
Government expenditure	0.121 (0.131)	0.0332 (0.122)	0.0862 (0.126)	0.138 (0.152)
Openness	-0.0004 (0.008)	0.0103 (0.009)	0.0013 (0.009)	0.0191** (0.008)
Urbanization	-0.0775 (0.079)	-0.119* (0.067)	-0.0910 (0.070)	-0.1622** (0.081)
FDI	0.0219*** (0.008)	-0.00586 (0.007)	-0.0047 (0.007)	-0.0053 (0.0106)
Constant	1.043*** (0.026)	1.011*** (0.030)	1.044*** (0.027)	1.013*** (0.025)
Country dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Hausman	67.8***	19.09***	31.58***	43.41***
Observations	192	192	192	192
R-squared	0.556	0.483	0.511	0.518
Number of id	8	8	8	8
F	6.689	4.998	5.590	5.734

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2 reports the results of panel estimation. Significant Hausman statistics support the choice of panel regression with two-way fixed effects. The first column shows the results using a model with innovation term denoted by the human capital, the catch-up term, as well as other control variables. Human capital is found to be negatively and significantly associated with TFP growth rate. This is in line with results of Cheng et al.'s (2013) study in that human capital negatively affects the TFP growth rate in a panel of 16 Asian countries, and the Stöllinger's (2013) work which took human capital as the innovation term in the same way and found the negative relationship of it with economic growth. As mentioned in the introductory section of this paper, the importance of human capital to TFP growth rate is obvious for it is highly related with knowledge or technology which is being repeatedly involved in many economic growth theories. Indeed, negative relationship between human capital and TFP growth is confusing. Human capital is further proxied by a ratio of population aged 25 and over with a certain educational level. From column 2 to 4, there are three educational levels, namely primary, secondary and tertiary education, independently and separately entering the estimation. Secondary education gives rise to the downside to the TFP growth rate, whereas primary and tertiary educations cannot provide significant positive effects. Thus, this may be a cause of why the estimates of human capital went against the expectation and be an indication of the existence of nonlinearity in human capital.

The catch-up term is another interest of this study. The estimates in all columns are as expected. The panel model (1) yields a positive coefficient for the catch-up term. More specifically, given the distance of follower country to the technology frontier, an increase in human capital level raises absorptive capacity; and therefore, boosts the TFP growth. The result of the catch-up term in column 2 of Table 3 favors Benhabib & Spiegel's (2005) study in which they pointed that if human capital is too low to make the catch-up process occur. As an indicator of low human capital level, primary education interacting with the objective technology gap has no response to TFP growth rate. In addition, the

technology gap which individually multiplied with secondary and tertiary education significantly activates the catch-up process in TFP growth rate. Besides, the latter generates more effects than the former.

Data limitation causes only four control variables to enter into the panel models. As main channels of transferring advanced technologies, openness and FDI are quite important for they effectively bridge the domestic market with external development; and therefore, are more likely to absorb advances by means of capital transferring, managerial training or competition in commodity selling. However, the first column (Panel model (1)) shows different situations in which FDI is positively associated with TFP growth; and the coefficient of openness, even though it is not significant, has a negative sign. Positive association of FDI with TFP growth rate is in line with most literature, especially Piyaarekul's (2008) study for five ASEAN countries. The finding of no impact of openness on TFP growth rate is similar to what Mahmood and Talat (2008) found in a panel of five East Asian countries including three ASEAN countries namely, Indonesia, Malaysia and Thailand; contradicting the common belief. In general, although human capital, as a proxy of innovation term, is found to be negatively associating with TFP growth rate, the results of its composition unveiled that this negative relationship is not linear and may not represent the real situation across ASEAN countries. Thus, using panel threshold regressions to examine the nonlinearity of human capital is necessary.

4.2. Panel Threshold Estimation

4.2.1 Threshold(s) in human capital for innovation term

It has been shown that innovation term generates inconsistent effects upon TFP growth rate when percentages of population with different educational levels are used to proxy different levels of human capital. Meanwhile, although human capital is often observed to weakly or insignificantly affecting the economic growth regression and the TFP

growth model, the empirical finding which contradicts theoretical expectation is possible. This is because these positive effects generated by one part of human capital are counteracted/overwhelmed by the other part. Thus, the purpose of this section is to find empirical evidence of the regime of innovation term that boosts TFP growth rate. Table 3 gives the result of the number of thresholds in terms of human capital. According to bootstrap p-values, corresponding statistics, F_1 , F_2 and F_3 , will suggest the number of thresholds. Tests for the single threshold F_1 and the double threshold F_2 are strongly significant, with bootstrap p-values of 0.019 and 0.020 respectively. Although the test for statistics F_3 shows possibility of the existence of a triple threshold model, the point estimates of the plot of $LR_3(\gamma)$ (Figure 1. (c)), the concentrated likelihood ratio function, are all below the dotted line, which means the statistic F_3 is invalid. On the other hand, the plots of $LR_1^r(\gamma)$ and $LR_2^r(\gamma)$ in Figures 1 (a) and (b) individually showed the valid value of ratio hitting the zero axis.

Table 3: Tests for threshold effects

Test for single threshold	
F_1	12.501**
P-value	0.019
(1%, 5%, 10% critical values)	(14.241, 8.946, 6.482)
Test for double threshold	
F_2	13.250**
P-value	0.020
(1%, 5%, 10% critical values)	(14.236, 8.874, 6.412)
Test for triple threshold	
F_3	4.881*
P-value	0.089
(1%, 5%, 10% critical values)	(10.246, 6.262, 4.574)

Note: 1. 1000 bootstrap replications were used for each of the three bootstrap tests.

2. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

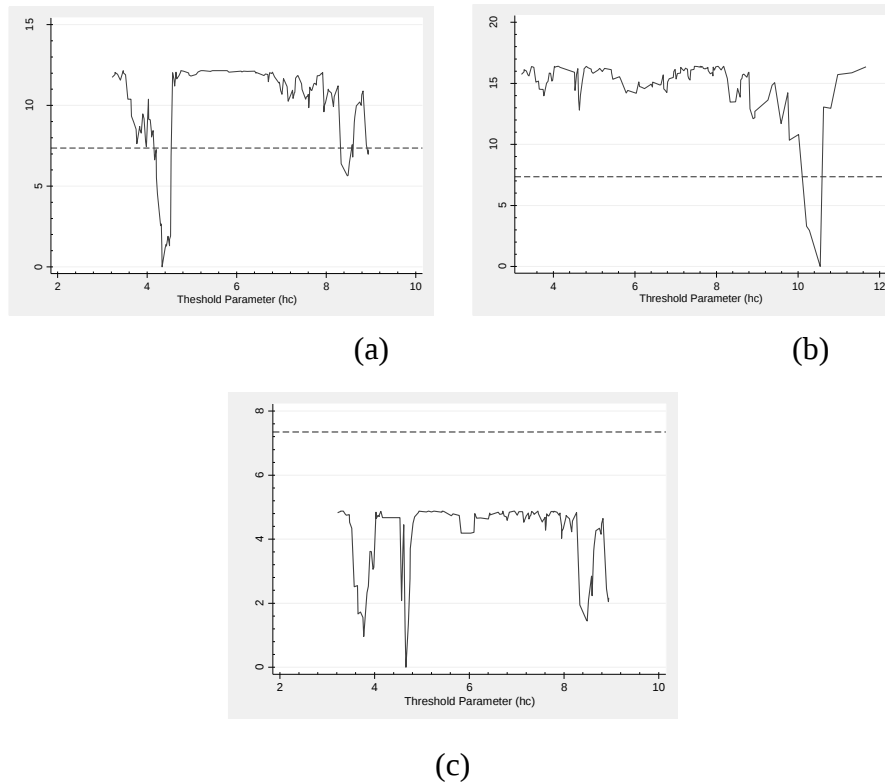
Figure 1: Likelihood ratio of the threshold/thresholds

Table 4 gives two threshold estimates and their own asymptotic 95% confidence interval. Since educational attainment is a proxy of innovation term, the first threshold estimate is 4.336 years of schooling and the second is 10.542 years of schooling. Thus, the three regimes separated by these point estimates are ‘low human capital’, ‘medium human capital’ and ‘high human capital’.

Table 4: Threshold estimates

	Estimate		95% confidence interval
$\hat{\gamma}^1$	4.336		[4.164, 8.942]
$\hat{\gamma}^2$	10.542		[10.208, 10.542]

The three regimes of human capital were entered into the threshold panel regression. Table 5 displays the coefficient of each split of human capital by using the two-way fixed-effect threshold procedure developed

by Lian et al. (2006). The ‘low human capital’ that includes a sample of countries with no more than 4.336 years of schooling positively affects TFP growth rate; while a sample of countries in the ‘medium human capital’ negatively associates with TFP growth rate. More importantly, it is different from the empirical evidence of the weak relationship between human capital and TFP growth, and generally meets theoretical expectations—for the ‘high human capital’ indeed positively affects TFP growth. Do note that the effect of ‘high human capital’, even together with that of ‘low human capital’, is still much less than the absolute value of the medium regime of human capital.

Table 5: Threshold Panel regression (Threshold(s) in human capital)

VARIABLES	Threshold model (1)
HC(low)	0.00505*** (0.002)
HC(medium)	-0.0210*** (0.005)
HC(high)	0.00344*** (0.001)
Catch-up	0.0265*** (0.004)
Government expenditure	0.160 (0.125)
Openness	0.00175 (0.008)
Urbanization	-0.0145 (0.076)
FDI	0.0225*** (0.007)
Constant	1.022*** (0.026)
Country dummies	Yes
Year dummies	Yes
Observations	192
R-squared	0.606
Number of id	8
F	7.604

Note: 1. 1000 bootstrap replications were used for each of the three bootstrap tests. 2.

*** p<0.01, ** p<0.05, * p<0.1

Despite the two thresholds categorizing human capital into three regimes, the significant estimate of each regime proves the existence of nonlinear effects upon TFP growth rate. Table 6 shows countries in each regime of human capital at different observed period. In 1991, three countries, namely Malaysia, Philippines and Singapore had obviously invested more in human capital and past the phase in which the TFP growth rate benefited from the initial development of human capital and where five other ASEAN countries were experiencing. Until 2002, the number of countries within the medium regime of human capital increased and the number of countries above 10.542 years of schooling remained zero. In 2014, Malaysia and Singapore's human capitals had enhanced their respective countries' TFP growth rates. Meanwhile, only Cambodia still has its human capital in the low regime.

Table 6: Countries in each regime at different observed period

Threshold Variable		$HC \leq 4.336$	$4.336 < HC \leq 10.542$	$HC > 10.542$
Human capital	1991	Cambodia, Indonesia, Laos, Thailand, Vietnam	Malaysia, Philippines, Singapore	-
	2002	Cambodia, Laos	Indonesia, Malaysia, Philippines, Singapore Thailand, Vietnam	-
	2014	Cambodia	Indonesia, Laos, Philippines, Thailand, Vietnam	Malaysia, Singapore

4.2.2 Thresholds in human capital for catch-up term

The catch-up term is an interaction between human capital and technology gap, denoting the absorptive capacity (or imitation term) of a nation. Given the distance of follower country to the technology frontier, searching for the threshold(s) within human capital will ascertain the number of regimes with respect to the catch-up term. As mentioned

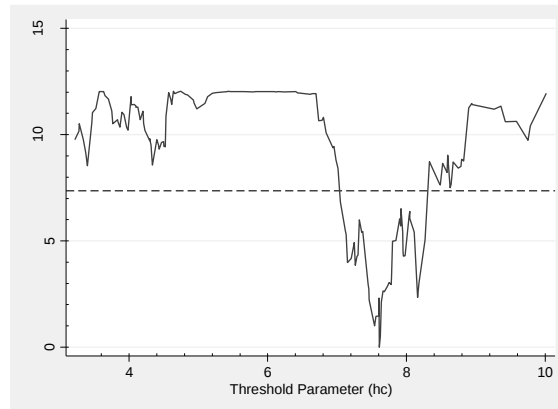
above, the technology gap denotes the selection set for follower countries. How much follower countries could learn or absorb from the selection set by means of all kinds of technology spillover depends upon the human capital level of the follower nation. In other words, the pace of catching up with the technology frontier may not be similar for the follower countries. Indeed, Table 7 shows that the test statistics F_1 is the only one with a bootstrap p-value of 0.005, whereas the test statistics F_1 and F_2 do not support the double and triple threshold model. Since the single threshold model is accepted, the plot of likelihood ratio of the threshold gives an estimate of the value of γ in which the corresponding likelihood ratio equal to zero.

Table 7: Tests for threshold effects

Test for single threshold	
F_1	12.037***
P-value	0.005
(1%, 5%, 10% critical values)	(9.529, 5.719, 4.060)
Test for double threshold	
F_2	6.630
P-value	0.139
(1%, 5%, 10% critical values)	(14.412, 10.792, 7.985)
Test for triple threshold	
F_3	7.257
P-value	0.078
(1%, 5%, 10% critical values)	(16.527, 8.585, 6.324)

Note: 1. 1000 bootstrap replications were used for each of the three bootstrap tests.

2. *** p<0.01, ** p<0.05, * p<0.1

Figure 2: Likelihood ratio of the threshold/thresholds**Table 8:** Threshold estimates

	Estimate		95% confidence interval
γ^1	7.608		[7.046 , 8.268]

Table 8 gives the threshold estimate with asymptotic 95% confidence interval. The single threshold found, splits the sample of the catch-up term into two groups. The sample of countries with no more than 7.608 years of schooling constructs the first regime named ‘low catch-up’; while the sample above the threshold value is the ‘high catch-up’ regime. In Table 9, the nonlinearity of the catch-up term found for both ‘low catch-up’ and ‘high catch-up’ regimes positively affect TFP growth rate in varying magnitudes. More specifically, the ‘low catch-up’ regime increases TFP growth rate by 0.0181; and the ‘high catch-up’ regime, with the higher capacity to absorb those technology spillovers, increases TFP growth rate slightly more, i.e. by 0.0193. In addition, the effects of both ‘low catch-up’ and ‘high catch-up’ regimes are greater than that of their innovative capacity (HC).

Table 9: Threshold Panel regression (Threshold(s) in human capital)

VARIABLES	Threshold model (2)
HC	-0.0130** (0.005)
Catch-up(low)	0.0181*** (0.004)
Catch-up(high)	0.0193*** (0.004)
Government expenditure	0.164 (0.146)
Openness	0.000940 (0.008)
Urbanization	-0.0798 (0.080)
FDI	0.0225*** (0.008)
Constant	1.035*** (0.028)
Country dummies	Yes
Year dummies	Yes
Observations	192
R-squared	0.557
Number of id	8
F	6.458

Note: 1. 1000 bootstrap replications were used for each of the three bootstrap tests. 2.

*** p<0.01, ** p<0.05, * p<0.1

Both ‘low catch-up’ and ‘high catch-up’ regimes include different countries at each observed period. From Table 10, all ASEAN countries in this study had human capital below 7.608 years of schooling in 1991; and therefore are placed in the ‘low catch-up’ regime. After 12 years,

Malaysia, Philippines and Singapore came out from the ‘low catch-up’ regime and benefited from a higher growth effect stemming from the catch-up term. Until 2014, only Cambodia and Laos were not in the ‘high catch-up’ regime.

Table 10: Countries in each regime at different observed period

Threshold Variable		$HC \leq 7.608$	$HC > 7.608$
Catchup	1991	Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, Vietnam	-
	2002	Cambodia, Indonesia, Laos, Thailand, Vietnam	Malaysia, Philippines, Singapore
	2014	Cambodia, Laos	Indonesia, Malaysia, Philippines, Singapore Thailand, Vietnam

5. Conclusion

This study first gives the estimated series of TFP growth rate for ASEAN 8 countries by using a new method developed by Feenstra et al. (2013) and Inklaar and Timmer (2013) for further investigating cross-country productivity convergence. Based on the Nelson-Phelps model (Nelson and Phelps, 1966) and Benhabib and Spiegel (1994, 2005), human capital endogenously enters into the technology progress and is affecting in two ways; namely domestic innovation and the catch-up term from the technology frontier, both of which focus upon productivity convergence. Using two-way fixed-effect estimation, this study also considers the effects of innovation term, denoted by human capital, and catch-up term upon TFP growth rate. Human capital is found to be negatively associating with TFP growth rate; whereas the catch-up term has a positive effect and is greater than that of the former. This demonstrates that the development in domestic innovation is still insufficient and technology spillover from the frontier plays a crucial role in the entire ASEAN region. Furthermore, by taking human capital

composition into account, primary, secondary and tertiary educations individually representing the proxies for the innovation term have different effects upon TFP growth rate. Secondary education dominates the negative effect, which may lead to the human capital being negatively associated with TFP growth rate. Correspondingly, catch-up terms also show different situations based on different absorptive capacity. Only secondary and tertiary education attainments multiplied with the technology gap will generate positive effects, while primary education is obviously inadequate in imitating external advanced technology; and therefore negatively affects TFP growth rate, proving that human capital has to reach a certain threshold value (Benhabib and Spiegel, 2005). Hence, the catch-up process would act as a booster for those following countries to approach the technology frontier.

According to the effects of innovation and the catch-up term upon TFP growth rate, when human capital composition is considered, negative relationship between TFP growth rate and human capital is probably attributable to nonlinearity. This study uses threshold-seeking procedures proposed by Hansen (1999) to examine existence of the number of thresholds in variables, namely innovation term and catch-up term. Innovation term is found to have two thresholds; and for the catch-up term, there is a single threshold in terms of human capital. Through the two-way fixed-effect threshold model, significant positive effects generated by human capital (low and high regimes) are found and less than the negative effect stemming from the human capital (medium regime) is found. In addition, Malaysia and Singapore are the only countries having entered into the regime of high human capital. Most of other ASEAN countries are still in the medium regime. For more than two decades, the progress of innovation in most ASEAN countries is quite obvious. After splitting the catch-up term into two regimes (low and high), higher human capital denoting higher absorptive capacity is, as expected, leveled up the influence of catch-up term on TFP growth. Besides, except for Cambodia and Laos, other ASEAN countries are the members of the regime of high catch-up term.

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Antecedents and Outcome of Waqif's Trust in Waqf Institution

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This study is undertaken to determine the ability of Waqf institutions toward influencing Waqif's trust and commitment. The stakeholder trust model for Waqf institution proposed by Hasan & Siraj (2017) was empirically tested with a sample of fifty-four Waqifs of public Waqf institution in Bangladesh. Results from Structural Equation Modeling (SEM) using Smart PLS 3.0 provided statistical validity of the model. Among the three components of board attributes, only board integrity has a statistically non-significant impact on Waqif's Trust. While board opportunism negatively affects trust, communication and accountability are found to have a positive association with Waqif's trust. Trust is also found to have a positive impact on commitment. The established model does not consider social, economic and psychological dimensions that might determine Waqif's trust and commitment toward public Waqf institutions. Results provided by the study will allow policy makers to focus on key issues that facilitate in developing trust and commitment between Waqif and Waqf institution. This study is the first to empirically test the commitment-trust theory in the context of Waqf operating in a South-East Asian country using Structural Equation Modelling technique.

Key Words: Waqf; Trust; Commitment; Governance

1. Introduction

Waqf is receiving increasing attention from the Muslim community due to its proven socio-economic contribution in providing a broad range of public goods (Yaacob, 2013). History has shown that Waqf played an important role in financing the expenditures of a Muslim country

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(Cizakca, 1998). Waqf can make perpetual contributions, and this ability has led researchers to explore the possibility to integrate Waqf in designing an Islamic poverty alleviation mechanism (Ahmad, 2015; Aliyu et al., 2015; Hasan, 2010; Khan, 2013; Pramanik et al., 2015; Sadeq, 2002).

Despite some poverty alleviation models proposed by scholars in past decade, Waqf is yet to make a significant mark in alleviating poverty. Among various reasons, the lack of ability of Mutawalli's in managing Waqf properties to ensure a perpetual return has been highlighted (Chowdhury, Chowdhury, Muhammad, & Yaso, 2012; Hasan & Siraj, 2016; Karim, 2009; Yaacob, 2013). Waqf has lost its glory after the fall of Ottoman Empire (Toraman, Tuncsiper, & Yilmaz, 2007) and modern revival of Waqf (Cajee, 2008) in solving the poverty problem in developing countries have not yet seen a steady growth due to the lack of contribution from Waqif (Hamdan, Mohd Ramli, Jalil, & Haris, 2013).

There are several charitable instruments in Islam that is designed to ensure equal distribution of wealth. *Zakah*, one of such instrument, is a mandatory obligation and is also one of the five pillars of Islam. Waqf, on the other hand, is a voluntary obligation and originated from the practices of Prophet Muhammad (PBUH) with no specific instruction from the Quran. In such circumstances, the issue of trust has a significant role in the growth of such non-profit institution (Torres-Moraga, Vasques-Parraga, & Barra, 2010) in the evidence of mismanagement of Waqf properties by unqualified Mutawallis (Rashid, 2012).

Review of past literature on Waqf revealed that researchers have discussed the issue of trust (Gaudiosi, 1988; Sulaiman, Adnan, Suad, & Nor, 2009; Stibbard, Russell, & Bromley, 2012) from a distance and have not explored the significance of maintaining trust relationships for the sustainability of Waqf institutions. In a recent study, Mustafa, Mohamad, & Adnan (2013) investigated the antecedents of donor trust in *Zakah* institution for Nigeria and provided new directions for Islamic non-profit organisations. Researchers on conventional non-profit organisations have already shifted on trust as past studies (Dhanani & Connolly, 2012; Sargeant & Woodliffe, 2007; Torres-Moraga, Vasques-

Parraga et al., 2010) have established the importance of trust toward the survival of such institutions.

In this light, the current study centres on investigating antecedents and outcome of trust in Waqf institutions operating in Bangladesh. The primary reason for such investigation is two-fold. First, Waqf properties are managed by the public sector, and Chowdhury et al. (2012) highlighted several problems that are affecting the ability of the public sector in efficiently managing Waqf endowment in Bangladesh. Second, Mannan (2014) indicated that one of the biggest challenges being faced by the Waqf institution in Bangladesh is the lack of interest among Waqif to register endowed property under public management. In such a situation, this study has focused on exploring the importance of trust in building a long-term commitment between Waqif and Waqf institution along with the identification of antecedents that can enhance Waqif's trust in Waqf institutions.

2. Literature Review

2.1 Socio-Economic Contribution of Waqf

Waqf assets are perpetual in nature and include real estate which can provide support to religious and philanthropic activities. The conditions of continuous return from Waqf asset allow it to play a vital role in the socio-political development of a Muslim country. One of the most common uses of waqf property is the creation of Mosque, which provides praying facilities to Muslim Ummah⁴. It facilitated them to worship Allah, strengthens their brotherhood and teaches them to be accountable for their deeds in this life through various types of religious, educational activities.

Although religious education is covered by a Waqf on mosques, Madrasa education, in general, has been another important user of waqf revenues. In Southeast Asia, Madrasa⁵ plays a vital role in providing education mostly to orphans and children from the needy family. Besides Madrasa, waqf estates have been used to build schools, colleges and universities.

⁴ Ummah is an Arabic word meaning "Nation" or "Community".

⁵ Madrasa is an Arabic word meaning "Religious School".

Interestingly, waqf also played a significant role in establishing and strengthening the power of states, imposing loyalty to rulers or leaders and cultivating favourable reputations (Kuran, 2001). A law school in Damascus was endowed by Sultan Sulayman, fundamentally to establish his influence on religious scholars and in the meantime, an endowment may affirm the donor's special prominence, immortalising their reputations in the institution and securing a public perception of their civic mindedness (Kuran, 2001).

Waqf has the potential to reduce the interest rate by providing essential services without any cost to the Government. *Riba* (interest) is prohibited in Islam, but no country has yet succeeded in eliminating interest abrupt by law (Çizakça, 1998). Effective integration of waqf in the modern Islamic economic system can facilitate in the struggle against eliminating *Riba*.

The waqf system can significantly contribute to solving the unemployment problem of a country. In fact, waqf can be a major source of employment only if it is properly utilised as an economic tool but not as a mere religious charity. Waqf sector can play a significant role in providing public services and contributing to socio-economic development as a benevolent, non-governmental and nonprofit sector in the economy. Waqf can reduce the tax burden by reducing Government expenditure and borrowing which allow the public to save and invest in financial markets that will eventually lead to economic development. Lower taxes would have a positive impact on aggregate production while at the same time reduce costs.

2.2 The Concept of Trust and Commitment

The growth of various forms of relationships has put trust in a centre stage. One of the primary reason for the exploration of trust is its ability in establishing co-operative relationships (Handfield & Bechtel, 2002; McQuiston, 1997). Hosmer (1995) has utilised the concept of philosophical ethics to define trust to be the result of a given decision that recognises and protects the rights of other people through the analysis of the ethical principles of analysis. Trust has been conceptualised from different theoretical viewpoints that include transaction cost theory, social exchange theory, agency theory, the resource dependency theory, system theory and attribution theory.

Mayer, Davis, & Schoorman (1995) defined trust as the willingness of a trustor to be vulnerable to the actions of a trustee with the expectation that certain activity will be performed by the trustee which is desired by the trustor.

Prior studies on trust cover various disciplines such as social psychology (Lewicki & Bunker, 1996), sociology (Lewis & Weigert, 1985), economic (Dasgupta, 1988) and more recently, marketing (Morgan & Hunt, 1994) and e-commerce (McKnight & Chervany, 2002). Based on their content and scope, definitions of trust vary a great deal. However, the majority of trust literature can be divided into two categories, i.e. holistic studies and studies focusing on the role of trust in specific sets of circumstances (Sargeant & Lee, 2004). Fukuyama (1995) belongs to the holistic category and defines trust as a function of aggregate values, social networks, and social ethics that underpin economic cohesion and growth.

Dwyer, Schurr, & Oh (1987) regard trust as a party's expectation that another party desires co-ordination, will fulfil obligations and will put weight on the relationship. While Moorman, Deshpande, & Zaltman (1993) define trust as the willingness to rely on an exchange partner in whom one has confidence, Morgan & Hunt (1994) felt trust exists when one party has faith in an exchange partner's reliability and integrity. Mayer et al. (1995) agree that definition of trust must include aspects of risk or vulnerability, thereby distinguishing trust from co-operation, confidence and predictability. Trustworthiness and trust are often considered as two separate constructs (Mayer et al., 1995). However, for a certain state of trust to exist between two parties, both the expectation of trustworthy behaviour and the intention to act based upon it must be present (Huff & Kelley, 2003).

Trust in institutions is often more important than interpersonal trust in modern society because institutions can have more resources to provide people with the means of achieving some of their goals. Although trust takes centre stage in the Commitment-Trust Theory, commitment is viewed as a critical complement of trust in exchange relationships. It is important for both parties to engage in a resource transaction relationship. Moorman et al. (1993) defined commitment as an enduring desire to maintain a valued relationship. The term value relationship emphasised the belief that commitment exists when the relationship is

considered essential. It has been established that trust precedes commitment (Chory & Hubbell, 2008) and it is widely understood and agreed that organisational commitment and trust are deeply interrelated (Kwon & Suh, 2006; Zeffane, Syed, & James, 2011).

2.3 The Concept of Trust in Islamic Perspective

The word *Amanah* originates from the three letter root verb *Amina*, which means to be in a state of peace, safety, and security. In the noun form, the word becomes *Amn*, which means to be in a state of peace, security, shelter and protection. *Amanah* means trust, reliability, trustworthiness, loyalty, faithfulness, integrity and honesty.

In Islam, human beings are believed as the steward of Allah and are responsible for the efficient utilisation of the wealth entrusted to them. As a trustee, stewards are responsible for maximising the value of the wealth toward benefiting the whole community. Ibn Taymiyah was the first scholar to add trustworthiness to the existing list of *Maqasid*⁶ in relationship to faith (Kasri, 2012).

While business organisations are accountable to Allah for its success in living up to the trust and realisation of *Maqasid Al Shariah*, they are also accountable to the stakeholder groups for realising their expectations and aspirations in conformity with the terms and *Maqasid* as well. Regarding waqf institutions, these principles should be followed by *Mutawallis* as trustee of the resources entrusted to them by Waqif. Effective utilisation of Islamic perspective of trust can foster the growth of these institutions and enhance their image among the general public.

3. Theoretical Framework

The Key mediating variable (KMV) model of relationship marketing developed by Morgan & Hunt (1994) by commitment-trust theory, has five antecedents. They are relationship termination cost, relationship benefits, shared value, communication and opportunistic behaviour. It also has five outcomes (acquiescence, propensity to leave, co-operation, functional conflict and decision-making uncertainty). The need for

⁶ The term 'Maqsid' (plural: Maqasid) literally means a purpose, intent, objective, principle, goal or end.

further explication, replication, extension, application and critical evaluation felt by the researchers will be taken into account and attempted in the context of waqf institutions through this study.

Morgan & Hunt (1994) conceptualise trust as confidence in an exchange partner's reliability and integrity. They propose that trust can be increased by sharing similar values and communicating those values between trustee and trustor. The different cases are also possible if partners are perceived to engage in opportunistic behaviour. Factors included in Key Mediating Variable (KMV) model have provided valuable insights in the process of relationship building. Morgan (2000) refers to an extended trust-commitment theory that included a framework that would provide further insight into the processes and motivations of relationship building.

Morgan & Hunt (1994) proposed the theory of Commitment – trust to understand the relationship building process of customers which opened new windows for relationship marketing research. This particular theory and detailed conceptual model allowed researchers to identify possible factors that make or break the successful relationship between customer and seller of commodities or services. Later on, the research model was reshaped by several researchers to cater some additional features and explore new horizons.

In the context of a non-profit religious organisation such as waqf, this theory is applicable for two reasons. First, the image of waqf institutions as a practical tool for economic development has already been destroyed (Stibbard et al., 2012). So, enhancing commitment among the current donors through increasing trust in this historical institution by focusing on improving governance structure, disclosure and accountability practices might be the most important function for the *Mutawallis* at present. The theory of Commitment-Trust will be used in this study to examine the donor trust in waqf institutions with a specific focus on governance, accounting and accountability issues. The utilisation of the theory and modification of the initial model proposed by Morgan & Hunt (1994) to analyse trust and commitment with the specific theme of accounting will serve as a significant contribution to the study.

The original KMV model of Morgan & Hunt (1994) provided three determinants (shared value, communication and opportunistic

behaviour) and four outcomes (relationship commitment, cooperation, functional conflict, uncertainty). Mayer et al. (1995) introduced ability, benevolence, and integrity as determinants of trust which are being moderated by trustor's propensity and positioned risk taking behaviour as an outcome of trust. Finally, Seal & Vincent-Jones (1997) proposed accountability as an antecedent of trust along with accounting which has already been covered by the original KMV model (communication).

Focused group interviews were conducted with experienced waqf administrators to determine the relevance of these variables in the context of Waqf institutions operating in Bangladesh. Respondents were asked to rate the importance of selected variables on a five-point Likert scale, ranging from strongly disagree to strongly agree. Based on the suggestions of focused group respondents along with the extensive review of related literature, only six determinants of trust are retained with only one outcome variable. These determinants include benevolence, ability, integrity, opportunism, communication and accountability. Commitment is proposed as a determinant of donor's trust in Waqf institutions.

4. Hypotheses Development

Public trust is part of ethical governance because moral values and mechanisms of accountability, independence, transparency, integrity, openness, expertise and motivation, participation and collaboration, and sanction and ethical codes can reduce corruption on one hand and increase public trust on the other (Osifo, 2012). Board attributes as a part of ethical governance practices can play a significant role in reporting public trust to a charitable organisation. Stakeholder theory has also emphasised the role of board attributes in ensuring the trust of a donor as the key stakeholder.

A competent board can provide assistance in resolving such conflict and improve coordination for the organisation. Mayer et al. (1995) have proposed benevolence, integrity, and ability as possible antecedents of trust which has been empirically tested for possible board attributes that could influence donor trust in Zakah institutions in Nigeria by Mustafa, Mohamad, & Adnan (2013). Results indicate that board attributes have a positive association with Zakat payer trust. While Jarvenpaa et al. (1998) and Knoll & Gill (2011) have also found a positive association

between all three attributes of board and trust, Yu et al. (2015) indicate a negative impact of benevolence on trust. Hence, following hypotheses are developed:

H_{1a}: Board benevolence has a positive impact on trust.

H_{1b}: Board ability has a positive impact on trust.

H_{1c}: Board integrity has a positive impact on trust.

Sargeant & Lee (2004a) have empirically tested the impact of disclosure practices on donor trust for the UK charity sector. The term used in their study was communication which has the similar meaning of disclosure practice. A sample of 1000 known charity givers to four specific organisations was randomly selected for the survey. The postal survey method generated a 34.2 percent response, and thus 334 responses were used in AMOS. Communication was found to have the strongest impact on donor commitment.

The study conducted by Torres-Moraga et al. (2010) for Chili also tested the impact of communication on donor trust. 300 potential respondents were divided into three classes based on socio-economic position. One of the limitations of this study is the application of convenience sampling method. Structural equation modelling result found communication effectiveness to have an indirect effect on donor trust. This difference in result for the charity sector of two different countries has led to the formulation of the following hypothesis:

H₂: Communication has a positive impact on trust.

Opportunistic behaviour can be linked to Waqf institutions regarding benefits generated from endowed properties donated for the sake of the beneficiaries. In the presence of opportunism, managers get involved in a conflict with the stakeholders as it influences deceptive behaviour such as hiding, revealing only incomplete or distorted information, consciously leading others to errors and converting others or confusing others (Romar, 2004). In line with the agency theory, this creates a conflict between donors and managers which can be minimised through effective governance.

However, a religious NPO like waqf is accountable to Allah as His steward for effective utilisation of public fund. As per stewardship theory, managers are not opportunistic and try to achieve principal's objectives. They are driven by profit motive and are concerned with maximisation of firm performance. Thus, any conflict that might arise from the information asymmetry between principal and agent as per the propositions of agency theory is non-existent between principal and steward which might increase trust in these institutions. Previous studies have found that an opportunistic behaviour hurts trust (Torres-Moraga et al., 2010; Williams, 2007). As a result, the following hypothesis is formulated to test whether donors of waqf institutions view managers as stewards or agents.

H₃: Board opportunism has a negative impact on trust.

Connolly & Hyndman (2013) explored accountability from the perspective of charity donors. The research utilised semi-structured interviews and found evidence that information commonly disclosed informal charity communication is questionable. It was also revealed that informal communication was used as an accountability mechanism by charities in the UK due to their importance in enhancing trust and reputation among donors.

Islamic accountability provides the notion that human beings are accountable to ALLAH as the key stakeholder (Ibrahim, 2000). Accountability toward Allah can only be achieved by being accountable to the community. Waqf institutions are accountable to the donors and can enhance trust by being accountable for their actions relating to the endowed property. A similar proposition is made by Seal & Vincent-Jones (1997) in their conceptual model of organisational trust. Thus, the following hypothesis is formulated:

H₄: Accountability has a positive impact on trust.

The association between trust and commitment has been investigated from several points of views in previous literature. Several authors have utilised the KMV model developed using commitment trust-theory by Morgan & Hunt (1994) while others have utilised the trust model drawn up by Mayer et al. (1995). Although the theoretical model provided by Seal & Vincent-Jones (1997) have not yet been empirically tested, the

introduction of the concept of accountability have made this model significant and relevant for the current study.

Sargeant & Woodliffe (2007) have empirically tested the relationship between trust, commitment, and intention of charitable giving in the context of UK and US charitable institutions. They conclude that trust in the selected charitable organisation drives engagement in the context of charitable giving among donors of those institutions. Similar results were found by Chen, Chen, & Yeh, (2014); Morgan & Hunt (1994); Mukherjee & Nath (2003); Wong & Sohal (2002) by using the commitment-trust theory. Hence, following hypothesis is generated:

H₅: Waqif's Trust has a positive impact on commitment.

5. Research Methodology

Based on the suggestions of Backstrom & Hursh-Cesar (1981), a sample size of 60 is conveniently chosen in the current study. The population of the survey is Waqif registered under Waqf Bangladesh, the public administrator of waqf estates in Bangladesh. After collecting the response from respondents, four were found to be unusable which leaves a final sample of 56 respondents. A brief description of demographic statistics of the sample is provided in Table 1.

Table 1 indicates those major portions of the respondents are male. Among the seven divisions of Bangladesh, Waqif's from Chittagong and Dhaka have a dominating presence in the study. Forty-three percent of the respondents have a Master's degree which provides a degree of assurance toward having a reliable response from the conveniently selected respondents. There are several respondents with an annual income level less than 2,50,000 BDT⁷ (1 USD = approximately 83 BDT). The range used in the income level follows taxable income limit and thus indicates that all except ten respondents have taxable income. While exploring the validity of respondents being a Waqif with income below the taxable limit, it was identified that they inherited and later donated a substantial portion of their property as Waqf.

⁷ BDT is the code for Bangladeshi Taka (the currency of Bangladesh)

Table 1: Demographic Profile of the sample

	Frequency	Percent		Frequency	Percent
Gender			Academic Qualification		
Male	42	75.0	Bachelor	9	16.1
Female	14	25.0	Masters	43	76.8
District			Others	4	7.1
Barisal	1	1.8	Annual Income Level (in BDT)		
Chittagong	17	30.4	<2,50,000	10	17.9
Dhaka	19	33.9	2,50,000-6,00,000	32	57.1
Khulna	7	12.5	6,00,000-11,00,000	9	16.1
Maymensing	5	8.9	11,00,000-17,50,000	3	5.4
Rajshahi	6	10.7	>17,50,000	2	3.6
Rangpur	1	1.8	Employment Status		
Marital Status			Employed (Private Service)	49	87.5
Single	36	64.3	Unemployed	3	5.4
Married	20	35.7	Businessman	2	3.6
			Retired	2	3.6

Reliability and validity of the questionnaire items are determined through descriptive statistics, Cronbach's Alpha value and correlations. Exploratory factor analysis is not performed in the study due to the limited number of sample size. The statistical validity of the developed conceptual model was tested using structural equation modelling technique. Structural Equation Modelling (SEM) approach is chosen as a data analysis tool due to its ability to simultaneously analyse all variables in the model which is not possible through a multiple regression analysis (Chin, 1998; Fornell & Larcker, 1987). Smart PLS can perform such complex analysis with a small sample and thus chosen as a data analysis tool in this study.

6. Discussion

The descriptive statistics of the respondents participated in the pilot study are provided in Table 1. The majority of the respondents are male, living in Dhaka city with a minimum bachelor degree and holding a private job. Pearson correlation test provided significant correlations among studied variables. However, none of the independent variables is highly correlated among themselves. So, the study is not affected by multicollinearity issue. Shapiro-Wilk test results indicated that data conforms to the normality assumption.

Validity and reliability of the measures included in the questionnaire are ensured through various mechanisms. First, content and face validity is provided by conducting a focused group discussion with five Waqf Administrators to verify whether the measures adequately measure the concept. Based on the suggestions of the experts, several changes are made to the initial questionnaire. Internal consistency reliability is determined through Cronbach's Alpha values provided in Table 3. George & Mallery (2003) states that an alpha value less than 0.50 is unacceptable while a value higher than 0.70 is acceptable. Cronbach's alpha value found from the pilot study proves the inter-item consistency of all measurement items. Separate tests were also conducted for each variable.

6.1 Results of Measurement Model

A two-step approach was used to test the validity of the measurement model as per the suggestions of Anderson & Fornell (2009). First, the convergent validity was assessed based on the information provided in Table 2. Convergent validity can be ascertained if the loadings are greater than 0.50 (Bagozzi & Yi, 1991), composite reliability greater than 0.70 (Gefen et al., 2000) and the average variance extracted is greater than 0.50 (Fornell & Lacker, 1981). Based on the selected criteria, convergent validity of the developed model is achieved.

Table 2: Convergent Validity of Constructs

Model Constructs	Measurement Item	Loading	Cronbach's Alpha	CR	AVE
Board Ability	A2	.849	.796	.750	.602
	A3	.696			
Board Benevolence	B1	.957	.713	.818	.698
	B2	.692			
Board Integrity	I2	.802	.731	.827	.706
	I4	.876			
Opportunism	O1	.919	.723	.793	.661
	O3	.691			
Communication	C1	.657	.806	.801	.574
	C2	.839			
	C3	.750			
Accountability	AC2	.808	.896	.893	.735
	AC4	.903			
	AC5	.858			
Trust	T1	.918	.836	.898	.814
	T2	.886			
Commitment	CM1	.911	.928	.945	.812
	CM2	.931			
	CM3	.891			
	CM4	.871			

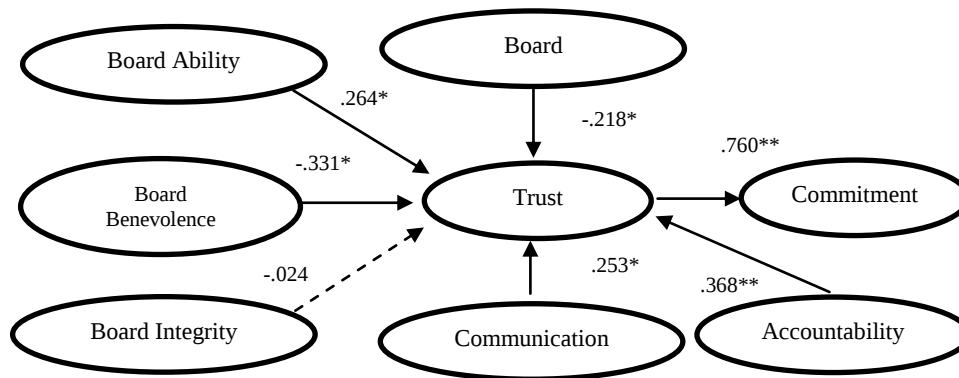
The discriminant validity was also tested using the Fornell & Lacker (1981) criterion whereby the average variance shared between each construct and its measures should be greater than the variance shared between the construct and other constructs. We have found that the correlations for each construct are less than the square root of the average variance extracted by the indicators measuring the construct indicating adequate discriminant validity. The majority of the constructs used in developing the structural model satisfied the convergent and discriminant validity test.

6.2 Results of Structural Model Analysis

The structural model was tested using SMART PLS 3.0 using bootstrapping with 200 resamples. The results are presented in figure 2 and Table 3. The adjusted R^2 value ranged from .520 to .577 percent. This suggests that the modelled variables can explain 52.0 to 57.7 percent of the variance of the respective dependent variables.

Table 5 provides the results of path coefficients and hypothesis tests. Among the three board attributes, the only board integrity was found to be a non-significant predictor of waqif's trust. While board ability has a positive impact on trust, board benevolence has an adverse impact on trust. Board opportunism, communication and accountability are also found as significant predictors of waqif's trust in waqf institution. Finally, trust was found to have a significant positive impact on the commitment which validated the propositions of Trust and Commitment theory.

Figure 2: Summary of Structural Equation Modelling (SEM) Results



Note: Bold line indicates significant relationships and the dotted line indicates non-significant relationships. * $p < .005$, ** $p < 0.01$

Table 3: Path Coefficient and hypothesis testing

Hypothesis	Relationship	Coefficient	t-Value	Supported
H _{1a}	Board Benevolence → Trust	-.331	2.026*	No
H _{1b}	Board Ability → Trust	.264	1.659*	Yes
H _{1c}	Board Integrity → Trust	-.024	0.154	No
H ₂	Board Opportunism → Trust	-.218	2.106*	Yes
H ₃	Communication → Trust	.253	2.353*	Yes
H ₄	Accountability → Trust	.368	2.315*	Yes
H _{5a}	Trust → Commitment	.760	7.417**	Yes

* $p < .005$, ** $p < 0.01$

7. Discussions and Conclusion

The study adds to the literature by validating the propositions of Commitment-Trust Theory through measuring the impact of opportunism and communication on trust and commitment of Waqf institutions. It also validates propositions of stewardship theory through a significant negative association between board opportunism and Waqif's trust. Finally, a positive impact of accountability on trust proves the statistical significance of the trust model of (Seal & Vincent-Jones, 1997).

Based on Mayer's (1995) model of trust; benevolence, ability and integrity of board members in influencing Waqif's trust and commitment to Government managed. Waqf institutions were tested using SEM technique. H_{1a} assumes that board benevolence has a positive impact on Waqif's trust. However, the study has found a negative impact of board benevolence on trust. Such, negative relationship is also found by Yu et al. (2015). A possible reason for such relationship might be the highly elusive and subjective nature of benevolence. So, H_{1a} is rejected.

Results indicate that ability of the board members has a positive association with generating trust in the organisation. This positive impact has also been found in the studies of Jarvenpaa, Knoll, & Leidner (1998); Knoll & Gill (2011) and Yu, Balaji, & Khong (2015). Hence, Ability, a construct from the Mayer & Davis (1999) is found significant in the context of Waqf institutions, and H_{1b} is accepted.

H_{1c} assumes by stewardship theory that Board Integrity has a positive influence on Donors' Trust. This positive contribution has also been found in the studies of Jarvenpaa, Knoll, & Leidner (1998); Knoll & Gill (2011) and Yu, Balaji, & Khong (2015). However, Integrity failed to establish a significant relationship with trust in the context of Waqf institutions, and H_{1c} is rejected.

Communication is found to have a positive impact on Waqif's trust. Such result is in line with the findings of prior literature (Mukherjee & Nath, 2003; Mustafa et al., 2013; Sargeant & Lee, 2004). Hence, H_2 is accepted. H_3 assumes by Commitment-Trust Theory that Board Opportunism has a negative influence on Donors' Trust. The value of -

0.218 is the contribution of Board Opportunism toward donors' trust in Waqf institutions. This negative contribution has also been found in prior studies (Mukherjee & Nath, 2003; Torres-Moraga et al., 2010). Surprisingly, a positive relationship is reported by Sargeant & Lee (2004) for donors of UK charities. Hence, Opportunism, a construct from the KMV model by Morgan & Hunt (1994) is found significant in the context of Waqf institutions, and H_3 is accepted.

Based on the propositions of Islamic Accountability and Stewardship theory, Accountability is hypothesised to have a positive influence on waqif's Trust. This positive impact found in the study provides statistical evidence for the conceptual trust model of Seal & Vincent-Jones (1997). A significant positive impact on accountability on trust establishes accountability as a valid construct in trust literature. Hence, Accountability is found significant in the context of waqf institutions, and H_4 is accepted. Among all the antecedent of donors' trust, accountability turns out to be the strongest.

Trust is also found to have a positive and significant impact on commitment. It indicates an increase in Waqif's trust will enhance their long-term commitment toward the institution. These findings are similar to prior studies (Jarvenpaa et al., 1998; Morgan & Hunt, 1994; Torres-Moraga, Vasques-Parraga, & Barra, 2010; Yu et al., 2015). Thus, hypothesis H_{5a} is also accepted.

The study has important theoretical implications. First, the research extends our current understanding of the association between board attributes, trust, and commitment through empirical analysis of an antecedent and outcome model. The result of this study provides strong evidence that trust in public waqf institutions is developed through perceptions toward the ability of board members responsible for managing the Waqf Fund. By including three attributes of the board, this study presents a process by which Government can build trust and enhance Waqif's intention to keep the donated property under the supervision of public authority that will benefit a large group of beneficiaries.

Second, this study provides valuable empirical findings that validate the application of Mayers' model of trust and the propositions of Commitment-Trust Theory which has been previously applied in

relationship marketing and strategic management literature. Findings of the study broaden the horizon of waqf literature which has been concentrating on historical, political and economic aspects. Now, the governance aspects in the context of a South-Asian country have also been explored.

This study also provides valuable insights for the public waqf administrators. As ability has a positive link with trust and trust also positively affect Waqif's commitment, reform strategies are needed to enhance the ability of waqf administrators. In this process, the image of public organisations as an administrator of waqf will increase, and the ability of Waqf in becoming a practical tool for poverty alleviation will enhance.

Finally, this study is not without limitations. Prior studies indicate other dimension such as communication, accountability, and opportunism might determine Waqif's trust (Morgan & Hunt, 1994; Mukherjee & Nath, 2003; Sargeant & Lee, 2004). Thus, further studies may consider other dimensions in exploring the issue of Waqif's trust. Furthermore, future research should extend the findings to a large sample so as to increase the generalizability of the results derived in the current study.

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