

Journal of Economic Cooperation & Development

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Fouzi Tahar Abderzag**

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Editorial

This issue of the Journal of Economic Cooperation and Development includes eight papers that revolve around cotemporary macroeconomic policy using different effective in variable estimation and forecasting econometric methods .

Triki, Adel, and Abderzag investigate and find a negative effect of geopolitical risk and the Consumer Confidence Index on Turkish stock returns, using monthly data (2004-2017) from the BIST100 (following Caldara and Lacoviello, 2018). They perform the Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH), specifically the DCC-GARCH and BEKK-GARCH models.

Sanya shows that negative monetary policy would be more efficacious when output is desired to be increased. Results from variance decomposition revealed that, among variables employed in the study, money supply and monetary policy rate explained much of the variations in Nigeria's real output. They conclude that the effects of monetary policy on real output are asymmetric and not symmetric.

Hussein and Fard find robust evidence that the misery index, external debt, and human development index increase resilience to external shocks and ultimately reduce a crisis. Lesser economic-resilient nations should pursue policies to reduce unemployment and inflation, adopt financial discipline, sustainable debt policies and develop education and public health sector to reduce the crisis at hand.

Ebaidalla and Mustafa find that per capita income, urbanization, trade openness, and inflation have significant effects on out-of-pocket health expenditures, causing a problematic OOPHE in Sub-Saharan Africa. The impact of accountability is found to be negative and statistically significant, indicating that the institutional quality and proper government spending decreases OOPHE

Hossain, Baten, and Mukta find E-GARCH and GJR-GARCH to perform better to forecast volatility in the Dhaka Stock Exchange. They find significant impact of positive shocks on volatility for Brac and Eastern banks whereas for City bank negative shocks tend to produce higher volatility. Volatility is persistent for City, Pubali, and Eastern banks. The

fitted models for Brac, City, and Eastern banks performed well in backtesting while Pubali bank did not.

Lassassi studies and finds that women are systematically underpaid in all sectors, except the public/education sector. Regional characteristics influence the choice of the sector and partly explain the wage gap between men and women. He states that there are other non-monetary factors beyond the financial benefit that motivates women to choose the public sector in Algeria.

Mansor develops and proposes a three-pillar framework for people-centric economic integration in the D-8, using Malaysia as an engine for talent development and talent recirculation. They delve into how Malaysia can offer a model for greater economic integration among the D-8 member states through (i) trade in cultural goods and services, (ii) international student flow and (iii) skilled labor mobility.

Rizwan and Al-Malkawi utilize the Theory of Planned Behavior (TPB) to examine the impact of brand equity and customer perceptions on the purchase intentions of UAE's Health Takaful customers based on age, income, education, and religion. While age, income, and education were significant moderators for purchase intentions of Health Takaful customers, religion was not.

Nebil DABUR
Editor-in-chief

Does Geopolitical Risk and Investors' Sentiment Matter for Turkish Stock Returns?

SAADLI Adel¹, Mohamed Bilel Triki² and Fouzi Tahar Abderzag³

ABSTRACT

The relationship among geopolitical risk, investor sentiment and stock returns is an important topic. This article investigates the effects of geopolitical risk and the Consumer Confidence Index for Turkish stocks returns over a period from the start of 2004 to the end of 2017. This study uses monthly data for stock returns (BIST100) and the GPR index, a constructed monthly geopolitical risk index (Caldara and Iacoviello, 2018). The empirical analysis is founded on the Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) method, specifically the DCC-GARCH and BEKK-GARCH models. The results show that geopolitical risk and investor sentiment have a negative effect, essentially on BIST100 returns and volatility.

ملخص

تعتبر العلاقة بين المخاطر الجيوسياسية وشعور المستثمرين وعائدات الأسهم موضوعا هاما. وهذا المقال، يتحرى آثار المخاطر الجيوسياسية ومؤشر ثقة المستهلك لعائدات الأسهم التركية على مدى فترة تمتد من بداية عام 2004 حتى نهاية عام 2017. وتستخدم هذه الدراسة البيانات الشهرية لعائدات الأسهم (BIST100) ومؤشر المخاطر الجيوسياسية، الذي يعتبر مؤشرا شهريا للمخاطر الجيوسياسية (Caldara and Iacoviello, 2018). ويستند التحليل التجريبي إلى نموذج التباين الذاتي

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الشرطي المعمم المتغاير (MGARCH)، وعلى وجه التحديد نموذجي الارتباط الدينامي المشروط-التباين الذاتي الشرطي المعمم (DCC-GARCH) وبابا، إنجل، كرافت، كرونر-التباين الذاتي الشرطي المعمم (BEKK-GARCH). وتبين النتائج أن للمخاطر الجيوسياسية وشعور المستثمرين أثرا سلبيا، أساسا على عائدات الأسهم (BIST100) وتقلباتها.

ABSTRAITE

La relation entre le risque géopolitique, le sentiment des investisseurs et les rendements boursiers est un sujet important. Cet article étudie les effets du risque géopolitique et de l'indice de confiance des consommateurs sur les rendements des actions turques sur une période allant du début de 2004 à la fin de 2017. Cette étude utilise les données mensuelles des rendements boursiers (BIST100) et l'indice GPR, un indice de risque géopolitique mensuel construit (Caldara et Iacoviello, 2018). L'analyse empirique est fondée sur la méthode MGARCH (Multivariate Generalized Autoregressive Conditional Heteroskedasticity), plus précisément sur les modèles DCC-GARCH et BEKK-GARCH. Les résultats montrent que le risque géopolitique et le sentiment des investisseurs ont un effet négatif, essentiellement sur les rendements et la volatilité du BIST100.

Keywords: Geopolitical risk index; Investors' sentiment; Turkish stock returns; Multivariate GARCH models, BEKK/DCC form

JEL Classification: H56; G1; G15

1. Introduction

Many studies have focused on stock markets whose fluctuations are affected by economic factors that can also be extremely sensitive to political events (Pástor and Veronesi, 2013; Hudson and Urquhart, 2016). Political events, whether national or international, can cause disturbance on the general economy, financial markets and more particularly stock markets. This disturbance can influence the sentiment of economic agents and lead to a financial crisis (Bialkowski et al., 2008; Wolfers and Zitzewitz, 2009). Nevertheless, an uncertain environment can be brought about by political instability caused by, for example, elections, political uncertainty, government changes, and civil strife, as well as terrorism has

been grafted onto a structural weakness in the economy or can lead to countless economic problems. This in turn can lead to an increase in the rate of return that investors demand (Guidolin and La Ferrara, 2010; Drakos and Kallandranis, 2015, Islam et al., 2019). Similarly, geopolitical friction, international tension, and armed conflict between states give rise to a significant level of risk and uncertainty that can damage global markets (Zussman et al., 2008, Abdalla et al., 2017).

Perhaps the best-known example of a country affected by geopolitical events is Turkey. Domestically, we can point to the political crisis that started in July 2008 following the court's rejection of a request to close down the AKP on the basis that it had become "a center of anti-secular activities." Following the largest protests in the history of the Turkish Republic in the summer of 2013, the AKP won the subsequent elections. Finally, the attempted coup of July 2016 was an important internal event for Turkey. Externally, we can highlight the political instability in Lebanon, the start of the Syrian Civil War in 2011, and Russia's entry into Syria in September 2015.

The field of behavioral finance has experienced significant expansion and development in recent decades. Indeed this field encompasses both concepts of psychology and finance. It aims to build a more detailed model of investor behavior. The advantage of behavioral finance is that it emphasizes the functioning of the human mind and the psychological profile of the investor. Lee, Jiang and Indro (2002) examined a sample for the period 1973–1995 and found that investor behavior leads to variability in future returns. In addition, Baker et al. (2012) confirmed that investor sentiment helps predict returns because it is an important factor in the volatility of international markets. In a study based on all CAC firms during the 2003–2013 period, Ben Aissia (2014) examined the effects of investor sentiment on stock market returns. The impact of sentiment is more pronounced when valuing real estate stocks. However, Haiqi Li and Sung Y. Park (2017) examined the effect of investor sentiment on the predictability of stock returns using the Consumer Confidence Index. Their study found that the price of a security cannot

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be disconnected from any reality positively influenced by investor sentiment during times of boom and deteriorate during times of recession.

The current paper contributes to the literature in some novel areas. First, our study complements the existing behavioral literature. Second, this research is of particular interest because it considers both geopolitical risk and investor sentiment and their impacts on stocks returns, because previous studies have not shed any light on the relationships that exist among geopolitical risk, investor sentiment, and stock returns. Third, this research will have implications for the stock markets, a stabilizer to investment strategies exposed to stock volatility and its outlook can help investors control their feelings and control the dangers ahead.

In this paper, we investigate the impact of geopolitical risk and the consumer confidence index on stock market returns based on monthly data for Turkey, namely the BIST100 index, the GPR index, and the Consumer Confidence Index as a proxy for investor sentiment. The period of this empirical investigation covers the start of 2004 to the end of 2017. The GPR index is inserted into a multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) model, specifically of the DCC-GARCH and BEKK-GARCH forms. We employ an unrestricted vector autoregressive GARCH model here for two main reasons: First, it presents a causal analysis and modeling between two or more variables without explicitly granting a specific direction. Second, the events studied in market finance are, for the most part, the result of a rational and voluntary decision by investors. However, the standard techniques implemented in event analysis do not take account of variances varying over time; this particular aspect of the event suggests that modeling conditional variances and covariance is an appropriate approach.

Our results reveal that in terms of the profitability and variability of the stock market indices, it does not convey any superiority over the consumer confidence index (CCI) which enjoys more influence by the

GPR index. Moreover, the extent of volatility transmission among the CCI, BIST100, and geopolitical risk indexes is very interesting, empirical results show that past geopolitical proximity plays a crucial role in explaining the variation in volatility over time of BIST100 in Turkey; this is useful for forecasting future price fluctuations.

The remainder of this article is organized as follows: Section 2 reviews the literature on the relationship between geopolitical risk, stock markets, and investor sentiment, while Section 3 details the data and methodology used in this analysis. Section 4 then discusses the empirical results before Section 5 concludes the paper.

2. Literature review

The relationships that exist between geopolitical risk, stock markets, and investor sentiment have been extensively, albeit separately, examined in some previous literature, with them reporting mixed results using different techniques and models. Among these, we can look to the study of Diamonte, Liew, and Stevens (1996), who demonstrated that political risk affects stock returns more in emerging markets than in developed markets. However, contrasting results were reported in the study of Clark (1997), who developed a model for measuring the implications of political risk for foreign direct investment. In addition, Clark and Tunaru (2001) created a new model for measuring the effect of political risk on portfolio investments. Meanwhile, based on a sample of 22 international companies in Malaysia, Noordin, Harjitoand, and Hazir (2006) tried to identify political risk assessment strategies. They found that most preferred a “good citizen” policy as a means to decrease political risk. Yapraklı and Gungor (2007), meanwhile, provided evidence of causality between political risk and the BIST100 index, but they did not manage to repeat this with financial risk. In their study, Sanlisoy and Kök (2010) found an inverse relationship between economic growth and political issues.

Baek and Qian (2011), meanwhile, demonstrated how political risk has had a very significant effect on foreign direct investment since the

September 11 attacks of 2001. Using a GARCH approach, Kollias et al. (2011) studied the effects that the Madrid train bombings in March 2004 and the London terrorist attacks in July 2005 had on the financial markets. They found that the London Stock Exchange (LSE) experienced some serious effects following the bombings, while the Spanish market went through significant negative effects following the Madrid bombings, with the volatility in the Spanish market being much higher than that of the London market. For their part, Peleg, Regens, Gunter, and Jaffe (2011) looked at Israeli markets over the 2000–2006 period and observed an exceptional new behavior, specifically a “normalization” of markets and investors to acts of terrorism. On the other hand, Berkman, Jacobsen and Lee (2011), in their work, counted the number of international crises to create a disaster risk variable, and they found this may be an important factor that ultimately decreases stock prices.

Ahmed and Mustafa (2019), seeks to establish the close relationship between macroeconomic variables (the change in the exchange rate, the inflation rate, the interest rate and the growth of industrial production) and stock returns for the case of Pakistan. By applying the ARDL approach and cointegration, the results show a significant effect between stock market returns and macroeconomic indicators on the one hand and the existence of a cointegration relationship between the study variables. This analysis can help investors make optimal decisions about their investments.

Çam (2014), meanwhile, examined the relationship in Turkey between political risk and the trade in BIST100 companies, with the results revealing a strong correlation between political risk in Turkey and these companies' performances. In their study of Turkey, Kaya et al. (2015) support the existence of a long-term negative relationship between BIST100 returns and political risk. Samet Günay (2016), meanwhile, analyzed the potential risks arising from internal political events and the duration of their effects on the Turkish stock market over the 2001–2014 period. The results illustrated how BIST100 returns are proportionally influenced by political events.

Studies that focus on the relationships that exist between geopolitical risk, investor sentiment, and stock returns are very limited. To examine the relationship between investor sentiment and stock returns, we looked at various indicators that could be used. For example, Brown and Cliff (2004) examined the effect of investor sentiment on stock returns using various measures, demonstrating that measures of investor sentiment affect big and small stock returns equally. Lemmon and Portniaguina (2006), meanwhile, applied the commonly used Consumer Confidence Index (CCI) in an attempt to measure investor sentiment and showed that consumer confidence can predict stock returns, especially for small stocks. Based on monthly Turkish data between July 1997 and June 2006, Canbas and Kandir (2006) tested the impact of investor sentiment on international stock markets, with their results revealing that investor sentiment affects Turkish stock returns.

In addition, Schmeling (2009) showed firstly that an investor sentiment indicator could be used to predict the variability of the stock markets and secondly that this effect is more pronounced in a country where there is less freedom to move capital across national borders. Guner (2009), meanwhile, showed that 10% of firms listed on the Turkish stock exchange were not influenced by investor sentiment. However, Baker et al. (2012) found that financial markets can be influenced by investor confidence indexes, both from inside and outside the country, with foreign investors contributing more due to the contagion effect through capital flows. Meanwhile, Chung, Hung, and Yeh (2012) showed that in times of economic recession, it is difficult to make predictions, unlike in times of expansion.

In addition, Mustafa and Hamid (2013) used the monthly Turkish Consumer Confidence Index over the 2004–2010 period to study the influence of individual Turkish investors' sentiment on the Istanbul Stock Exchange (ISE) and thus establish whether stock returns, investor sentiment, and volatility in Turkey are related. Their results suggest that the behavior of individual investors has a great influence on stock returns, with feelings of optimism contributing to developing positive expectations and reducing the volatility in stock market returns.

Ahmed (2020), meanwhile, proposed exploring the effects of investor sentiment on stock market performance and found that investor sentiment tends to positively affect both types of markets, albeit only in the short term. The results also highlight how the behavior of individual investors can influence on the future trajectory of asset prices more in emerging countries than in developed countries.

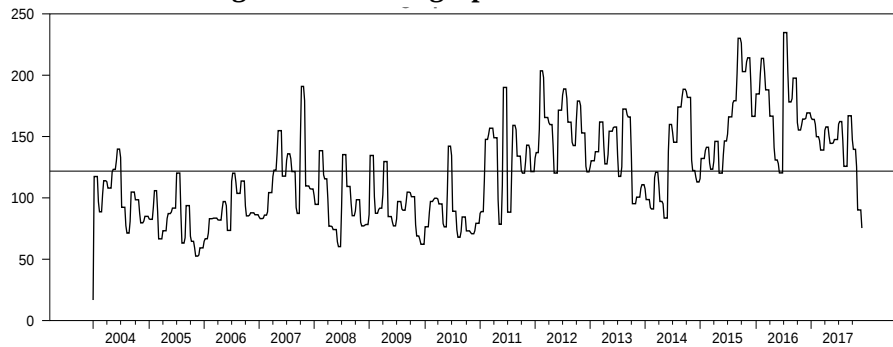
In conclusion, the literature as a whole would seem to suggest that geopolitical risk and the Consumer Confidence Index play a considerable role in investment decisions, so they have some consequences for financial markets, especially stock markets. Indeed, most studies confirm the negative effect of poor investor sentiment on stocks returns.

3. Data and methodology

Geopolitical risk is defined as the “risk associated with wars, terrorist acts, and tensions between states that affect the normal and peaceful course of international relations” (Caldara & Iacoviello (2018). This definition, however, excludes some other geopolitical phenomena like major economic crises, significant political events, climate change, and civil unrest. The geopolitical risk can be measured through two principal indexes proposed by Caldara and Iacoviello (2018),⁴ namely the Geopolitical Threats (GPT) index—which considers geopolitical threats, nuclear threats, the threat of war, and terrorist threats—and the geopolitical acts (GPA) index, which considers acts of war and terrorism.

The GPR index constructed by Caldara and Iacoviello (2018) has the advantage that it offers the opportunity to move beyond examining how specific events affect markets and the economy in general (Frey and Kucher, 2000; Kollias, 2013; Hudson and Urquhart, 2016).

⁴Available at https://www2.bc.edu/matteo-iacoviello/gpr_files/GPR_PAPER.pdf

Figure1: Turkish geopolitical risk index

Source: Authors' results

The GPR is a monthly index that quantifies the risk associated with, and produced by, events such as tension and friction between states, confrontation, armed conflict and war, and acts of terrorism. As shown in Fig. 1, the Turkish GPR index is characterized by an oscillation with peaks being associated with various events in the region. For instance, focusing on the origin of these events, the GPR index can be derived by counting the prevalence of words related to geopolitical tension in leading international newspapers (Caldara and Iacoviello, 2018).

A remarkable rise in the GPR index between 2007 and 2008 can be explained by the subprime crisis. Furthermore, the instability of the GPR index from 2011 was triggered by the events of the Arab Spring in Tunisia, Yemen, Libya, Egypt, and Syria. Later in April 2012, the Turkish government reported a record number of Syrian refugees, which increased the level of the GPR index, as can be seen in Fig. 1. The GPR index also elevated during the 2015–2017 period. This can be explained through several reasons, including Russia's military intervention in the Syrian Civil War, the purging of *Daech* (IS/ISIS) from Iraq, and the political disturbance in Lebanon related to *Hezbollah*. Finally, the GPR index reached its maximum value in July 2016, which corresponds to the failed coup attempt that sought to take over Turkey's state institutions.

The risk generated by instability and uncertainty is transmitted to investor sentiment, financial markets, and the wider economy (Zussman et al., 2008; Kollias, 2013; Drakos and Kallandranis, 2015; Wang, 2020).

This article focuses on the role of the GPR index and the Consumer Confidence Index (CCI) as a proxy for investor sentiment and their influence on Turkish stock returns. In order to perform the empirical analyses, we chose the multivariate GARCH (MGARCH) model and more precisely widely known as the BEKK-GARCH⁵ model (Engle and Kroner, 1995), and the Dynamic Conditional Correlation (DCC-GARCH) model of Engle (2002).

Moreover, we show that this model is a popular and tools to effectively model and analyze a multivariate time series. In addition, multivariate GARCH models identify equations for how the variance-covariance moves over time. In addition, DCC-GARCH and BEKK-GARCH offer a way to digitally measure the risk faced by financial institutions and individual investors. The multivariate GARCH approach is also flexible enough to modulate the dynamics of the conditional variance and covariance. What is more, the multivariate BEKK and DCC models are the twofold most usually used MGARCH models. For the above reasons, we believe that the above-mentioned multivariate GARCH models are naturally suited to our research aims.

Finally, in order to observe the impact of investor sentiment and geopolitical events, as determined more accurately by the GPR index, on Turkish stocks returns, our empirical data is based on monthly observations for the GPR index, the Consumer Confidence Index (CCI), and the BIST100 index. This study covers a period from January 2004 to December 2017. A VAR-GARCH model was used to capture the interdependencies among the GPR, BIST100, and CCI taking into

⁵ The BEKK part refers to a specific parameterization of the multivariate GARCH model developed by Engle and Kroner (1995).

account the cross effects of yield as well as volatility in the following equations.

We define trivariate GARCH (1, 1) as:

$$\begin{cases} X_t = \gamma + \delta \sum_{i=1}^p X_{t-i} + \varepsilon_t \\ \varepsilon_t = H_t^{1/2} \eta_t \end{cases} \quad (1)$$

Where X_t ($BIST\ 100_t, CCI_t, GPR_t$) represents the returns (in real terms) of the BIST100, investor sentiment, and the stock GPR index, respectively.

In 1995, Engle and Kroner proposed the BEKK-GARCH(1, 1) model to give the advantage of parsimony and address the difficulty with VECM in that its name is taken by the vectorized representation of the model. So, to know how the variance-covariance moves over time, a multivariate GARCH model is used, specifically the one proposed in 1995 by Baba, Engle, Kraft, and Kroner, which is where the BEKK part of the model's name derives from. In our case, the joint process governing the three variables is modeled with the trivariate Vector Autoregressive (VAR) unrestricted BEKK-GARCH (1, 1) model with the introduction of the geopolitical risk index in the construction of the mean, variance, and covariance matrices. More specifically, Eq. (1) shows the form for the conditional mean.

We recognized the lag length, named p , by applying the Akaike (AIC) criterion. The residual vector $\varepsilon = (\varepsilon_1, \varepsilon_2, \varepsilon_3)$ is trivariate and generalized distributed with $\varepsilon_t / \Phi_{t-1} \sim GED(0, H_t)$, while the corresponding conditional variance covariance matrix is defined as:

$$H_t = \begin{bmatrix} h_{11t} & h_{12t} & h_{13t} \\ h_{21t} & h_{22t} & h_{23t} \\ h_{31t} & h_{32t} & h_{33t} \end{bmatrix}$$

Such that the second moment is present in the following equation:

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$$H_t = C_0 C_0' + A' \varepsilon_{t-1} \varepsilon_{t-1}' A + B' H_{t-1} B \quad (2)$$

The developed form of equation (2) is then presented as follows:

$$H_t = \begin{pmatrix} c_{11} & 0 & 0 \\ c_{21} & c_{22} & 0 \\ c_{31} & c_{32} & c_{33} \end{pmatrix} \begin{pmatrix} c_{11} & 0 & 0 \\ c_{21} & c_{22} & 0 \\ c_{31} & c_{32} & c_{33} \end{pmatrix}' + \begin{pmatrix} \alpha_{11} \alpha_{12} \alpha_{13} \\ \alpha_{21} \alpha_{22} \alpha_{23} \\ \alpha_{31} \alpha_{32} \alpha_{33} \end{pmatrix}' \varepsilon_{t-1} \varepsilon_{t-1}' \begin{pmatrix} \alpha_{11} \alpha_{12} \alpha_{13} \\ \alpha_{21} \alpha_{22} \alpha_{23} \\ \alpha_{31} \alpha_{32} \alpha_{33} \end{pmatrix} + \begin{pmatrix} \beta_{11} \beta_{12} \beta_{13} \\ \beta_{21} \beta_{22} \beta_{23} \\ \beta_{31} \beta_{32} \beta_{33} \end{pmatrix}' H_{t-1} \begin{pmatrix} \beta_{11} \beta_{12} \beta_{13} \\ \beta_{21} \beta_{22} \beta_{23} \\ \beta_{31} \beta_{32} \beta_{33} \end{pmatrix} \quad (3)$$

In a single equation, the BEKK-GARCH model may be presented as follows:

$$\begin{aligned} h_{11t} = & C_{11}^2 + \alpha_{11}^2 \varepsilon_{1,t-1}^2 + \alpha_{21}^2 \varepsilon_{2,t-1}^2 + \alpha_{31}^2 \varepsilon_{3,t-1}^2 + 2\alpha_{11} \alpha_{21} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + 2\alpha_{11} \alpha_{31} \varepsilon_{1,t-1} \varepsilon_{3,t-1} \\ & + 2\alpha_{31} \alpha_{21} \varepsilon_{2,t-1} \varepsilon_{3,t-1} + h_{11,t-1} (\beta_{11}^2 + \beta_{12}^2 + \beta_{13}^2) + h_{21,t-1} (\beta_{11} \beta_{21} + \beta_{12} \beta_{22} + \beta_{13} \beta_{23}) + \\ & h_{31,t-1} (\beta_{11} \beta_{31} + \beta_{12} \beta_{32} + \beta_{13} \beta_{33}) \end{aligned} \quad (4)$$

$$\begin{aligned} h_{22t} = & c_{21}^2 + c_{22}^2 + \alpha_{12}^2 \varepsilon_{1,t-1}^2 + 2\alpha_{12} \alpha_{22} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + \alpha_{22}^2 \varepsilon_{2,t-1}^2 + 2\alpha_{12} \alpha_{32} \varepsilon_{1,t-1} \varepsilon_{3,t-1} + 2\alpha_{22} \alpha_{32} \varepsilon_{2,t-1} \varepsilon_{3,t-1} + \alpha_{32}^2 \varepsilon_{3,t-1}^2 \\ & + h_{22,t-1} (\beta_{21}^2 + \beta_{22}^2 + \beta_{23}^2) + h_{12,t-1} (\beta_{21} \beta_{11} + \beta_{22} \beta_{12} + \beta_{23} \beta_{13}) + h_{32,t-1} (\beta_{21} \beta_{31} + \beta_{22} \beta_{32} + \beta_{23} \beta_{33}) \end{aligned} \quad (5)$$

$$\begin{aligned} h_{33t} = & c_{31}^2 + c_{32}^2 + c_{33}^2 + \alpha_{13}^2 \varepsilon_{1,t-1}^2 + \alpha_{23}^2 \varepsilon_{2,t-1}^2 + \alpha_{33}^2 \varepsilon_{3,t-1}^2 + 2\alpha_{13} \alpha_{23} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + 2\alpha_{13} \alpha_{33} \varepsilon_{1,t-1} \varepsilon_{3,t-1} \\ & + 2\alpha_{23} \alpha_{33} \varepsilon_{2,t-1} \varepsilon_{3,t-1} + h_{33,t-1} (\beta_{31}^2 + \beta_{32}^2 + \beta_{33}^2) + h_{13,t-1} (\beta_{31} \beta_{11} + \beta_{32} \beta_{12} + \beta_{33} \beta_{13}) \\ & + h_{23,t-1} (\beta_{31} \beta_{21} + \beta_{32} \beta_{22} + \beta_{33} \beta_{23}) \end{aligned} \quad (6)$$

$$\begin{aligned} h_{12t} = & c_{11} c_{21} + \alpha_{12} \alpha_{11} \varepsilon_{1,t-1}^2 + \alpha_{22} \alpha_{21} \varepsilon_{2,t-1}^2 + \alpha_{32} \alpha_{31} \varepsilon_{3,t-1}^2 + (\alpha_{12} \alpha_{21} + \alpha_{22} \alpha_{11}) \varepsilon_{1,t-1} \varepsilon_{2,t-1} + \\ & (\alpha_{12} \alpha_{31} + \alpha_{32} \alpha_{11}) \varepsilon_{1,t-1} \varepsilon_{3,t-1} + (\alpha_{22} \alpha_{31} + \alpha_{32} \alpha_{21}) \varepsilon_{2,t-1} \varepsilon_{3,t-1} + h_{12,t-1} (\beta_{11}^2 + \beta_{12}^2 + \beta_{13}^2) + \\ & h_{22,t-1} (\beta_{11} \beta_{21} + \beta_{12} \beta_{22} + \beta_{13} \beta_{23}) + h_{32,t-1} (\beta_{11} \beta_{31} + \beta_{12} \beta_{32} + \beta_{13} \beta_{33}) \end{aligned} \quad (7)$$

$$\begin{aligned}
h_{13t} = & c_{11}c_{31} + \alpha_{13}\alpha_{11}\varepsilon_{1,t-1}^2 + \alpha_{23}\alpha_{21}\varepsilon_{2,t-1}^2 + \alpha_{33}\alpha_{31}\varepsilon_{3,t-1}^2 + (\alpha_{13}\alpha_{21} + \alpha_{23}\alpha_{11})\varepsilon_{1,t-1}\varepsilon_{2,t-1} \\
& + (\alpha_{13}\alpha_{31} + \alpha_{33}\alpha_{11})\varepsilon_{1,t-1}\varepsilon_{3,t-1} + (\alpha_{23}\alpha_{31} + \alpha_{33}\alpha_{21})\varepsilon_{2,t-1}\varepsilon_{3,t-1} + \beta_{13}\beta_{11}h_{11,t-1} + \beta_{23}\beta_{21}h_{22,t-1} \\
& + \beta_{33}\beta_{31}h_{33,t-1} + h_{12,t-1}(\beta_{13}\beta_{21} + \beta_{23}\beta_{11}) + h_{13,t-1}(\beta_{13}\beta_{31} + \beta_{33}\beta_{11}) + h_{23,t-1}(\beta_{23}\beta_{31} + \beta_{31}\beta_{23})
\end{aligned} \quad (8)$$

$$\begin{aligned}
h_{23t} = & c_{21}c_{31} + c_{22}c_{32} + \alpha_{13}\alpha_{12}\varepsilon_{1,t-1}^2 + \alpha_{23}\alpha_{22}\varepsilon_{2,t-1}^2 + \alpha_{33}\alpha_{32}\varepsilon_{3,t-1}^2 + (\alpha_{13}\alpha_{22} + \alpha_{23}\alpha_{12})\varepsilon_{1,t-1}\varepsilon_{2,t-1} \\
& + (\alpha_{13}\alpha_{32} + \alpha_{33}\alpha_{12})\varepsilon_{1,t-1}\varepsilon_{3,t-1} + (\alpha_{23}\alpha_{32} + \alpha_{33}\alpha_{22})\varepsilon_{2,t-1}\varepsilon_{3,t-1} + \beta_{13}\beta_{12}h_{11,t-1} + \beta_{23}\beta_{22}h_{22,t-1} \\
& + \beta_{33}\beta_{32}h_{33,t-1} + h_{12,t-1}(\beta_{13}\beta_{22} + \beta_{23}\beta_{12}) + h_{13,t-1}(\beta_{13}\beta_{32} + \beta_{33}\beta_{12}) + h_{23,t-1}(\beta_{23}\beta_{32} + \beta_{32}\beta_{23})
\end{aligned} \quad (9)$$

We used the maximum likelihood to jointly estimate the parameters of the mean and variance equations.

Engle (2002) proposed the Dynamic Conditional Correlation model. The form of Engle's DCC equation spelled this manner:

$$H_t = D_t P D_t \quad (10)$$

$$D_t = \text{dig} \left(h_{1t}^{1/2}, h_{2t}^{1/2}, h_{3t}^{1/2} \right) \quad (11)$$

Where each h_{it} is described by a univariate GARCH model,

Where

$$P_t = \text{dig} \left(q_{11t}^{1/2}, q_{22t}^{1/2}, q_{33t}^{1/2} \right) Q_t \text{dig} \left(q_{11t}^{1/2}, q_{22t}^{1/2}, q_{33t}^{1/2} \right), \quad (12)$$

and $Q_t = (q_{ijt})$ is the 3*3 symmetric positive definite matrix with the form:

$$Q_t = (1 - \alpha - \beta) \bar{Q} + \alpha \eta_{t-1} \eta'_{t-1} + \beta Q_{t-1} \quad (13)$$

Here, $\eta_{it} = \varepsilon_{it} / \sqrt{h_{iit}}$ and $(1 - \alpha - \beta)$ are non-negative scalars where $\alpha + \beta < 1$ and $\bar{Q}$ is the 3*3 unconditional variance matrix of standardized errors η_t .

4. Empirical results

As mentioned above, we are interested in the relationship between the Consumer Confidence Index, the GPR index, and stock market returns. Our variables, such as the CCI, BIST100 returns, and the GPR index are $I(1)$ processes. Table 1 summarizes their descriptive statistics. As can be seen, all variables are positive and statistically significant. In terms of volatility, the GPR index's volatility is greater than that of the CCI or BIST100 returns.

Table 1: Descriptive Statistics
Source: Authors’ results. Note: (**), (**) and (*) denote significance at 1% and 5% and 10%, respectively.

	observations	Sample mean	t-statistic (p-value)	Std. dev.	Skewness	Kurtosis (excess)	Jarque-Bera	Ljung-box test Q(16) p-value	ARCH(16) LM Test p-value
CCI	168	83.060	82.719	13.014	0.325	1.990	10.099	156.06	183.00
			0.000				<006***	<001***	<000***
BIST100_Returns	168	0.0017	0.659	0.033	-0.532	4.021	15.255	16.830	62.82
			0.000***				<000***	<007***	<000***
GPR_Index	168	121.63	39.541	39.87	0.515	2.52	9.02	69.859	1.97
			0.501				<001***	<000***	<004***

When looking at Table 1, we note how the degree of skewness is smaller for BIST100 returns than it is for the CCI or GPR index. In addition, the Jarque–Bera values are high and statistically significant for three series, confirming rejection of the null hypothesis of normality. Furthermore, applying the ARCH test to detect heteroskedasticity problems provides strong evidence of the ARCH effect in all series. In addition, the distribution of these variables is fat-tailed because excess kurtosis is superior to zero. As a result, adopting the VAR (p)-BEKK-GARCH and VAR-DCC-GARCH models in our analysis appears a suitable approach for taking into consideration any time-varying volatility in clusters.

Figure 2: Real Bist100 returns

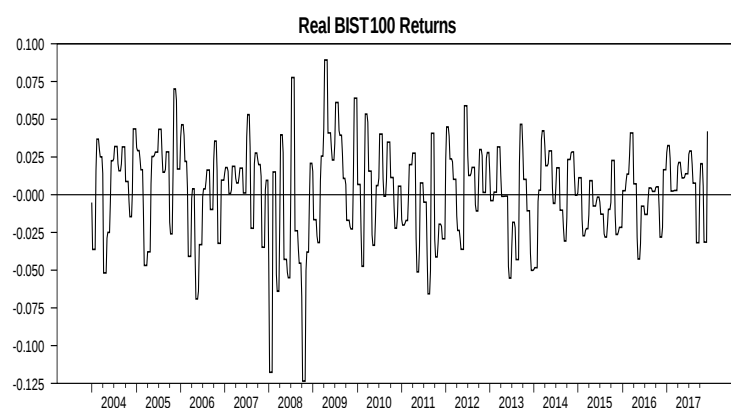
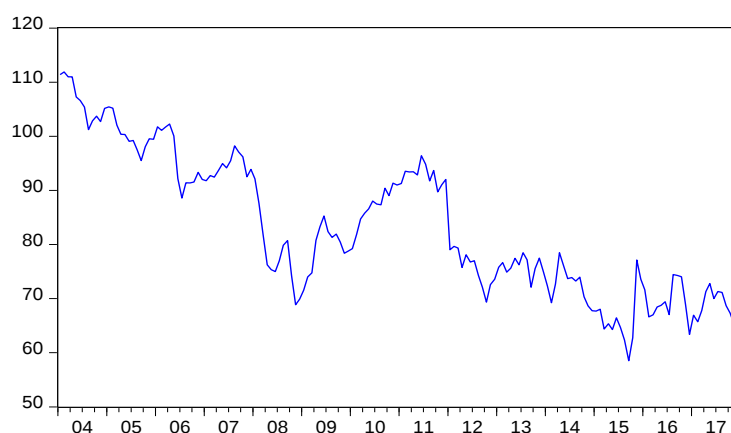


Figure 3: Consumer Confidence Index
CCI



Source: Authors' results

Figs. 2 and 3 also afford an indication of time-varying volatility for BIST100 returns then the CCI. Graphs 4 and 5 show the volatility for both CCI and BIST100 returns, and the latter is clearly more volatile than the former.

The volatility in BIST100 returns and the CCI, as shown in the above graphs, was a result of various events. The main important events are distributed over four points in time. In 2008, we noticed an acute fall that can be explained by three main events: the effects of the subprime crisis, Turkey's crisis about Islamic headscarves in university, and the trial of 86 people who were accused of planning a military coup. Two years later, another fall relates to the spread of the Arab Spring to more countries, including neighboring Syria. In addition, in October 2011, PKK rebels killed 24 Turkish troops near the Iraqi border, the deadliest attack against the military since the 1990s. Later on, the Turkish government encountered one of the biggest protests in Turkish history during the summer of 2013. Later that year in December, Erdogan was able to present the espionage case with Turkish and Iranian agents who were under the diplomatic cover of the Iranian embassy or consulates as an attempt to overthrow his government, orchestrated by his political opponents, and a number of prosecutors were excluded from the case, while police officials and officers were re-appointed and the investigation of Zarrab and the ministers was dropped. After transferring police officers from the counterterrorism unit to various positions and cities, they arrested nearly all of them on charges of plotting against the government in 2014. Finally, in 2015, Turkey shot down a Russian military jet in Syria. Russia, Turkey's second-largest trading partner, then imposed economic sanctions. In the same year, two suicide bomb attacks on an Ankara peace rally killed 100 people.

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Figure 4: Conditional variance CCI

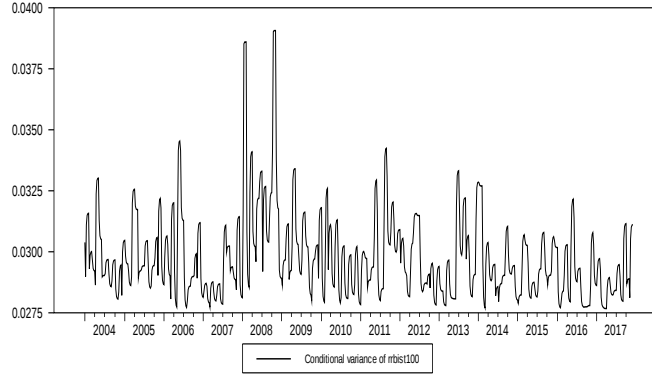
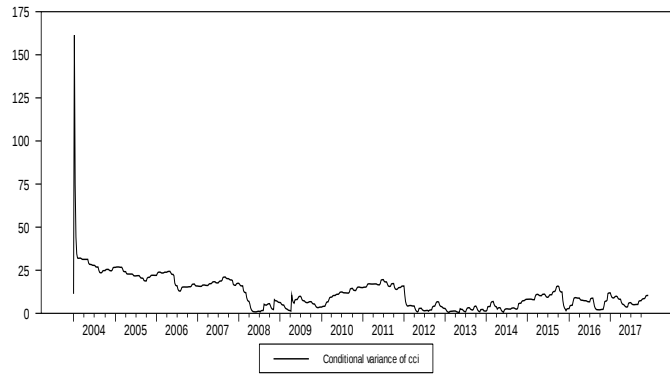


Figure 5: Conditional variance BIST100



Source: Authors' results

Table 2 gives the estimation results of our VAR-unrestricted BEKK-GARCH (1, 1) and VAR-DCC-GARCH (1, 1) models. We estimated with two models to learn which model (DCC or BEKK) is superior. When we applied the ARCH test to detect the problem of heteroscedasticity, we could not accept the null hypothesis. For the problem of autocorrelation, there is also a rejection of the null hypothesis, so there is no autocorrelation. When discussing the significant coefficients in the BIST100 mean returns equation, CCI mean return equation, and GPR index mean return equation, we find a significant negative effect from increased geopolitical risk on the CCI for both the VAR-BEKK- and VAR-DCC-GARCH models, but on the stock market, there is a negative

and significant effect only in the first year. It seems that geopolitical instability like conflict between countries, violence, and other problems can affect the confidence of consumers and therefore their purchasing decisions. Real options analysis (AOR) is a financial investment decision-making tool, directly inspired by the Arrow options theory (1959). This theory takes into consideration the flexibility of geopolitical events making investment decisions as a situation of uncertainty and investors get caught up in negative sentiment, so they opt to delay investment when it may be costly. This result is in line with the work of Shahzad and et al. (2017), who employed the novel technique of nonparametric causality-in-quintiles to examine the predictability of stock returns. On the other hand, the significant negative effect of the GPR index on BIST100 stock returns can be explained theoretically through Pastor and Veronesi's (2013) reasoning about how policy uncertainty affects stock market volatility. This result is also in line with the findings of Liu and Zhang (2015) and Kang and Ratti (2013).

The influence of indirect effects and significant positive effects can be interpreted as an uncertain geopolitical state affecting the stock market (BIST100) covariance (see coefficient $\beta_{33}\beta_{31}$). We can see this on Graph 6, which presents the evolution over time of geopolitical risk together with the conditional correlation between CCI and BIST100. Indeed, as Shleifer and Summers (1990) have stated, investors are not necessarily rational, yet investor sentiment is a determinant of price. The presence of disturbances in the business climate, such as geopolitical risk, makes investors shift from being rational to being classified as arbitrageurs and noise traders. When we compare the persistence of volatility, the results of the variance equation show that it is lower for the stock market (β_{11}) than for the CCI (β_{22}). In addition, the impact of the GPR index on CCI variability is clearly more substantial than it is on the stock market (compare the α_{11} and α_{22} coefficients).

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Table 2: VAR-BEKK-GARCH (1,1)-in-mean model estimation results.

	Variable	Model 1 VAR-DCC- GARCH (1,1)		Variable	Model 2 VAR-BEKK- GARCH (1,1)	
		BIST100- CCI -GPR			BIST100- CCI -GPR	
		Coeff	p-value		Coeff	p-value
BIST100 mean return equation	Const t	-0.001	0.000	Const t	0.01018791	0.041
	BIST100t-1	1.023	0.000***	BIST100t-1	1.058	0.000***
	BIST100t-2	-0.028	0.000***	BIST100t-2	-0.356	0.000***
	CCIt-1	0.00002	0.000***	CCIt-1	0.0001	0.004***
	CCIt-2	-0.00001	0.000***	CCIt-2	-0.0002	0.004***
	GPRt-1	-0.000002	0.0004***	GPRt-1	-0.00006	0.046**
	GPRt-2	0.000004	0.000004***	GPRt-2	0.00002	0.470
CCI mean return equation	Const.	0.050	0.000***	Const.	2.242	0.000***
	BIST100t-1	0.112	0.001***	BIST100t-1	5.629	0.001***
	BIST100t-2	0.194	0.00001**	BIST100t-2	1.109	0.544
	CCIt-1	1.021	0.000***	CCIt-1	0.998	0.000***
	CCIt-2	-0.021	0.000***	CCIt-2	-0.018	0.000004***
	GPRt-1	-0.0002	0.000001***	GPRt-1	-0.003	0.000***
	GPRt-2	-0.00003	0.601	GPRt-2	-0.002	0.043**
GPR mean return equation	Const.	0.125	0.012**	Const.	38.319	0.000***
	BIST100t-1	0.535	0.133	BIST100t-1	-30.793	0.1295
	BIST100t-2	-0.969	-0.969	BIST100t-2	-26.850	0.199
	CCIt-1	-0.024	0.000***	CCIt-1	-0.420	0.000***
	CCIt-2	0.022	0.000***	CCIt-2	0.133	0.0008***
	GPRt-1	1.022	0.000***	GPRt-1	1.077	0.000***
	GPRt-2	-0.023	0.000***	GPRt-2	-0.195	0.000***
Variances-covariance equations	C1	0.0001	0.000***	C11	0.008	0.000***
				C21	-0.054	0.382
	C2	0.379	0.000***	C22	0.198	0.161
				C31	1.011	0.183
	C3	117.938	0.000***	C32	1.395	0.644
				C33	6.602	0.000***

	Variable	Model 1 VAR- DCC- GARCH (1,1)	Variable	Model 2 VAR- BEKK- GARCH (1,1)		Variable
		BIST100-CCI-GPR		BIST100-CCI-GPR		
	α_1	18.274	0.000***	α_{11}	0.685	0.000***
				α_{12}	-11.548	0.000***
				α_{13}	96.463	0.003***
	α_2	18.846	0.000***	α_{21}	-0.0008	0.246
				α_{22}	0.637	0.000***
				α_{23}	0.654	0.217
	α_3	18.556	0.000***	α_{31}	0.0001	0.007***
				α_{32}	0.005	0.125
				α_{33}	0.566	0.000***
	β_1	0.251	0.000***	β_{11}	0.608	0.000***
				β_{12}	19.633	0.000***
				β_{13}	-12.278	0.672
	β_2	0.304	0.000***	β_{21}	-0.0012	0.014**
				β_{22}	0.787	0.000***
				β_{23}	0.917	0.001***
	β_3	0.244	0.000***	β_{31}	-0.0001	0.017**
				β_{32}	-0.015	0.000***
				β_{33}	0.698	0.000***
	DCC(A)	0.945	0.000***			
	DCC(B)	0.054	0.000***			
Diagnostics	GEDparameter					
	Usableobservations	726			726	
Loglikelihood		-898.074			-1850.862	
	Res.BIST100 equ	Res.CCI equ	Res.GPR equ	Res.BIST100 equ	Res.CCI equ	Res.GPR equ
Ljung-boxQ(12)p-value	0.45	0.42	0.06	0.43	0.43	0.07
McLeod-Li(12)p-value	0.97	0.98	0.95	0.96	0.98	0.06
ARCH(4)testp-value	0.97	0.98	0.95	0.96	0.98	0.95

Source: Authors' results. Note: (***), (**) and (*) denote significance at 1% and 5% and 10%, respectively.

The extent of the volatility transmission between the CCI, BIST100 returns, and the GPR index is very interesting. Our findings show that past

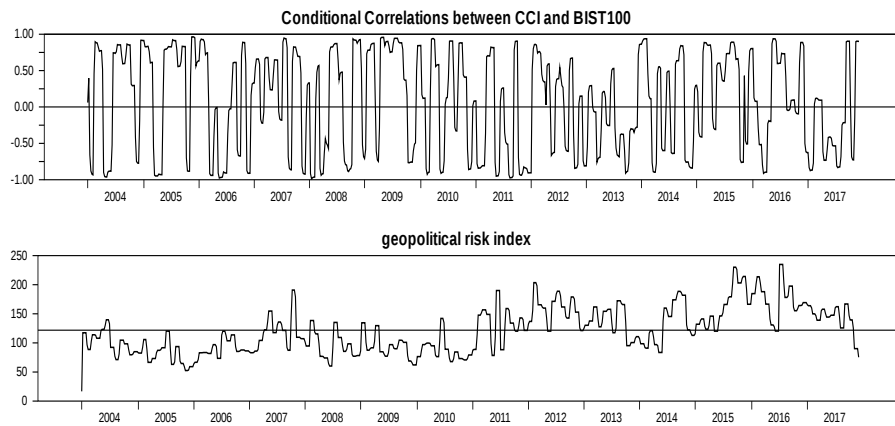
geopolitical risk plays a crucial role in explaining the temporal dynamics of conditional volatility for the BIST100 in Turkey, so this should also be accounted for when making volatility forecasts for future stock returns. This result is justified by Lensink et al. (2000), who states that an increase in political risk leads to an increase in capital flight. This is also justified by Diamonte et al. (1996), who found that portfolios that experience lower political risk also generated larger returns than portfolios with a greater degree of political risk. They also posited that emerging markets are more vulnerable to political instability than developed markets. Moreover, the conditional volatility of geopolitical risk causes significant changes in BIST100 returns (α_1). A shock to the Turkish stock market, regardless of direction, therefore implies an increase in the volatility of the GPR index. On the other hand, the past geopolitical risk, as represented by β_2 , has a significant effect on the CCI. This can be explained by the fundamental psychological motivations of investors, which can in themselves affect the stock markets. Pompian (2012) calls them emotional biases that can lead people to make suboptimal decisions. We should therefore expect to see a close interaction between human behavior and financial parameters. As a result, governments, central banks, and other regulators and supervisors pay particular attention to the management of expectations and perceptions. Investor sentiment (CCI) is one of the most important indicators that reflects expectations and perceptions.

We notice that the parameters β and α associated with the DCC model are statistically significant. On the other hand, we assert that the existence of a behavior of current variances is more influenced by the magnitude of past variances than by past performance innovations. Another remark that we can put forward is that the conditional correlation between the pairs of indices is not constant this is because of the positivity of the sum of the parameters of the model DCC ($\alpha+\beta$).

In Figure 6, the dynamic conditional correlation curve between the CCI index and the BIST100 returns is above compared with the Turkish GPR index curve. In addition, conditional correlation between the CCI index and BIST100 returns exists as a dynamic conditional correlation depending on the time change. However, as shown in figure 6, the coefficient is sometimes large and sometimes small, and the estimated conditional correlations have increased in recent years (2011, 2015 and 2016), implying greater linkage between BIST100 returns and the CCI when the GPR index is high. This may provide a clue for policy

developers. We can clearly see that these two indices vary in a different way over time. Then a "coupling" effect is present because of the value of the coefficient which approaches 0.22. This indicates that the two indices are correlated.

Figure 6: Geopolitical risk index versus conditional correlations between CCI and BIST 100 returns



Source: Authors' results.

5. Conclusion

In the existing literature, no study has attempted to discuss the impact of geopolitical risk and investor sentiment on stock returns. This paper also complements several studies that have measured the economic and/or financial consequences of war, tension between states, terrorist attacks, and other forms of large-scale violence.

This study used the recently proposed monthly geopolitical risk (GPR) index (Caldara and Iacoviello, 2018) to observe the effects of global tension, friction, and conflict on Turkish stock returns and consumer confidence. Three indices were therefore used in this empirical investigation for a period from January 2004 to December 2017, namely the GPR index, the CCI, and the BIST100 stock index. Our study employed VAR-BEKK-GARCH and VAR-DCC-GARCH models to allow the modeling of mean returns and the variance with the covariance.

Our findings show that the CCI seems to be more affected by the GPR index in terms of mean return and variability than the stock market index. This agrees with the work of Mustafa and Hamid (2013). Moreover, the conditional covariance between the CCI and BIST100 stock index was significantly affected in three periods: the 2008 subprime crisis, the Arab spring in 2011, and the coup attempt in Turkey on July 15, 2016. This provides evidence of international convergence and integration and may provide a clue to policy developers for public management. As many studies have revealed, globalized markets respond to major political events (Çam, 2014; Kaya et al., 2015; Samet Günay, 2016).

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Asymmetric Effects of Monetary Policy Shocks on Output Growth in Nigeria: A Sectoral Analysis

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ABSTRACT

In this study, the asymmetric effects of monetary policy on real output both at aggregate and disaggregate levels in Nigeria were scrutinized using data sourced from the Central Bank of Nigeria Statistical Bulletin and Bureau of Statistics. Data for the study was analysed with the nonlinear Autoregressive Distributed Lag (ARDL) and Structural Vector Autoregressive Model (SVAR). The study decomposed money supply (MS) and monetary policy rate (MPR) into positive and negative in order to capture expansionary and contractionary monetary policies. The real output was proxied by Gdpgr. Results from long-run nonlinear ARDL showed long-run co-movement between monetary policy variables and real output both at aggregate and sectoral levels. Results obtained from further empirical estimations showed that the response of real output to shocks emanating from both positive and negative monetary policies was significant with different magnitudes. While the response of output growth rate to shocks from positive monetary policy was significant but negative, its response to shocks from negative monetary policy was positive and significant. It was equally noted in our analysis that positive monetary policy shocks to domestic interest reduces the exchange and output growth rate both at aggregate and sectoral levels. However, the effects of negative monetary policy were wider than that of positive effects. This shows that negative monetary policy would be more efficacious when output is desired to be increased. Results from variance decomposition revealed that, among variables employed in the study, money supply and monetary policy rate explained much of the variations in Nigeria's real output. Based on these findings, the study, therefore, concludes that the effects of monetary policy on real output are asymmetric and not symmetric.

ملخص

في هذه الدراسة، تم التمهيد في الآثار غير المتماثلة للسياسة النقدية على الناتج الحقيقي على المستويين الإجمالي والمفصل في نيجيريا باستخدام البيانات التي تم الحصول عليها من النشرة

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الإحصائية للبنك المركزي النيجيري ومكتب الإحصاء. وتم تحليل بيانات الدراسة باستخدام الانحدار الذاتي للإبطاء الموزع (ARDL) ونموذج الانحدار الذاتي الهيكلي للمتجه (SVAR). كما قسمت الدراسة الإصدار النقدي (MS) ومعدل السياسة النقدية (MPR) إلى إيجابي وسلبي من أجل التعرف على السياسات النقدية التوسعية والانكماشية. وتم تمثيل الناتج الحقيقي بواسطة معدل نمو الناتج المحلي الإجمالي. وأظهرت نتائج الانحدار الذاتي للإبطاء الموزع غير الخطي طويل المدى حركة مشتركة طويلة المدى بين متغيرات السياسة النقدية والإنتاج الحقيقي على المستويين الإجمالي والقطاعي. كما أظهرت النتائج التي تم الحصول عليها من التقديرات التجريبية الإضافية أن استجابة الناتج الحقيقي للصدمات الناجمة عن كل من السياسات النقدية الإيجابية والسلبية كانت كبيرة بأحجام مختلفة. وفي حين كانت استجابة معدل نمو الناتج للصدمات من السياسة النقدية الإيجابية كبيرة ولكنها سلبية، كانت استجابتها للصدمات من السياسة النقدية السلبية إيجابية وكبيرة. كما لوحظ في تحليلنا أن صدمات السياسة النقدية الإيجابية على الفائدة المحلية تقلل من معدل نمو الصرف والناتج على المستويين الإجمالي والقطاعي. ومع ذلك، فإن تأثيرات السياسة النقدية السلبية كانت أوسع من التأثيرات الإيجابية. وهذا يدل على أن السياسة النقدية السلبية ستكون أكثر فعالية عندما تكون الرغبة في زيادة الإنتاج. وقد كشفت نتائج تحليل التباين أنه، من بين المتغيرات المستخدمة في الدراسة، الإصدار النقدي ومعدل السياسة النقدية يوضحان الكثير من الاختلافات في الناتج الحقيقي لنيجيريا. وبناء على هذه النتائج، تخلص الدراسة إلى أن تأثيرات السياسة النقدية على الناتج الحقيقي غير متكافئة وليست متماثلة.

ABSTRAITE

Dans cette étude, les effets asymétriques de la politique monétaire sur la production réelle, tant au niveau agrégé que désagrégé au Nigeria, ont été examinés à l'aide de données provenant du Bulletin statistique de la Banque centrale du Nigeria et de l'Office des statistiques. Les données de l'étude ont été analysées à l'aide des modèles non linéaires ARDL (Autoregressive Distributed Lag) et SVAR (Structural Vector Autoregressive Model). L'étude a décomposé la masse monétaire (MS) et le taux de politique monétaire (MPR) en positif et négatif afin de capturer les politiques monétaires expansionnistes et contractionnistes. La production réelle a été représentée par Gdpgr. Les résultats de l'analyse ARDL non linéaire à long terme ont montré une co-mobilité à long terme entre les variables de politique monétaire et la production réelle, tant au niveau global que sectoriel. Les résultats obtenus à partir d'autres estimations empiriques ont montré que la réponse de la production réelle aux chocs émanant de politiques monétaires tant positives que négatives était significative avec des magnitudes différentes. Alors que la réponse du taux de croissance de la

production aux chocs de politique monétaire positive était significative mais négative, sa réponse aux chocs de politique monétaire négative était positive et significative. Nous avons également noté dans notre analyse que les chocs positifs de politique monétaire sur l'intérêt national réduisent le taux de croissance de la production et du taux de change tant au niveau global que sectoriel. Toutefois, les effets de la politique monétaire négative ont été plus larges que ceux des effets positifs. Cela montre qu'une politique monétaire négative serait plus efficace lorsque l'on souhaite augmenter la production. Les résultats de la décomposition de la variance ont révélé que, parmi les variables utilisées dans l'étude, la masse monétaire et le taux de politique monétaire expliquent une grande partie des variations de la production réelle du Nigeria. Sur la base de ces résultats, l'étude conclut donc que les effets de la politique monétaire sur la production réelle sont asymétriques et non symétriques.

Keywords: Asymmetric, Monetary Policy, Shocks Structural VAR, Nonlinear ARDL, and Sectoral Analysis.

1. Introduction

The connection between monetary policy and economic growth is a perennial and a contentious discussion both in theoretical and empirical literature across countries (Parker and Rothman, 2004; Rodduts and Rigbon, 2003; Stephen, 2016; David, Prakash and Aleksandra, 2016). The intensive, extensive and ever-increasing stream of studies on this topic is not unconnected with its relevance in designing and implementing of macroeconomic management policies across nations. Monetary policy is considered as one of the effective tools of macroeconomic policy objectives. It complements other instruments such as fiscal, income, trade and debt management policies. The basic aims of monetary policy revolve around achieving: price stability, steady economic growth, exchange rate stability, full employment and balance of payment equilibrium (James and Hamisu, 2020).

The question of whether the response of real output to monetary policy shocks is symmetric or asymmetric in the short run or long run is still an empirical debate (Central Bank of Nigeria, 2014; Apanisile, 2017; Oloyede, 2014; Alam and Waheed, 2006; Fasanya *et al.*, 2013; Ulke and Berument, 2016). This is because previous studies were unable to provide precise empirical guides on this all-important relationship in guiding policy stance. In other words, empirical results are still ambiguous on the

discussion. However, Crawford (2007) shows that the transmission channel of monetary policy on economic growth depends on sectors, in that, reactions of sectors to actions from monetary authority may not be the same. In macroeconomic theory, reactions of output to actions from monetary policy come from two sides, that is, anticipated and unanticipated as presented by the rational expectation hypothesis championed by Lucas (1972) and Sargent and Wallace (1975). According to this theory, an economy that envisages changes in price may not necessarily have its macroeconomic variables being seriously impacted on since such changes would simply translate into changes in price level. In an economy where rational expectation is absent, however, unanticipated changes in monetary policy would definitely have real effects since economic agents find it difficult to differentiate among current, relative and absolute demand (Apanisile, 2017).

The efficacy of monetary policy on macroeconomic performance has continued to generate debates among academic researchers and policy makers. This is because monetary policy has become one of the constantly employed macroeconomic policy tools across countries for the purpose of putting in place macroeconomic policy objectives due to differences in domestic and external macroeconomic environment as noted by Jiang, Liping and Sharma (2013). Based on this, attentions have now been shifted to investigating if the responses of output to monetary policy are symmetric or asymmetric at disaggregate level. This is based on the fact that sectors respond to shocks from monetary policy in different ways. Take for instance, the response of agricultural sector to shocks emanating from expansionary monetary policy may be positive and significant while that of manufacturing sector may be negative but significant. It is therefore pertinent to discover the appropriate monetary policy (expansionary or contractionary) for each of the sectors.

Knowing the sectors that may be impacted either by expansionary or tightening monetary policy gives valuable policy directions for the monetary authority to work with. Understanding the responses of each of the sectors to shocks from monetary policy is essential since it enables policy makers to know those sectors that do not have capital intensities to stand shocks from either expansionary or contractionary monetary policies.

Quite a number of studies have attempted to investigate the efficacy of monetary policy on macro-economic variables, particularly economic growth (Cover, 1992; Alam and Waheed, 2006; Anyanwu and Kalu, 2010). Besides, the empirical results from these studies produced conflicting outcomes, as majority of them used a aggregate data that was unable to show individual characteristics of each of the sectors. In Nigeria particularly, majority of the studies conducted by Apanisile (2017), James and Hamisu (2020), Ajisafe and Folorunso (2002), Olayiwola and Ogun (2019) to examine economic variables have been on aggregate level. A study conducted by the Central Bank of Nigeria (2014) investigated monetary policy and sectoral real output, which no other study has attempted. However, this particular study employed only structural VAR which may not be able to capture asymmetric effects adequately. Also, Cover (1992), DeLong and Summers (1998), Olayiwola and Ogun (2019), Morgan (1993), James and Hamisu (2020) found the relationship between monetary policy and output to be asymmetric while Apanisile (2017), Ravn and Sola (1996), Oloyede (2014) and Stephen (2016) discovered the relationship to be symmetric.

Based on the foregoing, the broad objective of this paper is to investigate whether the response of output to monetary policy is symmetric or asymmetric or is in the short run or long run. This paper contributes to the existing body of knowledge in that it is one of the few studies, probably the second in Nigeria, that has attempted to investigate the connection between monetary policy and output at disaggregate level.

The remaining part of the paper is organized thus; after section one is section two which reviews existing literature on the topic. In section three, methods and materials are discussed while results and its discussion are presented in section four. Section five concludes the paper.

2. Empirical Literature

Series of studies have attempted to investigate the connections between monetary policy and macroeconomic fundamentals in advanced, emerged market economies and developing nations. However, these efforts have only yielded diverse research outcomes. Some of these studies are presented here empirically to guide and provide directions for this current study.

The issue of whether the effects of monetary policy on macroeconomic variables are symmetric or asymmetric, in the short or long run commenced with the seminal work carried out by Cover in 1992. In Cover's view, the effects of contractionary and expansionary monetary policies on macroeconomic fundamentals are not uniform. Researchers such as Morgan (1993), Delong and Summers (1998), Regis, Christian and Tim (2017), Morten and Martin, (2004) were of the opinion that positive and negative monetary policy shocks have asymmetric effects on real output while Ravn and Sola (1996) submitted that positive and negative monetary policy shocks displayed symmetric and not asymmetric effects on real output. These two schools of thoughts have generated controversial debates and each of them has its own followers. Parker and Rothman, (2004), Ulke and Berument (2016), Hayford (2006), Cover (1992), Nampewo *et al.*, (2013) school of thought agreed that the relationship is asymmetric while Raidwan (2016), Favero and Rovelli (2003) found the relationship to be symmetric. These studies from both symmetric and asymmetric positions employed various forms of vector Autoregressive model as estimation technique while few of them used non-linear ARDL to estimate their model.

Coming down to studies conducted using Nigerian data, the empirical results from them produced conflicting research outcomes. However, most of these studies were carried out using aggregate data. For example, the studies empirically conducted by Oloyede (2014), Olayiwola and Ogun (2019), Ogunsakin and Ogunoye (2019) found the response of output to shocks emanating from monetary policy to be asymmetric using vector autoregressive models while Akanbi (2016), Apanisile (2017) and Olayiwola (2018) in their own studies found the response of output to shocks coming from monetary policy to be symmetric.

In conclusion, it is discovered that majority of the studies above, if not all, used aggregate data. Besides, while some found the relationship between them to be symmetric, some discovered the relationship to be asymmetric. Therefore, it is essential to establish the exact direction of causality between output and monetary policy in order to guide policy stance.

3. Data and Methodology

To investigate whether the response of sectoral real output in Nigeria reacts symmetrically or asymmetrically in the short or long run to positive

or negative monetary policy shocks, data was gathered from the Central Bank of Nigeria and Bureau of Statistics. Both policy and non-policy variables were incorporated in the analysis. The policy variables employed in the study are money supply (ms) real effective exchange rate REER, interbank rate (IBR) domestic interest rate and monetary policy rate while non-policy variables are output growth rate Gdp_{gr} and consumer price index (CPI). To achieve the objective of this paper, both structural vector Autoregressive model and Autoregressive Distributive lag are employed.

$$y_t = \alpha_0 y_t + \alpha_1 y_t + \dots + \alpha_k y_{t-k} + e_t \quad \text{eq. 3.1}$$

Where $[y_t = CPI_t, MPR_t, MS_t, DIR, IBR_t, DITR, EXR_t, GDP_t]^1$ is a vector containing output growth, consumer price index, monetary policy rate, money supply, domestic interest rate, interbank rate and real effective exchange rate. All variables except the domestic interest rate are in logarithms. e_t represents wise nose with a zero mean and a diagonal variance, covariance matrix $A = (e_t e_t)$, where the diagonal entries are the variance of structural shocks.

The corresponding reduced – foam VAR can be estimated by

$$y_t = \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_k y_{t-k} + \varepsilon_1 \quad \text{eq 3.2}$$

$$y_t = (1 - \alpha_0)^{-1} \alpha_1 y_1 + (1 - \alpha_0)^{-1} \alpha_2 y_{t-2} + \dots + (1 - \alpha_0)^{-1} \alpha_k y_{t-k} + (1 - \alpha_0)^{-1} e_t$$

eq 3.3

Where ε_t denotes the regression residuals

The structural shocks and the reduced form related by $(1 - \alpha_0)^{-1} e_t$ and the relationship between the coefficients in equations (3.1) to (3.3) is

$$\phi_t = (1 - \alpha_0)^{-1} \alpha_j \forall_j = 1, 2 \dots k.$$

$$+ \sum_{t=1}^W P_{it} \Delta Y_{t-1} + \sum_{t=0}^r Y_1 = \Delta CPT_{t-1} + \sum_{t=0}^s Y_2 MPR_{t-1} + \sum_{t=0}^t \lambda \quad \text{eq. 3.4}$$

$$\Delta R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha_2 CPI_{t-1} + \alpha_3 MPR_{t-1} + \alpha_4 MS_{t-1} + \alpha_5 IBR_{t-1} + \alpha_6 REEX + DIR_{t-1}$$

eq. 3.5

3.1 Asymmetric Effects of Monetary Policy Shocks

When the structural shocks to domestic interest rate are determined, e_t^R , then contractionary monetary policy shock is now presented thus $e_t^{R+} = \max[0, e_t^R]$ and the expansionary monetary policy shock, as $e_t^{R-} = \min[0, e_t^R]$. The reason being that, positive (negative) value of e_t^R shows contractionary or tightness (expansionary) monetary policy. The equation 3.4 and 3.5 show nonlinear autoregressive distributed lag (AKDL) which is introduced into the analysis to determine if the response of real sectoral output to monetary policy is symmetric or asymmetric in Nigeria between 2000q1 to 2018q4.

4. Results

Table 1: Descriptive Statistics of Variables

Variables	GdPar	MS	Exr	IRI	IBR	CPI	MPR
Mean	164.652	162.341	83.1432	81.6111	73.123	63.421	43.231
Median	132.41	131.63	69.241	242.113	34.221	131.231	16.432
Maximum	963.432	88.231	88.634	84.113	232.132	361.452	247.44
Minimum	71.231	45.22	34.44	27.23	20.44	21.221	18.21
Std. Dev	96.23	25.231	31.2311	20.45	21.331	17.422	40.211
Skewness	5.21421	-0.4321	0.3211	1.231	0.621	1.367	0.432
Kurtosis	18.432	1.6212	7.3412	8.3311	9.234	6.234	2.456
Jargon-Bera	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Probability	56245.22	34.562	25.6221	422.41	534.622	456.422	342.311
Sumsq Dev	3924562	324562	24562	243241	224231	2145021	204256

Author's Computation

In any econometric analysis that involves ARDL co-integration method, it is essentially required to conduct unit root test to ascertain that none of the variables is of integrated order 1(2). In this regard, three stationarity tests were employed, that is, Augmented Dicky Fuller (ADF), Phillips – Perron (PP) and KIM, Pesaran and Shin (IPS).

In Table 1, the behaviour of the variables of interest is presented through descriptive statistics of the variables used in the study. It is noted in the table that, the median and mean of output growth and money stock are very close. The implication of this result is that their distributions are almost symmetrical. This shows that variability existence is low. Skewness statistics result indicates that all the variables employed in the model were positively skewed. It was equally noted that JargutBera probability values for all the variables employed are below the 0.05 critical levels. This is an indication of rejection of the null hypothesis of normal distribution for the entire variables at 5 percent level of significance. The cross-sectional and heterogeneous nature of the data used in the study might be the reason for the absence of normal distribution.

Table 2: Results of Stationarity Test

Variables	Adfier without trend	With trend	Pptes without trend	With trend	Kpsster without trend	With trend
GDpgr	-11.002***	12.005***	-26.161***	-25.123***	0.052***	0.041***
Exr	-4.121***	-4.322***	-3.531***	-3.422***	0.410***	0.406***
IRT	-1.641	-1.734***	-2.045***	-2.041***	1.321***	1.231***
IBR	-7.231***	-7.942***	-9.523***	-9.432***	-0.502***	0.501
MS	-5.721***	-6.341***	-9.535***	-9.341***	-1.672***	-1.661
C.P.I	-6.214***	-6.411***	-7.421***	-7.411***	1.456***	1.431
M.P.I	-5.412***	-5.621***	-8.231***	-8.221***	1.621***	1.610

Author's Computation

Note: In all stationarity test used, the null hypotheses of no unit root is rejected because all the stationarity tests employed (ADF, PP and KPSS) have unit root at various levels while ADF and PP have it at 1(1), KPSS has it at 1(0). Also*** connotes the significance level both at 1% and 10%

Results obtained from Augmented Dicky-Fuller (ADF), Phillips – Perron (PP) and Kwiatkowski – Phillips – Schmidt – Shin (KPSS) stationarity tests for each of the series were shown that at level, variables are integrated of difference orders. Therefore, we can conveniently reject the null hypothesis of no unit root. That is, all variables of interest contained unit root. Following Kilian and Park (2007), the null stationarity of all the variables are at all levels and any attempt to go into first difference may

lead to losing of asymptotic efficiency as revealed in wider error bands in the estimation. Therefore, taking the first difference of these variables may lead to a removal of the slow moving components in the series. As noted by Kilian and Park (2007), incorrect differencing can make the estimates to be unstable going by the nature of unit root.

Table 3: VAR Lag order selection

Lag	Log L	LR	FPE	AIC	SC	HQ
0	843.6224	NA	1.79e.06	-7.6621	-7.6214	-7.6843
1	848.7262	24.0321	1.67e.06	-7.63214	-7.6132	-7.6334
2	857.33241	16.3321	1.66e.06	-7.68621	-7.6414	-7.6523
3	859.21131	1.2304	1.63e.06	-7.6714	-7.6234	-7.68314
4	862.4321	12.4321	1.64e.06	-7.6342	-7.6133	-7.7332
5	865.2211	2.5321	1.66e.06	-7.6621	-7.6345	-7.6814
6	871.2413	12.5325	1.65e.06	-7.6324	-7.6214	-7.64143
7	872.2162	7.3456	1.66e.06	-7.6932	-7.6632	-7.6842
8	872.3841	0.32112	1.68e.06	-7.6312	-7.0621	-7.1634

- Shows lag order selected by the Criterion

Author's Computation

In Table 3 above, the results obtained from lag criteria selection for nonlinear ARDL model is presented. In selecting both dependent and independent variables, different lags can be employed. However, it is required to select a suitable lag before estimating nonlinear ARDL model. In this regard, the most employed selection methods are AIC and SBC in time series data.

In this study, we therefore, employed AIC approach for our lag selection to estimate nonlinear ARDL. Based on the results from AIC results on Table 3, lag 2 is the most suitable lag to estimate nonlinear ARDL model.

Table 4: Critical Bound Value

Significance	Critical Value Bounds 1(0)	1(1)
10%	3.19	4.16
5%	3.82	4.92
2.5%	4.51	5.68
1%	5.18	6.42

Author's Computation

Since results obtained from unit root tests showed that none of the variable is 1(2). Therefore, we can proceed to estimate bounds test. This is

however reported in Table 4 following the steps suggested by Pesaran, Shin, and Smith (2001). With reference to Table 4, the computed value of F – statistics showed 33.423 which exceeded the upper bound critical value of the bounds testing which stood at 4.02 at 5 percent level of significance. With this finding, we can therefore, reject null hypothesis of no co-integration. This implies that there is long-run co-movement among variables used in the analysis.

Table 5: Asymmetric ARDL bounds test

	Yearly			Monthly
Test statistic	Value	K	Test statistics	Value K
F – statistics	15.3212	2	F – statistics	75.32142

Table 5 shows the results from asymmetric ARDL bound test for the long run co-movement, Bound testing approach is used. Table 5 shows that at 5%, the $I(0)$ value was 3.82 and the $I(1)$ was 4.92, respectively. The calculated F statistics value was 15.3212 and 75.3214 both for yearly and monthly respectively which was greater than $I(0)$ compared to $I(1)$ value. This shows the existence of asymmetric co-integration.

Table 6: Nonlinear panel ARDL long-run estimates

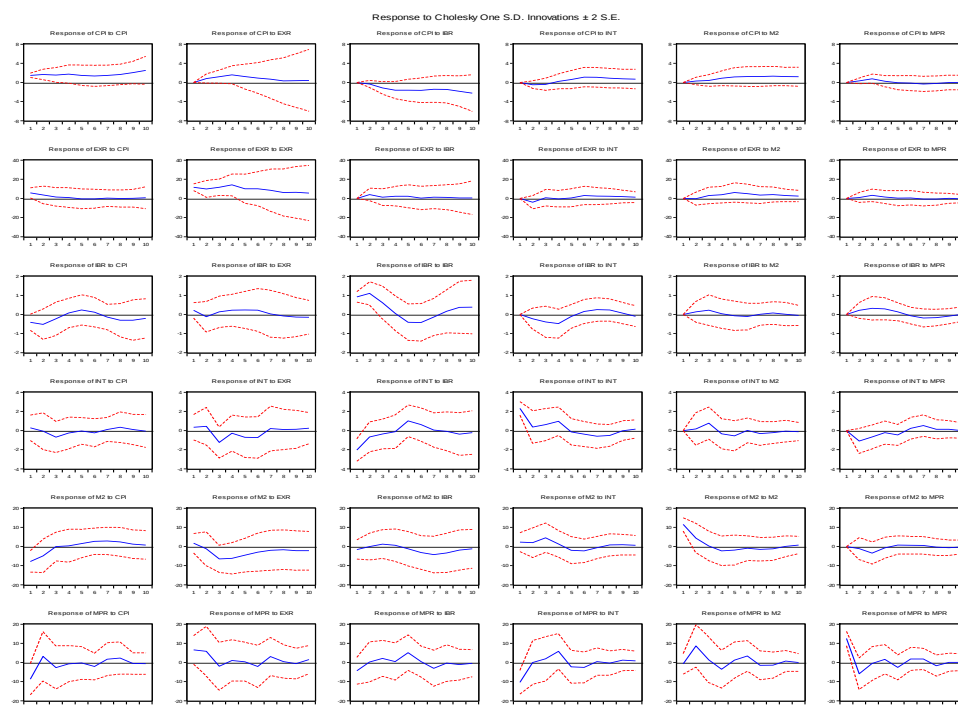
Variables	Coefficients	Std. error	t-statistics	P-value
CPI	1.432213	0.1324567	10.245621	0.01421
EX	1.3624314	0.0674562	-4.231462	0.054232
MPR	-0.3245721	0.0745622	7.456231	0.062411
IBR	0.4367142	0.143221	6.364210	0.04322
FIR	1.62456	0.045231	-7.53343	0.024562
MS+	0.0345622	0.138412	6.4562114	0.010321
MS-	0.7456722	0.07241	-4.512338	0.45621
MPR ⁺	1.624521	0.462331	12.23456	0.02145
MPR-	-0.345214	0.145621	-4.45621	0.063456

Author's Computation

Table 6 shows the impact of both negative and positive monetary policies on output growth. In this regard, money supply (MS) and monetary policy rate (MPS) are used to capture negative, positive, expansionary and contractionary monetary policies. In summary, expansionary monetary policy has negative but significant influence on aggregate real output while contractionary monetary policy has positive and significant impact on aggregate real output.

4.1 Impulse Response

Figure 1



Panel Structural VAR showing connections between Monetary Policy and Real Output at Aggregated Level

The results obtained from Impulse response function and variance decomposition are presented.

4.1.1 Impulse Response Function

The results from Figure 1 shows that the response of real output to an increase in inter-bank rate was positive but significant right from first the quarter till the last period. This corroborates a macroeconomic theory which says that contractionary monetary policy has an influence on output in the short run, though neutral in the long run (Blanchard, 2009). The figure also revealed that an interbank rate accompanied by an unanticipated increase in interest rate brings about a decline in interbank lending. A monetary supply shock corresponding to sudden increase in

inter-bank rate leads to a raise in real interest rate and this however reduces real output growth. This is because output accelerates when cost of borrowing (interest rate) and consumer price index reduces.

Both consumer price index and exchange rate devaluation bring about significant reactions from real output. A contractionary monetary policy with an unanticipated increase in the bank rate causes a significant rise in money supply. Output and consumer prices respond positively and significantly to an unexpected increase in money supply. An unanticipated increase in money supply increases output. Consumer price index responds significantly and positively to the expansionary monetary policy which makes output to increase. Contractionary monetary policy is harmful to an increase in the value of domestic currency. Contractionary monetary policy causes exchange rate to appreciate. This is compatible with a macroeconomic theory, which says “an interest rate is assumed to increase the portfolio induced inflows; for domestic interest rate and, brings about increase in the value of domestic currency”. Also from Figure 1, the contemporaneous effects of negative and positive shocks on interest rate are identical. However, the contemporaneous effects of interest rates on other macroeconomic variables are not asymmetric, while the responses for interest rate are asymmetric. Therefore, we conclude that there are some evidences of asymmetric effects in monetary policy.

Table 7: Variance Decomposition Analysis

Horizon	MPR	CPI	MS	EX	RDGP	IBR	DIR
0	1.000	0.014	0.041	0.013	0.001	0.001	0.0132
1	0.962	0.246	0.0172	0.0220	0.046	0.036	0.0461
2	0.8440	0.730	0.046	0.0241	0.042	0.0611	0.0362
3	0.706	0.262	0.145	0.033	0.0622	0.0462	0.0562
4	0.624	0.674	0.145	0.341	0.043	0.0532	0.0315
5	0.741	0.432	0.149	0.021	0.041	0.062	0.0466
6	0.824	0.523	0.146	0.031	0.052	0.072	0.048
7	0.952	0.728	0.146	0.045	0.042	0.023	0.0181
8	0.423	0.645	0.146	0.062	0.045	0.046	0.031
9	0.524	0.443	0.621	0.041	0.041	0.062	0.058
0.434	0.623	0.623	0.146	0.033	0.039	0.031	0.045

4.2 Variance Decomposition (VDC)

The results in Table 7 show that output growth rate, exchange rate and real interest rate contributed about 32%, 39% and 37% respectively. However, money supply contributed the highest, which was about 48%, to variation in monetary policy rate. The implication of this is that the channels through which monetary policy impacts Nigerian economy are: money supply, real interest rate, domestic interest rate, consumer price index, exchange rate and output growth rate.

4.3 Asymmetric Effect of Monetary Policy on Individual Sectors selected

This sub-section is necessarily carried out in order to overcome the inherent problem of panel analysis that always fails to show the individual characteristics of selected components. Also, it helps to know whether results from panel VAR is compatible with sector-by-sector analysis. The sectors examined are: agricultural, manufacturing, finance and insurance, solid mineral and wholesale and retail trading.

i. Agriculture

From Figure 2, the reaction of agricultural real output to the shocks from monetary policy rate was negative but significant from the first period to the eighth period. However, the responses became insignificant at the ninth period and died off at the tenth period. Meanwhile, the effects were positive for these two periods. The economic interpretation of these results is that agricultural sector in Nigeria has been neglected just because of discovery of crude oil in commercial quantity in the 1950s. Also, agriculture is at subsistence level in Nigeria; mainly practiced through small scale farming. In this analysis, it was discovered that the major determinants of agricultural sector of Nigerian economy are real interest rate and consumer price index as they accounted for 45 and 53 percents respectively in the forecast horizon. The finding of this study negates the findings of the Central Bank of Nigeria 2014, which showed that money supply was the major determinant of agricultural output in Nigeria and supports the findings of Saibu and Nwosa (2011), which reveals that among the macro-economic variables, interest rate is the most important determinants of effectiveness of agricultural sector in contributing to Nigerian economy. Results for variance error

decomposition show that the variables that contribute significantly to variation in the output of the sector are interest rate and money supply.

AGRICULTURE	CPI	MPR	GDPgr	INT	EXR	IBR	DIR
1	82.40743	0.496455	6.487873	0.422618	10.18563	0.64321	4.6511
2	78.82882	0.291757	7.176995	1.444277	12.25815	6.64943	0.3562
3	74.23649	0.215822	8.787415	2.243714	14.51656	1.27991	0.5221
4	69.54787	0.220748	10.89942	2.812233	16.51973	2.47505	4.1864

ii. Manufacturing

From Figure 2, a standard deviation shock from monetary policy rate exerts positive but insignificant influence on the manufacturing sector of Nigerian economy from the first period up to the third period when the positive impact was still maintained but became significant at the eighth quarter when it turned to negative but significant. This shows that, during the period of positive and significant impact, expansionary monetary policy was employed by monetary authority but negative and insignificant period reflect tightening monetary policy regime. This shows that when conditions for loan are relaxed, that is, not too tight, output from manufacturing sector increases but when the conditions for loan are too strict, production suffers. This finding is in line with the finding from a study carried out in Uganda by Nampewo *et al.*, (2013), which showed that manufacturing sector responded positively and significantly to a shock emanating from monetary policy rate. From the variance decomposition results, exchange rate, money supply and interbank rate contributed the highest to output variation in this sector.

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Nigeria: A Sectoral Analysis

MANUFACTURING	CPI	MPR	GDPgr	INT		EXR	IBR	DIR
1	0.044139	99.58533	0.098472	0.107772		0.164284	2.44542	0.015183
2	0.043192	98.74781	0.461037	0.582040		0.165925	2.96192	0.516621
3	0.246861	97.46062	0.853124	1.318108		0.121285	0.97488	0.782351
4	0.618093	95.95384	1.055597	2.280144		0.092321	2.41048	5.211812

iii. Finance and Insurance

From Figure 2, the response of finance and insurance sector to shock emanating from monetary policy was negative and insignificant right from the first period till the eighth quarter, when it started to oscillate. The economic interpretation of this result is that expansionary monetary policy is not a good policy for finance and insurance sector of Nigerian economy. The variance decomposition results showed that money supply, interest rate and interbank rate are major determinants of finance and insurance sector in Nigeria.

FINANCE AND INSURANCE	CPI	MPR	GDPgr	INT	EXR	IBR	DIR
1	0.185544	0.37672	1.438307	96.06166	1.937774	0.63084	1.67244
2	1.130875	0.339291	6.906096	80.21204	11.41170	1.13531	4.81125
3	2.005485	0.231217	8.158119	75.81009	13.79509	1.13173	0.18752
4	2.644168	0.210943	10.17983	71.08447	15.88059	5.18600	1.622173

iv. Solid Mineral

From Figure 2, the response of this sector to a standard deviation shock from monetary policy was initially positive, and diverged toward

equilibrium in 6th and 5th periods after which it started to decrease. The reason for this result might be that this sector is yet to be well developed in Nigeria. The sector is suffering from underutilization. Only money supply and interest rate significantly contributed to the variation in the output of this sector. The variance decomposition results show that exchange rate, consumer price index and interbank rate are the major determinants of this sector

SOLID MINERAL	CPI	MPR	GDPgr	INT	EXR	IBR	DIR
1	0.095756	0.455129	0.985938	7.846765	90.61641	3.12459	4.56711
2	0.259294	0.238685	7.029772	5.625792	86.84646	0.84797	1.84755
3	2.009295	0.221326	8.110871	6.995162	82.66335	0.68761	0.56711
4	5.494036	0.297422	8.990503	7.127494	78.09054	2.59174	0.295531

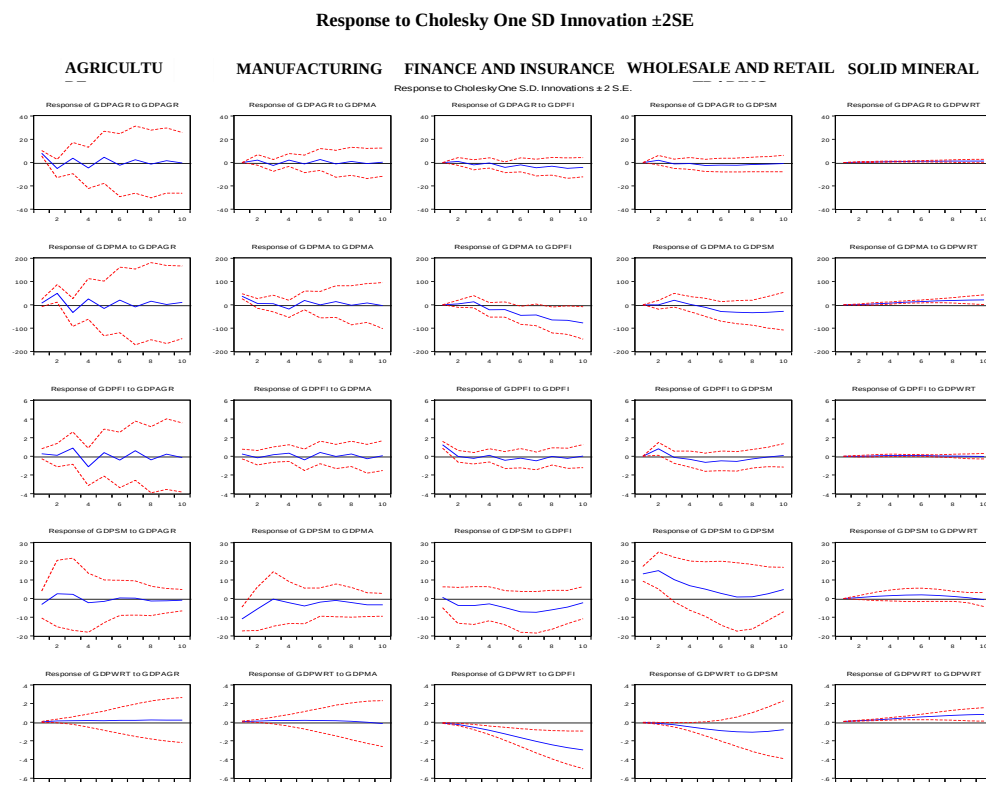
v. Wholesale and Retail Trading

From Figure 2, the response of this sector to the shock coming from monetary policy rate was negative and insignificant from the first quarter till the fourth quarter. Thereafter, the response became positive and still insignificant till the eighth quarter. After this, the response became positive till the tenth quarter. This result is not surprising because the management and implementation of monetary policies have been somehow erratic in Nigeria. Results from variance error decomposition show that the variation in the output of this sector is mainly responsible for interest rate, consumer price index and interbank rate.

WHOLE SALE AND RETAIL TRADING	CPI	MPR	GDPgr	INT	EXR	IBR	DIR
1	82.42534	0.455185	0.067459	7.247844	9.804169	2.93245	2.15562
2	78.82593	0.216719	0.147643	7.380935	13.35264	9.652382	2.89227
3	74.16673	0.216719	0.171382	9.149767	16.29540	7.866557	0.45226
4	69.45512	0.208791	0.165320	11.33261	18.83816	10.31682	3.06522

Impulse Response

Figure 2



6. Summary and Conclusion

In this study, structural vector Autoregressive model and Autoregressive Distributive lag were employed to investigate the response of sectoral real output both at aggregate and sectoral levels to asymmetric monetary policy in Nigeria's between 2000Q₁ to 2018Q₄ using data gathered from the Central Bank of Nigeria statistical Bulletin and Bureau of Statistics. ARDL results revealed long-run co-movement between real output at aggregate and disaggregate monetary policy variables. VAR Impulse response function indicated that the responses of real output across sectors to both expansionary and contractionary monetary policies were not the same. For instance, Agricultural and manufacturing sectors responded negatively and significantly to contractionary monetary policy while their

responses to expansionary monetary policy were positive and significant. The responses of real output from services, building and construction, wholesale and retail were positive but insignificant to contractionary monetary policy. However, real output across selected sectors responded positively and significantly to shocks from expansionary monetary policy. Considering the magnitudes and coefficients of the variables in their contemporaneous, money stock and monetary policy rate had positive and significant relationship with sectoral real output across sectors while other variables, inter-bank rate, consumer price index, and exchange rate have mixed effects across sectors. Results obtained from variance decomposition showed that percentage contributions of money supply and monetary policy as well as inter-bank rate were the highest to shocks coming from both expansionary and contractionary monetary policies in Nigeria during the study period.

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**Testing the Economic Resilience of Economic Cooperation
Organization (ECO) Member States Using AHP-TOPSIS
Approach in 2017**

Ishtiaq Hussain¹, and Dr. Ghafari Fard²

ABSTRACT

Economic resilience is a new phenomenon in the global economic discourse. Its significance and relevance has been widely discussed by leading economists, especially following the global financial meltdown in 2007-08. Different theories have been pitched and several determinants used by economists to measure resistance performance of an economy against external shocks. However, determinants used by Briguglio et al. (2008) have been widely accepted as most credible. Pertinently, this research paper is based on the determinants used by Briguglio to determine the economic resilience of ECO member states in 2017 using AHP and TOPSIS approach. This paper finds robust evidence that misery index, external debt and human development index increase resilience to external shocks and ultimately reduce the incident of crisis. Nations with low economic resilience, in order to strengthen their economies should pursue policies to reduce unemployment and inflation, adopt financial discipline, sustainable debt policies and develop education and public health sector to reduce economic crisis significantly. Moreover, this research is based on questionnaires filled by the economists, weighted through AHP approach and then ranked by TOPSIS. We conclude that Azerbaijan ranked first and was the most resilient country while Kyrgyz Republic was the least economic resilient country in 2017 against adverse shocks.

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ملخص

تعتبر المرونة الاقتصادية ظاهرة جديدة في الخطاب الاقتصادي العالمي اليوم. فقد تم نقاش أهميتها وملائمتها على نطاق واسع من قبل كبار الاقتصاديين، خاصة بعد الانهيار المالي العالمي في فترة 2007-2008. وتم طرح نظريات مختلفة واستخدم العديد من المحددات من قبل الاقتصاديين لقياس أداء مقاومة الاقتصاد ضد الصدمات الخارجية. ومع ذلك، فإن المحددات التي يستخدمها بريغوليو وآخرون (Briguglio et al.) 2008 تم قبولها على نطاق واسع باعتبارها الأكثر مصداقية. وعلى نحو وثيق الصلة، تستند هذه الورقة البحثية إلى المحددات التي استخدمها بريغوليو لتحديد المرونة الاقتصادية للدول الأعضاء في منظمة التعاون الاقتصادي عام 2017 باستخدام نهج عملية التحليل الهرمي (AHP) وترتيب الأولويات عن طريق التشابه مع الحل المثالي (TOPSIS). فهذا المقال يكشف عن وجود أدلة قوية على أن مؤشر البؤس والدين الخارجي ومؤشر التنمية البشرية يزيد من القدرة على الصمود أمام الصدمات الخارجية ويقلل في نهاية المطاف من وقوع الأزمات. وعليه، يجب على الدول ذات المرونة الاقتصادية المنخفضة، من أجل تعزيز اقتصاداتها، اتباع سياسات للحد من البطالة والتضخم، واعتماد الانضباط المالي، وسياسات الديون المستدامة، وتطوير قطاع التعليم والصحة العامة للحد من الأزمة الاقتصادية بشكل كبير. وعلاوة على ذلك، يستند هذا البحث إلى استبيانات استكملها الاقتصاديون، مرجحة من خلال نهج عملية التحليل الهرمي ثم مصنفة حسب ترتيب الأولويات عن طريق التشابه مع الحل المثالي. ونستنتج أن أذربيجان احتلت المرتبة الأولى وكانت الدولة الأكثر مرونة بينما كانت جمهورية قيرغيزستان الدولة الأقل مرونة اقتصاديا عام 2017 ضد الصدمات السلبية.

ABSTRAITE

La résilience économique est un phénomène nouveau dans le discours économique mondial actuel. Son importance et sa pertinence ont été largement débattues par d'éminents économistes, en particulier après l'effondrement financier mondial de 2007-2008. Différentes théories ont été élaborées et plusieurs déterminants utilisés par les économistes pour mesurer la performance de résistance d'une économie face aux chocs externes. Cependant, les déterminants utilisés par Briguglio et al. (2008) ont été largement acceptés comme les plus crédibles. De manière pertinente, ce document de recherche est basé sur les déterminants utilisés par Briguglio pour déterminer la résilience économique des États membres de l'ECO en 2017 en utilisant l'approche AHP et TOPSIS. Ce document trouve des preuves solides que l'indice de misère, la dette extérieure et l'indice de développement humain augmentent la résilience aux chocs extérieurs et réduisent finalement l'incidence de la crise. Les pays dont la résilience économique est faible devraient, pour renforcer leur économie, mener des politiques visant à réduire le chômage et l'inflation, adopter une discipline financière, des politiques d'endettement durable et développer les

secteurs de l'éducation et de la santé publique afin de réduire considérablement la crise économique. De plus, cette recherche est basée sur des questionnaires remplis par les économistes, pondérés par l'approche AHP et ensuite classés par TOPSIS. Nous concluons que l'Azerbaïdjan s'est classé premier et a été le pays le plus résilient tandis que la République kirghize a été le pays le moins résilient économiquement en 2017 face aux chocs défavorables.

Keywords: Economic resilience, resistance, AHP, TOPSIS, ECO Countries.

1. Introduction

Over the past decade, the term 'economic resilience' has emerged as a buzzword in popular discourse with far-reaching practical implications. It has prompted researchers and policy-makers to intensify their efforts in understanding the degree of resilience of economic systems. Economic resilience refers to ability of countries to withstand shocks and recover quickly to their potential (European Commission, 2017). It is the policy-induced ability of an economy to withstand or recover from the effects of such shocks (Briguglio et al., 2008). Resistance economy is basically to promote domestic production, particularly in strategic products and services and the consequent reduction of dependence on imports. It is the most substantial tool to reduce external vulnerabilities and diversifying national assets to cope with risk.

Resistance economy prepares the ground for the comprehensive growth and development even in the economic pressures and sanctions (Afkandeh, 2016). The notion of resistance economy has gained popularity among both academics (see, Fingleton et al., 2015) and policy makers (Alessi et al., 2019). This notion enables any country to convert crisis into opportunity and provides avenues to cope with uncertainties.

Keshavarzi and Fathi (2014) quoted that "resistance economy is the economy that determines prosperity of the country under pressure, sanction and serious enmities". Furthermore, Manca et al. (2017), documented: "a resilient system (or society) can face shocks and persistent structural changes in such a way that it does not lose its ability to deliver societal well-being in a sustainable way (i.e., deliver current societal well-being, without compromising well-being of future generations)". Resilience is not only about the ability to absorb and recover from shocks, but is also emphasized as an ability to create new paths (Boschma, 2015).

Similarly, the U.S. Economic Development Administration's (EDA) Comprehensive Economic Development Strategy (CEDS) Content Guidelines³ documented that resilience has three primary attributes:

- The ability to recover quickly from a shock.
- The ability to withstand a shock.
- The ability to avoid the shock altogether.

In order to lay foundation of a local or regional resilient economy, the ability to anticipate risk, evaluate how that risk can impact key economic assets and/or indicators and build a responsive capacity is of primary importance. The Content Guideline further explains that shocks may include:

- Downturn in national or global economy, impacting demand for local goods and spending.
- Downturn of particular industries critical to local economic activities.
- Other external shocks such as natural or man-made disasters, military base closures or a major employment crunch, changing climate, etc.

Iran's Supreme Leader defines resistance economy as thus:

*When it comes to economy what counts is the domestic production, job creation, and elimination of unemployment, keeping inflation under control, and most important is the economic prosperity and tackling recession all these falls under the purview of resistance economy.*⁴

Since sanctions have been imposed on a number of countries in North Africa and the Middle East, Iran is singled out for being the subject of the largest, longest and most stringent sanctions in history (Farahani & Shabani, 2013; Takeyh & Maloney, 2011). Iran's economy is the weakest point of its government—vulnerable to external shocks—where, the West can hit them hard and has been under constant attack since the Islamic

³ Available at, see <https://www.eda.gov/files/ceds/CEDS-Content-Guidelines-full.pdf>

⁴ Speech available at, see <https://www.youtube.com/watch?v=sp0pYNJUjMM>

Revolution of 1979. Iran has been trying to make the economy resilient. And, ultimately, the notion of Iranian resistance economy is based on the concept of total independence from foreign influence, including economic independence (Gerocs & Szanyi, 2019).

In order to measure resistance level of an economy, resilience index is put into use. The Resilience Index appears to have the power both to identify economies that are heading towards trouble and to identify the specific policy areas of weakness that lie behind their increasing vulnerability (Boorman et. al., 2013). The availability of reliable data clearly plays a crucial role in detecting vulnerabilities (Roberto & Stefano, 2016) in assessing the effectiveness of policy measures (Garda and Zieman, 2014; Caldera et al., 2015). Pertinently, high-quality micro-data is needed that widen and deepen statistical information on economic resilience.

Different studies have been carried out and different concepts been introduced so far discussing economic resilience. Hallegatte (2014) pitched ideas regarding measurement and definition of economic resilience while others aimed at defining country-level economic resistance (see, Rose, 2013). Briguglio (1995) argues that small states are prone to exogenous shocks although they may have high GDP per capita as they are highly dependent on trade due to lack of economic resources. However, many small states perform well in the context of economic resilience and this phenomenon is termed as ‘Singapore paradox’; although Singapore is vulnerable to external shocks still it has managed to attain high economic growth and has built its resilience in the face of exogenous shocks (for details, see Briguglio, 2003). This article is based on Briguglio et.al (2008) economic resistance framework that measures the capability of policy in four broad areas, namely: macroeconomic stability, microeconomic market efficiency, good governance and social development.

Resilience is not only in the interest of national economies, it also has possible spill-over effects for neighboring countries. Also, inadequate resilience has the potential to negatively affect the smooth functioning of any neighboring country. So for this purpose, Economic Corporation Organization (ECO) member states have been selected to gauge the economic resilience of these neighboring countries for the year 2017, as data for this year was easily accessible to introduce the economic

resilience ranking concept and can be further updated with new methods and techniques. This paper addresses the following two main question:

- Which ECO member state is relatively more economic resilient?
- What are the main economic indicators in strengthening the economy against adverse shocks?

Furthermore, we used an Analytical Hierarch Approach (AHP) which is a multi-criteria decision (MCDM) making approach in which factors are arranged in a hierarchical structure (Saaty, 1990). This approach was developed by Thomas L. Saaty in 1970, and it is the most popular MCDM model to solve complex problems (Chian, 2002). Having simple theory, basic calculation process, allowing sensitivity analysis, flexibility, both qualitative and quantitative methods are some beneficial aspects of AHP (Fahmy and Hagag, 2013).

The Expert Choice software tool runs the mathematical calculation based on the data inserted, and ultimately assigns relative weightage to the criteria. After assigning relative weightage to the criteria we used the weightage to find ideal solution using TOPSIS approach—a multi criteria decision analysis initially introduced by Ching-Lai Hwang and Yoon (1981) and it was further developed afterwards.

2. Literature Review

The concept of resilience has grown apace in the literature since the 70's. The first idea of resilience was pitched in physics to study the deformability of materials caused by compressive stress and it has been adopted also in ecology (Holling, 1973; Pimm, 1984), psychology (Garmezy, 1973) and economics (Hill et al., 2008; Martin, 2015; Sensier et al., 2016). To allow for an approach that is not field-specific, we build on our previous work (Manca et al., 2017), and operationalize the notion of resilience as the ability to face shocks and persistent structural changes in such a way that current societal well-being is preserved, without compromising that of future generations. Hence, resilience is key for staying on or returning to the sustainable development path of our society (Alessi et al., 2019).

Despite the many disparate definitions of resilience—ecological, economic, organizational behavior, engineering—they each identify a

similar general conceptualization of rebounding after a disaster or shock event (Rose, 2009; 2017).

Adaptive resilience brings the idea of a dynamic process of learning, which involves structural/ operational adjustment as a response to shocks, and also allows the system to evolve into a new development path (Folke et al. 2010; Simmie and Martin 2010; Davoudi 2012; Martin and Sunley 2015). The concept of economic resilience is a cross-cutting phenomenon, so it needs to be tackled from the economic and the social perspective. Therefore, our analysis takes into account a large set of variables to capture relevant aspects of economic performance and societal well-being production. We move away from the most used parsimonious approach in measuring economic resilience (Sensier et al. 2016; Lagravinese 2015; Martin et al., 2016; Faggian et al. 2018), and combine the joint dynamic response of many selected variables to the crisis, at different time horizons.

Martin and Sunley (2020) explain that resilience have a discernible impact on policy thinking: a new imperative of constructing or building regional and urban economic resilience is gaining momentum. Nevertheless, despite its popularity and influence, our understanding of the concept in economic geography still requires development.

The literature linking economic structures to economic resilience is relatively scarce. The role of high-quality basic political institutions (such as the rule of law or the political stability) for a better shock absorption has, for example, been studied by Acemoglu et al. (2003) and Rodrik (1999). Acemoglu et al. (2013) find that countries with weak institutions suffer substantially more volatility as measured by the standard deviation of per capital output. Rodrik (1999), in turn, notes that external shocks on growth are larger the greater the latent social conflicts in an economy and the weaker its institutions of conflict management.

In recent times, number of resilience indicators proposed and used both by researchers (Martin 2012; Sensier et al. 2016; Faggian et al. 2018) and policymakers (IPPR North 2014; Figueiredo et al. 2018). Still, operationalizing the concept of resilience is not a straightforward task for many reasons.

Canova (2012) relies on common GDP shocks, filtered by time series methods to examines the characteristics of sectoral cycles in EU countries and investigates the reasons which might explain differences in the

adjustment capacity of sectors and countries to economic shocks; broadly defined as unforeseen changes to business conditions. They showed that different capacity to absorb adverse shocks within industrial sub-sectors seems to be mainly explained by how far product market reforms have advanced.

Duval and Vogel (2008) conducted a similar analysis, but focused on the persistence of shocks in the output gap. Their simulations suggest that rigid labor and product markets extend the time it takes for output to recover to potential following an adverse shock, and it also increase the cumulative output loss incurred over the period.

Biroli et al. (2010) also look at economic resilience through the lenses of the competitiveness channel across euro area countries. They showed that real effective exchange rate (REER) adjusts and recovers in such a way to redress cyclical divergences and that after monetary unification REER dynamics have become less reactive to country-specific shocks but also less persistent.

In addition to the empirical literature regarding economic resilience, the crisis has impelled an increased policy focus on the need to determine factors improving economic resilience. The OECD has initiated a work stream to better understand economic resilience and to strengthen economies against adverse shocks⁵. Moreover, surveillance across OECD countries is meant to be fortified by identifying vulnerabilities to external shocks early on so as to reduce their likelihood and economic cost. For this purpose, the OECD team has pitched a large set of mainly macro and financial vulnerability indicators (see Röhn et al 2015) which could be used as an early warning tool (Hermansen and Röhn 2015).

Caldera-Sanchez et al. (2016) and Sutherland & Hoeller (2014) has explained the relationship between economic growth, macroeconomic stability and vulnerability as well as the creation of a new set of vulnerability indicators. The European Central Bank has also analyzed and proposed factors driving economic resilience in a similar vein (European Central Bank 2016; Sondermann 2018).

To synthesize the various academic and policy discussions, the Joint Research Centre (JRC) of the European Commission, in co-operation with the European Political Strategy Centre, started a common reflection

⁵ <http://www.oecd.org/economy/growth/economic-resilience.htm>

on resilience in the policy context (Joint Research Centre 2015) and set up a dedicated commission-wide research and policy network. The first result of these efforts was the development of a conceptual framework devoted to the assessment and measurement of resilience (Manca et al., 2017). It was also incorporated into the second Stieglitz Report on well-being metrics (De Smedt et al., 2018).

The nexus between resilience, sustainability, and well-being are increasingly being discussed in European policy (Folke et al. 2002; Stiglitz et al. 2009; Andor et al. 2011; Raworth 2017) and slowly are being considered as a basis for new policy frameworks (European Commission 2018b).

This paper adds to the existing literature by employing new mathematical technique (AHP-TOPSIS) to rank the economic resilience of Economic Corporation Organization (ECO) member states using a broad range of indicators to identify the relatively well-functioning economic structure (covering the macroeconomic stability, microeconomic efficiency, good governance and social development) for the year 2017.

Section 3 elaborates on the components of the resilience index and establishes a link of these indicators to economic resilience. Section 4 explains the collection of data selected for the resilience index. Section 5 explains the methodology and technique used in the current research.

3. Components of the Resilience Index

The framework to measure economic resistance was developed by Briguglio et al. (2008). The framework and indicators have been further updated and revised since then. Likewise, this research paper is based on the same Briguglio et al. (2008) framework, however, with different indicators and different approach. The economic resistance index measures the capability of policy in four broad areas, related to absorbing and neutralizing shocks, namely:

1. Macroeconomic Stability.
2. Microeconomic Market Efficiency.
3. Good Governance.
4. Social Development.

Table 1: Components of Resilience Index

Indicator	Sub-Component/s	Data Source
Macroeconomic Stability	Fiscal Deficit to GDP Ratio	Trading Economics and Central Banks
	Misery Index	World Bank
	External Debt to GDP Ratio	Central Banks
Microeconomic Market Efficiency	Business Freedom	The Heritage Foundation
	Financial Freedom	The Heritage Foundation
	Labor Freedom	The Heritage Foundation
	Trade Freedom	The Heritage Foundation
Good Governance	Property Rights	The Heritage Foundation
	Judicial Effectiveness	The Heritage Foundation
	Government Integrity	The Heritage Foundation
Social Development	Human Development Index	UNDP

3.1 Macroeconomic Stability

A stable macroeconomic system describes a national economy that has minimum vulnerability to external shocks and it is therefore prerequisite for sustained and inclusive development (see, Piece, 2012). Macroeconomic stability acts as a shield against external forces like currency and interest fluctuations in the global market. A stable macroeconomic system helps to keep inflation low and stable, besides maintaining low national debt to GDP and minimum government deficit. It is one of the most important indicators to measure health of any economy.

Different indicators can be used to find macroeconomic stability. In this paper, the macroeconomic stability of a country is constructed on the basis of three main indicators:

3.1.1 Fiscal deficit to GDP ratio

Fiscal deficit means the country is spending beyond its means—spending more than it collects in taxes and other revenues. It may not always have negative implications, however, it is an important indicator to measure government's performance. Uzbekistan is the only country running government surplus amongst the selected countries whereas other countries are running in deficit. Pakistan has performed miserably and was running the highest government budget deficit in 2017 as shown in table I in the Appendix.

3.1.2 Misery Index

It is the sum of unemployment and inflation rate. It is believed that both higher rate of unemployment and worsening inflation creates economic and social adversity for a country. The rise in inflation means increase in cost of living whereas higher rate of unemployment suggests more people plunging into poverty. Misery index is an important indicator to measure resilience index. Hence it received the highest weightage from respondents of survey in the selected indicators as shown in table II in the appendix. Turkey performed poorly due to high inflation and unemployment rate whereas Iran performed relatively well—due to ease in economic sanctions in year 2017 as shown in table I in the appendix.

3.1.3 External Debt to GDP Ratio

It is a debt a country owes to non-resident creditors. External debt to GDP ratio receives second highest weightage after misery index and it is considered the most important indicator in the context of resilience. Briguglio et.al (2008) considers this indicator a key measure of resilience index, because a country with a high level of external debt may not be able to mobilize resources. Iran has the minimum external debt to GDP whereas Kyrgyz Republic is burdened with external debt and performed low in this context as shown in table I in the appendix.

3.2 Microeconomic Market Efficiency

The efficient market is the one that adjusts promptly to achieve equilibrium. Efficient market absorbs the effects of shocks in the

economy without resulting in any further disturbance in economy. Different indicators can be used to evaluate market efficiency. In this research paper, we used components of the Index of Economic Freedom 2017, entitled “market efficiency” released by the Heritage Foundation. These particular components are aimed at estimating the extent to which markets operate freely, competitively and efficiently across countries. For this purpose, to assess microeconomic market efficiency for selected countries are constructed on the basis of following four indicators, namely:

3.2.1 Business Freedom

The business freedom component provides clear idea regarding business framework. It measures the extent to which the regulatory and infrastructure environment limits the effective operation of businesses.

3.2.2 Financial Freedom:

Financial freedom measures the extent of liberty people have over savings, investment and cash holding, and the level to which the financial sector is dominated by private firms. This index pertains to banking sector efficiency and the extent of government meddling in the financial sector.

3.2.3 Labor Freedom

This indicator measures various facets of legal and regulatory framework of a country’s labor market including minimum wages, laws inhibiting layoffs, severance requirements, and measurable regulatory restraints on hiring and hours worked. It also tells us about employment opportunities across the country.

3.2.4 Trade Freedom

Trade freedom index is applied to international trade. This index is used to appraise country’s trade mechanism—regulations and duties on imports and exports. Trade freedom is basically a composite measure of the extent of tariff and nontariff barriers that affect import and export of goods and services⁶.

⁶ For more details, see

<https://www.heritage.org/index/pdf/2019/book/methodology.pdf>

3.3 Good Governance

As the former UN Secretary-General Kofi Annan noted that “good governance is perhaps the single most important factor in eradicating poverty and promoting development”.⁷ So, basically, it is the exercise of political, economic and executive power to handle countries’ affairs. Good governance is an essential indicator for an economic system. It gives boost to economic resilience.

A state with weak legal and judicial effectiveness undermines respect for rule of law and further weakens progress towards sustainable development (for more details, see Rahmani et al., 2013). The present study uses below indicators to assess good governance extracted from The Heritage Foundation.⁸

3.3.1 Property Rights

This component assesses the legal framework of a country that allows individuals to acquire, hold, and utilize private property, and security provided by the law enforcement agencies. Turkey and Kazakhstan have better property rights legal framework, while Iran lacks this infrastructure as their performance is shown in table I in the Appendix.

3.3.2 Judicial effectiveness

An independent and efficient judicial system protects the rights of individuals against violation of laws by others, including elites and governments. Judicial effectiveness is a key indicator to assess justice in any country; it ensures that laws are respected and appropriate legal actions are taken against violators.

3.3.3 Government Integrity

It is a fundamental indicator of a citizens’ trust on the government. Corruption is a grave concern; it creates insecurity and erodes economic freedom. Turkey performed well and was the most trusted government among selected countries whereas Uzbekistan performed badly in the context of government integrity as shown in table I in the appendix.

⁷ Kofi Annan, Partnerships for Global Community: Annual Report on the Work of the Organisation (UN, 1998).

⁸ For more information, visit <https://www.heritage.org/index/book/methodology>

3.4 Social Development

Social development promotes well-being of each and every individual in a society and focuses on the need to “put people first” in the context of development processes. It seeks to help society reach its full potential. Social development is one of the most significant components of the economic resilience as it promotes social inclusion. Social development shows the investment in people and their well-being which requires removal of barriers and giving opportunity to every citizen to grow, develop their skills and contribute in a meaningful way.

Social Development is considered a key indicator in terms of economic resilience. In this paper, social development indicator of the resilience index entails education, life expectancy and per-capita income as measured by the UNDP human development index (HDI). A higher HDI index means that the citizens have higher lifespan, enjoy quality education and a high GNI per-capita. Among ECO member states, Kazakhstan has the highest HDI index with 0.80 and is followed by the Iran at 0.798 while Pakistan scores the lowest at 0.562.⁹

4. Data Collection

The data has been mainly collected from the World Bank indicators for the year 2017. Good governance and microeconomic efficiency data have been extracted from The Heritage Foundation. For some other specific information and collection of data tradingeconomics.com and respective central banks data were assessed. It is pertinent to mention here that Economic Cooperation Organization (ECO) is a Eurasian political and economic intergovernmental organization established in 1984 in Tehran. There are 10 members of the organization. However, Afghanistan has been excluded from this research due to insufficient data.

5. Methodology

This research article is based on the indicators described by Briguglio et.al (2008) which measures the capability of policy in four broad areas,

⁹ HUMAN DEVELOPMENT INDICES AND INDICATORS: 2018 STATISTICAL UPDATE, available at: http://hdr.undp.org/sites/default/files/hdi_table.pdf

namely: macroeconomic stability, microeconomic market efficiency, good governance and social development.

For the construction of resilience index and evaluating ranking of selected countries Analytical Hierarchy Process (AHP) and TOPSIS approaches have been used. This approach is used in wide range of circumstances in fields such as government, business, industry, healthcare, shipbuilding, and in education (see, Saracoglu, 2013).

Furthermore, to give suitable weightage to selected determinants, proper questionnaires were distributed among renowned academics in Tehran and top economists. Subsequently, after filling the questionnaires, we weighted the indicators through AHP approach—weightage for selected indicators is shown in table IV in the Appendix—and then ranked through the TOPSIS approach. The ranking is given in table VI in the Appendix.

6. Analytic Hierarchy Approach: (AHP)

Step 1: In this first step, the qualitative and quantitative criteria and sub-criteria are defined—developing a hierarchical structure with goal at the top level—criteria at the second level and alternatives at the lower most level.

Step 2: Relative importance of different attributes/criteria were assigned by the distinguished economists with respect to the goal through questionnaire. The Saaty (1990) comparison scale was used, as shown in Table 2. Equations from 1 to 9 are derived from Saaty (1980) AHP calculation.

$$C_{ij} = \begin{bmatrix} C_{11} & C_{12} & \dots & \dots & \dots & C_{1n} \\ C_{21} & C_{22} & \dots & \dots & \dots & C_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ C_{n1} & C_{n2} & \dots & \dots & \dots & C_{nn} \end{bmatrix}$$

Where n is the criteria count, and $C_{ji} = 1 / C_{ij}$, where i and j is 1 to n .

Table 2: Comparison Value Scale

Scale	Degree of Preference
1	Equal Importance
3	Moderate Importance
5	Strong Importance
7	Very, very Strong Importance
9	Extreme Importance
2,4,6,8	Intermediate Importance
1/3,1/7,1/9	Values of Inverse Comparison

Step 3: Third step is to generate the normalized pair-wise matrix ‘X’ by dividing each element in the matrix by its column total:

$$X_{ij} = \frac{c_{ij}}{\sum_{j=1}^n c_{ij}}$$

Where, i and j is 1 to n .

$$X_{ij} = \begin{bmatrix} X_{11} & X_{12} & \dots & \dots & \dots & X_{1n} \\ X_{21} & X_{22} & \dots & \dots & \dots & X_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ X_{n1} & X_{n2} & \dots & \dots & \dots & X_{nn} \end{bmatrix}$$

Now, using the above X matrix to get vector weights matrix W. It can be calculated as:

$$W_i = \frac{\sum_{j=1}^n X_{ij}}{n}, \text{ we get vector weight matrix } W = \begin{bmatrix} W_1 \\ W_2 \\ \vdots \\ W_n \end{bmatrix}$$

Where, i and j is 1 to n .

Step 4: Multiply each column pair-wise comparison matrix by the corresponding weight will give us another matrix:

$$D_{ij} = \begin{bmatrix} C_{11} & C_{11} & \dots & \dots & \dots & C_{1n} \\ C_{21} & C_{22} & \dots & \dots & \dots & C_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ C_{n1} & C_{n2} & \dots & \dots & \dots & C_{nn} \end{bmatrix} \times \begin{bmatrix} W_1 \\ W_2 \\ \vdots \\ \vdots \\ \vdots \\ W_n \end{bmatrix} = \begin{bmatrix} D_1 \\ D_2 \\ \vdots \\ \vdots \\ \vdots \\ D_n \end{bmatrix}$$

Where, i and j is 1 to n .

Step 5: In this particular step, divide the sum of row entries by the corresponding weight:

$$E_i = \frac{D_i}{w_i}$$

Where, i is 1 to n . Now, calculate average value ' λ ' as given below:

$$\lambda_{max} = \frac{\sum_{i=1}^n E_i}{n}$$

Where i is 1 to n

Step 6: The consistency index is calculated by the following given formula:

$$\text{Consistency Index} = \frac{\lambda_{max} - n}{n - 1}$$

Step 7: The final step in AHP approach is to calculate a Consistency Ratio (CR). In this stage we find out how consistent the judgments have been relative to large samples of purely random judgments. If CR is lower than 0.1 or equal to 0.1, the calculations of the criteria are consistent otherwise the judgments are not credible. The consistency ratio calculated as $CR = CI/RI$, where RI is random index and n is order of matrix given in table 3 below.

Table 3: Random Index Value Scale

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.46	1.49

Source: Golden and Wang (1990)

In our case, the inconsistency ratio is automatically generated by using Expert Choice software which comes out 0.06. This value is less than 0.1 or 10%. Thus, the weights presented in Table II in the appendix can be used for TOPSIS calculation. Besides, the best option using AHP approach is the one which achieves the most suitable trade-off among the different criteria as shown in the table II in the appendix.

Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)

Step 8: Decision-making matrix is given below:

$$A_{ij} = \begin{bmatrix} A_{11} & A_{12} & \dots & \dots & \dots & A_{1n} \\ A_{21} & A_{22} & \dots & \dots & \dots & A_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ A_{m1} & A_{m2} & \dots & \dots & \dots & A_{mn} \end{bmatrix}$$

Step 9: This step transforms various attribute dimensions into non-dimensional attributes which allows comparisons across criteria (Ewa, 2011). This is the most important step where the scores in the evaluation matrix A_{ij} are being transformed to a normalized scale.

$$N_{ij} = \frac{A_{ij}}{\sqrt{\sum_{j=1}^m A_{ij}^2}}$$

The normalized matrix or a dimensionless matrix in our present study is presented in table I in the appendix.

Step 10: In this step, multiplying each entry with corresponding weight—the weights we extracted in AHP process—in order to get new

matrix which is a weighted normalized matrix K_{ij} , as shown in table III in the appendix.

$$K_{ij} = \begin{bmatrix} N_{11} & N_{11} & \dots & \dots & \dots & N_{1n} \\ N_{21} & N_{22} & \dots & \dots & \dots & N_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ N_{m1} & N_{m2} & \dots & \dots & \dots & N_{mn} \end{bmatrix} \times \begin{bmatrix} W_1 \\ W_2 \\ \vdots \\ \vdots \\ \vdots \\ W_n \end{bmatrix}$$

Step 11:

The positive ideal solution can be calculated as:

$$A_j^+ = \text{Max}(K_{ij})$$

While negative ideal solution can be found as:

$$A_j^- = \text{Min}(K_{ij})$$

In this step, we find ideal best and ideal worst solution. It is pertinent to note here that the minimum value of misery index and external debt to GDP represent the best ideal solution because, normally lower value of external debt and misery index favor country's macroeconomic stability.

Meanwhile, the government deficit to GDP is a negative number—deficit—in all 8 selected countries except Uzbekistan, which is running a government surplus. To normalize this column we added a same number to the whole column that makes even the lowest digit a positive number. So, in this Uzbekistan performed better than others and Pakistan scored the lowest and ultimately positive value of government deficit to GDP represents the best ideal solution as shown in table IV in the appendix.

Step 12: Calculate the Euclidean distance from the ideal best and the ideal worst value. It can be calculated as:

$$S_i^+ = \sqrt{\sum_{j=1}^n (K_{ij} - A_j^+)^2}$$

$$S_i^- = \sqrt{\sum_{j=1}^n (K_{ij} - A_j^-)^2}$$

In this step values of positive and negative ideal solution distances is calculated. The Euclidean distance is presented in table V in the appendix.

Step 13: The final step would ultimately give us the performance score. It can be found as:

$$P_i = \frac{S_i^-}{S_i^- + S_i^+}$$

In addition, country with higher performance score would be ranked higher. In our model, Azerbaijan ranked first with higher performance score followed by Iran and then Pakistan as shown in Table VI below in the appendix.

7. Analysis

This section presents and argues the main results of our empirical analysis based on the indicators namely: macroeconomic stability, microeconomic market efficiency, good governance and social development. This précis the large number of economic variables into a single number for each country and thus serve as handy and informative summary statistics for the resilience capacities.

Once the economic resilience ranking of the ECO member states have been determined, the most immediate policy objective concerns the identification of certain deep-rooted features that are robust and meaningful predictors of resilient outcome at the country level.

In our results, Azerbaijan, a country at the crossroads of Eastern Europe and Western Asia with around 9.8 million population, topped the chart among ECO member countries despite being a small state as shown in fig 1 below. It has managed to cope with vulnerabilities through cautious economic development policies and has nurtured resilience.

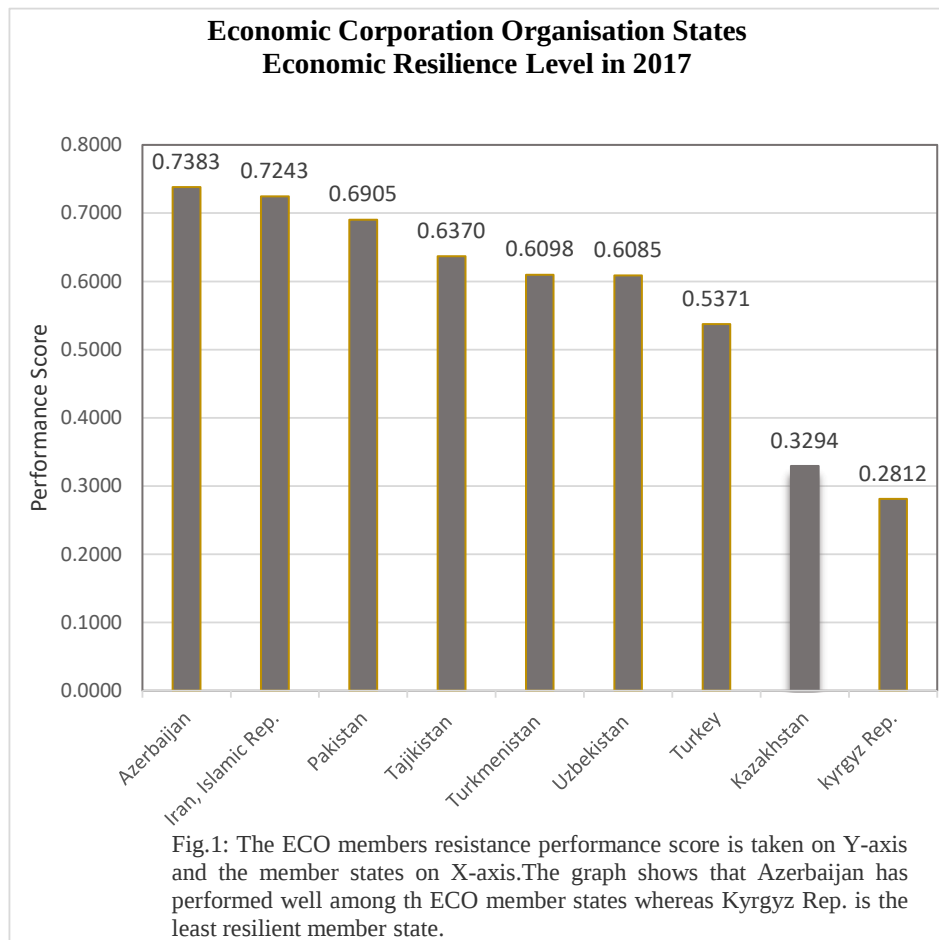
Alessi et al., (2019) result shows that government expenditures on social protection, political stability or a favorable business environment are strongly linked with resilient outcomes. However, our result shows that a country with low level of external debt can freely mobilize domestic resources and it is considered as one of the most important variable after misery index and strongly associated with economic resilience.

In addition, Iran has the minimum external debt to GDP and it is one of the main reasons helping the Islamic Republic of Iran to secure second position in terms of economic resilience despite having poor performance in some other indicators including financial freedom, trade freedom and labor freedom. Iran has an edge over other ECO member states in terms of low level of external debt and minimum budget deficit in 2017. Also, Iran maintained a high social development that suggests standard education and good quality of life. Our results are similar to Briguglio et.al (2008) where Iran was ranked higher than Pakistan and Turkey in economic resilience index.

Pakistan ranked third in the context of resilience index with 0.69 points as shown in figure 1. Pakistan has performed well in 2017 in many different area, however, high government budget deficit and low social development weakened its performance. Briguglio et.al (2008) resilience index rank Turkey slightly higher than Pakistan. In this current research Pakistan has relatively performed better than Turkey.

Similarly, Tajikistan ranked fourth in terms of resilience index. Tajikistan has the lowest government deficit amongst the selected countries (Only Uzbekistan running surplus in the year 2017) and followed by Turkmenistan and Uzbekistan ranked 5th and 6th respectively. Turkmenistan and Uzbekistan both performed badly in financial freedom index. However, Uzbekistan is the only country with government budget surplus, whereas other countries are experiencing budget deficit in the year 2017.

Figure 1.



Source: Author's calculation

Turkey has shown impressive economic and social development performance since 2000—increased employment and income making it an upper-middle-income country. However, growing economic vulnerabilities and more challenging external environment is threatening to undermine these achievements. Turkey performed poorly in the context of economic resilience index and ranked 7th, primarily in macroeconomic indicators including misery index and external debt to GDP ratio.

World Bank report (2019) noted that: “overheating in the economy since 2017, combined with tightening global financial conditions, has given rise to a stagflationary environment and a debt overhang. Turkey’s poor performance in resilience index and secure requires deeper analysis and cannot be elaborated further here due to space crunch.”

Kazakhstan’s performance was undermined by skyrocketing external debt and high government deficit to GDP ratio despite performing well in other sectors. Kazakhstan is the largest economy in central Asia worth \$162.8 billion. According to the National Bank of Kazakhstan, its external debt exceeds than its GDP making the economy’s debt servicing capacity vulnerable to future endogenous and exogenous shocks. Kazakhstan is the second low resilient country amongst the ECO member states. It was followed by the Kyrgyz Republic at the bottom of the list which is a land-locked, lower-middle-income country of 6.3 million people with around \$7.8 billion nominal GDP as of 2017. It is the least resilient country among the ECO member states.

Kyrgyzstan’s economic performance has been hindered by widespread corruption, judicial ineffectiveness, low foreign investment, regional instability and high degree of dependence on Kumtor gold mine operations which is a major driver of Kyrgyz economy (see, Gullette & Kalybekova, 2014). Moreover, its external debt to GDP ratio was highest among the selected countries in 2017. Thus, the Kyrgyz Republic is likely to remain at moderate risk of debt distress (for details, see Asian Development Bank Report, 2018).

8. Conclusion

This paper sheds some light on the economic resilience of ECO member states. In particular, it has addressed the following questions:

- What are the main economic indicators in strengthening the economy against adverse shocks?
- Which country has shown sound economic resilience in the year 2017?

The current research has led to the following main results and conclusions. First, questionnaires were distributed among renowned academics in Tehran and top economists to get their opinions on the

importance of the economic variables in terms of the economic resilience to strengthen economies against adverse shocks. After filling the questionnaires, we weighted the indicators through AHP approach—weightage for selected indicators and then ranked through the TOPSIS approach. The AHP result shows that misery index, external debt to GDP and HDI has been the most important indicators of economic resilience. Also, the TOPSIS results suggests that countries with good performance in misery index, external debt and HDI have strong resilient level.

Second, Azerbaijan, a small country has a sound economic resilience among the ECO member states. It has performed really well in almost all the economic sectors despite being a small state. Small developing states tend to be inherently prone to exogenous shocks over which they can exercise very little control (Briguglio et al., 2008). It was followed by Iran despite perpetual sanctions since past 40 years. While Kyrgyz Republic was the least resilient country in 2017 mainly because of high degree dependence on mining sector and less diversified export structure. This paper presents a measurement framework for the quantitative assessment of economic resilience by taking the socio-economic system as a whole. Our analysis contributes in improving economic resilience thinking in the policy arena in important ways. Also, this article provides further insight to policy makers on strengthening the level of resilience of national economy to fight exogenous shocks.

9. Policies Recommendations

Countries that perform poorly in the resistance economy index in this current research paper should adopt the following policies to improve this index.

1. Optimal monetary and fiscal policy to reduce inflation.
2. Support small and medium-sized enterprises in boosting their productivity to increase employment level.
3. Policy makers should support and promote e-businesses and commerce at domestic and foreign levels to gain economic prosperity.
4. Optimal use of foreign debts in the country and efforts to pay them on time.
5. Efficiently utilizing foreign resources in the development of infrastructure and domestic production.

6. Using the capacity development and domestic resources to improve welfare and economic growth of the country.
7. Introducing educational development programs on childhood levels and on different university levels with new tools and techniques.
8. Initiating programs to modify health sector and improving living standard of households.
9. Policy-making to diversify the country's exports, especially in the high-tech sector.
10. Annual and continuous review of the economic resistance level of the state to strengthen economy against adverse shocks to minimize its economic cost.

10. Future Research Direction

In order to determine economics resilience for combined indicators, researchers can use combined principal components analysis, taxonomy, factor analysis, Morris method and fuzzy logic. The efficiency and results of these methods should be evaluated and compared to the current research. It is also necessary for researchers in future research to identify the sub-indices of each indicator using the scientific literature to define the combined index with more up-to-date indicators. Furthermore, the role of fundamental justice, knowledge-based economy and role of people in the economy should be precisely defined in strengthening the economy. Also, using different mathematical techniques will help to determine the optimal status of each selected indicator in stimulating economic resilience of a country.

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APPENDIX

Table I: Normalized Matrix

Countries	Govt. Deficit	Misery Index	External Debt	HDI	Property Rights	Judicial Effectiveness	Government Integrity	Business Freedom	Financial Freedom	Labor Freedom	Trade Freedom
Azerbaijan	0.800	1.553	1.190	0.298	2.483	1.840	2.184	2.994	2.864	3.362	2.918
Iran	0.770	1.916	0.099	0.314	1.593	2.007	1.719	2.713	0.568	2.443	2.138
Kyrgyz	0.554	0.873	5.168	0.265	2.503	0.959	1.760	3.086	2.840	3.577	2.954
Kazakhstan	0.631	1.071	5.048	0.315	2.759	3.150	2.207	3.119	2.840	3.698	3.079
Pakistan	0.154	0.866	1.339	0.221	1.790	1.901	1.771	2.562	2.272	1.694	2.636
Tajikistan	1.001	0.781	1.974	0.256	2.238	2.542	1.899	2.747	1.704	2.205	2.899
Turkey	0.816	1.905	2.621	0.311	3.015	2.927	2.364	2.692	3.408	2.174	3.114
Turkmenistan	0.616	0.815	1.230	0.278	1.593	0.279	1.719	1.256	0.568	0.896	3.138
Uzbekistan	1.155	1.746	1.744	0.280	2.360	2.336	1.597	2.713	0.568	2.259	2.620

Table II: Weighted Matrix

[illegible]

Table III: Normalized Weighted Matrix

Countries	Govt. Deficit	Misery Index	External Debt	HDI	Property Rights	Judicial Effectiveness	Govt. Integrity	Business Freedom	Financial Freedom	Labor Freedom	Trade Freedom
Azerbaijan	0.0760	0.2501	0.1845	0.0394	0.1614	0.1398	0.1419	0.2096	0.1817	0.1950	0.1693
Iran	0.0731	0.3085	0.0154	0.0415	0.1036	0.1525	0.1117	0.1899	0.0363	0.1417	0.1240
Kyrgyz	0.0526	0.1406	0.8011	0.0349	0.1627	0.0729	0.1144	0.2160	0.1817	0.2075	0.1713
Kazakhstan	0.0600	0.1724	0.7824	0.0416	0.1793	0.2394	0.1434	0.2184	0.1817	0.2145	0.1786
Pakistan	0.0146	0.1395	0.2076	0.0292	0.1164	0.1445	0.1151	0.1794	0.1454	0.0983	0.1529
Tajikistan	0.0951	0.1257	0.3060	0.0338	0.1454	0.1932	0.1234	0.1923	0.1090	0.1279	0.1681
Turkey	0.0775	0.3068	0.4062	0.0411	0.1959	0.2224	0.1536	0.1885	0.2181	0.1261	0.1806
Turkmenistan	0.0585	0.1313	0.1906	0.0367	0.1036	0.0212	0.1117	0.0879	0.0363	0.0520	0.1820
Uzbekistan	0.1097	0.2812	0.2703	0.0369	0.1534	0.1775	0.1038	0.1899	0.0363	0.1310	0.1520

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Table IV: Ideal Solutions

V +	0.10 97	0.12 57	0.01 54	0.04 16	0.19 59	0.23 94	0.15 36	0.21 84	0.21 81	0.21 45	0.18 20
V -	0.01 46	0.30 85	0.80 11	0.02 92	0.10 36	0.02 12	0.10 38	0.08 79	0.03 63	0.05 20	0.12 40

Table V: Euclidean Distance, Performance Score and Ranking

Countries	Si+	Si-	Pi	Rank
Azerbaijan	0.2416	0.6817	0.7383	1
Iran, Islamic Rep.	0.3084	0.8103	0.7273	2
Kyrgyz Republic	0.8078	0.3161	0.2812	9
Kazakhstan	0.7712	0.3789	0.3294	8
Pakistan	0.2904	0.6477	0.6905	3
Tajikistan	0.3325	0.5836	0.6370	4
Turkey	0.4422	0.5132	0.5371	7
Turkmenistan	0.4095	0.6399	0.6098	5
Uzbekistan	0.3728	0.5796	0.6085	6

Explaining Out-of-Pocket Health care Expenditure in Sub-Saharan Africa: Evidence from Panel Data Analysis

Ebaidalla M. Ebaidalla¹ and Mohammed Elhaj Mustafa²

ABSTRACT

Motivated by the remarkable increases in the private health spending in Sub-Saharan Africa (SSA), this study aims at examining the factors that influence out-of-pocket health expenditure (OOPHE) in the region. The study also investigates the factors that push OOPHE to reach catastrophic levels. The study applies dynamic panel data method for a sample of 40 SSA countries over the period 1995-2014. The results indicate that economic factors such as per capita income, trade openness and inflation have significant effects on out-of-pocket health expenditure. The results also show that the expansion in urbanization pushes OOPHE to become catastrophic. Moreover, the morbidity factors such as the prevalence of anemia and tetanus diseases among under-five children boost OOPHE and raise the likelihood for incurring catastrophic health expenditure (CHE). Conversely, the increases in government expenditure lower the probability of undertaking OOPHE. Furthermore, the impact of accountability on OOPHE is found to be negative and statistically significant, indicating that the institutional quality decreases OOPHE and prevents it from reaching catastrophic levels.

ملخص

بدافع من الزيادات الملحوظة في الإنفاق الصحي الخاص في أفريقيا جنوب الصحراء الكبرى (SSA)، تهدف هذه الدراسة إلى التمييز في العوامل التي تؤثر على الإنفاق الصحي من الأموال الخاصة (OOPHE) في المنطقة. وتبحث الدراسة أيضا في العوامل التي تدفع بالإنفاق الصحي من الأموال

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الخاصة للوصول إلى مستويات كارثية. وعليه، تطبق الدراسة طريقة البيانات الديناميكية لعينة من 40 دولة في أفريقيا جنوب الصحراء خلال فترة 1995-2014. وتشير النتائج إلى أن العوامل الاقتصادية مثل دخل الفرد والانفتاح التجاري والتضخم لها تأثيرات كبيرة على الإنفاق الصحي من الأموال الخاصة. كما تظهر النتائج أيضا أن التوسع الحضري يدفع بالإنفاق الصحي من الأموال الخاصة إلى أن يصبح كارثيا. وعلاوة على ذلك، فإن عوامل المرض مثل انتشار فقر الدم وأمراض التيتانوس بين الأطفال دون سن الخامسة تعزز الإنفاق الصحي من الأموال الخاصة وتزيد من احتمال تكبد نفقات صحية كارثية (CHE). وفي المقابل، فإن الزيادات في الإنفاق الحكومي تقلل من احتمالية القيام بالإنفاق الصحي من الأموال الخاصة. وبالإضافة إلى ذلك، وجد أن تأثير المساءلة على الإنفاق الصحي من الأموال الخاصة سلبى وذو دلالة إحصائية، مما يشير إلى أن الجودة المؤسسية تقلل من هذا الإنفاق وتمنعه من الوصول إلى مستويات كارثية.

ABSTRAITE

Motivée par l'augmentation remarquable des dépenses de santé privées en Afrique subsaharienne (ASS), cette étude vise à examiner les facteurs qui influencent les dépenses de santé personnelles (DPS) dans la région. L'étude examine également les facteurs qui poussent OOPHE à atteindre des niveaux catastrophiques. L'étude applique la méthode des données de panel dynamiques pour un échantillon de 40 pays d'Afrique subsaharienne sur la période 1995-2014. Les résultats indiquent que les facteurs économiques tels que le revenu par habitant, l'ouverture commerciale et l'inflation ont des effets significatifs sur les dépenses de santé. Les résultats montrent également que l'expansion de l'urbanisation pousse OOPHE à devenir catastrophique. En outre, les facteurs de morbidité tels que la prévalence de l'anémie et des maladies tétaniques chez les enfants de moins de cinq ans augmentent l'OOPHE et la probabilité d'encourir des dépenses de santé catastrophiques (CHE). En revanche, l'augmentation des dépenses publiques diminue la probabilité d'entreprendre une OOPHE. En outre, l'impact de la responsabilité sur l'OOPHE s'avère négatif et statistiquement significatif, ce qui indique que la qualité institutionnelle diminue l'OOPHE et l'empêche d'atteindre des niveaux catastrophiques.

Keywords: Out of pocket, health expenditure, Sub-Saharan Africa, panel data

JEL Classification: I2, I3, C23, N37

1. Introduction

Access to healthcare service has been regarded as a crucial element in achieving human welfare and economic development. This is particularly evident in developing countries' contexts, where a large segment of the population lives below the poverty line, vulnerable to diseases and lacks effective social protection mechanisms. In these contexts, healthcare provision is usually financed through several means, including government budgets, health insurance, foreign aid, charitable bodies, and out-of-pocket health expenditure³. However, although all these funding methods are well-acknowledged, out-of-pocket health expenditure (OOPHE) remains the main method to finance healthcare in developing countries. The dominance of this method of funding exerts a devastating impact on the household's budget. Several studies have documented that OOPHE pushes a considerable portion of the population into poverty, and thus, increases the number of poor among the population in developing countries (Wagstaff and van Doorslaer, 2003, Xu et al. 2005, and Ebaidalla and Ali, 2019).

In SSA region, financing healthcare represents one of the troubling issues that confront policymakers. The adoption of structural adjustment programs (SAP) during the early 1990s in majority of the African countries has led governments to cut social spending, particularly on healthcare services. Consequently, a large portion of the population is forced to pay healthcare bills from their resources in the form of out-of-pocket health expenditure (OOPHE). As a result, SSA registers high levels of OOPHE, exceeding the global average. The recent statistics indicate that the average of OOPHE in SSA represents about 60% of the total private expenditures (World Bank, 2017). On the other hand, the statistics show that the key indicators of healthiness in the region are lagging behind compared to other regions in the world. According to the 2014's World Health Organization' Report, 90% of the worldwide malaria cases have occurred in SSA. The region also hosts the highest neonatal death rates in the world and of the 20 nations with the highest maternal mortality rates in the world, 19 were in Africa (World Health

³ Out of pocket expenditure is any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups. It is a part of private health expenditure (World Bank, 2017)

Organization, 2014). Likewise, although Africa constitutes only 11% of the world population, it hosts 60% of HIV carriers. On the whole, the cuts in public health provision, coupled with the absence of effective preventive health measures, are expected to boost OOPHE to the levels that obstruct people livelihoods.

Based on the above backdrop this paper aims at investigating the factors that influencing out-of-pocket health expenditure (OOPHE) and catastrophic health expenditure (CHE) in SSA. To the best of our knowledge, there are no empirical studies on this issue have been conducted using panel data, as most of the previous studies have used cross-sectional data (i.e. household surveys). The study applies a dynamic panel data for a sample of 40 SSA countries over the period 1995-2014.

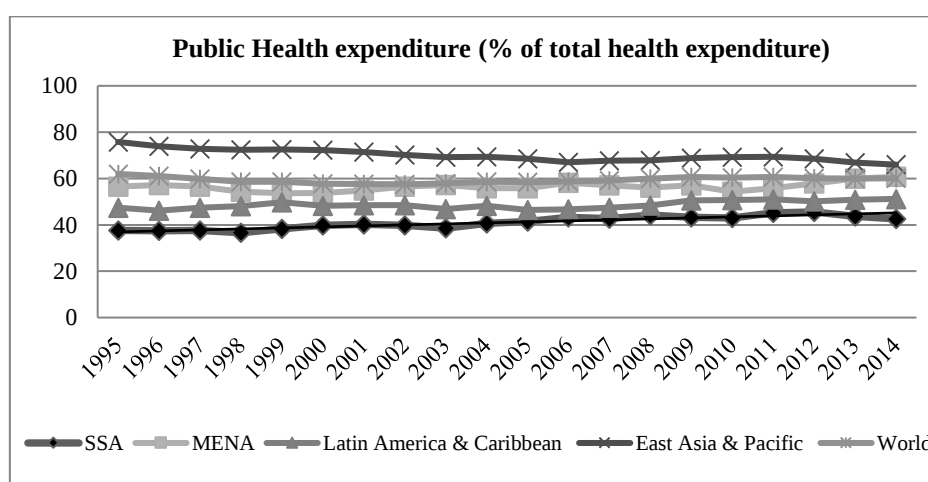
The remainder of this paper is organized as follows. Section Two presents some stylized facts about healthcare financing in SSA with some comparisons from other developing regions. Section Three reviews the relevant literature. Section Four outlines the data and methodology. Section Five presents empirical results and discussions. Section Six summarizes the findings and concludes.

2. Some Stylized Facts about Health Care Finance in SSA

Before examining the determinants of out-of-pocket health expenditure (OOPHE) and catastrophic health expenditure (CHE), it would be useful to shed some lights on the patterns of health expenditure and health care finance in SSA. In fact, the dismal health outcomes in the region signify the weakness of healthcare finance. Figure 1 below highlights the public health expenditure (% of total health expenditure) in SSA and some developing regions. As can be seen from the Figure SSA records the lowest public health expenditure during 1995-2014. Moreover, public health expenditure in SSA is lower than the global level. The Figure also reveals that public health spending as a percentage of total health expenditure was fluctuating at around 40% which indicates the weakness in public spending on health. However, during the last years, this expenditure has declined remarkably the matter that may be attributed, in part, to the incidence of the international financial crises. Generally speaking, the low public health expenditure implies that a considerable portion of health payments is paid by households. The continuity of such situation is likely to push OOPHE to grow at rates that are beyond the

financial capabilities of population. Eventually, this reality generates negative consequences on the levels of health outcomes in the region as increases in out-of-pocket health expenditure (OOPHE) cuts people's expenditure on other life-sustaining items, such as education and food.

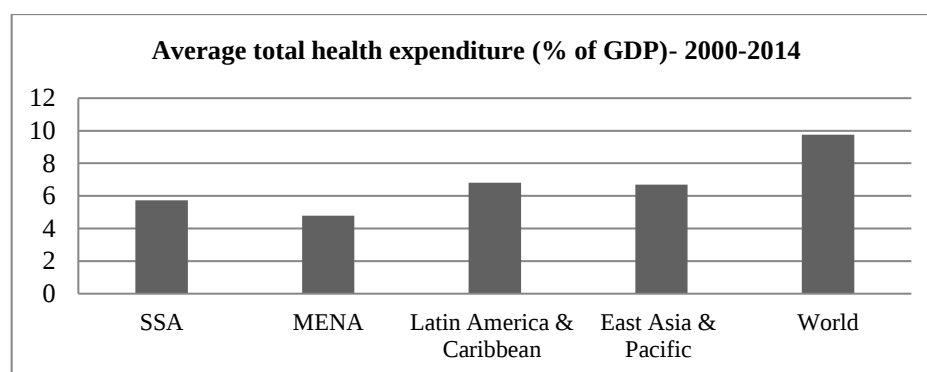
Figure 1: Public Health expenditure (% of total health expenditure) in SSA and other comparable regions - 1995-2014



Source: World Bank, World Bank Indicators (2017)

Figure 2 displays the state of public health expenditure (% of GDP) in SSA, MENA, Latin America and the Caribbean, East Asia and Pacific regions, over the period 2000-2014. As can be observed during the last two decades, SSA holds the lowest total health expenditure (%GDP) after the MENA region. Equally interesting, this share is extremely low compared to the global level. This relatively low level of publicly funded health spending has been observed although the majority of the population in the region exposes to poor health status.

Figure 2: Total Health expenditure (% of GDP) in SSA and other comparable regions - 2000-2014



Source: World Bank, World Bank Indicators (2017)

3. A brief Literature Review

The determinants of out-of-pocket health expenditure (OOPHE), in general, and catastrophic health expenditure (CHE), in particular, have received a great attention from researchers. Nevertheless, large part of the literature on this issue is based on the household surveys and country level data, while the cross-country's investigation is very scanty. Several empirical studies have shown that incurring OOPHE depends on a number of factors including, socio-economic factors, health status of the population, and the nature of the health system governs health care provision. For example, Xu et al (2011) examined the factors affecting total health expenditure, government health expenditure, and OOPHE in a set of developing countries. The authors applied both fixed effects and dynamic models to a panel data sourced from 143 developing countries over the period 1995-2008. Their results indicate that there is a great across countries variation in total health expenditure as a share of GDP. They documented that the impact of income on this branch of health spending is positive and statistically significant in all country-income groups. Moreover, the authors found that in low-income countries, the effect of Tuberculosis (TB) on OOPHE was positive and significant. They also showed that the population over 60 years is found to be positively associated with OOPHE only for the upper-middle income countries. Regarding the impact of health system characteristics, their results showed that there were no differences between tax, social health

insurance, and mixed systems on OOPHE. Compared to insurance-based systems, in the static model, the tax-based and mixed systems were found to have a positive association with OOPHE in lower-middle income countries. Moreover, the authors found that government expenditure as a share of GDP had no significant impact on OOPHE.

Several empirical studies have argued that the nature of health system represents a significant factor in determining health expenses. For example, the availability of health insurance coverage was found to be a critical determinant for health spending (Jowett et al., 2003; Spaan et al., 2012; Wirtz et al., 2012; Brown et al., 2014). Nevertheless, some empirical studies have underestimated the role of health insurance in protecting population from undertaking high OOPHE.

The literature shows that OOPHE turns out to be catastrophic after exceeding a certain threshold (Xu et al, 2003b and Wagstaff and van Doorslaer, 2003). Similar to OOPHE, factors such as household's socio-economic status, health status and the nature of health systems were also found to be responsible for incurring CHE. In particular, health care services utilization, capacity to pay, poverty, lack of health insurance coverage and fees levied at public health facilities were found to be among the factors that push OOPHE to reach catastrophic levels (Xu et al., 2003a; O'donnell et al., 2008; Yardim et al., 2010, and Rahman et al., 2013).

Many researchers have also confirmed that expanding health insurance coverage represents one of the decisive factors to protect people from financial catastrophe caused by higher health spending (Kavosi et al., 2012; Akinkugbe, 2012 and Devadasan et al., 2007). However, some researchers noted that the contribution of health insurance to reduce catastrophic health payments decreases significantly for a country with a great number of elderly, having chronic illnesses or disability and experiencing hospitalization.

Furthermore, the existing literature emphasizes that OOPHE can be also attributed to causes relatable to the country's health status. The argument is that the presence of chronic diseases pushes the population to spend continuously on medical services and, thus, generates financial catastrophe. In an empirical sense, the positive influences of health status

on citizens' CHE have been acknowledged by many scholars (e.g. Su et al., 2006; Abegunde and Stanciole, 2008).

The above discussion has made clear that the literature on the determinants of OOPHE and CHE is extensive and diverse. These determinants range from household socioeconomic characteristics to health system performance and economic indicators. However, most of the previous studies have focused on household surveys and there is very scant research on this issue using panel data techniques. Moreover, a distinguishing feature of this study would be its contribution to the literature by developing a measure for CHE in the context of panel data, as the existing literature (e.g. Wagstaff and van Doorslaer, 2003 and Xu et al. 2005) measures it for households using cross-sectional data.

4. Data and Methodology

4.1 Data

The study uses annual data for a sample of 40 Sub-Saharan African countries over the period 1995-2014. The data on health expenditure and health systems financing information is sourced from the National Health Accounts (NHA) database of the World Health Organization. The economic and demographic variables are gathered from several sources including the World Bank's development indicators and IMF Financial Statistics (IFS). Data on educational attainment is sourced from Barro and Lee database. Finally, we use the accountability index as a proxy for institutional quality. This index is obtained from the Varieties of Democracy Database (V-Dem).

4.2. Models Specification

To investigate the determinants of OOPHE and the factors that make it catastrophic, the study applies two regression models. First, to estimate the factors affecting OOPHE in SSA, the study employs a panel data technique to control for unobserved heterogeneity. The general notation for the model to be used can be specified in general form as follows:

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

Where y_{it} is the dependent variable in country i at time t ; X is a vector of explanatory variables; and α and β are parameters to be estimated. The

terms η_i and μ_t are time specific and country-specific effects, respectively; which are assumed to be independent and identically distributed (iid) over the countries and all time periods. Finally, the term ε_{it} is the error term.

Following the arguments of the previous studies on OOPHE, such as Xu et al (2011) and Wagstaff and van Doorslaer (2003) the model used to investigate the determinants of OOPHE in SSA can be specified as follows:

$$\text{OOPHE}_{it} = \beta_0 + \beta_1 \text{Eco}_{it} + \beta_2 \text{Soc}_{it} + \beta_3 \text{Health}_{it} + \beta_4 \text{Inst}_{it} + v_{it} \quad (2)$$

Where OOPHE_{it} is the dependent variable, captures out-of-pocket health expenditure as a percentage of total private health expenditures. The OOPHE variable is related to a set of explanatory variables including, economic, social, health system and institution characteristics of the country. The economic variables include per capita GDP, inflation, government expenditures, aid, and trade openness. The social characteristics include educational attainment, the level of urbanization, percentage of population under 15 years, percentage of the population between 15 and 64 years old and percentage of population above 65 years. The set of the country health characteristics include the prevalence of diseases, such as AIDS and Anemia among children. The health system factors are represented by health insurance coverage. The definition and the summary statistics of these variables are presented in Appendix I. Finally, the error term v_{it} in equation (2) is a composite disturbance term that includes an unobserved country-specific effect η_i and a time-specific effect μ_t as specified in equation (1).

Second, the study estimates a separate model to investigate the determining factors of catastrophic health expenditure (CHE). Following the lead of previous studies (e.g. Xu et al. 2003a, O'Donnell et al., 2008 and Ebaidalla and Ali, 2019), the CHE is defined as share of OOPHE from private health expenditures that equals or exceeds the two predetermined levels (thresholds), 30% and 50% of the population's capacity to pay. We follow Xu et al. (2005) and Wagstaff and van Doorslaer, 2003) in using a country's per capita private out of pocket health expenditures as an indicator for population capacity to pay. Thus, the model pertains to the determinants of CHE can be given by:

$$CHE_{it} = \beta_0 + \beta_1 Eco_{it} + \beta_2 Soc_{it} + \beta_3 Health_{it} + \beta_4 Inst_{it} + \beta_5 FER_{it} + \tau_{it} \quad (3)$$

Where CHE_{it} is CHE as measured by the share of OOPHE from private health expenditures in each country. The explanatory variables affecting CHE are indistinguishable from the factors that influence OOPHE in equation (2). Thus, the definitions of these variables remain as demarcated before.

4.3. Estimation strategy

To estimate the above two models, we use different estimation strategies. We use the panel data technique to estimate the first model, which focuses on the factors affecting the OOPHE. However, the possible endogeneity of regressors as well as the correlation of the unobserved country fixed effects with the error term implies that the orthogonality condition is not likely to be met for fixed effects (FE) or random effects (RE) estimator and; thus, may fail to produce consistent estimates. To account for the endogeneity of regressors, the appropriate method is to use instrumental variables (IV) estimator. Therefore, this study uses dynamic panel models based on the Generalized Method of Moments (GMM), developed by Arellano and Bond (1991).

The GMM dynamic method has many advantages over the conventional static panel data methods of the fixed effects and random effects models. First, the GMM model takes into account the time-series dimension of the data and, hence, it considers the short run effect. Second, it includes the non-observable country-specific characteristics. Finally, the GMM method treats all the explanatory variables as endogenous variables; hence it takes into account the potential problem of the endogeneity that may result from the correlation between the error term and the lagged dependent variable.

In literature, there are two methods of GMM models that have been widely used in estimating panel data regressions: the first-difference GMM estimator, developed by Arellano and Bond (1991) and the system GMM estimator, developed by Arellano and Bover (1995) and Blundell and Bond (1998). However, the literature has shown that there are some possible statistical problems associated with the use of the first-difference GMM estimator (Bond et al., 2001). That is, when the regressors are highly persistent, the instrumental variables used in difference GMM such

as lagged levels of the dependent variable and the explanatory variables might be weak instruments. In this situation, the first-differenced GMM model potentially suffers from a downward bias, especially when the time period (T) is small (Blundell and Bond, 1998). On the other hand, the system GMM estimator overcomes the weak instrument problem by allowing the use of the lagged differences and lagged levels of the explanatory variables or other variables as instruments. Therefore, the empirical analysis in this study relies solely on the system GMM technique.

The System GMM estimators are derived from the estimation of a system of two simultaneous equations, one in levels (with lagged first differences as instruments) and the second in first differences (with lagged levels as instruments). However, one possible problem that might arise when applying the system GMM is the invalidity of the lagged differences of the explanatory variables as instruments. Therefore, we examine the validity of the instruments by two tests: Sargan test of over-identifying restrictions, and Arellano and Bond (AB) test of serial correlation. Beside, the study tests the endogeneity problem applying Durbin (1954), Wu (1974) and Hausman (1978) endogeneity test.

On the other hand, the second model addresses the question about the determinants of CHE. Since the dependent variable is dichotomous (i.e. takes one if OOPHE exceeds the predetermined threshold level and zero otherwise), we use the dynamic random-effects probit model to estimate equation (3). We use the random effects model in the case of dynamic models with large sample (N) and short time period (T) as in our case because fixed effects generate inconsistent estimates as differencing out ε produces a linear regression model with lagged dependent regressors and serially correlated disturbances (Maddala, 1987).

5. Empirical Results and Discussion

This section presents the empirical results and discussion. The section is divided into two sub sections. Sub-section 5.1 reports some descriptive statistics about the dependent and independent variables. Sub-section 5.2 presents the estimation results of both OOPHE and CHE methods.

5.1. Descriptive Statistics

Before analyzing the factors that influence OOPHE and CHE, it is useful to briefly outline the pattern of the dependent variables (OOP health expenditure and catastrophic health expenditure) and the independent variables. Appendix I shows that the average out of pocket health payments is relatively high (40%), with higher standard deviation. This indicates that about 40% of health payments in SSA countries are paid by household's budget. The high variation in OOPHE also implies a high disparity in OOPHE across African countries. Likewise, the summary statistics in Appendix I shows that the proportion of households with catastrophic health spending is very high, reflecting the large out of pocket health payments in the region. Specifically, the mean of 30% and 50% threshold levels of CHE is about 70% and 50%, respectively; indicating large segment of population exposed to catastrophic health spending. This also means that a considerable portion of household's budget in SSA goes toward health payments. Appendix I also reveals that there is a remarkable variation in the economic performance of SSA countries, as explained by high standard deviation of economic indicators such as GDP, inflation and the share of trade in GDP. Moreover, the descriptive statistics reveal low disparities in the demographic characteristics of households in SSA, as indicated by low standard deviation of population under five years and above 65 years. Moreover, the statistics show some relative variation across countries in terms of urbanization, and the distribution of public goods such as electricity, clean water and sanitation. Furthermore, the descriptive statistics point out some variations in health situation and spread of diseases such as tetanus, HIV and anemia. Finally, the summary statistics indicate that SSA countries exhibit high disparities in institutional quality as represented by accountability. On the whole, these variations in economic, health and demographic characteristics may explain the high disparities in OOPHE and CHE in SSA region as shown in Appendix I.

5.2. Determinants of OOPHE

Table 1 reports the estimation results of equation 2 using GMM method. Interestingly, most of the variables' coefficients come out with expected signs, statistically significant and of acceptable magnitudes. For instance, the coefficient associated with the lagged OOPHE is negative and

statistically significant, indicating that OOPHE of the last year has a great say in determining current year's OOPHE.

Expectedly, the coefficient of the GDP per capita variable is negative and statistically significant. This indicates that achieving higher levels of growth in GDP per capita lowers the incidence of OOPHE. This outcome has many interpretations. First, the increases in GDP per capita is likely to improve livelihoods, and, thus, improves population healthiness. According to the argument of the human development index, the higher the GDP per capita the better will be the health status of the people. Also increase in GDP per capita may support people to change their lifestyle, particularly the aspects related to sanitation and health preventive measures. Achieving advancements on these aspects would make people healthier and therefore, lower OOPHE. Second, the higher GDP per capita indicates that the GDP has expanded, which means a larger taxable base and, then higher public revenues.

The coefficient in front of inflation variable is negative and statistically significant, signifying that higher inflation rate is accompanied by a great drop in OOPHE. The interpretation of this outcome is straightforward. A higher inflation rate is likely to deteriorate people purchasing power and, as a result, lower their purchases from all items including health care services. Nevertheless, the high inflation rates may sometimes result from higher public spending funded by expanding the monetary base. In the short run, if a larger share of such spending is directed to upgrade public health facilities it will contribute greatly in shrinking OOPHE.

Unexpectedly, the coefficient of the humanitarian aid variable is found to be insignificant, indicating that foreign aid has no impact on OOPHE. However, this outcome can be interpreted based on the fact that in the last decades, foreign aid inflow into the region has contracted or at least became growing at stagnant rates. The World Bank statistics (2017) shows that starting from the year 2007 onward; the share of official development assistance (ODA) in SSA's GNI has dropped below the level of 4%. These descending trends in aid may, in part, be attributed to the incidence of the international financial crises that engulfed the world economy from 2008 onward. Moreover, the changes in donors' preferences can be also claimed for these significant reductions in aid disbursement. In the era of globally shared values and concerns, donors become prioritizing issues such as human rights, political freedoms, democratic commitments, and fighting terrorism. Unfortunately, the

attitudes of the majority of SSA countries towards these issues do not converge with those of the donors. The divergence in the views on these issues may decrease the amount of aid transferred to SSA. In addition, some authors have argued that the decline in ODA after 2000 may resulted from changes in donors' priorities as many of them turn out to donate for countries in transition as well as for the new countries emerged due to the disintegration of the former Soviet Union (Loxley and Sackey 2008).

The coefficient of the government expenditure variable appears with an insignificant sign indicating that public spending fails to lessen OOPHE. It is worth to mention that, many African governments use their scarce resources to conduct high expenditures on security agendas instead of spending on public utilities. Thus, the rise in the shares of governments spending from GDP leaves OOPHE unaffected. Interestingly, the results indicate that trade openness leads to significant increases in OOPHE. This can be inferred by the positive and significant coefficient associated with the trade variable. In part, this outcome can be explained by the fact that SSA governments adopt an open trade policy along with other packages of policies, including structural adjustment programs, privatization, and economic liberalization. Adopting these policies would certainly push governments to implement strict austerity measures and, as a consequence, cut expenditures on public facilities and encourage the private sector to involve in its provision.

The results show that the educational equality seems to have no effect on OOPHE. This may be attributed to the poor educational attainment among SSA population. Shifting to demographic factors, the reported findings show that increases in population members with an age that is greater than 65 years cause no evolution in OOPHE. This outcome can be interpreted by the fact that the life expectancy at birth in SSA is, on average, 61 years, indicating smaller proportion of elders among population (World Bank, 2017). Alternatively stated, the smaller portion of the population who live more than 60 years is quite low and, thus, it has no significant effects on OOPHE. Similarly, increases in the number of the population with an age lesser than 14 years are found to have no impact on OOPHE. It worth to mention that health matters related to this category of the population enjoys great attention from both local and international organizations. In other words, the provision of free healthcare facilities via these organizations reduces OOPHE that could be paid in the absence of these interventions.

The results also show that the coefficient of the urban population variable is significant and carries a positive sign, indicating that the growth in this category of population boosts OOPHE. This outcome is expected since the majority of SSA countries expose to huge waves of immigration from rural to urban areas. According to the World Bank's statistics, the percentage of the population who reside in urban areas in SSA grew from 14% in 1960 to 38% in 2016 (World Bank, 2017). This dramatic growth rates in urban residents are likely impose great pressures on health care services in urban areas and, as a result, increases OOPHE. Moreover, the positive and significant sign of the urban population variable may indicate that urban residents, compared to rural one, are more enlightened about health matters, seek high-quality health services and, therefore, expose to high health spending.

Table 1: GMM Estimates: The Determinants of OOPHE in SSA

The dependent variable: log OOPHE				
Variable	Coefficient	S. E	Z	P-value
OOPHE(-1)	0.8140***	0.0283	28.67	0.000
GDP	-	0.0462	-2.60	0.009
Inflation	0.1201***	0.0002	-2.07	0.038
Humanitarian aid	-0.0005**	0.0011	0.27	0.788
Government spending	0.0003	0.0023	0.74	0.458
Trade	0.0017	0.0003	2.78	0.005
Educational quality	0.0009***	0.0344	1.61	0.107
Population age >65	0.0555	0.0450	0.44	0.662
Population age <14	0.0197	0.0101	0.51	0.610
Urban	0.0051	0.0030	2.44	0.015
Undernourished	0.0074**	0.0018	-0.43	0.667
Sanitation	-0.0008	0.0024	1.95	0.051
Water	0.0047**	0.0021	2.63	0.008
Electricity	0.0055***	0.0019	-1.45	0.146
Tetanus	-0.0028	0.0009	-2.09	0.036
HIV	-0.0018**	0.0207	1.20	0.232
Anemia	0.0247	0.0024	2.34	0.019
Accountability	0.0055***	0.0506	-2.70	0.007
Constant	-	0.1363***	0.69	0.488
	0.4777	0.6896		

Note: ***, **, and * indicate significance at the 1, 5 and 10 percent levels, respectively.

The prevalence of undernourishment appears to have no effect on OOPHE. As can be indicated from Table 1, the coefficient of the variable is insignificant, indicating that undernourishment does not OOPHE. This outcome can be interpreted by the fact that undernourished people do not secure enough income to conduct health expenditures. This category of the population may resort to traditional healers or visit medical practitioners in health public facilities which provide free health services.

Interestingly, the coefficients of sanitation variable and water are both positive and statistically significant. These results, which oppose our prior expectations, may indicate that smaller proportions of the population are furnished with health-improving facilities. According to the World Bank (2017), only 29% of the SSA population has access to improved sanitation facilities, indicating the presence of poor sanitation in the region. This percentage drops to 23.30%, when rural residents are considered. Similarly, although SSA region is very rich in terms of waters resources, the percentage of the population with access to improved waters facilities is 67%, while it declines to 55% for rural population (World Bank, 2017). This reality would not reduce the waves of OOPHE being encountered by population, particularly rural residents. The accessibility to electricity predicts the same neutral effects on OOPHE. The variable coefficient is found to be insignificant even at a conventional level indicating no desirable effects on OOPHE.

Expectedly, expanding the coverage of immunization against tetanus among newborn children is found to exert a desirable impact on OOPHE. The coefficient of the tetanus variable is negative and statistically significant, indicating that application of tetanus vaccine to children leads to significant decreases in OOPHE. The growth in the number of new HIV infections among uninfected populations ages 15-49 is found to have no significant effect on OOPHE. The coefficient of the HIV variable, although it carries a positive sign, however, it is statistically insignificant. The possible interpretation for this outcome is that in the early period of HIV infection, infected persons are less likely to take medical treatments. Moreover, even for those who live in the maturity period of the virus and develop some complications such as exposure to opportunistic infections, the cost of treatments is mostly be paid by international organizations and local charities. The prevalence of Anemia among under-five children seems to lead to significant increases in OOPHE. This can be indicated by the coefficient associated with the anemia variable which is positive

and statistically significant demonstrating that the increases in the percentage of under-five children whose hemoglobin level is less than 110 grams per liter would raise OOPHE.

Remarkably, and most importantly, the coefficient in front of the accountability variable is negative and statistically significant, indicating the pivotal role of heightening accountability measures in shrinking OOPHE. This result may also support the argument which states that making government officials accountable for their actions and policies would improve the effective utilization of public resources. In other words sustaining accountability measures in public offices would secure the fair delivery of health care services and, thus, diminishes OOPHE.

5.3. The Determinants of CHE

Table 2 displays the estimation results of the random effect probit model pertains to the factors that push the share of OOPHE from private health expenditures exceeding 50% and 30% (i.e. $OOPHE \geq 50\%$ and 30% of private health expenditures). As the table shows, the coefficients of the explanatory variables generate different effects on the CHE than that we observe in the case of OOPHE. For instance, the coefficients associated with variables such as GDP per capita and inflation turns out to be statistically insignificant in CHE model.

Different from OOPHE estimates, the coefficient of government expenditures (% GDP) variable is found to be negative and statistically significant. This indicates that the increase in share of government expenditures in GDP decreases the probability of undertaking CHE. In contrast to the results reported in Table 1, the coefficient of trade variable is positive and statistically insignificant, indicating that the adoption of trade openness has on impact on the likelihood of undertaking CHE.

Dissimilar from the results reported in Table 1, the educational equality variable appears to have a positive effect on CHE. Specifically, the coefficient of the variable is positive and statistically significant. This indicates that achieving higher educational quality among population increases the likelihood of conducting CHE. The coefficients of the population with age greater than 65 and less than 14 years variables are similar to those displayed in Table 1. This indicates that the growth in these two categories of population has no significant effects on the

likelihood of incurring CHE. Unlike the findings obtained on the determinants of OOPHE, the variables of sanitation and water appear with negative and statistically significant coefficients. This implies that raising population's accessibility to improved sanitation and water facilities lower the probability of incurring CHE.

Table 2: Random Effect Probit Estimates: The Determinants of CHE in SSA
(OOP>50 &>30)

Variable	50% Threshold CHE level	30% Threshold CHE level
GDP	0.7795 (1.2376)	1.832 (3.118)
Inflation	0.0066 (0.0114)	-0.005 (0.030)
Humanitarian aid	-0.0181 (0.0370)	0.025 (0.090)
Government spending	-0.1401* (0.0822)	0.025 (0.276)
Trade	0.0316 (0.0142)	0.013 (0.052)
Educational quality	3.1936** (0.9894)	6.549*** (1.639)
Population age >65	1.6176 (1.4674)	2.363 (2.322)
Population age <14	0.2732 (0.2103)	0.136 (0.606)
Urban	-0.0242* (0.0584)	-0.193 (0.118)
Undernourished	-0.0857 (0.0471)	-0.119 (0.131)
Sanitation	-0.1030** (0.0529)	-0.095 (0.118)
Water	-0.1136** (0.0511)	-0.188 (0.120)
Electricity	0.0733 (0.0522)	-0.138 (0.145)
Tetanus	-0.0048 (0.0321)	-0.104 (0.072)
HIV	-1.2385* (0.6996)	2.440 (1.564)
Anemia	0.0917** (0.0476)	0.438*** (0.135)
Accountability	-2.6429* (1.4080)	-10.99*** (3.962)
Constant	-10.386 (17.314)	8.48 (32.90)

Notes: ***, **, and * indicate significance at the 1, 5 and 10 percent levels, respectively. Values in parentheses are standard errors

In a complete conformity with the results obtained from the OOPHE model, the prevalence of anemia among under-five children increases the likelihood of incurring CHE. In contrast, the likelihood of experiencing CHE decreases with increases in the number of new HIV infections among uninfected populations. As mentioned previously, this outcome can be interpreted by the fact that health expenditures on HIV are mainly covered by health organizations.

The accountability variable carries a negative and statistically significant coefficient. This lends further support to the results reported in Table 1, confirming the effectiveness of accountability in mitigating the incidence of OOPHE in general and CHE in particular.

Turning to the factors that lead households to incur CHE at 30% threshold level, column three in Table 2 shows that the economic characteristics of the countries under consideration including GDP per capita, inflation and trade openness place no effect on the probability of undertaking CHE that equal or exceeds 30% of total private health expenditures. Similarly, the demographic factors such as population with ages greater than 65 and less than 14 years old, urban population, the presence of humanitarian aid have no impact on the probability of incurring CHE beyond the level that equals or exceeds this threshold.

With children infected by anemia as an exception, the morbidity characteristics are also found to have no effect on the probabilities of the population being burdened by CHE. As can be seen from column 3, the anemia children with anemia variable is found to be positive and statistically significant, indicating that the incidence of anemia disease among children increases the likelihood to undertake CHE that exceeds or equals to 30% of the total private health spending. In general, the positive and highly significant coefficients associated with this variable in the two models (i.e. 50% and 30% threshold levels of CHE) confirm that the incidence of this disease leads to CHE.

Similar to the findings of previous models, the coefficient of the accountability variable come up with a negative and statistically significant sign confirming the importance of institutional quality in determining the pattern of OOPHE in the region. Specifically, the negative and statistically significant coefficient accompanied this variable

indicate that of the level of accountability in SSA region lower the probabilities of undertaking CHE.

6. Conclusion and Policy Implications

This study aims at investigating the factors that lead the population in SSA to incur out-of-pocket health expenditure (OOPHE). The study also examines the factors that push normal OOPHE to become catastrophic. To this end, we apply both the Generalized Method of Moments (GMM) and random effect probit techniques to a panel data set pertain to 40 SSA countries spanning over the period 1995 to 2014. The results show that increases in GDP per capita and inflation rates reduce OOPHE. Conversely, the degree of trade openness is found to increase OOPHE. Yet, these economic factors have no significant effect on probabilities of pushing OOPHE to become catastrophic. With the growth in the urban population as an exception, the demographic variables such as the percentage of population with an age above 65 and under 15 years are found to have no significant effects on OOPHE. However, the increase in urban population generates significant increases in OOPHE, signifying the explosion in the urban population.

The results also show that the morbidity factors such as the prevalence of anemia and tetanus among children increase OOPHE. Specifically, the high incidence of anemia among children increases OOPHE and raises the probabilities for incurring CHE. The increases in government expenditures as a percentage of GDP although found to have no effect on OOPHE but it decreases the probability of undertaking CHE. Interestingly, in all models, the coefficients of the accountability variable are found to be negative and statistically significant. This indicates that sustaining higher level of accountability leads to significant decreases in OOPHE and prevents from incurring CHE.

Based on these findings, many recommendations can be suggested. First, policymakers should coin measures and strategies to protect population from the burden of OOPHE. These measures may include, but not limited to, the establishment of high-quality health facilities to achieve high health utilization. Second, health insurance schemes need to be expanded to cover large proportions of the population, especially those who belong to vulnerable categories. Third, the levels of accountability and governance in public offices need to be heightened to guarantee a fair

provision of healthcare services to the targeted population. Fourth, the policymakers need to work on sustaining a balanced regional development since this may lower the rates of immigration from rural to urban areas. Taking such policy action would minimize the pressures on health care facilities in urban centers and, therefore, lighten the burden of OOPHE. Finally, a wide range of healthcare services and nutrition programs need to be launched in order to cut the prevalence of diseases such as anemia and tetanus among newborn children in the region.

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Appendix I: Definition and Descriptive Statistics of the Variables to be used in the Regression Analysis

Variable	Definition	Mean	Std. Dev.
OOPHE	Out-of-pocket health expenditure (% of private expenditure on health)	39.4045	18.9379
30% CHE	1= if CHE equal or exceeds 30% and 0= otherwise	0.7249	0.2637
50% CHE	1= if CHE equal or exceeds 50% and 0= otherwise	0.5159	0.3878
GDP	Real gross domestic product (constant 2010, in U.S. million dollars)	24000	63700
Inflation	Inflation, consumer price (annual %)	22.8384	208.3946
Humanitarian aid	Humanitarian aid (% of GDP)	0.0062	0.0177
Government spending	Government spending (% of GDP)	15.3154	7.2377
Trade	Exports + imports (%of GDP)	77.7157	48.7472
Educational quality	Educational equality measures to what extent is high quality basic education guaranteed to all, sufficient to enable them to exercise their basic rights as adult citizens?	-0.1297	0.9437
Population age >65	Population ages 65 and above (% of total)	3.3406	1.0724
Population age <14	Population with ages under 14 as a percentage of the total population.	42.6779	5.2869
Urban	Rural population (% of total population)	63.8210	15.1061
Undernourished	Prevalence of undernourishment (% of population)	25.4613	13.7973
Sanitation	Improved sanitation facilities (% of population with access)	32.0273	21.9364
Water	Improved water source, urban (% of urban population with access)	66.4600	16.7131
Electricity	Access to electricity (% of population)	32.0119	25.2325
Tetanus	Newborns protected against tetanus (%). Newborns protected against tetanus are the percentage of births by women of child-bearing age who are immunized against tetanus.	73.7607	15.5645
HIV	Incidence of HIV (% of uninfected population ages 15-49. Number of new HIV infections among uninfected populations ages 15-49 expressed per 100 uninfected populations in the year before the period.	0.6406	0.8980
Anemia	Prevalence of anemia, children under age 5, is the percentage of children under age 5 whose hemoglobin level is less than 110 grams per liter at sea level.	66.6384	14.1277
Accountability	Accountability index which measures to what extent is the ideal of government accountability achieved?	0.4205	0.6636

Forecasting Volatility of Selected Banks of Dhaka Stock Exchange (DSE), Bangladesh with GARCH (p, q) Type Models

Hossain, M.S.¹, Baten, M.A.² and Mukta, F.B.³

ABSTRACT

Stock price volatility is an indication of unreasonable market performance in Bangladesh although stock prices produce valuable information to safeguarding the competence of capital markets. The objective of this paper is to study the volatility and forecasting volatility of selected Banks of the Dhaka Stock Exchange (DSE) by using Generalized Autoregressive Conditional Heteroscedasticity (GARCH) models. The volatility of DSE returns of selected banks Brac bank, City Bank, Pubali bank, and Eastern bank have been modelled from 2008 to 2018 based on a daily scale. The asymmetric volatility model E-GARCH and GJR-GARCH perform better in modelling the volatility of selected banks of DSE. There is a significant impact of positive shocks on volatility for Brac and Eastern banks whereas for City bank negative shocks tend to produce higher volatility. Volatility is persistent for City, Pubali, and Eastern banks meaning that in upcoming days they could be affected by volatility. The fitted models for Brac, City, and Eastern banks performed well in backtesting while Pubali bank does not perform well. In the upcoming days all bank's volatility will have a chance to be increasing where Brac bank is less volatile and Pubali bank is the most volatile bank of DSE.

ملخص

يُعد تقلب أسعار الأسهم مؤشراً على أداء السوق غير عقلاني في بنغلاديش على الرغم من أن أسعار الأسهم تُنتج معلومات قيمة لحماية كفاءة أسواق رأس المال. ويتمثل الهدف من هذا المقال في دراسة التقلبات والتنبؤ بتقلبات البنوك المختارة في بورصة دكا (DSE) باستخدام نماذج التباين الذاتي

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الشرطي المعمم (GARCH). وقد تم نمذجة تقلبات عائدات بورصة دكا بالنسبة لبنوك مختارة تشمل بنك براك وبنك سيتي وبنك بوبالي والبنك الشرقي من عام 2008 إلى عام 2018 بناء على مقياس يومي. ويعمل نموذجي التقلبات غير المتماثلة، التباين الذاتي الشرطي المعمم المتسارع (E-GARCH) والتباين الذاتي الشرطي المعمم-جلوستن، جاغاناثان، رانكل (GJR-GARCH) بشكل أفضل في نمذجة تقلبات البنوك المختارة التابعة لبورصة دكا. وإن هناك تأثير كبير للصدمات الإيجابية على التقلبات في مصرف براك والبنك الشرقي، بينما تميل الصدمات السلبية إلى زيادة التقلبات فيما يتعلق ببنك سيتي. وتستمر التقلبات في الاستمرار بالنسبة لكل من بنوك سيتي وبوبالي والشرق الأمر الذي يعني أنها قد تتأثر بالتقلبات في الأيام القادمة. وكان أداء النماذج المتوائمة لبنوك براك وسيتي والشرق جيدا في التنبؤ العكسي بينما أداء بنك بوبالي لم يكن كذلك. وفي الأيام المقبلة، ستكون هناك فرصة لتزايد تقلبات البنوك حيث يكون بنك براك أقل تقلبا وبنك بوبالي هو البنك الأكثر تقلبا في بورصة دكا.

ABSTRAITE

La volatilité des prix des actions est une indication de la performance déraisonnable du marché au Bangladesh bien que les prix des actions produisent des informations précieuses pour sauvegarder la compétence des marchés de capitaux. L'objectif de cet article est d'étudier la volatilité et la prévision de la volatilité de certaines banques de la Dhaka Stock Exchange (DSE) en utilisant des modèles GARCH (Generalized Autoregressive Conditional Heteroscedasticity). La volatilité des rendements du DSE de certaines banques - Brac bank, City Bank, Pubali bank et Eastern bank - a été modélisée de 2008 à 2018 sur la base d'une échelle quotidienne. Les modèles de volatilité asymétrique E-GARCH et GJR-GARCH sont plus performants pour modéliser la volatilité des banques sélectionnées du DSE. Il y a un impact significatif des chocs positifs sur la volatilité pour les banques de Brac et de l'Est, tandis que pour la banque de la ville, les chocs négatifs ont tendance à produire une volatilité plus élevée. La volatilité est persistante pour les banques City, Pubali et Eastern, ce qui signifie qu'elles pourraient être affectées par la volatilité dans les jours à venir. Les modèles ajustés pour les banques Brac, City et Eastern ont donné de bons résultats dans le backtesting, tandis que la banque Pubali n'a pas donné de bons résultats. Dans les prochains jours, la volatilité de toutes les banques aura une chance d'augmenter, la banque Brac étant moins volatile et la banque Pubali étant la plus volatile du DSE.

Keywords: Volatility, Forecast, GARCH, Selected Banks, Dhaka Stock Exchange

JEL Classification: O16, N2, G11, G17, G21

1. Introduction

The stock market is the powerhouse of the world economy and plays an important role in mobilizing savings and investments for organizing the production of goods and services, creating employment opportunities, and enhancing economic development (Ahmed et al., 2014). There are two stock exchanges namely the Dhaka stock exchange (DSE) and Chittagong stock exchange (CSE) (Sarbabidya & Saha, 2018). Dhaka stock exchange (DSE) functions as a strong mechanism in the industrialization and economic growth of Bangladesh.

Volatility is mainly related to investment markets and it is referring to fluctuation or movement in the price of a particular stock or index major over some period of time (Roni, et al., 2017; Mala & Reddy, 2007). The collapse of the stock market always tends to trigger a financial crisis and push the economy into recession. Most of the major stock markets in the world were greatly affected by this global financial crisis (Oseni & Nwosa, 2015). Over the past two decades, the Bangladesh stock market has to face two big bubbles the first time in 1996 and the second time in 2011. Reasons of recent catastrophe in stock market involving the lack of government awareness/control over the stock market, political instability, uncontrollable macroeconomic factors, syndication or manipulation in the stock market, scarcity of information or reliable information, trade & budget deficits, lack of proper knowledge/ skill of investors (Hossain & Islam, 2012; Saha, 2012).

Despite of all these factors that increase volatility, to make the stock market efficient and reduce uncertainty, volatility modeling and forecasting is necessary for the policymakers, researchers, and practitioners. Some of them have given an effort to find the volatility persistency property of the stock return, some tried to model the risk return relationship while some others tried to forecast the volatility only. But there lies in contradiction and lack of knowledge among the researchers about the robustness of the volatility model. As it is not possible to control volatility or cannot completely eradicate this financial hazard; it is possible to know the future situation of the volatility. A timely accurate forecast with early warnings with sufficient lead time is one of the best way to reduce the loss of stocks which may enhance the sustainability of the economic growth of Bangladesh. Therefore, the main objective is to study the volatility and forecasting volatility of selected

Banks of Dhaka Stock Exchange by using Generalized Autoregressive Conditional Heteroscedasticity (GARCH) type models. Motivated by the limited research in this sector and the drawback of methods used in previous studies will develop this study to reach into the defined goal. Moreover, the current study tries to address the questions: What is the current situation of volatility in the commercial Banks of DSE? What are the impacts of the leverage effect (rumors, bad news) on volatility? And what could be the future scenario of volatility in the selected Banks of DSE?

Due to strong economic growth in the region, South Asian capital markets have become more attractive investment opportunities for foreign and domestic investors. Compared to any other country in South Asia, Bangladesh has made significant progress in economic development in the last two or three years and the Bangladeshi stock market especially the commercial banks have played an important role in this economic progress (The Financial Express, 2019). The Dhaka Stock Exchange (DSE) is one of the most vibrant, well-functioning and efficient stock market in South Asia with a favorable outlook for investors (Islam & Alam, 2019). This could be a growing concern for many national and international traders, especially for South Asian traders as well as Chinese and Japanese.

The remaining sections of this paper are organized as follows: A review of related literature presents the most relevant domestic and international studies on the stock market, volatility and volatility forecasting was carried out in section two. The focus of section three is the research methodology, estimation techniques, analytical tools, data collection and data requirements for modeling and forecasting volatility of DSE. Section four is concerned with data analysis as well as the various data presentation techniques used and estimated results of the analysis. The summary and conclusion from the study, recommendation and policy implications in this field covered in section five.

2. Literature Review

The necessity of modelling and forecasting of stock market volatility has been extensively explored in developing and developed countries in last few years. For accurate modelling of stock market volatility some researchers used Support Vector Machines (SVM), ARIMA model, VAR

model, ANN model, GARCH model (Adebiyi, et al., 2014; Pai & Lin, 2004). For example, Wang (2010) investigates the time-series relationship between stock market volatility and macroeconomic variable volatility for China using exponential generalized autoregressive conditional heteroscedasticity (EGARCH) and lag-augmented VAR (LA-VAR) models and found that there is a bilateral relationship between inflation and stock prices. Oseni & Nwosa, (2015) employed EGARCH (p, q) technique to examine the volatility in stock market and macroeconomic variables. Abdalla (2017) employed a bi-variate vector autoregressive-generalized autoregressive conditional heteroscedasticity model to investigate the stock market fluctuation. Ashraf & Noor (2010) investigated the impact of financial intermediary factors on stock market bubbles by using two techniques: first a simulation based technique and second an ordinary least square regression technique. According to a study by Liu and Hung (2010), GJR-GARCH has achieved better volatility forecasts where E-GARCH is slightly behind. In contrast, Mukherjee and Mishra (2010) found that E-GARCH is better compared to the T-GARCH (also referred to as GJR-GARCH) model for the SENSEX returns. Lee, et al. (2008) found that Bayesian Chiao's (BC) was selected the best model for short-term forecasting while SARIMA model was considered as the best model for mid-term and long-term forecasting. McMillan et al. (2000) revealed that GARCH, moving average and smoothing models produced marginally better daily volatility forecasts whereas the random walk model gives immensely better monthly volatility forecasts. Ederington & Guan (2005) reported that in emerging stock markets, GARCH (1,1) model outperforms for volatility forecasting. Al-Zeaud (2011) conducted a study on modeling and forecasting volatility using ARIMA model and found that ARIMA (2,0,2) is the best model in the banking sector.

Sharif & Hasan, (2019) found that for predicting stock prices Holt's Method performs better for short time than a long time interval. Abdullah, et al., (2018) applied various GARCH models to forecast future volatility and examined that GARCH (2,1) and EGARCH (1,3) is the best model to capture volatility. Roni, et al., (2017) suggested that (TGARCH) model is more accurate for the model accuracy and statistic error measurements and also indicates that the GARCH model is more efficient than others and it has also more forecasting ability. Khan & Hossain, (2016) examined the GARCH type models for capturing the stylized factors of the stock index return's volatility. The appropriateness of the GARCH (1,

1) model has been endorsed by Miah & Rahman, (2016) who conducted their study on Dhaka Stock Exchange (DSE) returns of four selected companies, namely BEICL, BPL, PBL and ABBL for the period January 2000 to November 2014. Hossain, et al., (2015) found that for projecting volatility of DSE, Vector Autoregressive (VAR) model performs better than the ARIMA model and they give further direction to use the GARCH model.

In economic and financial data, time-varying volatility is more common than constant volatility and by reviewing the literature, for accurate modeling of time-varying volatility or variance dynamics, GARCH models perform better than other models and some suggested to use GARCH model (Hossain, et al., 2015; Malik, 2017). As such, GARCH models differ from homoscedastic models which assume a constant volatility. That's why in this study GARCH models will be used to predict or forecast volatility. Many researchers have examined the volatility of stock market by considering different models for different time period and sample size and found contradictory results in some cases. Very limited numbers of scholar tried to modelling and forecasting volatility but there exists plenty research gaps in their works. For example, many researchers used traditional techniques such as regression analysis technique, ARIMA, SARIMA etc. to model and predict volatility but these methods are completely failed to capture the "stylized facts" of financial returns such as volatility clustering, fat tails, leverage effect etc. (Cont, 2001) and most importantly it's quite impossible to find out any seasonal pattern in the time-varying volatility. To capture the asymmetry effect of stock returns, asymmetric volatility model E-GARCH and GJR-GARCH can perform better but most of the studies didn't consider this issue and just used simple GARCH i.e. GARCH (1,1) model. A few articles have been studied in Bangladesh to predict volatility and most of them just fitted several models and made comparisons among them (Islam, et al., 2012; Alam, et al., 2013; Kamruzzaman, et al., 2017). Most of the researchers in Bangladesh used the DSEX index (general index) for modeling volatility, none of them focused on the specific Companies volatility modeling except Miah & Rahman, (2016). And as a methodological-based study obviously the novelty of this paper lies in the detailed procedure of the applied models (GARCH type models) with historical Backtesting procedure.

3. Data and Methodology

3.1. Data Description and Variables

Time series data are used for modeling volatility on the daily closing prices of Banks in DS30 (leading 30 Companies on 10th January 2019) named as BRAC BANK, CITY BANK, EBL (Eastern Bank Limited), and PUBALI BANK for the period from March 2008 to December 2018 based on daily scale. Among the five banks of DS30, due to the unavailability of data NBL (National Bank Limited) could not be considered in this study. The data are collected from DSE library, 9F Motijhil Commercial Area, Dhaka, Bangladesh; Stock Bangladesh, 99 Kazi Nazrul Islam Road, Towfiq Hossain Ave, Dhaka; Unique Trade Centre, Panthapath, Dhaka; Bangladesh Securities and Exchange Commission (BSEC), Agargaon, Dhaka and Bangladesh Bank.

In this data set, among 11 variables (DATE, TRADING CODE, LTP, HIGH, LOW, CLOSEP, YCP, CHANGE, TRADE, VALUE (mn), and VOLUME) only the most important variables including DATE, TRADING CODE, CLOSEP (closing price) are used for this study. Daily returns (r_t) are calculated from equation (1) as the continuously compounded returns which are the first difference in logarithm of closing prices of each selective Companies of successive days:

$$r_t = \ln \left(\frac{p_t}{p_{t-1}} \right) * 100 \quad (1)$$

Where p_t and p_{t-1} are the closing price of each selective Companies at the current day and the previous day respectively and log is Natural Logarithm.

3.2. Empirical Methods

The perfect modeling of the conditional mean can be considered as a prerequisite of correct model specification of the conditional variance of the stock market return. Along with independent variables researchers of volatility modeling usually augment the conditional mean model either with Autoregressive (AR) or with Moving Average (MA) or even with a mixture of these two (Autoregressive Moving Average, ARMA) process. In this study ARMA specification is used as a conditional mean model in the following way:

$$y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots + \phi_p y_{t-p} + \theta_1 e_{t-1} + \theta_2 e_{t-2} + \dots + \theta_q e_{t-q} + e_t \quad (2)$$

Where, y_t is the differenced series, c is a constant term, $\phi_1, \phi_2 \dots \phi_p$ are the coefficients of autoregressive part, $\theta_1, \theta_2 \dots \theta_q$ are the coefficients of the moving average part and e_t is the error term.

Considering the following general specification of the variance model: $\epsilon_t = \sigma_t v_t$ where $v_t \sim IID(0, 1)$ and specification of σ_t determines different varieties of GARCH family models; the following models have been used to analyze the different feature of stock market return with volatility.

3.2.1. Generalized Autoregressive Conditional Heteroscedasticity (GARCH) Model

For accurate modelling of time-varying volatility or variance dynamics, Tim, (1986) extended the Engle, (1982) ARCH model into the generalized ARCH (GARCH) model. The general form of GARCH (p, q) model is defined as follows:

$$z_t = \mu_t + \epsilon_t, \text{ where } \epsilon_t \sim N(0, \sigma_t^2) \quad (3)$$

$$\epsilon_t = \sigma_t v_t, \text{ where } v_t \sim IID(0, 1)$$

$$\sigma_t^2 = \omega + \alpha_1 \epsilon_{t-1}^2 + \alpha_2 \epsilon_{t-2}^2 + \dots + \alpha_q \epsilon_{t-q}^2 = \omega + \sum_{i=1}^q \alpha_i \epsilon_{t-i}^2 + \sum_{j=1}^p \beta_j \sigma_{t-j}^2$$

Where μ_t is the conditional mean of GARCH (p, q) model along with ARMA specification which is showed above by equation (1), σ_t^2 is conditional variance, ϵ_{t-i}^2 is squared residual return, σ_{t-j}^2 is the past conditional variance and p and q denotes the lag order of GARCH and ARCH terms respectively. The most commonly used GARCH model is GARCH (1, 1) that meets

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2, \omega > 0, \alpha, \beta \geq 0 \quad (4)$$

Where ω , β and α are the parameters, which are assumed to be non-negative to guarantee that volatility is always positive. This model is able to capture the volatility clustering. $\beta + \alpha < 1$, implies that the volatility is

stationary and the speed for which the shock to volatility decays becomes slower as $\beta + \alpha$ approaches to one.

3.2.2. Exponential GARCH (EGARCH) Model

The exponential GARCH (EGARCH) model developed by (Nelson, 1991) can demonstrate the existence of asymmetry in volatility with respect to the direction of real growth. The EGARCH (p, q) model is given by

$$\ln(\sigma_t^2) = \omega + \sum_{i=1}^p \alpha_i \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + \sum_{j=1}^q \beta_j \ln(\sigma_{t-j}^2) + \sum_{k=1}^p \gamma_k \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| \quad (5)$$

The left side of the equation is logarithmic conditional variance, which means that the leverage effect is exponential, not quadratic. The existence of leverage effect (γ) is tested through the hypothesis. Further, the variance of the right side of the equation coefficients can be positive or negative.

3.2.3. Glosten-Jagannathan-Runkle GARCH (GJR-GARCH) Model

The GJR-GARCH model is proposed by Glosten, Jagannathan and Runkle (1993) to capture the asymmetry of data. The GJR-GARCH (p, q) model is as follows:

$$\sigma_t^2 = \omega + \sum_{i=1}^p \alpha_i \sigma_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j}^2 + \sum_{k=1}^p \gamma_k \sigma_{t-k}^2 d_{t-k} \quad (6)$$

Where d_t is a dummy variable, defined by the time $\varepsilon_t < 0$, $d_t=1$; then as long as $\gamma_k \neq 0$, the asymmetric effect exists. In the above equation, the term asymmetric effect of items, good information $d_t=0$ will have an impact time, and bad information will have another impact. The equation demonstrates the asymmetric effect and the good rumor have a low impact on the volatility returns in the stock market which is associated with leverage effect.

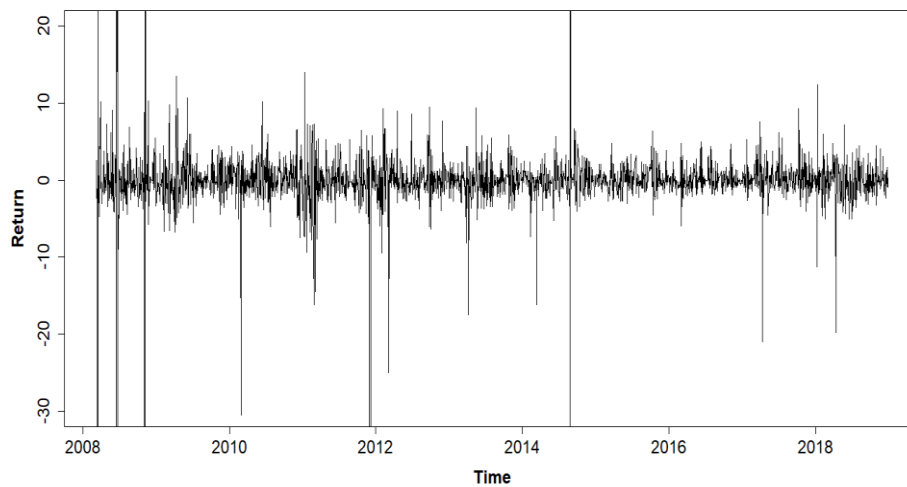
4. Empirical Results

4.1. Basic Statistical Analysis

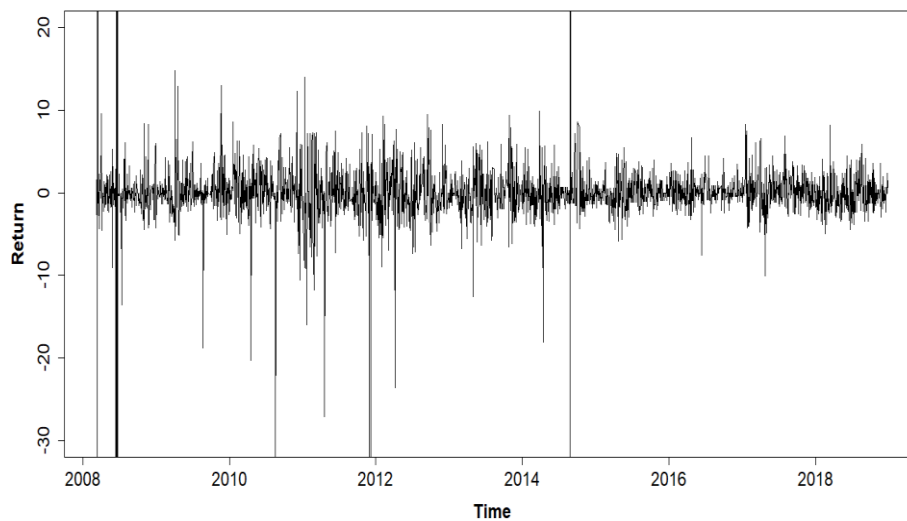
From Figure 1 it is observed that the return series appears to be stable with an average return of approximately zero: however the volatility or

variability of the data changes over time. In fact, the data shows volatility clustering, which is highly volatile periods tend to be clustered together means there is no visual evidence of serial correlation in the return but there is evidence of serial correlation in the amplitude of the returns.

BRACBANK Return Series



CITYBANK Return Series



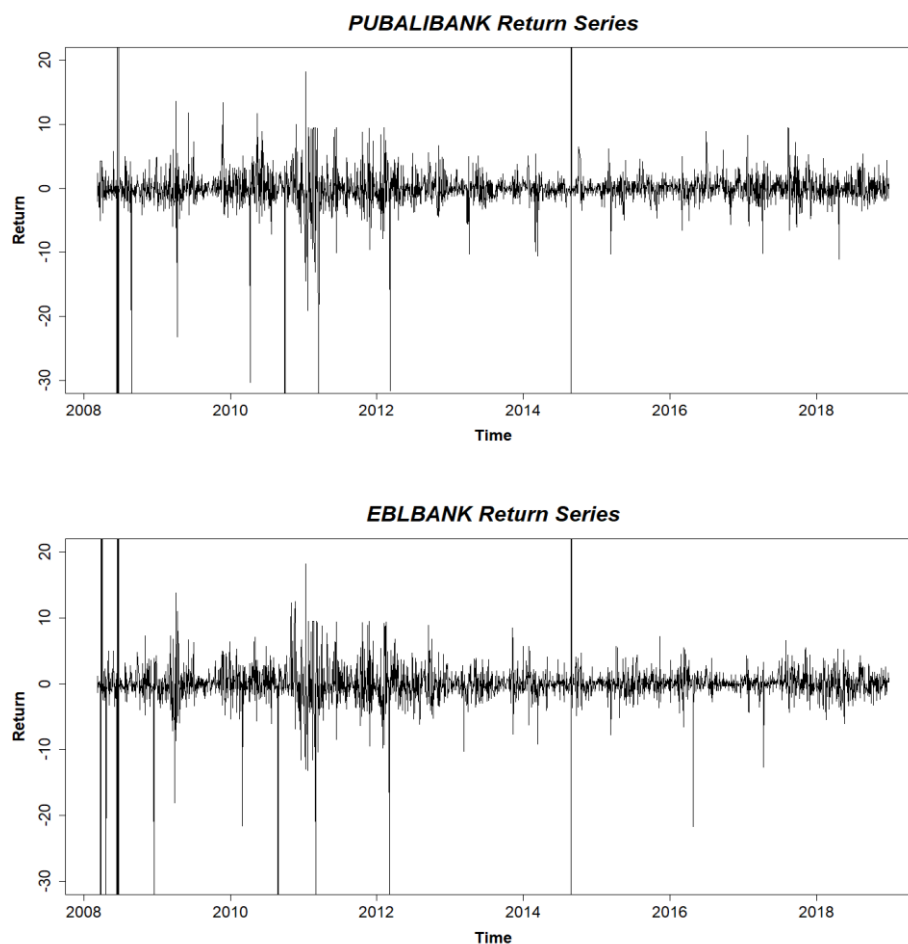


Figure 1: Distribution of Daily Return Series Data of selected Banks

From Table 1, it is observed that the average daily returns of all the banks lie between (-0.11 to -0.14) where the standard deviations are in (28.51 to 39.72) that reflects high level of dispersion from the average return in the share market. The mounting gap between maximum and minimum returns for the selected banks gives high volatility of price changes in the DSE which showed the shape of distribution too. Here the positive or negative value of skewness indicates asymmetry of the series and the large value of kurtosis around (500) suggests shocks of either are more likely to be present the return series are clearly leptokurtic which support the works of Khan & Hossain, (2016); Miah & Rahman, (2016) and Panait & Slăvescu, (2012).

Table 1: Descriptive Statistics of Daily Return Series

	Name of the Banks			
Descriptive Statistics	Brac Bank	City Bank	Pubali Bank	Eastern Bank
No. of observation	2595	2595	2595	2595
Mean	-0.11	-0.12	-0.14	-0.13
Standard deviation	39.72	36.91	28.51	39.48
Minimum	-701.75	-643.49	-676.65	-693.34
Maximum	698.66	643.49	676.94	691.55
Skew ness	-0.21	-0.11	-0.16	-0.08
Kurtosis	281.74	283.22	497.14	279.63

Source: Author's computation

Since from Figure 1 the mean reversion would possibly be quite frequent in the stock return series of four banks, it might contain the stationary condition of time series. To check the stationary of the return series Augmented Dickey-Fuller Test is applied.

Table 2: Result of Augmented Dickey-Fuller Test

	Brac Bank	City Bank	Pubali Bank	Eastern Bank
Augmented Dickey-Fuller (P-value)	-18.925 (0.01)	-18.53(0.01)	-18.41(0.01)	-20.29(0.01)

Source: Author's computation

From above Table 2 it is concluded that all the return series hold the stationary condition as P-value is less than 0.05 and gives an indication of fitting mean model.

4.2. Selection of the Conditional Mean model for Volatility

To identify the conditional mean model appropriately for modeling the volatility in the concerned variable and the way the selection of the estimation method of a conditional mean model for stock return series is of vital importance. Fitting an ARMA in the mean equation of the GARCH model, helps to correct the problem of serial correlation in the residuals, once the absence of serial correlation is confirmed by adding the required ARMA terms, the conditional volatility can be modeled using GARCH. To eliminate non-stationary, the price time series has been transformed into a return time series by taking logarithmic because

logarithmic returns are analytically more tractable. To find out the best fitted ARMA model with the appropriate order of lags “p” and “q”, Akaike Information Criterion (AIC) is used. By considering some tentative ARMA models, it is observed from Table 3 that ARMA (4, 4) for Brac bank, ARMA (3,4) for City bank, ARMA (4, 3) for Pubali bank and ARMA (4, 4) for Eastern bank are achieved by using the minimum value of AIC.

Table 3: Selecting the Mean Model using AIC

	Brac Bank AIC	City Bank AIC	Pubali Bank AIC	Eastern Bank AIC
ARMA (3, 2)	25149	25409	23975	25593
ARMA (3, 3)	25061	25349	23819	25347
ARMA (3, 4)	24989	25240	23802	25349
ARMA (4, 2)	24775	25362	23701	25595
ARMA (4, 3)	24752	25358	23627	25345
ARMA (4, 4)	24750	25249	23723	25324

Source: Author’s computation

4.3. Results of the Volatility Test

4.3.1. Box-Ljung Test

After fitting the ARMA (4, 4) for Brac bank, ARMA (3,4) for City bank, ARMA (4, 3) for Pubali bank and ARMA (4, 4) for Eastern bank, the square of the residuals are calculated. To check whether there exists any autocorrelation in the mean model or not, Ljung & Box, (1978) test is applied. The null hypothesis for Box-Ljung test is stated as the squared residuals are uncorrelated hence follows a white noise process. From Table 4, the Ljung-Box test gives the result that autocorrelation is present in the mean model of each selected bank.

Table 4: Results on the Test of Presence of Autocorrelation and ARCH Effect

	Brac Bank	City Bank	Pubali Bank	Eastern Bank
Q statistic (P-value)	1104.1 (0.0001)	3276.3 (0.0001)	2416.8 (0.0001)	2109.3 (0.0001)
ARCH LM (P-value)	4.560 (0.0327)	140.57 (0.0001)	21.254 (0.0001)	113.13 (0.0001)

Source: Author’s computation

4.3.2. Engle's ARCH LM Test

From the Box-Ljung test results where autocorrelation is present in the series. To make sure of the presence of a significant ARCH effect, Engle's ARCH LM test is applied. The null hypothesis of the test is no ARCH effect is present in the mean model of each selected bank. Table 4 ARCH LM test indicates that there is a significant ARCH effect present in the mean model of selected banks. Thus DSE stock price return for different banks is conditional heteroscedastic. So the modeling of volatility clustering is necessary.

4.4. Selection of the Conditional Variance Model for Volatility

For each selected bank three types of GARCH model are fitted, one is the symmetric GARCH model i.e. GARCH (1,1) and other asymmetric models are E-GARCH and GJR-GARCH model which is explored in Table 5.

Table 5: Results on Selecting the Best Model using AIC and BIC

	Selection criteria	Brac Bank ARMA (4, 4)	City Bank ARMA (3,4)	Pubali Bank ARMA (4, 3)	Eastern Bank ARMA (4, 4)
GARCH (1,1)	AIC	5.16	5.30	4.74	5.65
	BIC	5.18	5.33	4.76	5.68
E-GARCH (1,1)	AIC	5.02	5.34	5.97	4.99
	BIC	5.05	5.37	6.00	5.02
GJR-GARCH (1,1)	AIC	5.15	5.30	4.73	5.53
	BIC	5.18	5.32	4.75	5.56

Source: Author's computation

From these various combinations, the best model is being selected according to the lowest Akaike information criterion (AIC) and Bayesian information criterion (BIC). E-GARCH (1, 1) is found to be the least model for volatility measurement based on the lowest AIC and BIC for both Brac bank and Eastern bank while GJR-GARCH (1,1) considered the best model for City bank and Pubali bank.

4.5. Conditional Mean-Variance Model Estimation

Table 6 presents the estimates of EGARCH and GJR-GARCH asymmetric volatility models. These estimates are used to examine the existence of asymmetry in stock returns volatility of the selected banks of DSE.

Table 6: Results of the EGARCH and GJR-GARCH Models

	Brac Bank	City Bank	Pubali Bank	Eastern Bank
Parameter	ARMA(4, 4)- EGARCH (1,1)	ARMA(3, 4)- GJRGARCH (1,1)	ARMA(4, 3)- GJRGARCH (1,1)	ARMA(4, 4)- EGARCH (1,1)
μ	-0.18298	-0.051779	-0.024372	0.257802***
AR (1)	-1.08813 ***	-0.040750	-0.529640***	0.770912***
AR (2)	0.58216 ***	-0.377694 ***	-1.062443***	0.157290***
AR (3)	0.81752 ***	-0.370868	-0.079233***	0.190486***
AR (4)	0.13691 ***		-0.093533***	-0.339972***
MA (1)	1.10840 ***	0.196436	0.547086 ***	-0.749015***
MA (2)	-0.57023 ***	0.376110 ***	0.964030***	-0.073334***
MA (3)	-0.84246 ***	0.392487	0.043336***	-0.221249***
MA (4)	-0.15396***	2.290019 ***		0.273433***
ω	1.16952***	0.332646***	0.730333***	0.201921***
α	-0.18092***	0.073023***	0.396251***	0.194334***
β	0.41049***	0.607160 ***	0.555310***	0.924450***
γ	0.46853***	0.079086***	0.094878	0.251598***

*** indicates significant at 5% level

Source: Author's computation

The estimated E-GARCH and GJR-GARCH models for the selected banks are fitted as follows:

The estimated ARMA(4,4)-E-GARCH (1,1) model for Brac bank is:

$$\hat{y}_t = -0.18298 - 1.08813 y_{t-1} + 0.58216 y_{t-2} + 0.81752 y_{t-3} + 0.13691 y_{t-4} \\ + 1.1084 \varepsilon_{t-1} - 0.57023 \varepsilon_{t-2} - 0.84246 \varepsilon_{t-3} - 0.15396 \varepsilon_{t-4}$$

$$\ln \hat{\sigma}_t^2 = 1.169 - 0.18092 \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + 0.41049 \ln \sigma_{t-1}^2 + 0.46853 \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| \quad (7)$$

The estimated ARMA(3,4)-GJRGARCH (1,1) model for City bank is:

$$\hat{y}_t = -0.051779 - 0.04075 y_{t-1} - 0.377694 y_{t-2} - 0.370868 y_{t-3} + 0.196436 \varepsilon_{t-1} \\ + 0.376110 \varepsilon_{t-2} + 0.392487 \varepsilon_{t-3} + 2.290019 \varepsilon_{t-4}$$

$$\hat{\sigma}_t^2 = 0.332646 + 0.073023 \sigma_{t-1}^2 + 0.607160 \sigma_{t-1}^2 - 0.079086 \sigma_{t-1}^2 d_{t-1} \quad (8)$$

The estimated ARMA(4, 3)-GJRGARCH (1,1) model for Pubali bank is:

$$\hat{y}_t = -0.024372 - 0.52964 y_{t-1} - 1.062443 y_{t-2} - 0.079233 y_{t-3} - 0.093533 y_{t-4} \\ + 0.547086 \varepsilon_{t-1} + 0.964030 \varepsilon_{t-2} + 0.043336 \varepsilon_{t-3}$$

$$\hat{\sigma}_t^2 = 0.730333 + 0.396251 \sigma_{t-1}^2 + 0.555310 \sigma_{t-1}^2 + 0.094878 \sigma_{t-1}^2 d_{t-1} \quad (9)$$

The estimated ARMA(4,4)-EGARCH (1,1) model for EBL bank is:

$$\hat{y}_t = 0.257802 - 0.770912 y_{t-1} + 0.15729 y_{t-2} + 0.190486 y_{t-3} - 0.339972 y_{t-4} \\ - 0.749015 \varepsilon_{t-1} - 0.073334 \varepsilon_{t-2} - 0.221249 \varepsilon_{t-3} \\ + 0.273433 \varepsilon_{t-4}$$

$$\ln \hat{\sigma}_t^2 = 0.201921 + 0.194334 \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + 0.92445 \ln \sigma_{t-1}^2 + 0.251598 \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| \quad (10)$$

For Brac bank, table 6 shows the significance of ARCH parameter α , GARCH parameter β and leverage effect γ . The significance of ARCH parameter $\alpha = -0.18092$ indicates that the news about volatility from the previous day has less explanatory power on current volatility. The GARCH parameter $\beta = 0.41049$ indicate explanatory power on current volatility but also suggests volatility clustering in the daily returns of the DSE. Volatility persistence is measured by $\alpha + \beta = 0.229$ which indicates that volatility is not persistent for Brac bank. The asymmetric volatility model E-GARCH with their estimates are used to examine the existence of asymmetry in stock returns volatility of Brac Bank of DSE. For E-GARCH(1,1) the leverage effect $\gamma = 0.46853$ which shows a negative correlation between the past return and future volatility of the return. The γ coefficient is positive and significant suggesting that positive shock (good news) tends to produce higher volatility in the immediate future than the negative shocks (bad news).

For City bank, the ARCH parameter $\alpha = 0.073023$ is found to be significant as the news about volatility from the previous day has less effect on current volatility. The GARCH parameter $\beta = 0.60716$ is positive and significant which does not indicate explanatory power on current volatility but also suggests volatility clustering in the daily price returns of City bank of DSE. Volatility persistence is measured by $\alpha + \beta + \gamma/2 = 0.719726$ which indicates that volatility is persistent for City Bank. The statistically significant γ coefficient indicates that the null hypothesis of no asymmetric effects in the volatility of the city bank of DSE is false. In other words, there is an asymmetric effect in the volatility of stock returns of city bank in the Dhaka Stock Market. The $\gamma = 0.079086$ is positive indicating that negative shocks (bad news) tend to produce higher volatility in the immediate future than the positive shocks (good news).

For Pubali bank, the significance of ARCH parameter $\alpha = 0.396251$ indicates that the news about volatility from the previous day has less effect on current volatility. The GARCH parameter $\beta = 0.55531$ indicate explanatory power on current volatility but also suggests volatility clustering in the daily returns of the DSE. The asymmetric volatility model GJR-GARCH with their estimates are used to examine the existence of asymmetry in stock returns volatility of Pubali bank of DSE. For GJR-GARCH (1,1), the $\gamma = 0.094878$ is positive but insignificant. For the GJR-GARCH model volatility persistence of Pubali bank is measured by the sum of α , β and γ coefficient with $\alpha + \beta + \gamma/2 < 1$. For pubali bank the sum of three coefficient is $\alpha + \beta + \gamma/2 = 0.998$ which indicates that volatility is persistent for Pubali bank. It means that today's volatility tells something not only about volatility tomorrow, but also about volatility many days ahead of Pubali bank of DSE. High persistence implies that average variance will remain high since increases in conditional variance due to shocks will decay slowly (Rachev et al., 2007) and the persistence in volatility shocks supports with (Emenike, 2010; Roni, et al., 2017; Abdullah, et al., 2018).

For Eastern bank, the significance of the ARCH parameter $\alpha = 0.194334$ indicates that the news about volatility from the previous day has less effect on current volatility. The GARCH parameter $\beta = 0.92445$ indicate explanatory power on current volatility but also suggests volatility clustering in the daily returns of the DSE. Volatility persistence is measured by $\alpha + \beta = 1.118784$ which indicates that volatility is persistent for Eastern Bank. For E-GARCH (1,1), the $\gamma = 0.251598$ is significant

suggesting that positive shock increases volatility more than the negative shocks of the same magnitude.

4.6. Model Diagnosis

One of the most important assumptions of GARCH model that standardized residuals are independent and identically distributed. From Table 7 Ljung-Box test gives the large p-value for the selected banks which suggests that autocorrelation is not present i.e. the residuals are independent and follows white noise.

Table 7: Test of Presence of Autocorrelation and ARCH Effect

	Brac Bank ARMA(4,4)- EGARCH (1,1)	City Bank ARMA(3, 4)- GJRGARCH (1,1)	Pubali Bank ARMA(4, 3)- GJRGARCH (1,1)	Eastern Bank ARMA(4, 4)- EGARCH (1,1)
Q Statistic (P-value)	0.3549 (0.6155)	0.6776 (0.4104)	0.0602 (0.8008)	0.1376 (0.7107)
ARCH LM (P-value)	0.0036 (0.9614)	0.0009 (0.976)	0.00164(0.968 0)	0.0026 (0.9589)

Source: Author's computation

From the ARCH LM test, the greater p-value indicates that not the rejection of the null hypothesis i.e. there is no existing ARCH effect present in all the series which indicates that the models are fitted better for each selected bank.

4.7. Backtesting

A backtest shows how reliable a model is by reconstructing scenarios with historical data. The procedure is conducted by comparing the confidence level and actual returns that fall outside this VaR estimate (Blanco and Oks, 2004). The backtest is a part of the model validation which verifies to what extent actual losses match expected losses. It is a tool that risk managers apply to check how well their forecasts on VaR are attuned (Jorion, 2007). After fitting the GARCH type model, the performance of the model is checked by performing historical backtest.

Table 8: Back Testing Report of the Fitted Model

	Brac Bank ARMA(4,4)- EGARCH (1,1)	City Bank ARMA(3, 4)- GJRGARCH(1,1)	Pubali Bank ARMA(4, 3)- GJRGARCH (1,1)	EasternBank ARMA(4, 4)- EGARCH (1,1)
Backtest Length	1095	1095	1095	1095
Expected Exceed	11	11	11	11
Actual VaR Exceed	8	4	15	9
Kupiec Test (p-value)	0.347 ^a	0.015 ^a	0.244 ^a	0.541 ^a

^a means significant at 1%

Source: Author's computation

Here, in Table 8 the returns of the data of Brac, City, Pubali and Eastern bank hits the 1% VaR limits 8, 4, 15 and 9 times compared to 11 times expected. So the above fitted models for Brac, City and Eastern banks perform well in modelling changing volatility but the GJR-GARCH model for Pubali bank with normally distributed errors does not perform well at least in this case. We don't reject the null hypothesis of Kupiec's unconditional coverage at 1% Var limits and concluded that the exceedances are correct and independent. These results are not surprising since the data exhibits some excess kurtosis that cannot be captured by the normal GARCH model. Thus, the results obtained from backtesting that almost all models are found to be able to sufficiently cope with the changing volatility.

4.8. Volatility Forecasting

This study compared the forecasting performance of selected banks using the GARCH-type models. This study indicated that the EGARCH (1,1) and GJRGARCH(1,1) model outperforms in the volatility of DSE returns. The inclusion of leverage effects or asymmetric components is thus important for forecasting short-run volatility. Table 9 shows the short-term forecasted volatility of different banks by using previously fitted GARCH type models.

Table 9: Seven days forecasted volatility of different banks

Time	Forecasted Volatility			
	Brac Bank	City Bank	Pubali Bank	Eastern Bank
Day 1	2.37	2.48	1.70	1.94
Day 2	2.56	2.59	1.91	2.04
Day 3	2.64	2.67	2.09	2.14
Day 4	2.67	2.72	2.25	2.23
Day 5	2.68	2.76	2.41	2.32
Day 6	2.69	2.79	2.55	2.41
Day 7	2.69	2.81	2.69	2.50

Source: Author's computation

From Table 9 it is observed that in the next seven days all banks will be more volatile as their volatility increasing continuously. But among them Brac bank shows a slightly increasing pattern and it has the lowest volatility changes comparing other banks. Among the four selected banks, Pubali bank shows a very increasing pattern and it has a very high increasing pattern in the next seven days comparing all other banks.

5. Conclusion

The volatility of Dhaka Stock Exchange (DSE) returns of four selected banks Brac Bank, City Bank, Pubali Bank and Eastern Bank have been modeled from March 2008 to December 2018 using different GARCH(p,q) models; GARCH(1,1), E-GARCH(1,1), GJR-GARCH(1,1). From the empirical results, it is concluded that the asymmetric volatility models E-GARCH and GJR-GARCH perform better for the selected banks of DSE which are supported by Roni, et al. (2017), Abdullah, et al. (2018) and Khan & Hossain (2016) and contradicted with the study of Miah & Rahman (2016). Another similar study was also conducted by Abdalla (2017) where he reported satisfactory results of VAR-GARCH model in modeling volatility of Sudanese stock market. The existence of asymmetry in stock returns volatility, asymmetric GARCH models (E-GARCH, GJR-GARCH, PGARCH etc.) performs better in modeling volatility which was absent Miah & Rahman, (2016) as the distribution of daily returns are non-normal with negative skewness and pronounced excess kurtosis. The coefficient of γ (leverage effect) under E-GARCH (1,1) and the GJR-

GARCH (1,1) model is recorded significant for the selected banks except for Pubali bank. For Brac and Eastern bank, positive shock (good news) tend to produce higher volatility in the immediate future than the negative shocks (bad news) and the impact of the positive shock on volatility is much higher for Eastern bank than the other banks. There is a significant impact of negative shocks on City bank. Volatility is persistent for City, Pubali and Eastern bank which means that today's volatility tells something not only about volatility tomorrow, but also about volatility many days ahead that means they could be affected by volatility in upcoming days which also similar to the findings of Abdalla (2017) where he indicated volatility of Sudanese stock returns as an explosive process especially after the secession of South Sudan.

Backtesting was conducted to check the performance of GARCH type models. The fitted models for Brac, City and Eastern banks performed quite well in this case while for Pubali bank the GJR-GARCH model does not perform well. Though all bank's volatility is continuously increasing day by day, in the next seven days Brac bank will be the lowest volatile bank comparing all other selected banks and on the contrary Pubali bank may be the most volatile bank in the leading 30 companies (DS30) of DSE.

The findings of this study would help investors and traders to buy and sell share or multiple shares in the future domestically or internationally to their chosen financial institution with a minimum risk and the government and the regulators would get an idea about the future condition of the volatility of the selected financial institution to formulate policies.

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Formal Vs Informal Sector Choice and Wage Differentials in Algeria

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ABSTRACT

In this paper, we analyze the determinants of formal vs. informal employment choice and gender wage differentials in Algeria. Using the Algerian national consumption survey, we estimate wage equations with correction of selection bias based on switching regression model. The results show that women are systematically underpaid in all sectors especially in the Informal sector. However, the public sector is the one that best protects women from wage discrimination. The returns to education are generally higher in the public and formal sector for both men and women. Regional characteristics influence the choice of the sector and partly explain the wage gap between men and women. Finally, the choice of working in the public sector versus working as informal employees is mainly due to the pattern of wages. However, the financial benefit is not a motivation for choosing the public sector compared to self-employment. This result suggests that there should be a non-monetary benefit that influences the choice of the public sector in Algeria.

ملخص

في هذا المقال، نقوم بتحليل محددات اختيار العمل الرسمي مقابل العمل غير الرسمي والفروق في الأجور بين الجنسين في الجزائر. وباستخدام مسح الاستهلاك الوطني الجزائري، قمنا بتقدير معادلات الأجور مع تصحيح تحيزات الاختيار بناء على تغيير نموذج الانحدار. وتظهر النتائج أن المرأة تتقاضى أجورا منخفضة بشكل منهجي في جميع القطاعات وخاصة في القطاع غير الرسمي. ومع ذلك، فإن القطاع العام هو الذي يوفر حماية أفضل للمرأة من التمييز في الأجور. وعادة ما تكون العائدات إلى التعليم أعلى في القطاع العام والقطاع الرسمي لكل من الرجال والنساء. وتعتبر الخصائص الإقليمية من المؤثرات على اختيار القطاع وتفسر جزئيا الفجوة القائمة في الأجور بين الرجال والنساء. ويرجع

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اختيار العمل في القطاع العام مقابل العمل كعمال غير رسميين أساسا إلى نمط الأجور. ما لا يجعل المنفعة المالية دافعا لاختيار القطاع العام مقارنة بالعمل الحر. وتشير هذه النتيجة إلى وجوب وجود فائدة غير نقدية تؤثر على اختيار القطاع العام في الجزائر.

ABSTRAITE

Dans cet article, nous analysons les déterminants du choix de l'emploi formel ou informel et les écarts de salaire entre les sexes en Algérie. En utilisant l'enquête nationale sur la consommation en Algérie, nous estimons les équations de salaire avec correction du biais de sélection sur la base d'un modèle de régression à commutation. Les résultats montrent que les femmes sont systématiquement sous-payées dans tous les secteurs, en particulier dans le secteur informel. Cependant, le secteur public est celui qui protège le mieux les femmes contre la discrimination salariale. Le rendement de l'éducation est généralement plus élevé dans le secteur public et formel, tant pour les hommes que pour les femmes. Les caractéristiques régionales influencent le choix du secteur et expliquent en partie l'écart salarial entre les hommes et les femmes. Enfin, le choix de travailler dans le secteur public ou de travailler tant qu'employé informel est principalement dû à la structure des salaires. Toutefois, l'avantage financier n'est pas une motivation pour choisir le secteur public par rapport au travail indépendant. Ce résultat suggère qu'il devrait y avoir un avantage non monétaire qui influence le choix du secteur public en Algérie.

Keywords: Wages, sectorial choice, Informal, gender, selection, Algeria.

Classification JEL : J16, J21, J23, J31, J45, J71, O17

1. Introduction

The empirical works on the determinants of wages has received more attention in recent years, especially in the case of developed countries and Latin America. The question of wages remains very controversial but rarely studied in the Arab countries especially in Algeria. In the current context, affected by strong social protest, it is important to devote more attention on the issue of wages in Algeria.

The analysis of wages determinants has received much attention in developed countries (Pedersen & al, 1990) for Denmark, (Van Der Hoek, 1989; Van Ophem, 1993; Jacobson and Ohlsson, 1994) for Sweden, (Heitmueller A, 2004) for Scotland, (Dustmann & van Soest, 1995) for Germany, (Card D, 1999; Katz & Krueger, 1991; Krueger, 1988; Lewis,

1988; Moulton, 1990; Belman & Heywood, 1989) for the United States. Most of these studies analyzed the determinants of wages by comparing two segments (public vs private, formal vs informal...) in the labor market.

Many studies indicate significant differences in the wage structure between public and private sectors, with rewards in the public sector, often higher than those in the private sector. Benjamin et al. (1998) find differences of the order of 5 to 10% in Canada and the United States, but they assert that these gaps diminish with time and they are more important for women and low-wage workers.

Tansel (1999) studied the wage gap between the formal and informal sectors in Turkey using the Survey of Household Spending 1994. The results indicate significant wage differentials between formal and informal workers for men and women, suggesting a strong segmentation of the labor market in Turkey. Tansel (2001) extends the analysis by integrating the self-employed into the model. She follows a similar methodology and examines the determinant of the choice of the employment sector and the wage differentials for formal, informal and self-employed workers with a gender-based analysis. She finds that formal salaried men are better off compared to employees not covered by social security and the self-employed. Approximately, male salaried workers who are covered win twice as much as their female counterparts.

Whereas, male workers' wages are close to parity with those of female workers.

Carneiro and Henley (2001) analyze the determinants of wages and the selection of workers in formal and informal employment using the Brazilian household survey 1997. In order to modeling the selection, they adopt the Lee procedure (1985). The results indicate that: age, experience, education and gender are determining factors of wages. In addition, they report that the selectivity correction term is statistically significant in the earnings equation, thus, quantitatively important in the modeling of wage differentials.

Badaoui et al (2008) re-examine the determinants of wage differentials between the formal and informal sectors on a sample of South African employees. They point out that the potential bias of selection is the main

challenge in measuring the wage gap between the formal and informal sector. From several specifications, they try to measure the impact of different groups of variables on wage differentials between these two segments.

Bargain and Kwenda (2009) examine the wage gap between the informal sector and the formal sector in Brazil, Mexico and South Africa using panel data. The sample is designed to include only the men aged 15-65 living in urban areas. The results reveal a similar distribution outline of earnings between the two segments in all countries. This Wage gap is mainly observed in the lower income quintiles and disappears in the superior quintiles.

Blunch (2001) examines the determinants of wage gap between the formal and informal sector in Serbia by testing different measures of the informality (company registration, employment contract, size of the firm, etc.). The results show a large income gap between the formal and informal sectors. The analysis of the breakdown of wage differentials shows that individual characteristics such as education account for a large part of the wage gap between the two segments: formal vs informal whatever the specification of informality.

Günther and Launov (2012) extend the existing literature by formulating a new econometric methodology that allows for a heterogeneous structure in the informal sector in the case of Côte d'Ivoire (cross-sectional data from). They find that the earnings of informal workers differ considerably depending on their segment. The results show that the informal sector is composed of two segments, one of which is higher levels of education and experience, gains and returns than the other.

For developing countries, particularly in the case of Arab countries, there are few empirical studies on the returns to education. The analysis of the determinants of wages in each segment of the labor market can help to identify the extents to which institutional are responsible for labor market segmentation.

The formal vs informal dichotomy does not constitute a satisfactory explanatory framework for the Algerian labor market situation. We have segmented the labor market into four segments: Self-employed, Public sector employees, Informal employees and Formal employees in the private sector.

The outline of this paper is as follows. After the introduction, Section 2 presents the institutional context in Algeria. Section 3 discusses the data used and the methodology followed. Section 4 presents the results of the

analysis in several parts. The first part examines the results of gender wage differentials based on switching model. The second part focuses on the determinants of formal vs. informal employment based on structural equation. Section 5 concludes.

2. The Issue of Wages in Algeria

The discussion about wages remains very controversial but very little studied in Algeria. The wage survey was interrupted in 1996. There are, irregular surveys carried by Ministry of Labor or indicators published by the National Social Insurance (CNAS). Also, there are some attempts of indirect analysis (Bouklia & Talahite, 2008; Boutaleb, 2013).

Since the implementation of the reforms (1989), the role of the State in the regulation of wages has been limited, on the one hand, the establishment of a national grid for the public sector and, on the other hand, Minimum wage (SNMG) after consultation with the social partners (trade unions and employers' organizations). The fixing of wages in the economic world (public and private) is governed by collective agreements between workers and employers, with deposit with the services of the Ministry, in charge of labor.

The basis of the wage system in Algeria is fixed by the State, namely the national guaranteed minimum wage (SNMG) valid for all sectors of activity. In determining the SNMG, the following indicators are taken into account: national average productivity, consumer price index and general economic conditions. In 1994, faced with the economic crisis, Algeria will modify the composition of the minimum wage, which now includes not only post salaries, but also includes allowances and bonuses of any kind. The SNMG thus reflects the rise in the level of wages. Between 2002 and 2009, the guaranteed national minimum wage increased from 8,000 DA (61 EUR) to 12,000 DA (91 EUR), but these increases in fact only maintain the purchasing power of employees as inflation remains relatively high.

Overall, the average monthly wage in public sector for all activities combined is 1.73 higher compared to the private sector. In terms of monetary value, employees in the public sector receive an average of 17300 DA (177 EUR) more in comparison with employees in the private sector. By activity, it appears that the largest gap between the public and

private sector is observed in the extractive sector with a ratio of 3.8 higher for public sector employees. In monetary value the difference is 55500 DA (570 EUR). The only sector where the average monthly wage is higher (in the private sector versus the public sector) is the financial activities sector. Indeed, in this sector, employees in the private sector receive 1.23 more than public sector employees. In monetary terms, private sector employees receive 10100 DA (103 EUR) more. The smallest gap is observed in the services sector "Hotel and Catering", less than 1600 DA (17 EUR). The analysis by qualification shows that: 1) in the financial activities sector, wages are higher in the private sector than in the public sector, whatever the qualifications of employees (senior managers, supervisors, executing agents). 2) the average wage gap between public and private sector employees varies according to the qualification: for senior managers, wages are higher for private sector employees in the sectors of manufacturing, trade, financial activity. For supervisors, wages are higher for private sector employees in the hotel / restaurant, financial sectors. For executing agents, wages are higher for private sector employees in the financial activities sector.

3. Data and Methodology

We use the latest available survey on household consumption conducted by the National Statistics Office (ONS) in 2000. Previous editions were carried out in 1967-1968, 1979-1980 and 1988-1989.

Table 1: Characteristics of the different segments (% in line)

	Employees in Public Sector	Employees in Formal Private Sector	Employees in Informal Private Sector	Self- employment	Total
Demographic characteristics					
Gender					
Male	48,2	4,3	22,8	24,7	100
Female	70,8	3,7	12,9	12,6	100
Age					
15 – 24 years	33,8	3,7	45,2	17,3	100
25 – 34 years	51,8	5	22,6	20,6	100
35 – 44 years	57	4,1	16,9	22	100
45 – 54 years	57,1	4	11,9	27,1	100
55 – 64 years	37,7	3,6	9,8	48,9	100

	Employees in Public Sector	Employees in Formal Private Sector	Employees in Informal Private Sector	Self- employment	Total
Demographic characteristics					
Gender					
Male	48,2	4,3	22,8	24,7	100
Female	70,8	3,7	12,9	12,6	100
Marital status					
Married	52,2	4	16,7	27	100
Other	48	4,7	30	17,4	100
Human Capital					
Without instruction	33,7	3,4	25,2	37,7	100
Primary	39,3	4,7	26,8	29,2	100
Intermediate	46,9	4,8	27,2	21,1	100
Secondary	69,6	3,5	12,9	13,9	100
University	83,4	4,5	3,5	8,6	100
Job characteristics					
Agriculture	8,5	0,9	40,1	50,5	100
Industry	59,8	10,3	19	10,9	100
Construction	18	7,6	55,3	19,1	100
Trade	6,1	6,2	24,4	63,3	100
Services	75,9	2,5	9,1	12,6	100
Household characteristics					
Presence of children under 5 years	49,7	4,1	21,8	24,4	100
Presence of public employees	40,4	26,8	25,7	22,8	100
Presence of formal employees	2,7	12,0	2,5	1,9	100
Presence of informal employees	11,0	12,5	33,8	12,1	100
Presence of self-employment	12,8	12,5	16,6	23,4	100
Strate					
Urban	56,3	4,8	18,4	20,5	100
Rural	44	3,6	25,5	26,8	100
Average wages (DA)	11900	10700	8000	13500	
Sample	6452	544	2766	2983	12745

Source: Constructed from consumption survey data (2000) -ONS.

Our sample is composed of 41807 observations, the distribution according to the individual situation is as follows: 12910 occupied, 6612 unemployed, 18954 housewives and 3331 other inactive. The employed population aged 15-64 consists of 12,745 observations (11,356 men and 1,369 women). Of these, 9762 are employees (8548 men and 1214

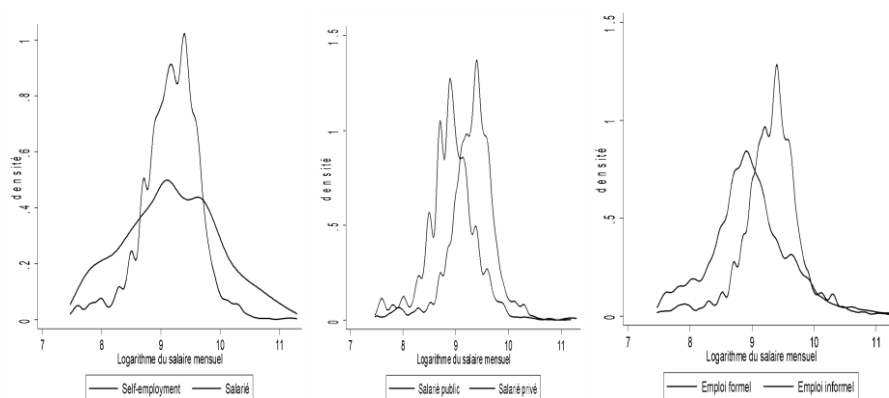
women) and 2983 self-employed (2808 men and 175 women). For those employed, there are 6452 workers in the public sector (5468 men and 984 women), 544 working in the private sector and affiliated to social security (493 men and 51 women) and 2766 who work in the private sector but are not affiliated to social security (2587 men and 179 women). The sample is composed of individuals (employees and self-employed) aged between 15 and 64 years.

The table above shows: 1) More than 50% (about 66% of employees) of the employed are employees working in the public sector. Women work more (about seven out of ten women) as employees in the public sector. On the other hand, they are less represented in the status: self-employment (12.6% compared to men 24.7%). 2) The proportion of the employed working as employees in the private sector and benefiting from social security coverage is relatively low for both men (4.3%) and women (3.7%). 3) Among the youth category (15-24 years), the proportion of those who work as informal wage earners is relatively high (over 45%). Young people are the most vulnerable in the labor market. 4) The proportion of employed persons working as informal wage-earners decreases progressively with the age. On the other hand, it increases for the employed working in the public sector and for self-employed until the age of 54 years. Several empirical works on the topic of occupational choice (Rees and Shah (1986), Kidd (1993), Evans and Leighton (1989), Blanchflower and Meyer (1994), Blanchflower (2000) find positive influence of the experience on the choice of self-employment one of the interpretations of this relation is that people who start working younger accumulate not only Knowledge and skills in their field but also the capital needed to start their own business. 5) Among married persons, more than 52% are employees working in the public sector, this is the most dominant form of employment for this category of people. 6) More than 83% of those with a high level of education are employees in the public sector. This sector has long been the guarantor of skilled jobs for educated people. The proportion of employed persons in the public sector increases with the level of education. On the other hand, it decreases with the evolution of educational attainment for both self-employed and informal workers. For uneducated persons, 25% are informal employees, 33% are employees in the public sector and 37% are self-employed, while those with a higher level 83.4% are employees in the public sector, 8.6% are self-employed and 3.5% informal workers. 7) The dominant form of employment in the agricultural sector is employees without social security

(40.1%) and self-employment (50.5%), for industry and services the public sector is dominant (about 60% for industry and more than 75% for services). For trade, the dominant form of employment is self-employment (63.3%), while for the construction sector, informal employees (55.3%) dominate. 8) The situation of the occupied in the different segments is positively correlated with the presence of the members of the individual's household in similar segments. 9) The dominant form of employment in urban areas is wage-earning in the public sector (56.3%). There are more informal and self-employed workers in rural areas than in urban areas. 10) The average wage is higher for the self-employed, followed by public sector employees, formal wage earners and, finally, informal wage earners in the private sector.

Figure 1: Distribution (density) of monthly wages by segment

Figure a: Self-employment vs Salaried **Figure b:** Public vs. Private **Figure c:** Formal vs. Informal



Source: Constructed from consumption survey data 2000 – ONS.

Analysis of the logarithm distribution of the monthly wages by segments shows that: 1) the wage distribution in informal sector is shifted to the left and its apex is slightly lower compared to formal sector, reflecting lower wages in the informal sector. 2) We find the same result for individuals working in the private sector compared to those in the public sector. 3) the wage distribution of individuals working as self-employed appears more flattened, which is due to the greater dispersion of their wages compared to the employees.

The Kolmogorov-Smirnov test¹ shows that the wage distribution is different, whatever the specification: formal jobs vs informal jobs, public employee's vs private employees and self-employment vs employees.

We estimated several switching equations. This model allows, estimating separately the wage equations for two sectors taking into account the selection effect between these two sectors. In our work, we estimate different switching models between different combinations of sectors taking into account the different selection biases: participation bias and allocation bias in the different segments.

Suppose that $y_{1i}, y_{2i}, y_{3i}, y_{4i}, y_{5i}, \dots, y_i$ are the monthly wages in public segment, private segment for affiliated wage earners, private segment for unaffiliated wage earners and self-employed workers respectively. Thus, the wage equations to be estimated are respectively:

$$\text{Regime 1: } \ln y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i} \quad (1)$$

$$\text{Regime 2 : } \ln y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i} \quad (2)$$

$$\text{Regime 3 : } \ln y_{3i} = \beta_3 X_{3i} + \varepsilon_{3i} \quad (3)$$

$$\text{Regime 4 : } \ln y_{4i} = \beta_4 X_{4i} + \varepsilon_{4i} \quad (4)$$

$$\text{Regime 5 : } \ln y_{5i} = \beta_5 X_{5i} + \varepsilon_{5i} \quad (5)$$

The estimation requires the combination of two regimes. And we estimate simultaneously two different regimes.

The dependent variable is the logarithm of the monthly wage. In the wage equations we introduced three blocks of variables: demographic characteristics, human capital and job characteristics. In the selection equation in addition to demographic characteristics and human capital, we introduced two other blocks of variables: household characteristics and territory characteristics. These last two blocks of variables are supposed to influence the choice of the employment sector but not affect directly the wages.

¹ See annex 1.

4. Estimation Results of Switching Model

4.1. Selection equation

Demographic characteristics

The marital status has a positive effect on the choice of the self-employment. A married person may take more risk for creating an activity if the spouse works, because the spouse's salary is like a security, in the case where the project fails. The marital status has different effects on participation depending on the combination of segments. In fact, marital status (for married people) has a negative effect on public and private sector entry as informal wage earners in reference to self-employment, but it has a positive effect on entry into the labor market as employees in the public sector in reference to formal employees in the private sector.

Youth are less likely to start their career as self-employed. This is because young people would have fewer resources to start their own businesses. The probability of choosing self-employment decreases with age up to the age group 45-54 years. The likelihood of being self-employed increases for the elderly (55-64 years), this may be due to the fact that older people may have accumulated the resources needed to start their own business. Taken the public sector as a reference, we find that young people are more likely to start their working lives as employees in the private sector (but more as informal wage earners) and as self-employed. The probabilities of being in these sectors decrease with age. This result indicates that young people are more confronted with precariousness and insecurity in the labor market.

Human capital is an important factor in the choice of the employment sector. The self-employed likelihood decreases systematically with the level of education. In other words, more a person is educated more the likelihood is greater that he/she chooses to be in the wage system especially in the public sector that provides more stability and security. In all models where the public sector is taken as a reference, we find that the level of education has a positive effect on the choice of wage in the public sector, the higher levels of education, have greater likelihood to choose this sector compared to others (self-employment, informal employees and formal employees). Thus, education has a positive effect on the choice of the formal employment sector. In the latter model (self-employment vs

informal wage-earner), the level of education has a positive effect on self-employment. This result shows the importance of human capital for more stable and protected employment.

Household characteristics

The Size of the household has a positive effect to fall into self-employment. This can be agreeing that the financial insurance assistance that can be provided by the members of the household (who are employed) for a person in the household who wants to create an independent activity. The size of the household is significant with a positive effect to be in the public sector with reference to the private sector (formal and informal).

The presence of employees in the household (working in the public or private sector) has a negative effect on the choice of self-employment. Hence, the presence of self-employed individual in the household increases the likelihood of self-employment choice, this may mean by the transmission for entrepreneurship, as it may mean that the presence of a member of self-employed households can facilitate the access to this segment through their relationships, experience and possibly financial support. The presence of self-employed persons in the household increases the likelihood of public sector choice (for other members of the household) compared to other sector. On the other hand, the presence of members of the household as employees in the public sector increases the probability for the other members of the household to be in the public sector. Overall, we find similar effects for the presence in the household of formal and informal employees in the private sector on the choice of the same sector by the other members of the household.

Table 2: Wages Equation -switching regression- with selection effect correction

	Employees in Informal Private Sector lnws0	Employees in Public Sector lnws1	Employees in Private Sector lnws0	Employees in Formal Private Sector lnws1	Self-employment lnws0	Employees in Informal Private Sector lnws1
Gender						
Male (ref)	-0.492*** (0.0344)	-0.187*** (0.0134)	-0.491*** (0.0342)	-0.433*** (0.0662)	-0.593*** (0.0622)	-0.489*** (0.0344)
Female	0.0216*** (0.00382)	0.0198*** (0.00218)	0.0213*** (0.00334)	0.0266*** (0.00761)	0.0351*** (0.00640)	0.0231*** (0.00331)
Number of years of study	0.0226*** (0.00274)	0.0240*** (0.00162)	0.0223*** (0.00234)	0.0281*** (0.00535)	0.0247*** (0.00416)	0.0237*** (0.00244)
Experience	-0.000299*** (4.82e-05)	-0.000294*** (2.82e-05)	-0.000294*** (4.62e-05)	-0.000389*** (9.96e-05)	-0.000243*** (6.63e-05)	-0.000310*** (4.60e-05)
Experience Square	-0.0445 (0.0310)	-0.235*** (0.0313)	-0.0327 (0.0312)	0.0845 (0.107)	-0.0968 (0.0637)	-0.0448 (0.0311)
Agriculture	0.169*** (0.0295)	-0.180*** (0.0245)	0.177*** (0.0295)	0.0128 (0.0500)	-0.104 (0.0725)	0.170*** (0.0295)
Construction	-0.0414 (0.0294)	-0.177*** (0.0128)	-0.0355 (0.0293)	-0.0738* (0.0444)	-0.0888 (0.0617)	-0.0416 (0.0294)
Service	-0.00200 (0.0338)	-0.101** (0.0423)	0.00470 (0.0337)	-0.0930* (0.0545)	-0.0702 (0.0643)	-0.000520 (0.0338)
Trade	0.195* (0.113)	0.464*** (0.0305)	0.206* (0.113)	0.558*** (0.123)	0.618*** (0.0679)	0.196* (0.113)
Senior manager	0.534*** (0.143)	0.422*** (0.0248)	0.473*** (0.142)	0.483*** (0.131)	0.945*** (0.177)	0.541*** (0.143)
Middle manager	0.170*** (0.0501)	0.253*** (0.0157)	0.162*** (0.0498)	0.266*** (0.0715)	0.575*** (0.143)	0.172*** (0.0501)
Employee	0.121*** (0.0188)	0.234*** (0.0131)	0.119*** (0.0188)	0.161*** (0.0496)	0.335*** (0.0652)	0.120*** (0.0188)
Worker						

Table 2: Wages Equation -switching regression- with selection effect correction

	Employees in Informal Private Sector	Employees in Public Sector	Employees in Informal Private Sector	Employees in Formal Private Sector	Self-employment	Employees in Informal Private Sector
	lnws0	lnws1	lnws0	lnws1	lnws0	lnws1
Affiliation to Social Security						
Affiliate (ref)					-0.305*** (0.0377)	
Correction term λ						
lns0	0.0884** (0.0398)	0.217*** (0.0200)	0.0892*** (0.0241)	-0.137*** (0.0659)	0.198*** (0.0641)	0.0650** (0.0293)
lns1	-0.873*** (0.0140)		-0.865*** (0.0150)		-0.258*** (0.0247)	
r0	-1.029*** (0.00892)		-0.890*** (0.0429)		-0.875*** (0.0135)	
r1	-0.0777 (0.0947)		-0.304*** (0.0950)		-0.402*** (0.122)	
Constant	0.0923** (0.0436)		-0.323** (0.152)		0.0167 (0.0868)	
	8.963*** (0.0832)	9.093*** (0.0538)	8.961*** (0.0670)	8.787*** (0.172)	9.466*** (0.173)	8.924*** (0.0680)

Table 2: Wages Equation -switching regression- with the selection effect correction

Selection Equation	Non-affiliated employees vs. Public employees	Non-affiliated Vs. Non-affiliated	Public vs. Non-affiliated
Household size	0.0227** (0.00926)	-0.0161 (0.0173)	-0.0168 (0.0103)
Number of children <= 5 years	-0.0173 (0.0219)	0.0393 (0.0393)	0.0355 (0.0240)
Number of women 15+	-0.0282* (0.0171)	0.00664 (0.0313)	-0.0178 (0.0186)
Number of employees in the public sector	0.131*** (0.0256)	0.0182 (0.0518)	-0.0115 (0.0327)
Number of employees affiliated with the private sector	0.0152 (0.0937)	0.419*** (0.109)	0.0784 (0.108)
Number of unaffiliated private sector employees	-0.316*** (0.0302)	-0.385*** (0.0652)	0.332*** (0.0348)
Number of self-employment	0.0324 (0.0409)	0.0595 (0.0787)	-0.322*** (0.0386)
Married	0.529*** (0.0502)	0.440*** (0.0925)	-0.424*** (0.0571)
Other (ref)	1.053*** (0.0645)	0.668*** (0.124)	-0.724*** (0.0744)
Age 25 to 34 years old	1.493*** (0.0755)	0.926*** (0.144)	-1.096*** (0.0853)
Age 35-44 years	1.528*** (0.105)	1.040*** (0.195)	-1.582*** (0.106)
Primary	0.263*** (0.0530)	0.137 (0.0977)	-0.151*** (0.0533)
Intermediate	0.642*** (0.0595)	0.335*** (0.113)	-0.276*** (0.0637)
Secondary	1.210*** (0.0640)	0.458*** (0.126)	-0.435*** (0.0741)
Superior	1.829*** (0.0998)	1.163*** (0.182)	-0.717*** (0.137)

Table 2: Wages Equation -switching regression- with the selection effect correction

Density	-0.000517 (0.00244)	0.00286 (0.00456)	0.00284 (0.00329)
Local unemployment rate	0.246 (0.171)	-0.0929 (0.292)	0.0482 (0.182)
Industry rate in the district	-0.00179 (0.00230)	0.00507 (0.00411)	-0.000680 (0.00265)
Construction rate in the district	0.00274 (0.00197)	0.00488 (0.00381)	-0.00195 (0.00201)
Rate of trade in the district	-0.00609** (0.00238)	0.00210 (0.00421)	-0.000323 (0.00249)
Service rate in the district	-0.00322* (0.00193)	0.00564 (0.00358)	-0.00231 (0.00203)
Public employee rate in the district	0.0148*** (0.00410)	-0.00748 (0.00717)	0.0252*** (0.00451)
Affiliated private employee rate in the district	-0.00854 (0.00617)	0.0688*** (0.00988)	0.0286*** (0.00692)
Unaffiliated private employee rates in the district	-0.0221*** (0.00197)	-0.0163*** (0.00372)	0.0371*** (0.00198)
Informal employment rate in the district	0.00115 (0.00395)	-0.00935 (0.00698)	0.00513 (0.00421)
Constant	-1.103*** (0.394)	-1.263* (0.706)	-1.212*** (0.426)
Observations	9218	3310	5749

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1 Source: Estimation based on data from ONS survey consumption 2000.

Characteristics of the territory

The empirical results of the analysis of the relationship between the unemployment rate and self-employment by testing the theories "Push" and "Pull" are contradictory. Under the assumption of "push effect", high unemployment may reduce the possibility of obtaining paid employment and there is a positive effect on self-employment. The increase of unemployment rate means more difficulties to find a job as salaried workers and more people eastern themselves on self-employment to create their own job. According to the "pull effect" assumption, high unemployment rate can negatively affect individual expectations on the success of self-employment. The first hypothesis would imply a positive relationship between the rate of entry into self-employment and unemployment. On the other hand, the second hypothesis would imply a negative relationship. Bregger (1963), Rayr (1975), Becker (1984) concluded that the unemployment rate has a positive "push" effect on self-employment, Self-employment has a counter-cyclical effect in the case of United States, on the other hand, Creigh et al. (1986) concluded that unemployment does not have a net effect on the evolution of self-employment in the case of United Kingdom. Unemployment has a negative effect "Pull" on self-employment and therefore self-employment has a cyclical effect.

In our work, we find that the unemployment rate is negatively correlated with self-employment, it means that the likelihood of self-employment is lower in regions with high unemployment rate. It is rather the "Pull" theory that is verified in the Algerian case.

The local unemployment rate is significant only in the first model (self-employment vs public sector) with a positive effect on the choice of the public sector. This means that the higher the unemployment rate is in a region, the greater is the probability of entering the public sector. The public sector plays as a shock absorber of social tensions in the periods of economic shocks.

We introduced variables that measure the concentration rates of sector activities (agriculture, industry, construction, trade, services), different segments of the labor market (public employee, affiliated private employee, unaffiliated private employee) at the district level, density of the population and the local unemployment rate. The likelihood of being

self-employed is higher in regions with low levels of agricultural activity, but is relatively high in regions with a high concentration of trade, services and industry. Finally, the likelihood of being self-employed is higher in the regions where the dominant form of employment is self-employment. This means that there is a dissemination and specialization effect in the activities by region. Finally, there are some important effects of the characteristics of the regions on the choice of a particular employment sector.

4.2. Wages Equation

Demographic Characteristics and Human Capital

Women would earn less than men regardless of the employment sector they choose. If they choose the public sector, the wage gap varies between 18.4% and 18.9% compared to men, regardless of the sector referenced. The choice of self-employment causes women to lose between 60% and 63.1% of the potential salary compared to men. Being in the formal wage sector decreases the potential wages of women from 41.9% to 42.6% compared to men. Finally, women who opt for the informal wage receive a lower salary (49.7%) than men. It also emerges from this finding that the public sector is the sector that guarantees more equal wages between women and men. The performance of the experiment varies according to the sectors with a positive effect on wages but with decreasing returns. The effect of experience is greater in the self-employment sector compared to the public and informal wage sectors. Also, the effect of experience is greater in the formal wage compared to self-employment and informal wage-earning. The effect of experience is greater in the public sector compared to formal and informal wage in the private sector. Human capital is an important factor not only in the choice of sectors but also in the determination of the potential wages. As a result, returns to human capital are generally higher in formal employment sector than in the public sector and in the private formal sector.

Job characteristics

The effect of the sector of activity is different between the two sectors: employees and self-employment. For the former, we find that wage earners in industry earn higher wages than their counterparts in other sectors (agriculture, service and trade). For the second sector, only

dummy construction is significant with a negative effect on wages compared to the industry sector. It is the only dummy where the signs are opposed between the two sectors. This means that in the construction sector, a person would earn more if he is in the first sector (wage-earning). For the wage sector, we also introduced the variables: occupation and legal sector. For the profession, we find that the wages increase systematically with the hierarchy in the position occupied. For the legal sector, we note that private sector employees earn 13.1% less than employees in the public sector. Non-affiliation to social security has a negative effect on wages in both sectors, meaning that people covered by social security will earn more than unheated persons in both sectors, but non-covered persons will earn more if they choose the wage sector where the wage gap between covered and uncovered persons is 15.6% against 36.8% in the second sector.

Working in the industry sector increases the potential wage (compared to other sectors) in all employment sectors except for informal wage earners where the potential wage is higher in the construction sector. The potential wage gap (between the industry sector and the other sectors) is less important in the self-employment. Also, the wage gap is larger in the public sector compare to formal and informal wage sectors. In the formal wage, the expected wages are higher in all occupational categories compared to the informal wage sector. Expected wages are also higher in the public sector in all occupational categories except for middle managers where the potential wage is higher in the informal wage sector. Finally, the expected wages are lower in the public sector for all grades except for workers compared to the private sector. The public sector is the one that protects the least qualified employees.

The selection terms are significant across the models, which mean that there was indeed a selection effect in the determination of wages.

4.3. Structural equation for sector choice

First, we estimate structural equations for the choice between two segments, several specifications are estimated. In Second time, we estimate a structural equation for the choice of various segments in a multinomial framework. In the multinomial logistic model, every individual (i) has to choose between four alternatives ($j = 1$ to 4):

employees in the public sector, formal employees, informal employees and self-employed.

Demographic Characteristics and Human Capital

The model shows a negative relationship between the age and the probability of access to formal and informal salaried segments, but with greater effects for the latter segment compared to the "public sector". For the self-employment segment, we observe that people aged between 35 and 54 years are less likely to be in this segment with reference to the public sector. On the other hand, for those aged between 25-34 years and 55-64 years, they are more likely to have access to the self-employment segment compared to younger people (15-24 years) with reference to the public sector. Hence, married people are more likely to be self-employed instead of being employees in the public sector. Or else, they are less likely to be informal employees with reference to the public sector.

Human capital increases the likelihood of access to the public sector, therefore, they have less chance for entry into other segments. We observe a positive relationship between education and the entry into the public sector. In other words, when the level of education is higher, the chance for access to the public sector is greater.

Table 3: Multinomial Logistic Estimation of the Structural Equation

	Self-employment	Formal	Informal
Age			
25 -34 years	0.191** (0.0843)	0.160 (0.157)	-0.439*** (0.0776)
35-44 years	-0.299*** (0.104)	-0.441** (0.194)	-1.262*** (0.104)
45-54 years	-0.354*** (0.115)	-0.680*** (0.221)	-1.897*** (0.124)
55 - 64 years	0.397*** (0.137)	-0.523* (0.287)	-1.958*** (0.172)
Marital status			
Married	0.196** (0.0777)	-0.110 (0.142)	-0.199** (0.0845)
Other (ref)			
Primary	-0.199*** (0.0742)	-0.188 (0.163)	-0.281*** (0.0851)
Intermediate	-0.720*** (0.0877)	-0.633*** (0.184)	-0.920*** (0.0977)
Secondary	-1.349*** (0.0986)	-1.355*** (0.202)	-1.762*** (0.111)
University	-1.922*** (0.142)	-1.460*** (0.249)	-2.946*** (0.203)
Household size	0.00823 (0.0132)	-0.0545** (0.0270)	-0.0435*** (0.0146)
Number of children <= 5 years	-0.0309 (0.0311)	0.00724 (0.0630)	0.0317 (0.0348)
Number of women 15 and over	0.0350 (0.0244)	0.0480 (0.0485)	0.0316 (0.0270)
Number of employees in public sector	-0.260*** (0.0397)	-0.226*** (0.0765)	-0.199*** (0.0426)
Number of employees in formal private sector	0.0248 (0.136)	0.857*** (0.132)	0.0231 (0.144)
Number of employees in informal private sector	-0.103* (0.0551)	-0.164 (0.119)	0.509*** (0.0471)
Number of self-employment	0.412*** (0.0502)	-0.0569 (0.122)	-0.0790 (0.0621)
Density	-0.00384 (0.00409)	0.00337 (0.00640)	-0.00549 (0.00412)
Local unemployment rate	-0.546** (0.256)	-0.337 (0.481)	-0.691** (0.271)
Industry rate in the district	0.00768** (0.00345)	0.0106 (0.00662)	0.00885** (0.00370)
Construction rate in the district	-0.00173 (0.00290)	0.00638 (0.00618)	-0.00118 (0.00303)
Rate of trade in the district	0.0114*** (0.00340)	0.0177** (0.00719)	0.0132*** (0.00373)
Service rate in the district	0.0104*** (0.00273)	0.0144** (0.00600)	0.0101*** (0.00305)
Public employee rate in the district	-0.0691*** (0.00541)	-0.0363*** (0.0107)	-0.0307*** (0.00650)
Affiliated private employee rate in the district	-0.0436*** (0.00906)	0.116*** (0.0142)	0.0108 (0.00989)
Unaffiliated private employee rates in the district	-0.0281*** (0.00289)	0.00967 (0.00627)	0.0339*** (0.00305)
Informal employment rate in the district	-0.0130** (0.00507)	-0.0215** (0.0106)	-0.00511 (0.00627)
Earnings differential	-0.452** (0.191)	0.487 (0.341)	-1.176*** (0.213)
Constant	3.899*** (0.519)	-0.410 (1.078)	1.463** (0.631)
Observations	13,910	13,910	13,910

Source: Estimation based on consumption survey data 2000-ONS.

Household characteristics

The household size has a negative effect on the access to formal and informal wage segments in the private sector with reference to the public sector. The number of children (under 5 years old) and the number of women (aged over of 15 years old) in the household is not significant for the choice of the sectors. These variables influence the decision to participate in the labor market.

The presence of household members working as employee in the public sector increases the likelihood of entry into this segment. On the other hand, the presence in the household of self-employed workers increases the likelihood of entering other members of the household in this segment.

Characteristics of the territory

The model shows some regional specificity influencing the access to the different sectors in the labor market. The effects of these variables are different according to the sectors analyzed. Thus, the local unemployment rate decreases the probability of entering in the self-employment and that of informal wage-earners compared to the public sector.

The Differential earnings

In this model, the differential earnings are the difference between the potential wage in the public sector and the maximum wage potential in the other three segments. The variable is significant in the self-employment and informal wage segments but with a negative sign which means that those who choose to work as employees in the public sector earn less in this segment compared to other segments. This means that pecuniary gains are not a motivation for choice the public sector, other factors must influence the decision for the choice of this sector.

5. Conclusion

This work shows that returns to education and experience are higher in the public sector for both men and women, but the impact of these two factors on wages is less important for the segments: informal and self-employed workers.

This work also allowed us to see that, regardless of the segment in the labor market, women are paid less than men. The public sector is the one that most protects women from wage discrimination but the situation remains very difficult for women with the reduction of opportunities to find a job in the public sector. There, we speak of protection for women only with higher levels of education, since there are barriers to entry into the sector. We wonder about the fate of this category of women. The largest gap is recorded in the informal and self-employed segments.

In the private sector and in particular for informal wage earners, the gap between men and women is due more to discrimination against women, since in the latter segment, the gap is only slightly explained by the variables relating to human capital and social capital.

Another result, wages in the public sector are higher than in other sectors and that overall returns to education (all occupational situations) are higher in the public sector for men and women, but there is evidence that wages in the public and private sectors vary over time for most countries due to changes in policy or the economic environment. The results do not mean that public sector employees are always overpaid.

Some regional specificities (geographical areas, density of population and local unemployment rate) influence the choice of the sector and explain in part the differences in wages between men and women.

The analysis of the evolution over time of wage differentials between different segments (public vs private, formal vs informal, wage vs self-employment) using comparable data and similar techniques should be carried out.

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ANNEX I

Table 1: Kolmogorov-Smirnov test for equality of distribution

Smaller group	D	P-value	Corrected	
Formal vs informal employment				
Formal employment Emploi formel	0.0104	0.514		Different distribution function
Informal employment Emploi informel	-0.3682	0.000		
Combined K-S:	0.3682	0.000	0.000	
Public employee vs. private employee				
Public employee	0.0042	0.926		Different distribution function
Private employee	-0.4319	0.000		
Combined K-S:	0.4319	0.000	0.000	
Self-employment vs employee				
Self-employment	0.1634	0.000		Different distribution function
Employee Salariat	-0.1822	0.000		
Combined K-S:	0.1822	0.000	0.000	
Agricultural employment vs non-agricultural employment				
Agricultural employment	0.2838	0.000		Different distribution function
Non agricultural employment	-0.0346	0.026		
Combined K-S:	0.2838	0.000	0.000	

Economic Cooperation and Human Development in the D-8 Countries: The Malaysian Model

M Niaz Asadullah¹ and Norma Mansor²

ABSTRACT

Muslim-majority countries worldwide account for a disproportionately large proportion of the world's illiterate and poor population and are home to millions of out of school children. Many of these countries have grown rather slowly over the past decades. The lack of economic development have further limited economic integration among the OIC member states. Malaysia belongs to the small number of Muslim-majority countries that have proved an exception to this pattern. This paper therefore develops and proposes a three-pillar framework for people-centric economic integration in the D-8, using Malaysia as an engine for talent development and talent recirculation. To motivate the framework, we first provide a comparative assessment of Malaysia's progress in key social and economic indicators vis-à-vis D-8 member countries and critically review some of the main policies and strategies which defined Malaysia's economic transformation. We then introduce the three-pillar framework, explaining how Malaysia can offer a model for greater economic integration among the D-8 member states through (i) trade in cultural goods and services, (ii) international student flow and (iii) skilled labor mobility. We conclude by briefly commenting on some of the policy challenges for implementing the framework.

ملخص

تمثل البلدان ذات الأغلبية المسلمة في جميع أنحاء العالم نسبة كبيرة بشكل غير متناسب من الأميين والفقراء في العالم، وهي موطن لملايين الأطفال غير الملتحقين بالمدارس. وبالرغم من ذلك نما العديد من هذه البلدان ببطء نسبياً خلال العقود الماضية. ومثل الافتقار إلى التنمية الاقتصادية سبباً للحد من التكامل الاقتصادي بين الدول الأعضاء في منظمة التعاون الإسلامي. فيما تنتهي ماليزيا إلى البلدان

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القليلة ذات الأغلبية المسلمة التي أثبتت أنها استثناء فيما يتعلق بهذا النمط. ولذلك فإن هذا البحث يضع ويقترح إطارا ثلاثي الركائز للتكامل الاقتصادي المبني على الناس في مجموعة الدول الإسلامية النامية الثمانية، باستخدام ماليزيا كمحرك لتنمية المواهب وإعادة توزيع المواهب. ولتحفيز إطار العمل، نقدم أولا تقييما مقارنا للتقدم الذي أحرزته ماليزيا على مستوى المؤشرات الاجتماعية والاقتصادية الرئيسية مقابل الدول الأعضاء في مجموعة الدول الإسلامية النامية الثمانية ومراجعة بعض السياسات والاستراتيجيات الرئيسية التي حددت التحول الاقتصادي لماليزيا بشكل نقدي. ونقدم بعد ذلك إطار العمل المكون من ثلاث ركائز، موضحين كيف يمكن لماليزيا أن تقدم نموذجا لتكامل اقتصادي أكبر بين الدول الأعضاء في مجموعة الدول الإسلامية النامية الثمانية من خلال (1) التجارة في السلع والخدمات الثقافية، و (2) تدفق الطلاب الدوليين و (3) حركة العمالة المهرة. ونختتم بالتعليق بإيجاز على بعض التحديات السياسية القائمة في تنفيذ إطار العمل.

ABSTRAITE

Les pays à majorité musulmane représentent une proportion disproportionnée de la population analphabète et pauvre du monde et abritent des millions d'enfants non scolarisés. Beaucoup de ces pays ont connu une croissance plutôt lente au cours des dernières décennies. Le manque de développement économique a encore limité l'intégration économique entre les États membres de l'OIC. La Malaisie fait partie du petit nombre de pays à majorité musulmane qui ont fait exception à cette règle. Cet article développe et propose donc un cadre à trois piliers pour une intégration économique centrée sur les personnes dans le D-8, en utilisant la Malaisie comme moteur pour le développement et la recirculation des talents. Pour motiver ce cadre, nous fournissons d'abord une évaluation comparative des progrès de la Malaisie dans les principaux indicateurs sociaux et économiques par rapport aux pays membres du D-8 et nous examinons de manière critique certaines des principales politiques et stratégies qui ont défini la transformation économique de la Malaisie. Nous présentons ensuite le cadre des trois piliers, en expliquant comment la Malaisie peut offrir un modèle pour une plus grande intégration économique entre les États membres du D-8 grâce (i) au commerce des biens et services culturels, (ii) au flux international d'étudiants et (iii) à la mobilité de la main-d'œuvre qualifiée. Nous concluons en commentant brièvement certains des défis politiques liés à la mise en œuvre du cadre.

1. Introduction

The Developing-8 Organization for Economic Cooperation (henceforth D-8) countries face a range of development challenges. Despite some success in trade creation compared to other regional groups among OIC

countries such as the Economic Co-operation Organization (ECO) (Hassan, Sanchez & Hu, 2010), they rank poorly in human development (Bayraktar, 2004). Bangladesh, Pakistan, Indonesia and Nigeria account for a significant proportion of the world's illiterate and poor population. Some member countries (e.g. Egypt) have grown rather slowly over the past decades while others (e.g. Iran) face the prospect of a growth collapse. Malaysia belongs to the small number of Muslim countries that have proved an exception to this pattern. Not only has it sustained growth by modernizing the economy, it has done so by achieving human development. Today, it ranks among the top 10 richest Muslim countries in terms of per capita income (in purchasing parity terms), is the world's 20th-largest exporter, and has the most advanced manufacturing sectors in the Muslim world. No wonder, Malaysia is frequently referred as a development miracle (Dadzie, 2013), an example for other Muslim nations (Wilson 1998; Van der Westhuizen 2004).

As the world has to achieve a new set of global development goals by 2030, many in the Muslim world will look to replicate the Malaysian model. This is also true for D-8 countries which collectively account for one fifth of the world's population. Yet human resources development is yet to be identified as an area for cooperation among member states.³ Trade integration is also far from complete within the Muslim world (Acar, Alpay, Bskimli and Koc 2009). This calls for policy innovations to facilitate regional cooperation among the member states. To this end, this paper builds on the Malaysian experience to develop a three-pillar conceptual framework for people-centric economic cooperation and human development in the Developing-8 countries. The focus of the framework is on higher education and labor mobility. The contribution of this study however is not limited to D-8 economies. The human resources development is also a priority cooperation area for Muslim majority countries as per the OIC Action Plan. Therefore, our three-pillar framework is also expected to inform existing policy efforts for human development within the wider Islamic world.

The rest of the paper is organized as follows. **Section 2** describes key development achievements of Malaysia. **Section 3** briefly discusses the

³ Current areas of cooperation include agriculture & food security, trade, transportation, industrial cooperation, energy and minerals, tourism and health. For further details, see <http://developing8.org/> (accessed on 30 Dec 2019).

main policies and strategies which defined the country's underlying economic model. **Section 4** presents the three-pillar framework for human development in D8 countries and explains how Malaysia can serve as the model in this context. **Section 5** summarizes the model highlighting various challenges and its potential (including the issue of the extent of trade with OIC countries). **Section 6** concludes by commenting on the factors that can limit the application of the Malaysian development model to other D-8 member countries.

2. Study background: Malaysia vs D-8

More than 240 million people are in extreme poverty in the OIC Member countries (COMCEC 2018). In contrast, income poverty in Malaysia has been historically lower than the average for the D-8 and other OIC countries. The biggest fall in poverty occurred in the 1970s coinciding with the New Economic Policy (NEP), an ethnicity-based affirmative action program. Malaysia achieved MDG target of halving the number of people in poverty -- the fall in rural poverty surpassed the MDG target of halving the proportion of people whose income is less than US\$1 a day between 1990 and 2015 (Rodrigo and Mansor 2013). This is remarkable because historically Malaysia had a high level of natural resource dependence. Yet it has low poverty levels, compared to other natural resources dependent D8 economies (e.g. Indonesia and Nigeria). This is partly because other oil-rich D-8 countries failed to use natural resource wealth for poverty reduction (Venables 2016).

Malaysia also ranks favorably in poverty when compared to ethnically diverse D8 countries. It also enjoys similar advantages in other development indicators such as literacy rate, secondary school enrolment, infant mortality and immunization rates. Asadullah, Mansor and Savoia (2019) examined Malaysia's development journey in a comparative setting between 1970 and 2010. In a range of social indicators, Malaysia was ahead of ethnically-diverse and resource rich D-8 member country Nigeria.

Overall, Malaysia's record on reducing income poverty and improving related social indicators, such as literacy rate, child mortality and immunisation rate during 1970-1990, has been remarkable by regional and world standards. Cross-country regression analysis confirms that Malaysia outperformed other countries in terms of progress in reducing

poverty with similar level of economic development in the early stage of its economic transformation (Asadullah, Mansor and Savoia 2019). Regarding other non-income poverty indicators, Malaysia outperformed other Muslim and D8 countries with similar levels of economic development on a number of indicators such as universal primary education and child mortality (both infant and under-5). In the 1976-1980 period, 9 percentage points more of Malaysia's young population was more literate than is normal for a country of its income level, reflecting 'excess' literacy of 6 percentage points for males and 12 percentage points for females. Malaysia's cross-country ranking in female schooling in 1970s and 1980s was also superior (Asadullah, Mansor and Savoia 2019).

3. Malaysia's Development Achievements: The Role of Government Policies and Programmes

Malaysia's exceptional development progress originates from a combination of public expenditure led initiatives for social development. Education expenditure (as a % of total development budget) increased sharply from 6% in 1970 to 21% in 2003 (UNDP 2005). Public resources favored primary school education, rather than secondary school. The government also increased spending on public goods such as communication and transport infrastructure. Foreign aid inflow increased 10 times between 1996 and 2000 (UNDP 2005). However, evidence does not suggest that development progress in Malaysia was driven by foreign aid (Asadullah, Mansor and Savoia 2019). Instead, the domestic investment including the role of public infrastructure growth was more important. Such public investment in physical and communication is likely to have facilitated greater inward foreign investment and sustain macroeconomic growth. In this section, we further elaborate on the policy origin of the country's economic transformation with a focus on human development.

Post-independence Malaysia went through a rapid structural transformation. The state initially supported industrial development through import-substitution but later on increased support for export promotion. In the 1970s, high growth was driven by labour-intensive export oriented manufacturing industries like textiles and electronics assembly. Soon it graduated from the world's largest rubber producer to becoming a diversified manufacturing exporter. A high rate of economic growth was sustained for most part of the period 1970-2000

(Thillainathan and Kee-Cheok 2016). At the same time, the state intervened heavily to redistribute gains from economic growth. Budgetary allocations prioritized agricultural modernization and rural development in the five-year plan documents (Henderson et al., 2002).⁴

The government further emphasized rural development in under the NEP, whereby the focus was addressing ethnic group income inequality, particularly between the Bumiputeras⁵ and non-Bumiputeras, to be achieved by 1990. Specific targets were also set for poverty reduction and the ethnic restructuring of employment and business ownership. Budgetary allocations to poverty reduction initiatives increased significantly during the NEP era (Henderson et al. 2002) while new pro-poor interventions (e.g. the “Program Pembangunan Rakyat Termiskin” (PPRT)) for the hard-core poor were introduced.

In post-NEP era, much of the past poverty strategy continued through the National Development Policy (NDP) launched in 1991. The ethnicity focus' was retained alongside a range of redistributive policies to close the income and wealth gaps between the Bumiputera and non-Bumiputera citizens. At the same time, there was a shift in policy favoring macroeconomic growth (Henderson et al. 2002).

In general, much of the poverty reduction in the 1970s is attributed to the NEP (Edwards 2005). In Addition, the policy of openness to foreign capital and skills set Malaysia aside from other Muslim nations. In contrast to other D-8 countries which were largely aid-dependent, Malaysia embraced a trade-dependent model where poverty alleviation benefited from outward-oriented industrialization alongside public investment building capabilities of the native workforce. Historically, many developing countries including D-8 members resisted FDI (Meerman 2008). In contrast, the government in Malaysia strategically promoted foreign investment, emerging as an attractive global destination for FDI. This also had a multiplier effect in the labor market, creating thousands of jobs for locals and foreign nationals. In the process, FDI and

⁴ Budget officially allocated to poverty eradication also included expenditure on rural and agricultural development (Henderson et al. 2002).

⁵ This category encompasses the Malays and indigenous (i.e. aboriginal minorities) population.

multinational corporations helped transform the economy into a manufacturing exporter.

Considering poor development records of other ethnically diverse and natural resources dependent D8 economies (e.g. Nigeria), Malaysia's record on poverty reduction and human development appears impressive. The evidence reviewed earlier in this paper suggests that macroeconomic growth and heterodox social policies were key to this success. The NEP, whilst remains debated, played a critical role in defining the country's social floor and facilitating broad based human development. Under the NEP, the government assumed the role of a 'Development State'. Instead of expropriation of private assets and large-scale nationalisation of enterprises and land, it targeted public expenditure-led social development while retaining a macroeconomic growth-centric approach. Both required strong fiscal capacity. Therefore, the success of the NEP rested on bureaucratic competence to manage large pool of federal funds and direct them to the poor ethnic groups. Another deciding factor was the country's governance landscape -- the early formation of a multi-ethnic political coalition following the riot in 1969. This helped sustain macroeconomic growth and secure broad agreement on the early investment in human development.

Lastly, it is widely acknowledged in the development literature that high performing East Asian economies that invested heavily in health and education in their pre-reform period enjoyed a virtuous cycle of high human development and high economic growth (Ranis and Stewart 2012). Malaysia appears to have followed this Asiatic model of development. In the past two decades, the government further prioritized human capital development as a strategy for graduation to high income nation status. This included dual emphasis on a high-quality higher education sector and turning the country into a global hub for talents and skilled workers. We discuss this further in the next two sections.

4. Economic and social cooperation between Malaysia and other D-8 countries

Given the cultural proximity among member countries, a people-centric model of economic cooperation between Malaysia and D8 countries is of particular relevance. Turkey and Malaysia are major emerging markets with upper-middle income economies high growth prospects while

Nigeria and Bangladesh have lately enjoyed a booming economy. At the time D-8 was founded, trade between Muslim countries was less than 4 percent of their overall trade with the rest of the world⁶. While members of D-8 were undeniably part of the developing world, their commonality was more conspicuous in the religious front: With the exception of Nigeria and Malaysia (with Muslims accounting for over sixty percent of the population), D-8 country populations are primarily followed of the Islamic faith. This common cultural capital can serve as an additional pillar for a people-focused model of economic integration. This section therefore scrutinizes the existing economic linkages between Malaysia and other D-8 members to argue that the former can act as an engine for human development in the latter through talent development and talent recirculation.

Cultural proximity, proxied by common language, religion, or ethnicity, is well-acknowledged as important driver of bilateral trade volumes. This works either by lowering communication and transaction costs (and hence lowering the overall trade costs) or through preferences (common tastes for tradable goods). (Felbermayr and Toubal 2010). Even in the case of migration flows between developed countries, cultural barriers can be more important in explaining the migration pattern than traditional economic variables (e.g. income; unemployment differentials). The available evidence based on data on migration flows between 22 OECD countries confirms a significant and negative effect of cultural differences on international migration flows (Belot & Ederveen, 2012). Language, education and religion positively impact on exports of cultural goods such as US motion pictures to rest of the world (Marvasti and Canterbury 2005). Culture can also matter directly in trade in the form of production of exportable cultural goods such as visual arts and crafts, audiovisual and interactive media and books. The ratio of exports in cultural goods to imports is growing in many countries.

Below we discuss the current status and prospects of further bi-lateral trade, skilled migration and international student flows between Malaysia and D8 member states.

i. International trade: Among D-8 member states, Malaysia remained most open to foreign capital and labor as it went through structural

⁶ <https://dergipark.org.tr/en/download/article-file/19455>

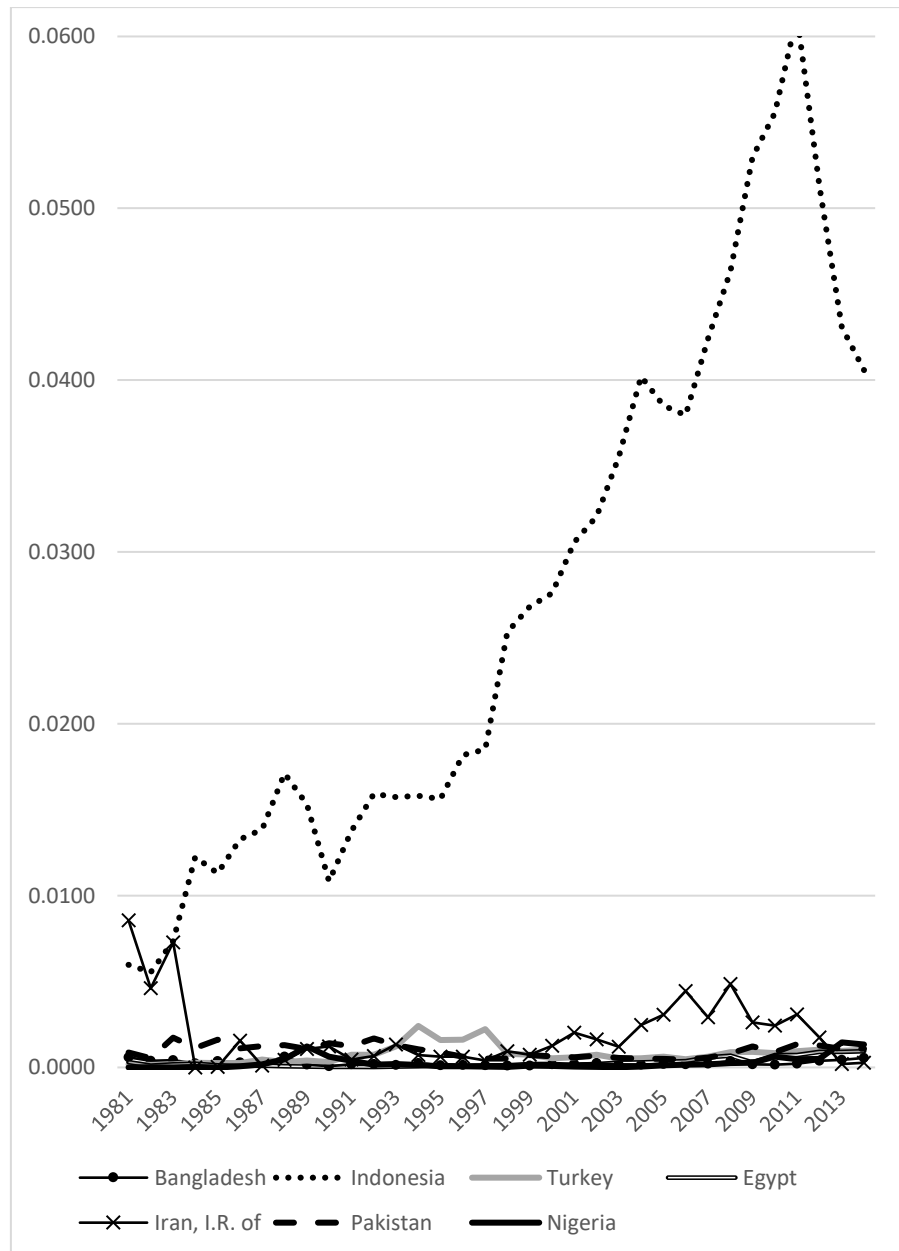
transformation of its economy since 1970s. However, D-8 member countries contributed little to this transformation process. Bilateral trade shares remain very low (see Figures 1 and 2). In 1997, D-8 members had a share of 54 percent of the total exports and 55 percent of the total imports realised by OIC countries; the combined GDP of the 8 member states comprised nearly 60 percent of the total GDP of the OIC countries. In the past two decades, trade volume and composition both have experienced considerable change. According to data from UNESCO (2018), Turkey and Malaysia have emerged as leading exporters of cultural goods. Malaysia's export of cultural goods has tripled between 2004 and 2013, increasing from USD 992.37 million to USD 2,624.43 million. With rising per capita income, demand for cultural goods is likely to grow further, including that of cultural services (i.e. musicians performing abroad). Malaysia's geography renders it an advantage as a regional communication hub. This combined with the country's cultural capital (diverse population with a Muslim majority) has turned it among the most visited D8 country in Asia⁷. In 2018, Malaysia welcomed a total of 25.8 million international tourist.⁸ Of this, two D8 member countries Indonesia and Bangladesh accounted for about 12% (3.3 million)⁹. Tourism and trade in cultural services has potential for further expansion.

⁷ <https://www.thestar.com.my/news/nation/2018/10/14/malaysia-among-asias-most-visited-countries-says-report>

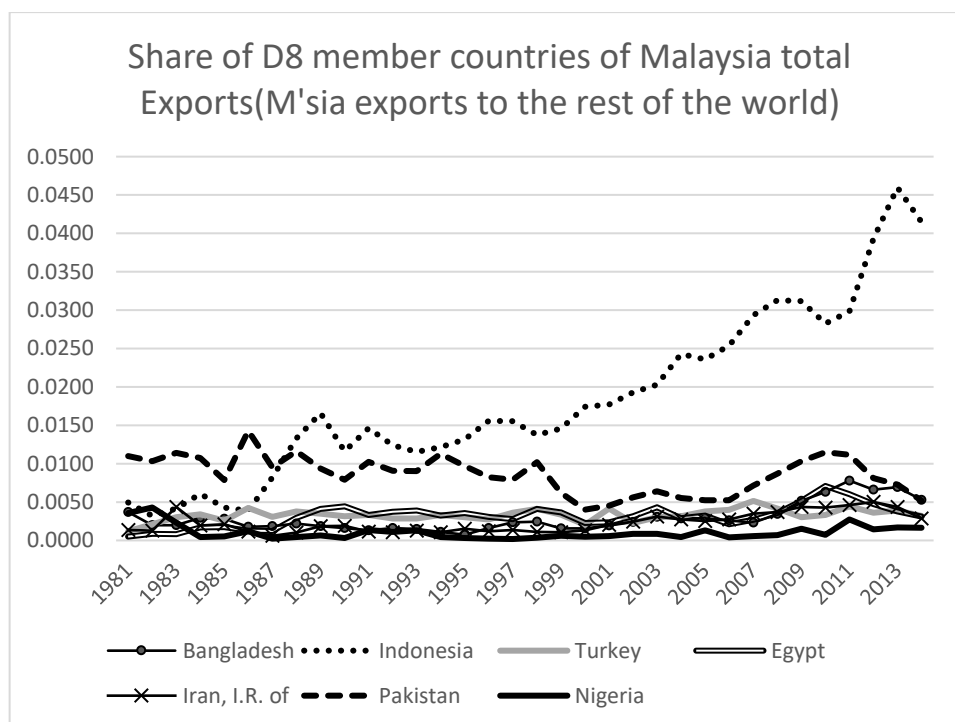
⁸ <https://www.thestar.com.my/news/nation/2019/07/22/dr-m-unveils-vm-2020-logo-sets-30-million-tourist-arrivals-target#vAzEfSOPqIJzjPmH.99>

⁹ https://en.wikipedia.org/wiki/Tourism_in_Malaysia

Figure 1: Malaysia's imports from D8 countries, 1981 – 2013



Source: Authors.

Figure 2: Malaysia's exports to D8 countries, 1981 – 2013

Source: Authors.

Malaysia has already succeeded in developing an economy based on cultural capital. Today, it leads in the world's halal industry with an estimated global market value of USD2.30 trillion¹⁰. The first halal standards released in 2000, only three years after D-8 was formed. The government set up a specialized office -- the Department of Islamic Development Malaysia (JAKIM) - the world's first halal certification monitoring and regulatory body. Another key state agency is the Halal Industry Development Corporation (HDC), formed under the Ministry of International Trade and Industry (MITI) in 2008. The agency facilitates the inflow of foreign direct investment (FDI) into the halal sector. The government also organizes prestigious annual events such as the Malaysia International Halal Showcase (MIHAS) and the World Halal Forum (WHF). The halal sector has now expanded into finance, tourism, services and consumer goods. Malaysia enjoys an RM35.4 billion from annual

¹⁰<https://itc.gov.my/tourists/discover-the-muslim-friendly-malaysia/malaysia-the-worlds-leading-halal-hub/>

export of halal products which accounts for approximately 5.1% of the country's total exports.

ii. International student flows: The number of internationally mobile students worldwide has grown rapidly - during 2005-2013, the number increased by 1.3 million (UNESCO 2018). There are 4.1 million foreign students studying worldwide from different countries in 2013. The growth in cross-border movement of international students has coincided with the increasing internationalisation of the education sector worldwide (UNESCO 2018). Today, millions of students are internationally mobile - they physically cross an international border between two countries to participate in educational activities in a destination country. This has been also viewed by some as “educational tourism” (Matahir & Tang, 2018).

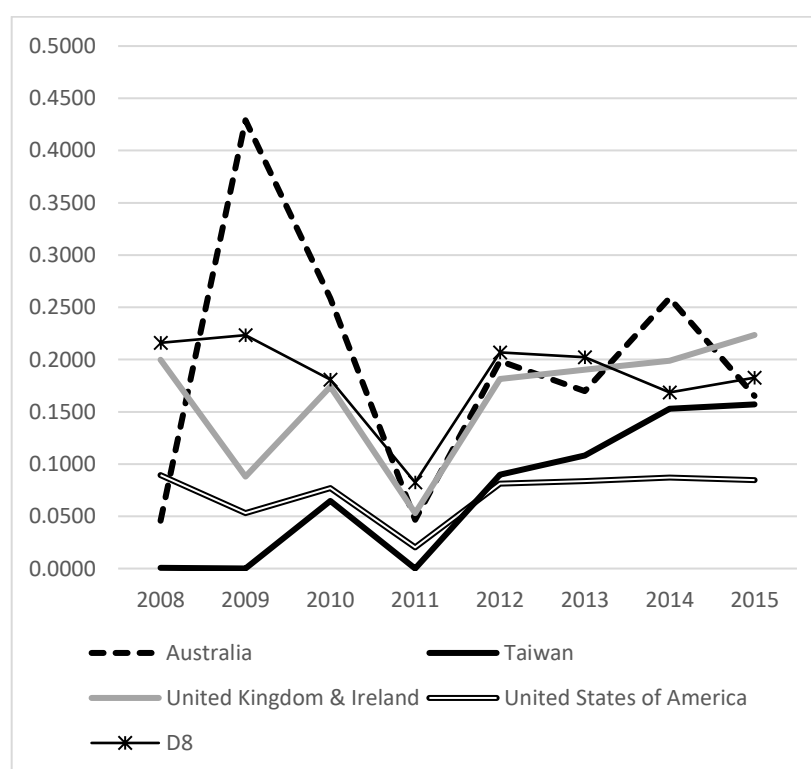
For the host country (e.g. Malaysia), international student migration provides a number of benefits. Foreign students are an important source of income for local universities as international students are charged higher fees compared to domestic students. The UK Higher Education contributed £7.9 billion to the country's export industry in 2009 (Wilson 2012)¹¹ Almost £4.5 billion per annum came from tuition fee income from international students, while another £10 billion was gained annually through students' consumption spending. Higher education is a profitable export for leading high income nations such as the United States (US), the UK, and Australia (Altbach et al. 2009). This also helps maintain their economy's competitiveness in the world market by ensuring global talent supply. Other economic benefits include more job opportunities for the locals as the sector in the higher education sector.

Investment in human capital has been key to ensuring social cohesion and sustaining economic growth. The government has produced an Education Blueprint charting out a detailed roadmap for how further expansion of the education sector can future-proof the Malaysian economy against changes in technology and jobs. Internationalization of the education sector is also an important component of the reform strategy. The key institutional development facilitating educational tourism is the emergence of “education hubs” - a national plan and priority to serve as a

¹¹ Wilson, T. (2012). *A Review of Business-University Collaboration*. Retrieved September 4, 2018, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32383/12-610-wilson-review-business-university-collaboration.pdf

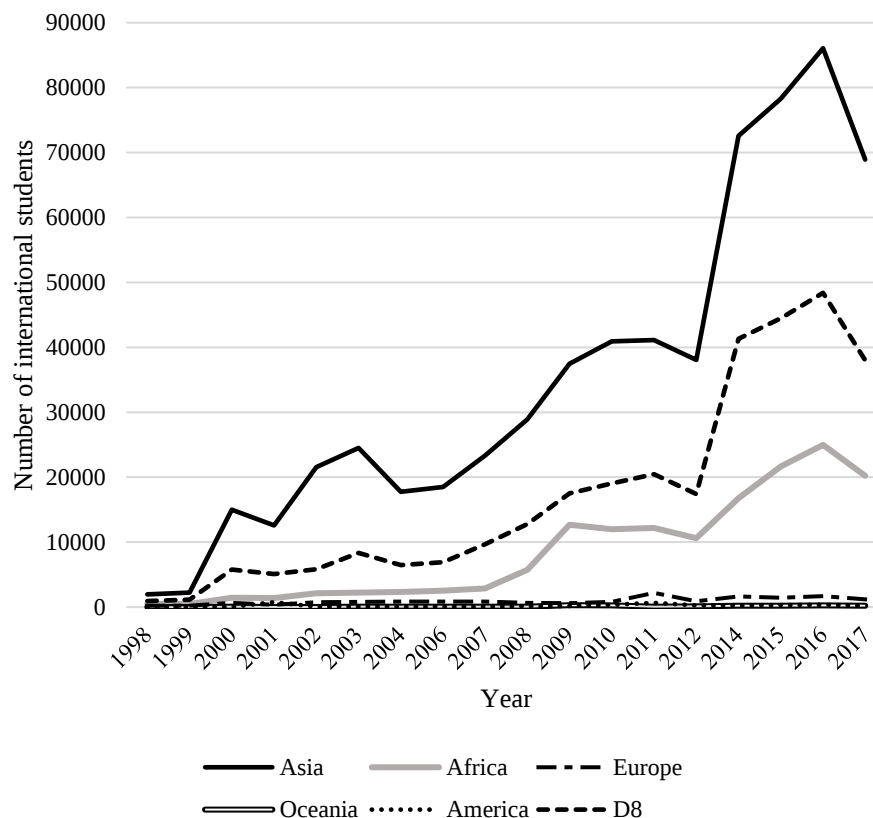
centre of education expertise, excellence, and economy which can involve all types of education. A number of other Muslim countries have successfully set up education hubs. Examples include Qatar, Bahrain and the United Arab Emirates. However, as Singapore, China and Hong Kong intensify their efforts in attracting students from all over the world as one of their key development strategies, D-8 countries face stiff competition. In this context, Malaysia can serve as the leader and its education hub can be leveraged to train and development youths from D-8 countries. With a large number of reputed secondary and post-secondary international centres for higher education and research and simultaneous emphasis on talents, Malaysia already enjoys an advantage within the D-8 block in terms of international student migration.

Figure 3: Malaysian student migration to the D-8 and selected major destination countries, 2008 - 2014



Source: Authors. Notes: All figures refer to proportions.

Figure 4: International student migration from D-8 countries and other regions to Malaysia, 1998 - 2017



Source: Authors. Values for 2005 and 2013 are missing.

While student outflow from Malaysia to D-8 member countries is very small (Figure 3), Malaysia has already become an established education hub for D-8 country students (see Figure 4). According to Ministry of Higher Education (MOHE)¹², Malaysia has attracted a total of 170 068 international students from over 150 nations in 2017. On top of that, the country aims to attract 250 000 international students by 2025 as stated

¹² Ministry of Higher Education (MOHE), Malaysia. (2018). *KPT Report Card: Malaysia as international education hub*. Retrieved September 5, 2018, from <http://news.moe.gov.my/2018/04/25/kpt-report-card-malaysia-as-international-education-hub/>

under the Malaysia Education Blueprint 2015-2025. The number of international students in Malaysia is dominated by students from Asia (i.e., Southeast, Middle East countries and Middle Asia) and Africa with a small number of students originated from Europe.

The inflow of foreign students to Malaysia contributes to RM7.5 billion savings in foreign currency exchange and generates the country's income of approximately RM 30 000 per student (PEMANDU, 2010). However, there is scope for further growth. According to UNESCO data, the top 10 destinations of international students in 2013 did not include Malaysia¹³. Apart from being an education hub, there is an opportunity for Malaysia to economically benefit from the tremendous growth of the inflow of international students to the country over the past decade. Malaysia's orientation as a trade dependent economy offers an additional advantage -- , this is the chance to diversify its source of economy and reduce its over-reliance on only a few exports and imports with trading partners.

Further internationalisation of Malaysia's higher education sector hinges on leveraging cultural, religious and economic linkages with other countries. Culture and religion are among the key factors attracting international students to Malaysia (The Star 2014)¹⁴. Therefore, attracting more students from D-8 countries can help. There is strong political support further internationalization (The New Straits Times 2016)¹⁵. The country's high English literacy, Islamic culture and low cost of living being the added attractions, particularly for students from the Middle East. For the same reasons, though, Malaysia also has a comparative advantage in trading with D-8 countries. Trade and migration are both substitutes and complements. However, recent research on advanced European economies shows a significant and positive relationship between exports and migrations from the South to the North (Campaniello; 2014).

¹³ These countries are the US, the UK, Australia, France, Germany, Russia, Japan, Canada, China and Italy

¹⁴ The Star (2018). *Malaysia as education hub looks positive*. Retrieved September 5, 2018, from <https://www.thestar.com.my/news/nation/2014/06/21/msia-as-education-hub-looks-positive/>

¹⁵ New Straits Times. (2016). International student enrolment up by 12 percent last year: Higher Education Ministry. <https://www.nst.com.my/news/2016/03/136247/international-student-enrolment-12-percent-last-year-higher-education-ministry>

Growing bilateral trade relations is therefore another means for internationalization of the education sector and attracting skilled workers.

iii. Skilled labor migration and mobility: While the trend of students' overseas migration may be temporary, it can also serve as a form of highly skilled labour migration and facilitate further skilled migrations (Castles and Miller, 1998). The economic significance of such migration has grown in recent years. The structure of the world economy has changed radically in the last two decades, since D-8 was established. The fourth industrial revolution and rapid technological advancement present member countries with a new challenge: how to reap the demographic dividend and harness young workforce for sustainable development while also making them resilient to technological unemployment? A model of growth that puts human development at the center stage is necessary for the D-8 block to deal with these emerging 21st century challenges. Harnessing talents and ensuring their international mobility should be a priority. Member countries together possess a large pool of human resources which can be tapped for mutual gains. D-8 block has a global pool of overseas 'talent' migrants. For students from other D-8 countries, studying in Malaysia could be a stepping stone to permanent labour migration to Malaysia or to other D8 member countries. Circulation of youths among member countries offer scope for brain gain through overseas higher education and skills developments. This can be also an effective way to deal with "talent drain" out of the D8 block. D8 diaspora working abroad can be also exploited to create cross-national links and build global networks. Talent mobility encourages brain circulation and will foster knowledge and skills transfer.

Malaysia's shift to a knowledge economy based on high productivity and skills has resulted in manpower shortage in the labor market (World Bank 2019). The country's small working-age population contrasts with labor surplus compared D-8 states such as Indonesia, Bangladesh, Nigeria and Pakistan. Steady economic growth in the past decades have kept unemployment rate low. Skilled migrants from D-8 countries can fill the vacancies in NKEAs. The government has set up the Talent Corp to attract and retain foreign talent for long-term employment in Malaysia. Its primary role is to fill the critical skills gap and complement the Malaysian talent pool by enhancing "expatriate facilitation through policies and top-

notch services to top foreign talent” Talent Corp (2017)¹⁶. Some of these notable policies include (a) Residence Pass-Talent (RP-T), (b) Returning Expert Programme (REP); (c) Knowledge Malaysia Diaspora (KNOWMADS) and (d) MYXpats Centre. These initiatives collectively can serve as a template for other member states to develop a comprehensive framework for labor mobility for all citizens. We present one such framework in the next section.

5. A New conceptual framework: the three-pillar model

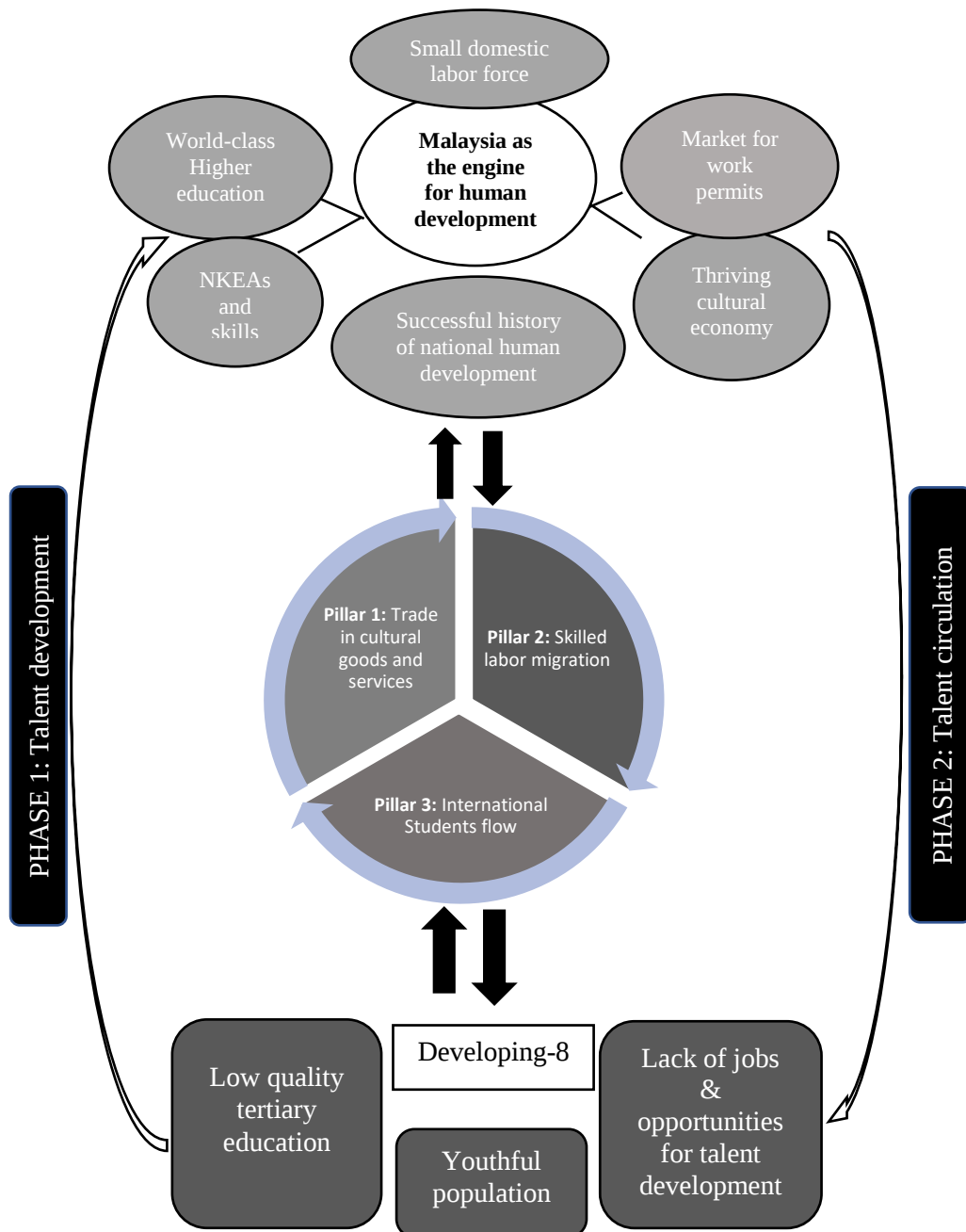
All D-8 countries have now achieved at least lower middle-income nation status. Given the youthful population, the demand for higher education has grown in all member states following decades of macroeconomic growth. However, the respective domestic labor markets have not developed to respond to the demographic change. In Turkey¹⁷, for instance, the labour force participation rate is only 56.1% and there is a shortage of skilled jobs. In contrast, Malaysia has a higher labor force participation rate and is on course to graduate to a high-income nation status.

Taking into account common cultural traditions and the prospect for gains from trade in cultural goods and exchange of labor and skills, Figure 5 presents a visual summary of the discussion in section 4 and formally introduces our three-pillar conceptual framework of people-centric economic cooperation in the Muslim world in the context of D-8 countries. The framework is organized in two phases. Phase 1 is about “talent development”. Here, students and skilled workers from the D-8 states temporarily move to a high human capital member state (e.g. Malaysia). This in turn facilitates trade creation in cultural goods and services sector. Everyone involved in related transactions experience “brain gain”. In the second phase, this process is reversed -- talents flow back from the high human capital member state (e.g. Malaysia) to source D-8 member countries. In other words, brain circulation occurs in Phase 2.

¹⁶ Talent Corp (2017) Visioning Malaysia’s Future Of Work: A Framework For Action https://www.talentcorp.com.my/clients/TalentCorp_2016_7A6571AE-D9D0-4175-B35D-99EC514F2D24/contentms/img/publication/TalentCorp_Visioning%20Malaysias%20Future%20of%20Work_2017.pdf

¹⁷ <https://data.oecd.org/emp/labour-force-participation-rate.htm>

Figure 5: The Three-pillar Framework for Economic Cooperation



Source: Authors

Our model emphasizes human development for at least two reasons. First, there is already significant loss of brain or talent from the D-8 as millions of citizens take up employment in non-member countries. A popular motivation is obtaining a tertiary education degree training, Malaysia being a popular destination within the D-8. A number of factors is responsible for educational migration to Malaysia: low tuition fees and cost of living, quality educational technologies, large presence of multinational companies, the ease of admission, perceived high quality of Malaysian universities and the ease of obtaining work permits for employment (Kazemi et al 2018)¹⁸.

Second, cultural factors also influence the flow of people and resources. Bilateral trade in cultural goods and services is likely to increase in the future. This offers scope for further trade creation. D-8 countries currently comprise approximately two-third of the total population in the Islamic world (Aral 2005) and also enjoy a youthful (i.e. under-40) population. Reaping this demographic dividend requires a skills and employment focused approach that complements the goal of strengthening trade linkages. A number of initiatives are in place to boost regional trade within the D-8 block¹⁹. In contrast, policy measures for collective human development and integration of the labor market in the D8 are lacking.

Such policy coordination is of mutual interest. For Malaysia, despite the optimism over graduation to a high-income nation status, there are concerns about the so called “middle income trap”. Overcoming this trap would require further investment into education and the knowledge economy²⁰. In this regard, collaboration with D-8 economies can help. As a matter of fact, Malaysia can play a leading role in Phase 1 of our proposed framework (see figure 5).

¹⁸ This is based on a sample of 250 Iranian post-graduate and undergraduate students in Malaysia

¹⁹ <https://www.yenisafak.com/en/world/d8-countries-to-use-single-payment-card-in-trade-3472505>

²⁰ This is already reflected in the government’s National Transformation Programme (NTP) which provided the strategy to guide the country’s transition to developed-nation status. This included targets such as creating 3.3 million new jobs and attracting over US\$440 billion in investments. Towards this end, the government identified key economic sectors, popularly known as “National Key Economic Areas” (NKEAs). These sectors received preferential Government funding and employment of top talents.

On the other hand, Malaysia already has a range of institutions and physical infrastructure to support aspiring students and skilled workers from D-8 countries. At the national level, the government has developed an institutional model for talent development which encourages expatriate Malaysians to return to their homeland for knowledge transfer and sharing purposes. Popularly, it is known as the TalentCorp that manages the Residence Pass Talent (RP-T) program. Under this scheme, a ten-year renewable pass is issued for highly qualified expatriates to allowing them to reside and work in the country. Programme beneficiaries enjoy flexibility over change in jobs (Del Carpio et al. 2015).²¹ RP-T has helped diversify Malaysia's talent pool by attracting foreign talents and bring back overseas Malaysians. In doing so, it allows citizens to contribute to national development while retaining their global links (Leipziger 2008). This therefore facilitates both "brain circulation" and "circular migration" (Zimmermann, 2014). This can be adapted to serve shared interests of D8 member countries and, for instance, increase the share of RP-T holders from D-member states in Phase 1 of our proposed 3-pillar model.

Malaysia has a sizable diaspora – an estimated population of 1.5 million people (Hugo, 2011). However, none of the D-8 member countries hosts a sizable number of Malaysian immigrants. Introducing a preferential work permit scheme for D-8 member countries can attract some of these expatriate Malaysians to D-8 nations thereby increasing the within D-8 flow of talents and skills.

In sum, the current pattern of in and out-migration within the D-8 is biased towards Western nations. This is primarily driven by a high concentration of world class universities and high-tech firms in the West²². Innovation in labor migration policies is a necessary first step to better manage the flow of trade and skilled labor towards D-8 member countries. These measures can help create a common Islamic market intensive in skilled labor. However, in the long-run, coordinated investment in high quality education systems and R&D is also critical.

Lastly, while policy interventions can engineer a large-scale movement of people, it is not without risks. There is concern over a possible social

²¹https://www.talentcorp.com.my/clients/TalentCorp_2016_7A6571AE-D9D0-4175-B35D-99EC514F2D24/contentms/img/TalentCorp%20Annual%20Review%202018.pdf

²²<https://www.weforum.org/agenda/2016/10/this-is-where-skilled-workers-are-migrating-to>

backlash. Policy innovations aimed at enlarging the domestic labor market through participation of skilled foreign professionals require measures that make intra-group migration more acceptable. One such innovation involves issuing time-bound right-to-work permits. This is feasible in economically advanced countries with sectors that are not attractive to local workers. But these jobs could be attractive to workers from relatively poorer D-8 countries. Time-bound right-to-work permits can leverage this mismatch in demand and supply: Malaysian citizens can rent out their right-to-work to foreign professionals from other D-8 countries. Citizens from respective countries can auction off their permits which can be formalized through a web based platform managed by the host country (Lokshin and Ravallion 2019). Malaysia can act as the hub for such experimentation and innovations. If successful, the policy practices can be reciprocated by other member states on a multilateral basis. Once all member states have complementary institutional measures in place, that would facilitate transition to Phase 2 of our model i.e. D-8 wide “brain circulation”.

6. Conclusion

Many developing country governments look to the economic success of East Asia for policy lessons to sustain high macroeconomic growth with poverty reduction. Against this background, in this paper, we have scrutinized the development achievements of Malaysia, one of the eight prominent East Asian Tiger economies which is also considered by many as a model for growth with human development. In this paper, we first reviewed Malaysia’s economic progress in comparative perspectives and identified a number of stylized facts highlighting the developmental role of state. We explained how Malaysia’s progress in a number of human development indicators coincided with government interventions on education and health, as part of the NEP, confirming the developmental role of the state. Progress during the recent past also benefited from government programs under the New Economic Model and Economic Transformation Programme, both of which further emphasized human development and skills to facilitate graduation to a high-income nation. This shift in strategy ideally places Malaysia to guide the process of human development in D-8 countries. At the same time, we pointed out the lack of bi-lateral trade linkages among D-8 countries even though there are potentials for gainful economic exchanges given the shared Islamic culture. To this end, we have emphasized on human development

in the D-8 with a focus on increased flow of international students and skilled labor mobility.

To this end, we proposed and developed a three-pillar framework for people-centric economic integration in the D-8. We did so by describing Malaysia as an engine for talent development and talent recirculation in D-8 member states. The three pillars are: (a) trade in cultural goods and services, (b) international student flow and (c) skilled labor mobility.

The framework explains how Malaysia can offer a model for greater economic integration among the D-8. More specifically, we have advocated for freer international migration and discussed how in light of the Malaysian experience, an institutional model could be developed for the greater benefit of all D-8 member states. For low skill workers in the labor market, our recommendations include a D-8 wide market for work permits. This can help host member countries meet their labour force requirements while also facilitating emigration. For high skill workers, we have proposed a D-8 wide institutional model akin to Malaysia's Talent Corp. This has the potential facilitate talent mobility and work placement opportunities which together can create a network of D8 professionals. This segment of the region-wide workforce possess local knowledge and global experience of conducting business in D8 member states and can play a critical role for graduation out of the middle-income status.

At an initial stage, the proposed institutional innovations and reforms should be piloted in a country context. Our proposal is for Malaysia to show the way, providing preferential access to D-8 countries to Malaysian labor market and the education system for greater student mobility and brain circulation. If successful, this model can be replicated and reciprocated by other member states. Our three-pillar framework not only offers a blue print for how to leverage Malaysia's development model for human development within the D-8 block, it also provides a mechanism for Malaysia to benefiting further from the wider pool of talents within the Muslim world.

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Development of a Conceptual Model to Understand the Purchase Intentions of Takaful (Islamic insurance) Customers

Shahid Rizwan¹ and Husam-Aldin N. Al-Malkawi²

ABSTRACT

Despite being among the pioneers of the Takaful industry, the UAE's share of the Takaful (Islamic insurance) business is less than 10 percent. Against this background, this study was conducted with the main objective of developing a conceptual model that combines the potential factors contributing towards robust and sustainable growth of the Takaful business in the second largest economy of the Arab world. The study utilizes the Theory of Planned Behavior (TPB) to examine the impact of brand equity and customer perceptions on the purchase intentions of Health Takaful customers through the moderating role of age, income, education, and religion. A quantitative study was adopted, using random sampling technique for data collection from 400 respondents through a self-administered questionnaire. The major findings of the study confirmed that brand equity and customer perceptions have a significant positive influence on the purchase intentions of Health Takaful customers in the UAE. Analyses of the moderating variables showed that while age, income and education are significant moderators, religion is a non-significant moderator for the above relationships. An interesting finding of the study is the non-significant moderating role of religion, indicating that every resident of the UAE can be a potential buyer of Takaful, regardless of his religion. The study is, to the best of the researcher's knowledge, a pioneer attempt to propose a conceptual model to understand the purchase intentions of Takaful customers in a dynamic Arab country like the UAE. This model can be utilized and explored further by academia, industry practitioners and government bodies through its application in various business industries across the globe.

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ملخص

على الرغم من كونها تُعد من بين رواد صناعة التكافل، فإن حصة الإمارات العربية المتحدة في أعمال التكافل (التأمين الإسلامي) أقل من 10 في المائة. وفي هذا السياق، أجريت هذه الدراسة بهدف رئيسي يتمثل في تطوير نموذج مفاهيمي يجمع بين العوامل المحتملة التي تساهم في تحقيق نمو قوي ومستدام لأعمال التكافل في ثاني أكبر اقتصاد في العالم العربي. وتستخدم الدراسة نظرية السلوك المخطط (TPB) لفحص تأثير ملكية العلامة التجارية وتصورات العملاء على نوايا الشراء لعملاء التكافل الصحي من خلال دور الوسيط لكل من العمر والدخل والتعليم والدين. وتم اعتماد دراسة كمية باستخدام طريقة أخذ العينات العشوائية لجمع البيانات من 400 مجيب من خلال استبيان ذاتي. وأكدت النتائج الرئيسية للدراسة أن لدى ملكية العلامة التجارية وتصورات العملاء تأثير إيجابي كبير على نوايا الشراء لعملاء التكافل الصحي في الإمارات العربية المتحدة. كما أظهرت تحليلات المتغيرات الوسطية أنه في حين أن العمر والدخل والتعليم يعتبرون وشكاء مهمون، فإن الدين ليس كذلك بالنسبة للعلاقات المذكورة أعلاه. ومن النتائج المثيرة للاهتمام دور الوسيط غير المهم للدين، مما يشير إلى أن كل مقيم في الإمارات العربية المتحدة يمكن أن يكون مشتري محتمل للتكافل، بغض النظر عن دينه. وتعد الدراسة، حسب معرفة الباحث، محاولة رائدة لاقتراح نموذج مفاهيمي لفهم نوايا الشراء لعملاء التكافل في بلد عربي ديناميكي مثل الإمارات العربية المتحدة. ويمكن استخدام هذا النموذج واستكشافه بشكل أكبر من قبل الأوساط الأكاديمية وممارسي الصناعة والهيئات الحكومية من خلال تطبيقه في مختلف الصناعات التجارية في جميع أنحاء العالم.

ABSTRAITE

Bien qu'ils fassent partie des pionniers du secteur du Takaful, la part des Émirats arabes unis dans le secteur du Takaful (assurance islamique) est inférieure à 10 %. Dans ce contexte, cette étude a été menée avec l'objectif principal de développer un modèle conceptuel qui combine les facteurs potentiels contribuant à une croissance robuste et durable de l'activité Takaful dans la deuxième plus grande économie du monde arabe. L'étude utilise la théorie du comportement planifié (TPB) pour examiner l'impact de la valeur de la marque et des perceptions du client sur les intentions d'achat des clients de Health Takaful à travers le rôle modérateur de l'âge, du revenu, de l'éducation et de la religion. Une étude quantitative a été adoptée, en utilisant une technique d'échantillonnage aléatoire pour la collecte de données auprès de 400 répondants au moyen d'un questionnaire auto-administré. Les principaux résultats de l'étude ont confirmé que le capital de la marque et les perceptions des clients ont une influence positive significative sur les intentions d'achat des clients de Health Takaful aux EAU. Les analyses des variables modératrices ont montré que si

l'âge, le revenu et l'éducation sont des modérateurs significatifs, la religion est un modérateur non significatif pour les relations ci-dessus. Un résultat intéressant de l'étude est le rôle modérateur non significatif de la religion, ce qui indique que tout résident des EAU peut être un acheteur potentiel de Takaful, quelle que soit sa religion. Cette étude est, à la connaissance du chercheur, une tentative pionnière de proposer un modèle conceptuel pour comprendre les intentions d'achat des clients du Takaful dans un pays arabe dynamique comme les EAU. Ce modèle peut être utilisé et exploré plus avant par le monde universitaire, les praticiens de l'industrie et les organismes gouvernementaux par le biais de son application dans diverses industries commerciales à travers le monde.

Keywords: Takaful, brand equity, customer perceptions, purchase intention, demographic factors, religion, UAE.

1. Introduction

The global Takaful industry has reached US\$26.1 billion in 2017 in terms of Gross Written Premiums (GWP) and contributing 44 percent of the total contributions from the GCC (Gulf Co-Operation Council) region (IFSB Stability Report, 2019). Among the GCC nations, Saudi Arabia, Bahrain, Kuwait, and Oman demonstrated double digit market share of the Takaful business while the UAE and Qatar hardly reached the threshold of 10 percent (IFSB Stability Report, 2019). It is important to note that the market share of Takaful in Oman is more than that of the UAE although Oman started Takaful operations only in 2014 while the UAE had started the Takaful business earlier, in 1979 (ICD-Thomson Reuters Report, 2017). This is despite His Highness Sheikh Mohammad Bin Rashid Al Maktoum, Vice-President, Prime Minister of the UAE, and Ruler of Dubai, unveiling in 2013, of his vision to make Dubai the hub of Islamic economy (Global Islamic Finance Report, 2016).

In 2005, the law on mandatory health insurance for all non-citizen residents of Abu Dhabi was implemented and a similar law was also implemented in Dubai in 2014 (Alpen Capital Report, 2016). According to mid-year estimates of 2019, Abu Dhabi has an estimated total population of 3.2 million (GMI Statistics, 2019) while year-end estimates of 2018 showed that Dubai has a total population of over 3.2 million (DSC Annual Report, 2019). Based on current estimates, in both the states, a total of 5.82 million individuals were insured by conventional health insurance while 0.576 million individuals were insured by Health

Takaful. Overall, the conventional insurance sector dominated the UAE market with a 91 percent market share (IFSB Stability Report, 2019) even though the country has an almost 76 percent Muslim population (Pew Research Centre, 2011).

To address the issue of low market share of Takaful in the UAE, a study was conducted with the aim of developing a conceptual model which combines the key factors which are significant for the growth and development of the insurance industry. These factors were identified from the findings of previous studies conducted within the insurance industry across different regions of the world. Gunawardane *et al.*, (2016) and Noormahmoudi & Zomorrodian (2016) conducted studies on the insurance industry and concluded that creating a strong brand equity is vital to promoting the insurance business. Another study by Sarlak (2013) on financial institutions concluded that strong brands have better brand equity, therefore financial institutions should primarily focus on building themselves as a strong brand. Previous studies have shown that for the past three decades, brand equity was found to be one of the most valuable assets of any insurance firm to ensure the growth and expansion of the business (Noormahmoudi & Zomorrodian, 2016). Similarly, other studies in the insurance industry suggest that customer perceptions greatly influence the purchase intentions of customers (Tubio *et al.*, 2016) while demographic factors are also significant to affect the choice of customers in the insurance industry (Rizwan *et al.*, 2016).

The impact of brand equity on purchase intentions has been explored in various past studies (Awan *et al.*, 2020; Bashir *et al.*, 2019). Moreover, individual dimensions of brand equity including brand awareness, brand association, perceived quality and brand loyalty have also been studied, as shown in previous literatures (Sasirekha & Sathish, 2017; Tariq *et al.*, 2017). Similarly, the relationships of customer perceptions and demographic factors with purchase intentions have also been examined in many studies (Kiran & Lakshman, 2017; Maina, 2016). However, key variables such as brand equity, its four dimensions, customer perceptions and demographic factors (including religion) have not been previously examined in a single study. Thus, this paper aims to highlight a study, a pioneer attempt, to bridge the gap in existing literature by combining the various key variables, and to come up with a comprehensive conceptual model to understand the purchase intentions of Health Takaful customers. Various reasons have been put forward for selecting the UAE in the study.

Firstly, the UAE is among the pioneers of the Takaful industry in the world, in which the second Takaful company was established in 1979. Secondly, population-wise, the UAE is the second largest GCC nation and is known as the most vibrant and modern Islamic economy providing ample opportunities to businesses of all domains. Therefore, the UAE can be used as a model for other regional and emerging markets. Finally, current available literature is quite limited about purchase intentions of Health Takaful customers in the GCC region in general, and in the UAE.

Section two of this paper discusses the literature review. In the third section, the hypotheses and conceptual framework of the study are given, while the fourth section describes the research methodology. Section five presents the results while the last section provides the conclusion and limitations of the study, and suggestions for further research.

2. Literature Review

2.1 Underpinning Theory

Considering the relevance of the Theory of Planned Behavior (TPB), this study utilizes TPB as the underpinning theory. Over the past three decades, TPB has been utilized by numerous studies which aim to understand the key factors that influence the intentions of individual human beings (Ajzen, 1985). It is important to note that TPB is among the theories of social sciences that have attracted over 50000 scholarly citations globally. Due to its significance and practical implications, TPB has been successfully applied in multiple domains of various business segments across the globe (Ashraf *et al.*, 2017).

In 1985, Icek Ajzen developed the Theory of Planned Behavior (TPB) which is an extension of the Theory of Reasoned Action (TRA) that was jointly developed by Martin Fishbein and Icek Ajzen in 1967 (Ozer & Yilmaz, 2010). TRA believes that human intentions are influenced by attitude and subjective norms while TPB believes that human intentions are influenced by attitude, subjective norms and perceived behavioral controls (Wang, 2014). The following presents details of each of the factors of the TPB.

Ajzen (1985, p. 188) believes that an attitude towards a behavior is “the degree to which a person has favorable or unfavorable evaluation of the

behavior in question” while Muzaffar (2015) defines attitude as a psychological emotion that comes from the positive or negative evaluation of a situation. According to the TPB, attitude directly impacts the intention of an individual that ultimately influences his behavior (Kassim *et al.*, 2016). Since the study aims to evaluate the purchase intentions of the customer, therefore the element of attitude is included in the study.

According to Ajzen (1985, p. 188), subjective norms are “the perceived social pressure to perform or not to perform the behavior”. Subjective norms are also known as the perceptions that an individual collects from people around him such as his family, friends, and colleagues. Opinion of people is important to an individual as he/she always considers the reaction of people around him before he/she performs a particular behavior (Muzaffar, 2015). Studies of consumer behavior have shown that the purchase intentions of customers are greatly influenced by subject norms (Kumar, 2012).

The TPB defines perceived behavior controls as “the perception of an individual about the difficulty or ease that he/she might face while performing a particular behavior” (Ajzen, 1985, p. 457). Perceived behavioral controls consist of two basic elements known as controllability and self-efficacy. Controllability means the availability of resources to perform a behavior while self-efficacy is the confidence of an individual to perform a behavior (Tuan & Vinh, 2016). Lama (2017) found in his study that perceived behavioral controls have a direct impact on the purchase intentions of customers. Since this paper examines “customer perceptions” as an independent variable and past studies have shown the link of “customer perceptions” with subjective norms and perceived behavioral control, therefore, both elements are included in the study.

According to TPB, attitude, subjective norms and perceived behavioral controls are influenced by various background factors including personal, information and social factors (Ajzen, 1985). To achieve the objectives of this study, potential variables of the conceptual framework are derived from the background factors of TPB. For instance, brand equity and its four dimensions are derived from information factors, customer perceptions are acquired from personal factors while demographics factors are taken from social factors.

2.2 Brand Equity

According to Keller (1993, p. 2), “brand equity is the differential effect that brand knowledge has on customer response to the marketing of that brand”. This definition is one of the most comprehensive definitions of brand equity as it comprises three core elements of brand equity known as differential effect, brand knowledge and customer response to marketing. According to Adam & Akbar (2016), differential effect is the difference that a customer establishes while comparing one brand with another. Similarly, knowledge about a brand that comes from the past experience of customers with the brand is called brand knowledge while reaction of customer against the marketing campaign of a brand or product is known as customer response to marketing.

Primarily, the concept of brand equity emerged in 1980 and since then, it has been extensively researched by the academia and marketing practitioners to know its effect on the purchase intentions of customers across various business industries (Bashir *et al.*, 2019). Aaker (1991), opines that brand equity consists of five dimensions which are brand awareness, brand association, perceived quality, brand loyalty and other proprietary assets. Most of the studies on customer-based brand equity suggest that the fifth dimension of brand equity known as other proprietary assets is not significant enough to measure brand equity (Buil *et al.*, 2013). Therefore, four core dimensions of brand equity are considered for this study which include brand awareness, brand association, perceived quality, and brand loyalty.

Brand awareness is imagination of a brand that exists in the mind of a customer and it is the power of a customer to recall and identify a brand in various situations (Aaker, 1991). Brand awareness greatly helps a customer to differentiate one brand from its competitors during the brand selection process (Awan *et al.*, 2020). Past studies of Tariq *et al.*, (2017) conclude that brand awareness is the core component of brand equity that has a direct influence on the purchase intentions of customers.

Brand association is the sum of certain characteristics of brand which are developed in the mind of a customer through the passage of time. According to Bashir *et al.*, (2019), every brand strives to build stronger brand association in order to enjoy long-term relationship of a brand with its customers. Studies of Gordon *et al.*, (2016) show that brand association

plays a significant role in the marketplace when the customer finalized his purchases.

According to Kotler (2003), perceived quality is the combination of product features and it demonstrates the ability of a product to fulfill the needs of the customer. Perceived quality positions a brand at higher level, differentiates it from its competitors and becomes a reason to buy a brand (Lee *et al.*, 2000). Previous studies by Bashir *et al.*, (2019) show that customers give high preference to quality brands and that is why perceived quality has a significant role in the brand selection process.

Brand loyalty is the attachment that a customer has towards a brand and it is the most important dimension of brand equity (Aaker, 1991). Brand loyalty is conceived through the features and benefits of a brand and it influences customers to prefer one brand over others (Sharma *et al.*, 2013). According to Aaker (1991), if a brand can develop large groups of loyal customers, then the brand will have multiple benefits of premium positioning, enhanced market share and feasible profit margins. Based on the above discussion, brand equity and its four dimensions are included in this study.

2.3 Customer Perceptions

According to Kotler (2003), the overall understanding of a customer about a product or service is called customer perceptions. Marketers of various business industries allocate healthy budget to build positive perceptions about their brand as purchase intentions are intricately linked to customer perceptions (Kiran & Lakshmana, 2017). Customer perceptions have a high impact on purchase intentions since customers always consider those perceptions which are stored in their mind before they decide to buy a product or service (Sheth *et al.*, 1999). Considering the significance of customer perceptions, this study has examined their impact on the purchase intention of Health Takaful customers.

2.4 Demographic Factors

According to Kotler (2003), the characteristics of a population, such as age, gender, income, education, religion, race, ethnicity, nationality, and social status are known as demographic factors. Demographic factors remain the key focus of marketers in business research because of their

ability to provide the essential information about the needs, wants, attitude and preference of a population. Mendes (1998) believes that the long-term success of a business is linked to demographical studies as they help businesses to design effective and efficient marketing strategies based on demographical characteristics of their target population. Studies by Maina (2016) concluded that demographical factors have a contingent impact on the purchase intentions of insurance products. Therefore, demography should be a primary focus in studies of the insurance industry. Considering the recommendations of past studies, this study has included four core elements of demography i.e., age, income, education, and religion.

2.5 Purchase Intentions

According to Padhy & Sawlikar (2018), purchase intentions are defined as the plan, desire and possibility of buying a product or service. Madahi & Sakati (2012) believe that purchase intentions are the sign of repetitive purchases of the same product by a customer if it fulfills his requirement. Studies of consumer behavior suggest that the strength of relationship between a customer and a product or brand can be seen through purchase intentions (Khan *et al.*, 2012). Purchase intentions are among the few variables of business studies which are heavily explored by marketers and academia. It is due to this fact that businesses are always keen to know those factors which affect the purchase intentions of their customers and by knowing this, businesses can enjoy long-term relationship with the customer and yield substantial profits (Tariq *et al.*, 2017).

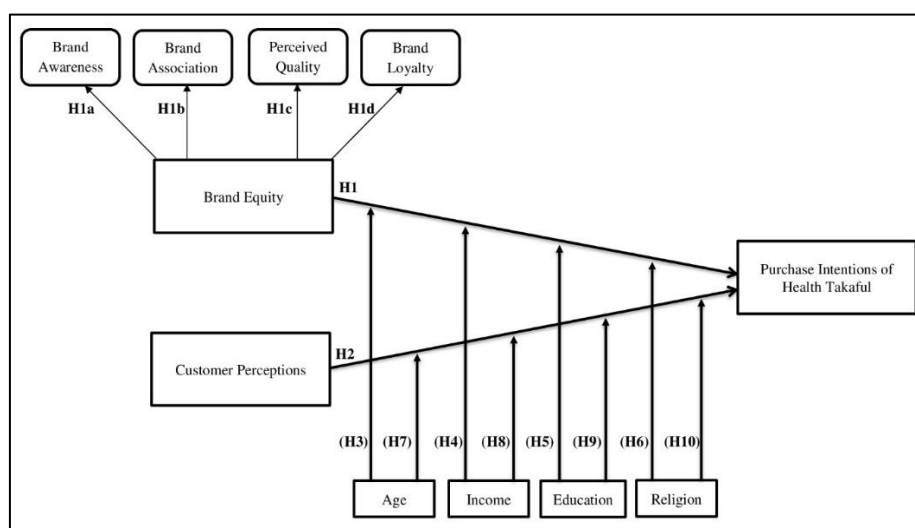
3. Conceptual Framework and Research Hypotheses:

Based on the literature discussed above and consistent with the Theory of Planned Behavior (TPB), we propose the following research hypotheses and conceptual framework for the study:

- H1: Brand equity influences the purchase intentions of Health Takaful customer in the UAE.
- H1a, 1b, 1c, 1d: Brand awareness/brand association/perceived quality/brand loyalty are significant dimensions of brand equity in terms of Health Takaful buying in the UAE.

- H2: Customer perceptions influence the purchase intentions of Health Takaful customer in the UAE.
- H3, 4, 5, 6: Age/income/education/religion moderate the relationship between brand equity and purchase intentions of Health Takaful customer in the UAE.
- H7, 8, 9, 10: Age/income/education/religion moderate the relationship of customer perceptions with purchase intentions of Health Takaful customers in the UAE.

Figure 1: Conceptual framework of the study



4. Research Methodology

In the study, Structural Equation Modeling (SEM) technique of Smart PLS (Partial Least Squares) was utilized to analyze the data collected from 400 respondents.

4.1 Population, Sample and Data Collection

The target population of the study included existing and potential customers of health insurance (Islamic & conventional both) in Abu Dhabi and Dubai which are the two largest states of the UAE. Sample size table of Krejcie & Morgan (1970) suggests a sample size of 384

respondents for any study spanning over one million people. Therefore, a total of 400 respondents were selected for the study. Details of market share of insurance companies in the UAE were taken from “Milliman Market Monitor UAE, 2019”. A total of ten insurance companies were selected for this study that included five conventional insurance and five Takaful (Islamic insurance) companies. All the companies included in this study have branch offices in Abu Dhabi and Dubai. Respondents of the study were chosen through simple random technique considering average daily customer flow. To achieve the desired sample size, a total of 670 questionnaires were distributed which included 350 and 320 questionnaires in Abu Dhabi and Dubai respectively. Out of 670, 417 questionnaires were collected, yielding a response rate of 62 percent. All 417 questionnaires were tested for validity and completion. Seventeen (17) questionnaires were discarded since they were incomplete. Finally, 400 questionnaires were finalized for data analysis which included 203 (50.75%) questionnaires from Abu Dhabi and 197 (49.25%) questionnaires from Dubai.

4.2 Questionnaire and Measurement Scales

The study used six measurement scales, namely brand awareness, brand association, perceived quality, brand loyalty, customer perceptions and purchase intentions. The questionnaire was divided into two sections and consisted a total of 36 questions. Section one was on the demographic profile of the respondents and a total of six questions were designed to collect relevant information about age, gender, income, education, religion, and nationality. Section two contained a total of thirty questions, in which each measurement scale used had five questions. A pilot test of the questionnaire was conducted prior to the main test, with a sample size of ten respondents as suggested by Saunders *et al.*, (2009) to ensure the overall understanding of each item by the respondents. A five-point Likert scale was used to measure all the six measurement scales, in which 1 denotes “strongly disagree”, 2 - “disagree”, 3 - “undecided”, 4 - “agree” and 5 - “strongly agree”.

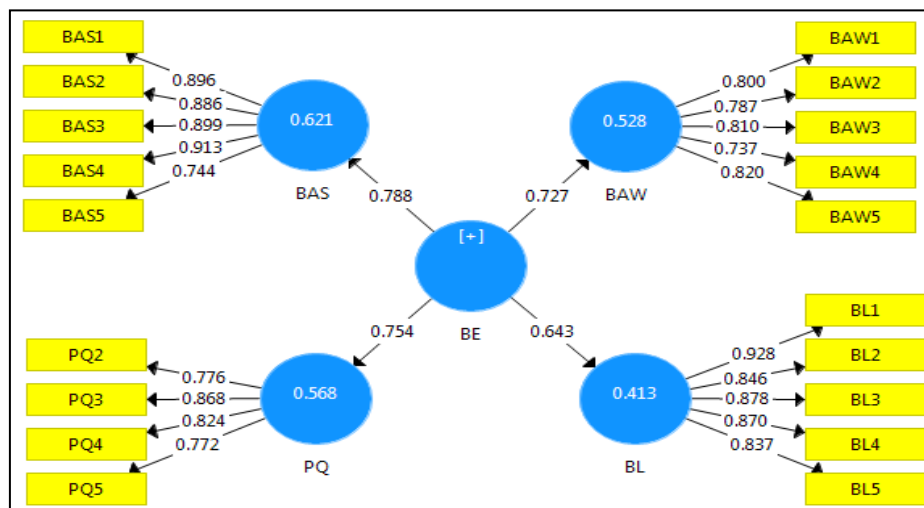
4.3 Data Analysis

The Smart PLS (Partial Least Square) data analysis comprises two stages. In the first stage, we evaluate the measurement (outer) model while in second stage we evaluate the structural (inner) model of the study.

4.3.1 Second Order CFA

In this study, brand equity (BE) was the exogenous variable and it included four dimensions, namely brand awareness (BAW), brand association (BAS), perceived quality (PQ) and brand loyalty (BL). All four dimensions were analyzed in terms of their influence on brand equity (BE). In Smart PLS, dimensions of a construct (also known as second-order construct) are measured through second order confirmatory factory analysis (CFA). The following chart shows the results of second order CFA for four dimensions of brand equity.

Figure 2: Second order CFA for brand equity dimensions



Hair *et al.*, (2012) suggested four primary assessments to analyze the dimensions of a construct which include assessment of path coefficient (β), t-statistics value, p-value and R-square (R^2) which is also known as coefficient of determination. Cohen (1992) suggested the criterion of significance of path coefficient and mentioned path coefficient values of 0.02, 0.15, and 0.35 as small, medium, and large, respectively. The acceptable values for t-test and p-test are greater than 1.96 and less than 0.05 respectively (Rifai & Hasan, 2016). According to Hair *et al.*, (2012), in studies of consumer behavior, an R^2 value of 0.20 is considered as high. Table 1 below combines the detail of results derived through the second order CFA.

Table1: Consolidated results of second order CFA of brand equity dimensions

Path	(β)	p-value	t-value	R ²
BAW→BE	0.727	0.000	27.518	0.528
BAS→BE	0.788	0.000	27.875	0.621
PQ→BE	0.754	0.000	24.395	0.568
BL→BE	0.643	0.000	11.978	0.413

Notes: BAW= Brand awareness, BAS= Brand association,
BE= Brand equity, BL= Brand loyalty, PQ= Perceived quality

The overall results of the second order CFA confirmed that all four dimensions of brand equity had important contributions to build brand equity. Among the four dimensions of brand equity, brand association had the highest impact on brand equity followed by perceived quality, brand awareness and brand loyalty.

4.3.2 Evaluation of Measurement Model

Evaluation of the measurement model (also known as the outer model) includes the assessment of relationships between the observed variables and principal construct. Hair *et al.*, (2012), proposed four basic assessments to evaluate the measurement model which include composite reliability, indicator reliability, convergent validity (average variance extracted) and discernment validity.

According to Urbah & Ahleman, (2010) the value of composite reliability should be greater than 0.70 while the acceptable value for indicator reliability is 0.70 and above (Hair *et al.*, 2014). In this study, one item (PQ1) of “perceived quality scale” showed a value of 0.491, and was thus removed, since previous studies have suggested removal of items with factor loading of less than 0.50 (Ghozali & Latan, 2015). Commonly used method to measure convergent validity is average variance extracted (AVE) and the acceptable value of AVE is greater than 0.50 (Hair *et al.*, 2014). The rule of thumb for discriminant validity is that the items of a scale should load strongly on the intended construct and weakly on the unintended constructs (Gefen & Straub, 2005). Tables 2 and 3 below combine the results of all tests conducted to evaluate the measurement model of the study.

Table 2: Combined results for validity and reliability of measurement model

Latent Variable	Indicator	Indicator Loading	Composite Reliability	AVE
Brand Association	BAS1	0.896	0.939	0.757
	BAS2	0.886		
	BAS3	0.899		
	BAS4	0.913		
	BAS5	0.744		
Brand Awareness	BAW1	0.800	0.893	0.626
	BAW2	0.787		
	BAW3	0.810		
	BAW4	0.737		
	BAW5	0.820		
Brand Loyalty	BL1	0.928	0.941	0.761
	BL2	0.846		
	BL3	0.878		
	BL4	0.870		
	BL5	0.837		
Customer Perceptions	CP1	0.914	0.966	0.850
	CP2	0.933		
	CP3	0.917		
	CP4	0.912		
	CP5	0.935		
Purchase Intentions	PI1	0.911	0.960	0.827
	PI2	0.943		
	PI3	0.930		
	PI4	0.928		
	PI5	0.830		
Perceived Quality	PQ2	0.776	0.885	0.658
	PQ3	0.868		
	PQ4	0.824		
	PQ5	0.772		

Notes: BAS= Brand association, BAW= Brand awareness, BL= Brand loyalty, CP= Customer perceptions, PI= Purchase intentions, PQ= Perceived quality

Table 3: Discriminant validity of latent variables

	BAS	BAW	BL	CP	PI	PQ
BAS	0.870					
BAW	0.511	0.791				
BL	0.251	0.215	0.872			
CP	0.484	0.444	0.265	0.922		
PI	0.429	0.463	0.253	0.533	0.909	
PQ	0.435	0.403	0.448	0.437	0.431	0.811

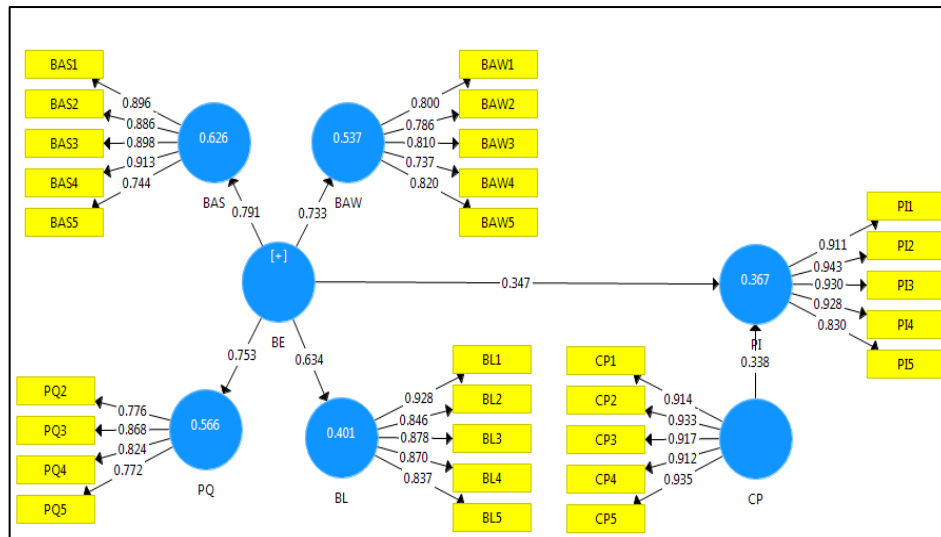
Notes: BAS= Brand association, BAW= Brand awareness,
 BL= Brand loyalty, CP= Customer perceptions,
 PI= Purchase intentions, PQ= Perceived quality

Both foregoing tables confirmed that the measurement model of the study is valid and reliable since the four primary assessments (composite reliability, indicator reliability, convergent validity & discriminant validity) meet the standard evaluation criteria of Hair *et al.*, (2012).

4.3.3 Evaluation of Structural Model

The next step of Smart PLS analysis is evaluation of the structural model which is also known as the inner model. The evaluation of the structural model includes three steps which are collinearity assessment through VIF (variance inflation factor), R-square (coefficient of determination) and significance of path coefficient. According to Hair *et al.*, (2012), the acceptable value of VIF is less than 5 while the path coefficient values of 0.02, 0.15 and 0.35 are considered as small, medium, and large respectively (Cohen, 1992). Similarly, Hair *et al.*, (2012) suggested that the R² value of below 0.20 is considered as high in studies of consumer behavior. Figure 3 below depicts the structural model of the study including exogenous variables (brand equity & customer perceptions) and endogenous variable (purchase intentions).

Figure3: Structural model of the study



The first step of structural model evaluation is variance inflation factor (VIF) and analysis of Smart PLS showed that the value of VIF for both the predictor constructs (brand equity & purchase intentions) is less than 5 which meets the standard evaluation criteria for VIF value. The next assessment of the structural model is the R^2 which represents the combined effect of exogenous variables on endogenous variable. Analysis of Smart PLS showed that the value of R^2 is 0.367 which is significant as per standard evaluation criteria. This means that brand equity and customer perceptions explained a total of 36.70 percent of the variance of the endogenous variable.

4.3.3.1 Interaction Effect (Moderation)

Moderation is a situation in which the relationship of two variables is dependent on a third variable which is known as a moderator or moderating variable (Hair *et al.*, 2012). In the study, age, income, education, and religion are moderating variables which are analyzed in terms of their moderating role for the relationship of brand equity and customer perception with purchase intentions. In Smart PLS, the effect of the moderating variable is measured through values of interaction effect, and the criteria for evaluation of interaction effect is suggested by Ghozali & Latan (2015) where values of 0.02, 0.15 and 0.35 show weak, moderate,

and strong interaction effects, respectively. Table 4 summarizes the results of path coefficient significance for direct and indirect (moderating) relationships tested through a total of fourteen hypotheses.

Table 4: Consolidated results of path coefficients analysis

Path	Type	(β)	p-value	t-value	Result
BE→PI	Direct	0.538	0.000	13.498	Significant
BAW→BE	Direct	0.727	0.000	27.518	Significant
BAS→BE	Direct	0.788	0.000	27.875	Significant
PQ→BE	Direct	0.754	0.000	24.395	Significant
BL→BE	Direct	0.643	0.000	11.978	Significant
CP→PI	Direct	0.535	0.000	14.080	Significant
Age →BE	Moderating	0.526	0.237	1.183	Non-significant
Income →BE	Moderating	0.533	0.412	0.822	Non-significant
Education →BE	Moderating	0.544	0.050	1.969	Significant
Religion →BE	Moderating	0.502	0.617	0.497	Non-significant
Age →CP	Moderating	0.523	0.021	2.323	Significant
Income →CP	Moderating	0.541	0.004	2.881	Significant
Education →CP	Moderating	0.525	0.031	2.168	Significant
Religion →CP	Moderating	0.511	0.385	0.869	Non-significant

Notes: BAS= Brand association, BAW= Brand awareness, BE= Brand equity, BL= Brand loyalty, CP= Customer perceptions, PI= Purchase intentions, PQ= Perceived quality

4.3.4 Goodness of Fit

In order to evaluate the research model, Tenenhaus *et al.*, (2004) suggested the global criteria to measure goodness of fit. Goodness of fit test evaluates both the measurement and structural models and primarily focuses on the predictive power of the model. Standard criteria to evaluate goodness of fit is suggested by Ghozali & Latan, (2015) where the values of 0.35, 0.50 and 0.61 are considered as small, moderate, and large, respectively. According to Tenenhaus *et al.*, (2004), the following formula is used to obtain goodness of fit indices (GFI).

$$GFI = \sqrt[3]{(\text{Average of AVE} * \text{Average of } R^2)}$$

In this study the average of AVE is 0.746 while the average of R^2 is 0.498, thus the GFI value of the research model is 0.61 which confirmed that the model is significantly fit to predict purchase intentions of Health Takaful customers in the UAE.

5. Results and Discussion

As seen in Table 5, majority of the respondents of this study were male and aged between 41 to 48 years holding university degrees. Moreover, most of the respondents were Muslims, Arab nationals (non-Emiratis) and having monthly income between AED 6000 to 12000.

Table 5: Demographic profile of respondents

Variable	Description	Frequency	Percentage
Gender	Male	328	82%
	Female	72	18%
Age	Between 25-32 years	23	6%
	Between 33-40 years	138	34%
	Between 41-48 years	182	46%
	Between 49-56 years	57	14%
Education	Less than high school	8	2%
	High school	40	10%
	College graduate	96	24%
	University graduate	183	46%
	Postgraduate or equivalence	73	18%
Religion	Islam	276	69%
	Christianity	73	18%
	Hinduism	51	13%
Nationality	Arab (Emiratis)	110	28%
	Arab (non-Emiratis)	151	38%
	Pakistani	53	13%
	Indian	86	21%
Income (monthly)	Less than AED 6000	20	5%
	Between AED 6000 to 12000	122	30%
	Between AED 13000 to 19000	85	21%
	Between AED 20000 to 26000	67	17%
	More than AED 26000	106	27%

The core objective of this study is to develop a conceptual model that combines potential factors which can significantly contribute towards the robust and sustainable growth of the Takaful business in the UAE. In order to achieve the objectives of the study, potential factors were identified from the extensive review of literature, relevant to this study.

Finally, brand equity, its four dimensions and customer perceptions were included as exogenous variables, demographic factors as moderating variables while purchase intentions as endogenous variable. Data analysis of this study was conducted through Smart PLS using structural equation modelling (SEM) technique to test the direct and indirect (moderating) relationships among variables.

For the study, a total of fourteen hypotheses were tested which include six hypotheses of direct relationships and eight hypotheses of indirect relationships. Based on the findings, all six hypotheses of direct relationships are supported while out of eight hypotheses of indirect relationships, only four hypotheses are supported.

The results show that brand equity has a strong positive impact on purchase intentions of Health Takaful customers and all four dimensions of brand equity play a vital role in building overall brand equity. This shows that the marketers of the Takaful industry should focus on building strong brand equity of Takaful products and services. Similarly, customer perceptions also have an equally significant role towards the buying of Takaful products in the UAE. Therefore, marketing campaigns should focus on building positive perceptions of customers towards Shariah compliant insurance products. Other important points derived from the study suggest focusing on creating awareness, better product quality, better pricing, large network of hospital/clinics, wide product range, better customer service and positive perceptions to make Takaful as a powerful and well-known brand in the UAE.

Similarly, evaluation of the demographic factors (moderating variables) shows that age, income, and education are significant moderators while religion is a non-significant moderator. These results can help Takaful operators strategize for effective market segmentation.

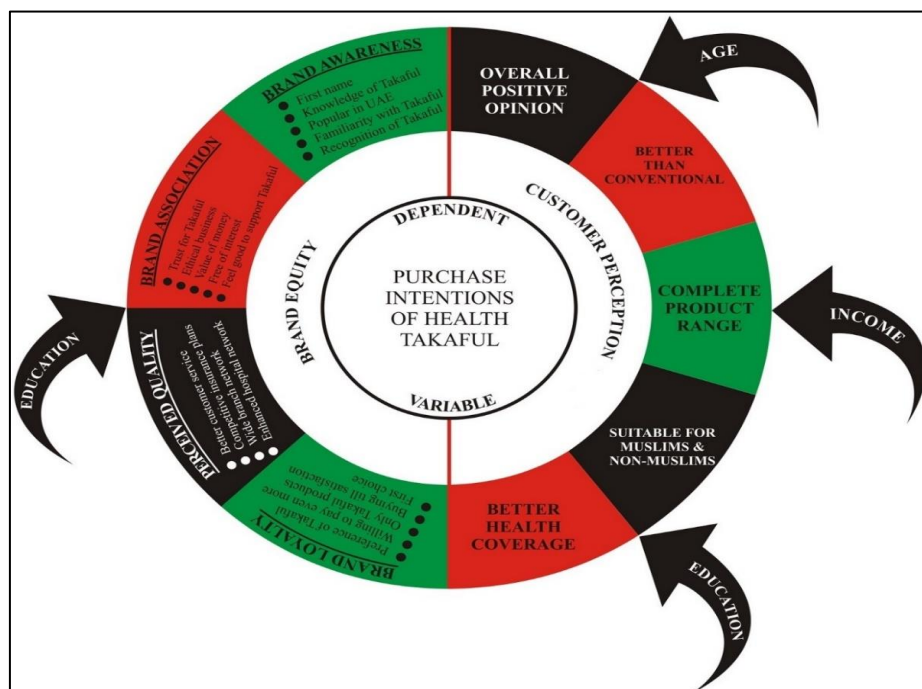
6. Concluding Remarks

The results show that brand equity has a significant positive influence on purchase intentions of Health Takaful customers in the UAE. Secondly, brand awareness, brand association, perceived quality and brand loyalty are significant dimensions of brand equity in terms of Health Takaful buying in the UAE. Thirdly, customer perceptions have a significant positive influence on the purchase intentions of Health Takaful customers

in the UAE. Lastly, analysis of moderating variables reveals that education moderates while age, income and religion do not moderate the relation of brand equity with purchase intentions. Similarly, age, income and education moderate the relation of customer perceptions with purchase intentions, while religion does not.

The present study provides significant contributions to the body of knowledge and offers some implications to the industry. This study bridges the gap of previous studies by combining brand equity, its four dimensions, customer perceptions and demographic factors in a single study. An important aspect of this study is the inclusion of ‘religion’ in demographic factors since recent studies on Shariah-compliant financial products suggest exploring the ‘religion’ aspect of customers while studying their purchase intentions.

Figure 4: Contribution/end-product of the study



As shown in Figure 4, the primary theoretical contribution of this study is the development of a conceptual model that includes those key elements which are considered by customers before they buy Takaful products.

Basically, these elements are items (questions) of each measurement scale of the questionnaire which have been tested individually for their validity and reliability, based on the respondents' response. Importantly, this study is a pioneer attempt to develop a conceptual model and the scope of this model is not limited to the Takaful industry. Researchers from various domains can apply this model to other industries such as retail, healthcare, hospitality, banking, tourism and others to understand the purchase intentions of their customers.

Furthermore, findings of the study lend support to the application of the Theory of Planned Behavior in the Takaful industry. Although numerous studies have applied TPB, they were not used to examine the purchase intentions of Health Takaful customers.

In relation to the industry, the model developed in this study can help Takaful companies to expand their customer portfolio to enjoy long term benefits and increase their market share. In addition, marketing activities should reinforce Takaful as a brand, built on stronger brand equity. Takaful operators should provide better experience for customers with Takaful products to create positive customer perceptions. Lastly, marketers of Takaful should adopt standardized marketing approach to attract customers of different beliefs.

Like other studies, this study is not free from limitations. Firstly, the study was based only on a single country namely the United Arab Emirates, which may limit its generalization. Secondly, data collection of this study was done through individual customers, therefore, the model developed through this study may limit its application to corporate clients since corporate clients follow company policies to facilitate their employees with compulsory health insurance. Finally, there are limitations inherent in questionnaire-based research and this study is no exception.

The present study proposes various areas for future research. Firstly, this paper can be extended to cross-country dimension. Secondly, it is recommended to examine the role of regulatory framework and government support towards the growth of the Takaful industry. Finally, further research can be conducted within those countries where most of the population are non-Muslim.

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