

Journal of Economic Cooperation & Development

Telisa Falianty

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(SESRIC)**

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Editorial

Studies and literature of economic development are becoming more prominent in our contemporarily integrated world. Nations all over are seeking internal adjustment options to positively influence their macro-economic factors. In this context, the current issue of Journal of Economic Cooperation and Development includes eight articles which focus on: effect of terrorism on specific tourism patterns, optimal level of schooling, workers' remittance as a driver of economic growth, stock market returns effect on global macro-economic factors, discussion of the performance of foreign aid in economic development, private sector development in the OIC, endogenous money fueling development projects, the rising significance of the Chinese Renminbi (especially in ASEAN nations). A brief synopsis of each article is given below.

The first article, "Tourist Arrivals to Muslim Countries: Pre- and Post-September 11" studies how patterns in tourism in Islamic nations changed after the terrorist attack in New York City on September 11, 2001. Using a tourism flows gravity model, the research in the paper concludes that tourism to several Islamic nations was negatively affected after September 11. Furthermore, the negative portrayal of Islam and Muslim countries in global media may have played a part in disrupting tourism in Islamic nations in recent years.

The second article, "Workers' Ability Index and Optimal Level Of Schooling In Malaysian Service Sector" examines the impact of the Workers' Ability Index optimal level of schooling within the service sector of Malaysia in 2015. Based on the four regression models (wages, marginal return to schooling, marginal cost, and optimal schooling level), the results indicate that the Workers' Ability Index does not affect wages significantly; however, the index displays a positive correlation as a determinant for years of schooling. Furthermore, the paper concludes 14 years (diploma level) is the optimal years of schooling in the Malaysian schooling sector. Interestingly, results showed that 28.2 percent of respondents classify below the optimal level while 46.5 percent exceed the optimal level. It is necessary to decrease the prior statistic in the next few years.

The third article, “Workers’ Remittances and Economic Growth in Palestine: Evidence from A Computable General Equilibrium Model” analyzes the impact of workers' remittances on economic development and growth, with a focus in Palestine. Workers’ remittances are one of the largest sources of external financial flows in developing nations. In 2015, a Palestinian Social Accounting Matrix (SAM) showed (in real terms) that: the real GDP increased by 0.42%, the level of real private consumption increased by 4.95%, imports increased by 4.28%, exports declined by 6.86%, net taxes increased by 2.29%, the trade deficit increased by 10.16%, absorption increased by 3.24%, and the real exchange rate appreciated by 1.6% (from base line).

The fourth article, “Macroeconomic Factors and Equity Market of Pakistan: Evidence from Bound Testing Technique” appraises an influence of macroeconomic variables on stock market returns represented by the exchange rate change, inflation rate, interest rate, industrial production growth, and the price of crude oil. The main findings revealed cointegration to exist amongst the variables and furthermore, industrial production and interest rate are negative determinants of stock returns in the long run. The study also finds that all the macroeconomic indicators in the model drive stock market returns in the short term. Moreover, the error correction coefficient suggests a high magnitude of convergence headed for the long run equilibrium. The stock market volatility can be pinpointed to conflicting cultural influences and economic/political unrest. The article outlines issues and provides eloquent insights for investors to make optimal decisions regarding investment in Pakistan.

The fifth article, “Does Foreign Aid Promote Economic Growth in Sudan? Evidence from ARDL Bounds Testing Analysis,” examines the relationship between foreign aid and economic growth in Sudan. The paper indicates a long-term relationship between variables under consideration; specifically, foreign aid in the form of official development assistance (ODA) has a positive and significant long-term impact on economic growth in Sudan. Interestingly, the interaction between aid and corruption in public institutions imposes a negative and significant long-term impact on economic growth. From this, the paper concludes that aid spurs economic growth long term via its contributions to human capital and improving infrastructural facilities.

The sixth article, “Private Sector Development Index of OIC Countries” describes, private sector development as a multidimensional process, conceptually and empirically. It involves many efficiency, quality, sustainability, performance, and dynamism features. However, there is no single country-level measure that captures all these features of private sector development. The paper introduces a new composite index of private sector development and its four sub-indices: environment, penetration, sophistication and accountability. These indices were created for the OIC and can be recalculated annually.

The seventh article, “Endogenous Monetary Transmission in Islamic Financial Economics” projects an Islamic economic theory of endogenous money to pursue the financing of projects holding goals of economic stability and performance. Among these are 100% circulation of bank-savings (that banks otherwise hold back for liquid spending) and 100% maintenance of the Reserve Requirement Monetary System in Islamic monetary transmission. Consequently, debt reduces to zero; the market transformation leads to an increase in stake holding via the diversification of projects, the portfolio diversification of financing instruments (mobilizes monetary units as micro-money projects), and the increase in stake holding (makes the real output level statistically elastic). Thereby, prices stabilize in the absence of all forms of interest rates. The result is the generalized inter-causality among the endogenous inter-variable relations.

The eighth article, “Renminbi in ASEAN Economy: How ASEAN responds to Renminbi Internationalization” explains why the IMF included the Chinese Yuan Renminbi in its Special Drawing Right since the end of 2015. Seeing the rising significance of Renminbi in international currency, Chiang Mai Initiative of Multilateralization (CMIM) observes the internationalization of the currency and relation to the Asian financial crisis. Specifically, the article finds a significant impact of Renminbi internationalization on the movement of ASEAN member exchange rates, especially after ASEAN China FTA (ACFTA). Empirical evidence from the article suggests increasing trade between ASEAN nations and China will further increase Renminbi’s effect in the ASEAN foreign exchange market.

As SESRIC, we will continue our efforts to make our Journal of Economic Cooperation and Development an opened window for academics and researchers within as well as outside the OIC members for sharing their valuable work and studies with all who are interested in the OIC member countries and the Islamic world at large through providing them with an opportunity to keep pace with the socio-economic developments in OIC member countries in the light of the changes taking place in the world economy.

Nebil DABUR
Editor-in-chief

Renminbi in ASEAN Economy: How ASEAN responds to Renminbi Internationalization

Telisa Falianty¹

Free trade agreements (FTAs) between the Association of Southeast Asian Nations (ASEAN) and, Australia and New Zealand, China, Japan, the Republic of Korea and India take effect on January 2010. One important FTA for ASEAN is ASEAN China FTA (ACFTA). Policies related to reducing trade barriers will benefit ASEAN exporters. ASEAN exporters will get better access to the Chinese market compared to other exporters from countries with ACFTA with China. One way to measuring China's growth as a word superpower is by looking at its currency the Chinese renminbi (RMB). The growth of China and ASEAN's relationship is reflected by trade statistics showing an increase in RMB invoicing for trade.

This condition shows that the Renminbi is increasingly important to use it as the main actor in international currencies. The internationalization of the renminbi and Financial crisis in Asian region has been responded by ASEAN plus 3 through the formation of Chiang Mai Initiative Multilateralization (CMIM). This paper will explore on the impact of Renminbi internationalization on the movement of ASEAN member exchange rate before and after ACFTA implementation. This research provides empirical evidence that the role of the Renminbi becomes important which then impacts the East Asian currency exchange rates after the implementation of ACFTA. The framework of empirical model using Ordinary Least Square (OLS) regression model using quarterly data from 2000 to 2015 adopting the model from Frankel and Wei (1994), as well as from Ogawa and Shimizu (2006). This research found that the effects of Renminbi internationalization are significant in explaining ASEAN currency movements, especially after ASEAN China FTA (ACFTA). There was an empirical evidence that increasing trade between ASEAN and China could facilitate the increase use of RMB in the ASEAN foreign exchange market. Indonesian study case as one member of ASEAN using currency demand invoicing model also supporting this evidence.

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JEL Classification: F15, F31, F33

Keywords: exchange rate, Renminbi, ASEAN China FTA, international currency

Introduction

In the era of globalization, conducting foreign relations have become very important to increase the country's economic growth. including one of them by conducting trade activities, namely international trade. In international trade activities, one of the things that is common to be an action in conducting foreign relations is to enter into international agreements. The agreement can be carried out with any country or international legal subject either bilaterally, regionally or internationally.

International trade, generally develops towards more free and open trade. Countries bilaterally, regionally and globally, tend to cooperate in the form of reduction or elimination altogether trade, tariff and non-tariff barriers to create a more conducive, aggressive and progressive trading mechanism. Countries increasingly understand the meaning of free markets, including the benefits that can be obtained from the trade mechanism.

ASEAN-China Free Trade Agreement (ACFTA) is an agreement made by ASEAN member countries and China related to trade. This agreement is used to realize the free trade area by removing or reducing barriers to trade in goods. In this agreement it was agreed to overcome both tariff and non-tariff barriers, increase market access to services, investment rules and regulations, and enhance aspects of economic cooperation to encourage economic relations of the ACFTA in order to improve the welfare of the people of ASEAN and China. Of the five new FTAs, the agreement between ASEAN and China (ACFTA) is the most important. This is because this trade agreement affects the largest regional by population (almost 1.9 billion) and the third largest (after the EU and NAFTA) by trade volume (US \$ 192 billion in 2008).

The internationalization of the Renminbi currency is a form of response that must be faced with regard with the increasing share of Chinese trade and investment flows in the world economy. SWIFT (2015) states that, financial institutions in more than 70 countries, with more than 900 financial institutions running a business using the Chinese Renminbi

(RMB). Since June 2010, companies around the world have generally been able to complete transactions in RMB; SWIFT recorded a sizeable growth in the last few years. 10 percent of China's international trade currently uses RMB. Even though Chinese yuan have a small proportion of worldwide international currency usage (0.5%), is nonetheless experiencing a stellar ascension. And now the RMB ranks fifth for Asia-Pacific inflows and outflows with Europe, except Britain. (SWIFT, 2015).

After the Asian Financial Crisis that occurred in 1997-1998, the role of Republic of China (the PRC) in regional and global trade has increased significantly. This condition was triggered by the growth of exports and imports in China from and to another country, such as countries in Europe, the United States and countries in the Asian region. Since 2015, largest economy in the world (based on purchasing power parity), producers, merchandise, exporters and importers, and holders of international reserves have been held by China. China is a big player in the international economy, but the question remains about whether or not China is capable of sustaining its remarkable growth. One way of measuring China's growth as a world superpower is by looking at its currency: the Chinese renminbi. If the renminbi can join the likes of the Japanese yen, British pound sterling and Euro as an international currency, there's a strong economic case for continued Chinese growth in the world economy. The economic power of the PRC influences countries in the Asian region. The story of the renminbi in Southeast Asia as a trade settlement currency paints a clear picture about where the renminbi and China are headed. The steady rise in China's importance in the ASEAN economies not only dethroned the United States' historically strong ties in the region, but continues to grow year after year. (Cheung, 2015).

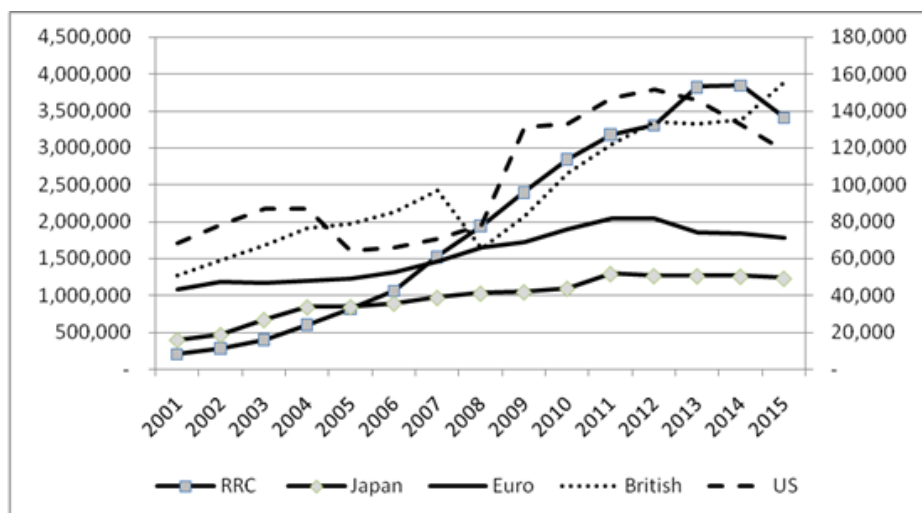
Today the official currency of the People's Republic of China is called the Renminbi. Renminbi if translated it means "public money". The international symbol of the Renminbi is CNY (abbreviated as RMB, with the symbol ¥). For transactions, the renminbi unit name is yuan. This is like the condition in the UK with the pound sterling, but the prices are calculated in pounds.

In December 2015 an important history regarding the internationalization of the RMB began. At that time, Chinese Renminbi began to be put in the Special Withdrawal Rights basket (SDR). After more than 15 years currency list consisting of SDR has changed. This was approved by the

IMF executive board. The inclusion of the Renminbi in the SDR is a marker of the integration of the Chinese economy in the global financial architecture. IMF managing director Christine Lagarde stated that this also showed the success of Chinese authorities in reforming their financial and monetary systems.

The SDR basket is being recalculated by the IMF. The weight of currencies in the SDR pool will be calculated by the issuance export size, the amount of reserves in each currency determined by the monetary authority of other countries, international bank obligations, changes in international exchange, and the impact of international debt. With this new formula the SDR basket is at value as follows: 41.73 percent for the US Dollar as main international vehicle currency; 8.33 percent for the Japanese Yen; 30.93 percent for Euros; and 8.09 percent for the British Pound; and 10.92 percent for Chinese RMB (IMF Survey Magazine, 2015). This research about the inclusion of RMB since 2015 in IMF SDDR Basket could become future research potential.

The effect of RMB internationalization is not only felt by the PRC but also has an effect on other countries. This influence affected the international monetary and financial system massively (Eichengreen and Kawai (2014)). Changes in economic policy and PRC conditions will affect countries that use the RMB in international transactions. This is because their commercial banks also mean more dependent on RMB funds. The policy of the Central Bank which gives greater weight to the RMB to calculate the exchange rate and also to foreign exchange reserves will also be affected. This will especially happen to Asian countries including Indonesia. The Association of Southeast Asian Nations (ASEAN) the average country has intense trade transactions with China. This has implications for ASEAN-China financial transactions. The majority of ASEAN members have a Bilateral Currency Swap Agreement (BCSA) with China since the assumption that the RMB is internationalized in response to the Asian Financial Crisis. RMB's internationalization has logical implications related to increasing China's power in the economy and trade, and marks the emergence of Chinese power as a country that has the highest international reserves in the world. (Figure 1).

Figure 1: Foreign Reserve of Five SDR currencies (2001-2015)

Source: Central Bank of Indonesia Financial Statistics (External Sector)

Note: LHS : RRC and Japan Reserve

RHS: Euro, British, US

Based on the above presentation, the purpose of this research is to analyze the weight/share of RMB exchange rate movements in the currencies of ASEAN member countries. Increasing share could become an indicator of increasing used of RMB in ASEAN currencies. The additional objective of this research is to analyze the factors that determine the extent of RMB used in trade invoicing, especially after ACFTA implementation and comparing before and after ACFTA implementation.

Existing Literature

Eichengreen and Kawai (2014) states that the RMB has the opportunity to become a currencies used globally, such as the US Dollar. RMB will have a very important role, especially in the Asian region. This role will be like the role Euro has taken in Europe. China's strong economic and political relations with Asian countries will influence the role of the RMB as a leading Asian currency. Ito (2011) states that the internationalization of the RMB is certain and cannot be avoided. This is because many countries have used the RMB in trade and capital market transactions, and the entry of the RMB in the SDR basket at the IMF. The role of the RMB

in international trade will continue and affect the status of the US Dollar as the main international reserve currency, although so far the role of the RMB is still limited to the Asian region.

Kawai and Pontines (2014) conducted research related to the exchange rate of the RMB and the impact of the movement of the RMB on other currencies that emerged in East Asia. This study uses data from 2000-2014. This study uses the same regression model used by Frankel-Wei (1994) to see changes in the state of the value of the RMB compared to the exchange rates of other currencies in that period and also a version of the changes and adjustments of the model to see changes in the state of the RMB weights in a basket of developing country currencies in East Asian countries. The results show that the role of the US dollar as the dominant major currency in the East Asian region has not been replaced. But the role of the RMB has continued to increase, especially in the last few periods.

This study uses the same method as Kawai and Pontines (2014), namely Frankel-Wei. This research focuses research for ASEAN countries, while Kawai and Pontines conduct research for East Asian countries. In the model used, Kawai and Pontines used New Zealand Dollar as a based currency, while this study used Swiss Franc as a based currency. Different with Kawai and Pontines (2014), we also notify the importance of ACFTA as the catalyst for RMB used and we have the Indonesian study case for confirming the demand for RMB currency.

Ito et al (1998) estimate the optimal weight of the US dollar and Yen in currency basket to stabilize trade balance and capital flows in East Asia before the Asian currency crisis. US dollar optimal weights were found to be smaller than the weight gained by Frankle and Wei (1994) who found the East Asian region adopts a dollar peg. It implied that the currency basket peg system can stabilize trade balance than de facto dollar peg system.

Exporter has the option to determine the currency used in the determination of the price of goods. When the exporter does international trade, they have the option to create an invoice in the currency of the country, of the country's trading partners, or other currencies, called a vehicle currency. The decision of the selection of the currency used in

invoice has an important role in the transmission of financial impact across countries.

The decision for the election vehicle currency completes the analysis of the factors that determine the selection of the invoiced currency. The role of the currency is first as a medium exchange then the focus is not on the trade itself but financial transactions. The selection of the currency is associated with the low cost of a transaction. Low transaction costs indicate that the level of liquidity is high on the foreign exchange market for the currency in question (Portes and Rey, 1999).

The second analysis is related to the characteristics of the industry. The industry consists of homogeneous goods and traders in specialized markets prefer to generate the invoice using the currencies with the least cost (McKinnon, 1979). If a currency is specified as the dominant currency in a market, then there's no incentive for a particular firm to create invoices in other currencies. This is because the use of other currencies will result in high transaction costs and the level of sales will be more volatile because of relative price movements compared to competitors (Krugman, 1980). When exporters' demand is very elastic and marginal costs increase towards output, exporters tend to have incentives to stabilize their prices against the currencies of their trading partners (customers) (Bacchetta and van Wincoop, 2005).

The third analysis involves currency invoicing driven by the volatility of macroeconomic condition in different countries. The company will specify the currency used for invoicing, based on the country where the level of volatility due to financial shock of the monetary aggregate is moderate. More moderate volatility shocks minimize fluctuations in currency exchange rates (other factor constants).

Methodology, Empirical Testing, and Data

The data to be used in this research is using quarterly ASEAN member data for the year 2000 until 2015. The data is obtained from International Financial statistics, Central Bank statistics from each ASEAN member, and the Census and Economic Information Center (CEIC) database. Data related to China's international reserves, Indonesia's international trade with China and China's manufacturing production index were obtained from ASIC data (www.ceicdata.com). The trusted method used in the

following research is a method called OLS which is used to find out how the conditions of the exchange rates of the five most powerful currencies (in SDR baskets) on the movements of ASEAN member exchange rates.

In theory of the demand for currency, the use of a country's currency is influenced by internal factors, external factors and an inertia factor. In the case of demand for RMB, an internal factor is China's foreign exchange reserve and China Manufacture Production Index. External factors are trade between Indonesia and China, and the inertia factor is the use of RMB in the previous period .

In general, the model used in this study is the Frankel and Wei (1994) model and is modified by providing additional Chinese Yuan (CNY) or RMB to the model. The base currency used in this study is the Swiss Franc. Models are as follows:

$$\begin{aligned} \Delta \log \left(\frac{ASEAN\ member}{CHF} \right) = & \beta_0 + \beta_1 \Delta \log \left(\frac{USD}{CHF} \right) + \beta_2 \Delta \log \left(\frac{JPY}{CHF} \right) + \beta_3 \Delta \log \left(\frac{EURO}{CHF} \right) \\ & + \beta_4 \Delta \log \left(\frac{GBP}{CHF} \right) + \beta_5 \Delta \log \left(\frac{CNY}{CHF} \right) + e_t \end{aligned} \quad (1)$$

Where:

$\Delta \log (ASEAN\ member/CHF)$ = movement of ASEAN members
Currency to Swiss Franc;

$\Delta \log (USD/CHF)$ = movement of US Dollar to Swiss Franc;

$\Delta \log (JPY/CHF)$ = movement of Yen to Swiss Franc;

$\Delta \log (Euro/CHF)$ = movement of Euro to Swiss Franc;

$\Delta \log (GBP/CHF)$ = movement of Pound Sterling to Swiss Franc;

$\Delta \log (CNY/CHF)$ = movement of Chinese Yuan to Swiss Franc;

β_0 = constant; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = coefficient of regression; e_t = error term

That coefficient of exchange rate of the five major currencies (SDR currency basket) restrictions must equal one ($\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 = 1$).

Swiss francs are used as a currency based in this study. This is because the value of the Swiss franc has increased substantially against the US

dollar and euro. Changes that occur in one currency will affect the value of other currencies. Factors such as the European debt crisis and accommodative monetary policies of the US Federal Reserve in recent years have given rise to the role of the Swiss franc. The European debt crisis has caused investors attracted by the Swiss franc to seek security and loose monetary policy has influenced the attractiveness of the US dollar. The stability of the government and the stable Swiss financial system are considered financial protection. And this also makes the franc a stable currency. In addition, other currencies are also needed as a base currency other than the US Dollar in anticipation of fluctuations in the US Dollar (USD) itself.

This paper also analyzes the factors that determine the CNY/RMB currency invoicing in Indonesia as a case study (because the data available for the use of RMB is only accessible from Bank Indonesia). The determinants of total used of CNY/RMB are derived from the existing literature. The high level of liquidity in the foreign exchange market for currencies is proxy by China's international reserves. The macroeconomic variable from the country that will be used as vehicle currency is proxied by the Manufacture Production Index of China. The volatility of exchange rate is proxied by the log exchange rate of CNY/RMB to USD. The model is specified below:

$$LTotal_used = \alpha_0 + \alpha_1 LReserve + \alpha_2 LTotal_trade + \alpha_3 LMPI_PI + \alpha_4 LExcrate + e_t$$

$$LTotal_used = \alpha_0 + \alpha_1 LReserve + \alpha_2 LTotal_trade + \alpha_3 LMPI_PI + \alpha_4 LExcrate + e_t \quad (2)$$

Where :

$Ltotal_used$ = log total Renmimbi used in Indonesian international trade (export + import)

$LReserve$ = log China's international reserve

$Ltotal_trade$ = log Indonesia international trade with China (export+import)

$LMPI_PI$ = log China's manufacture production index

$Lexchrates$ = log exchange rate (CNY to USD)

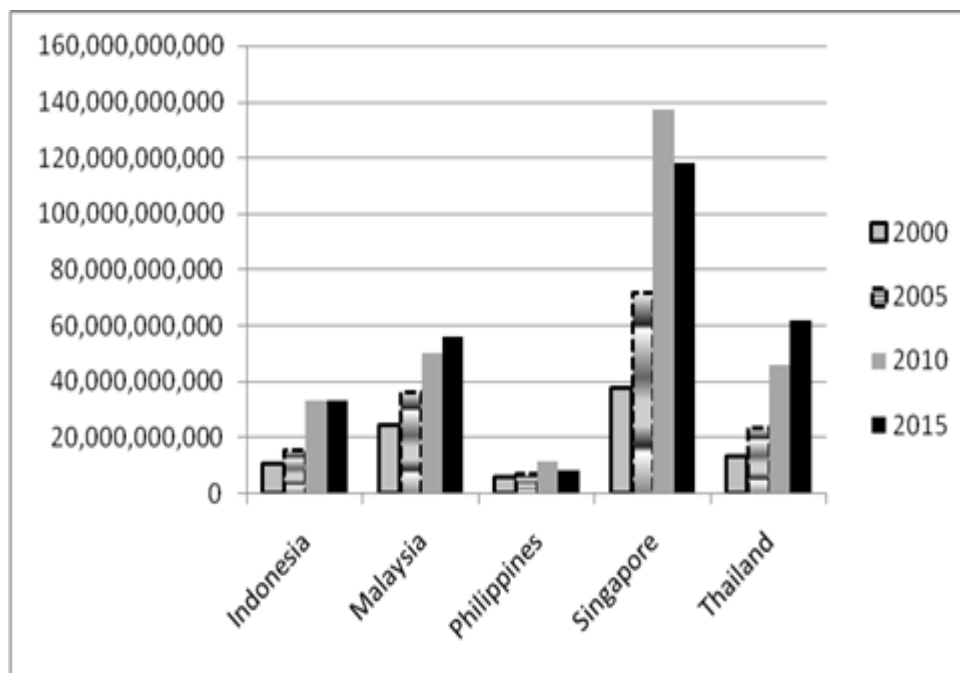
α_0 = constant; $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ = coefficient of regression; e_t = error term

Analysis is only done for Indonesia. This is because of the data limitation of CNY/RMB used in international trade in ASEAN countries. Econometric analysis will be supplemented by facts and literature studies on policies taken by each country in ASEAN countries related to the internationalization of the RMB.

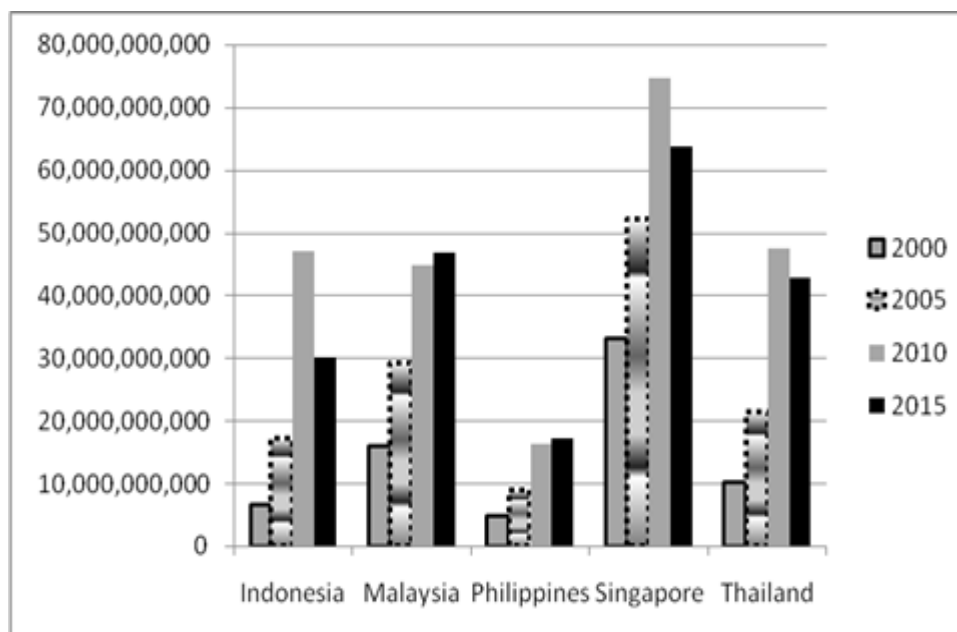
Facts from Each Country and ASEAN Countries Responses to RMB Internationalization

The discussion about Renminbi used in ASEAN countries would be related to the ASEAN trade potential as well as ASEAN trade with China. Intra ASEAN trade is depicted in Figures 2 and 3 below while ASEAN-China trade is depicted in Figure 4 and 5. ASEAN member intra-trade shows a slower trend in 2015, but the long-term trend is increasing.

Figure 2: ASEAN Member Export Intra-Trade (in US\$)



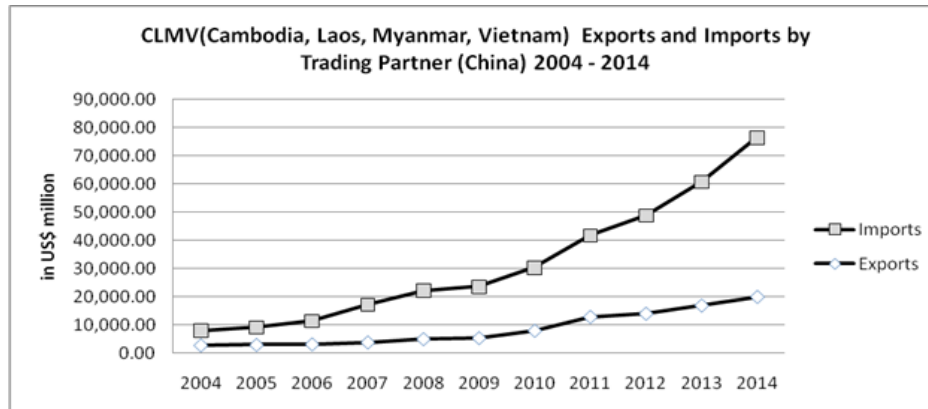
Source: ASEAN Statistical Yearbook

Figure 3: ASEAN Member Import Intra-Trade (in US\$)

Source: ASEAN Statistical Yearbook

Figure 4: ASEAN6 - China Trade (in million US\$)

Source: ASEAN Statistical Yearbook

Figure 5: ASEAN 4 (CLMV) – China Trade (in million US\$)

Source: ASEAN Statistical Yearbook

The increasing trend of ASEAN intra-trade and ASEAN-China trade (that possibly comes from ASEAN China FTA results since 2010) could become important support for RMB use in the ASEAN foreign exchange market. ASEAN-China trade could intensify the use of RMB in their trade settlements. As in the statement of Minikin and Lau (2013), China's role in international trade is a key driver for currency internationalization. It seems natural that RMB will gain its role as a vehicle currency, given China's growing significance in the Asian and global economy. To capture the ACFTA impact we can divide regression into two sub samples, where sample 1 before ACFTA (before 2010), and sample 2 is period after 2010 (after ACFTA).

Table 1. ASEAN+China Exchange Rate Statistics

Period 1: Before ACFTA (2000M1 – 2009 M12)

VAR	RMB	IDR	MYR	THB	PHP	SGD
OBSERVATION	2,509.00	2,506.00	2,509.00	2,509.00	2,507.00	2,509.00
MEAN	7.89	9,344.93	3.67	38.73	50.16	1.64
MEDIAN	8.28	9,207.60	3.80	39.41	50.96	1.68
MAX	8.28	12,209.00	3.80	45.80	56.45	1.85
MIN	6.81	7,037.90	3.13	29.32	38.96	1.35
STD DEV	0.55	844.99	0.18	4.21	4.51	0.14
Variation coef	6.92	9.04	4.90	10.87	9.00	8.27

Period 2: After ACFTA, Before Tapering Off (2010 M1 – 2013 M10)

VAR	RMB	IDR	MYR	THB	PHP	SGD
OBSERVATION	940.00	940.00	940.00	940.00	940.00	940.00
MEAN	6.45	9,260.17	3.12	30.95	43.24	1.28
MEDIAN	7.80	9,132.40	3.10	30.79	43.26	1.27
MAX	6.84	11,573.10	3.44	33.21	47.46	1.42
MIN	6.11	8,450.90	2.94	28.62	40.54	1.20
STD DEV	0.23	532.79	0.10	0.96	1.56	0.06
Variation coef	3.57	5.75	3.29	3.09	3.60	4.46

Period 3: After ACFTA, After Tapering Off (2013 M10 – 2016 M12)

VAR	RMB	IDR	MYR	THB	PHP	SGD
OBSERVATION	728.00	728.00	728.00	728.00	728.00	728.00
MEAN	6.29	12,709.58	3.67	33.67	45.28	1.33
MEDIAN	6.22	12,931.15	3.62	32.90	44.90	1.34
MAX	6.70	14,739.60	4.46	36.49	48.00	1.44
MIN	6.04	11,000.00	3.13	31.01	43.02	1.24
STD DEV	0.18	867.89	0.41	1.53	1.31	0.06
Variation coef	2.83	6.83	11.19	4.54	2.89	4.58

Source: Author's own

In the three periods of sub-samples, China's exchange rate to USD has decreasing volatility. As a whole, we could conclude that in the period after ACFTA, the volatility exchange rates of the ASEAN economy to USD are lower on average. ACFTA could possibly help to stabilize ASEAN member exchange rates.

In the period of tapering off from QE, Malaysia was hit hardest compared to other members, regarding increased exchange rate volatility. On the other hand, four countries over ASEAN-5 have higher volatility to USD in the tapering off period, thus increasing the need to decrease dollar dependency.

ASEAN responses related: Chiang Mai Initiative

Related to the topic of the use of RMB in ASEAN countries, the Chiang Mai Initiative (CMI) was established in response to the Asian Financial Crisis (AFC). CMI is a regional financial arrangement to supplement the existing international facilities. It can help facilitate promotion of RMB for ASEAN countries. CMI in the view of RMB internationalization could help liquidity aspect needed as prerequisites for international currencies.

On May 2000, an agreement was signed in Chiang Mai, Thailand, where ASEAN +3 (Japan, South Korea, and the China) set up a partnership in an exchange system to ASEAN countries from the Asian crisis in 1997-1998, termed the Chiang Mai Initiatives. This agreement also included a policy that called for a Bilateral Swap Arrangement/Bilateral Currency Swap Arrangement (BSA/BCSA) between ASEAN countries and Japan, South Korean and the China. The BSA is a facility in the form of swaps of US dollars with the domestic currencies of participating countries. Repurchase agreements were meant to provide liquidity support through the sale and buyback of US treasury notes or bills with a remaining life of no more than 5 years and government securities of the counterparty country.(Garcia and Lee, 2013).

In 2009, the bilateral swap mechanism was found to be inefficient. On March 24, 2010, it became multilateral and from then on it has been called the Chiang Mai Initiative Multilateralization (CMIM). Member countries are: Brunei, Cambodia, Hong Kong, Indonesia, Japan, Laos, Malaysia, Myanmar, the People's Republic of China, Philippines, Singapore, South Korea, Thailand, Vietnam. The key role in governing CMIM lies upon Central Banks of those member countries. CMIM's capital draws from a foreign exchange reserves pool worth US\$120 billion and was launched on 24 March, 2010. This pool of reserves was expanded to US\$240 billion in 2012.

China's Bilateral Currency Swap Agreement (BCSA)

China has many BCSAs with several countries including ASEAN members. The BCSA is a key pillar of cooperation between PBOC and ASEAN countries, especially to strengthen regional economic resilience and financial stability. According to Gui (2012), China launched BCSA as its diplomatic campaign.

China is able to use this policy to reinforce their currency in a payment system. Since July 2009, the PRC authorities started to allow exporters and importers to use RMB to settle merchandise trade (Kawai and Pontines, 2014). The BCSA's by the People's Bank of China (PBOC) with ASEAN members are as follows.

Table 2. Renminbi-Denominated BCSA by the PBOC with ASEAN Members

Date signed	Economy	Value		Note
		CNY Billion	(\$ billion)	
Aug, 2003	Philippines	2		Amended April 2007
Dec, 2011	Thailand	70	11	
Feb, 2012	Malaysia (extended)	180	28.6	Increased from CNY 80 billion in Feb 2009
Mar, 2013	Singapore (extended)	300	47.8	Increased from CNY 150 billion in July 2010
Oct, 2013	Indonesia (extended)	100	16.3	Increased to CNY 120 billion in 2015

Notes: (i) Value in US Dollars is calculated based on the US Dollar-Yuan exchange rate at the time of signing.

Source: ADB, People's Bank of China; Asia Regional Integration Center (ARIC) Website; Yu (2012); Bank of Japan

We also summarize the trade development in ASEAN members related to RMB used and the financial agreement related with RMB used in Table 3 (compiled from various sources on ASEAN member websites and compiled research).

Table 3. Trade and Financial Agreement/Condition Between ASEAN
Countries and China

Country/ Explanation	Indonesia	Malaysia	Singapore	Philippines	Thailand
Trade Condition/ Bilateral Agreement	- RMB invoicing has increasing trend. - Export share in USD and Japanese Yen has decreasing trend. - USD invoicing is still dominant (above 90%). - RMB used in Indonesian imports remains low.	- China is Malaysia's largest import source with 12% of total. - Malaysia is China's largest trading partner among the 10 members of ASEAN.	- China is Singapore's largest trading partner while Singapore is China's third largest trading partner in ASEAN.	- The data shows from 2000 until 2015, the export from Philippines to the PRC and import from the PRC to Philippines always increases.	- The data shows from 2000 until 2015, the export from Thailand to the PRC and import from the PRC to Thailand tends to increase.
Finance Agreement	- In Oct 2013 BCSA with China 100billion Yuan. - In 2015, BCSA 120 billion Yuan. - The arrangement will contribute positively to an increase in trade and direct investment, help provide short-term liquidity to stabilize the financial market, and help to overcome tight liquidity from overseas funds.	- August 2010 direct quotes between RMB and ringgit in the interbank foreign exchange market on the CFETS (China Foreign Exchange Trade System). - The RMB was included in the national RGS, - Bank Negara signed a MoU with the People's Bank of China (PBoC) in Beijing to establish yuan clearing arrangements in Malaysia. - In Apr 2015, agreement to renew its BCSA for a further term of three years with the size maintained at 180 billion yuan/ 90 billion ringgit	- In March 2013 Singapore increased the number of BCSA agreement to 300 billion yuan (before only a half ; 150 billion Yuan)	- In August 2003, BCSA with China 2 billion Yuan. - In 2006 Yuan is a currency convertible with the BSP, thus it is an acceptable currency for export receipts.	- In Dec 2011, BCSA with China 70 billion yuan. - Jan 2015 PBOC officially authorized ICBC (Thai) to act as RMB clearing bank in Thailand
Country/ Explanation	Brunei Darusalam	Vietnam	Cambodia	Myanmar	Laos
Trade Condition/ Bilateral Agreement	- Boosting trade between China and Brunei through Brunei-Guangxi economic corridor. - China is a third import origin for Brunei.	- In terms of trade, China is the largest market for Vietnamese imports and among the top markets for Vietnamese exports. - Agreements with China for Renminbi direct trading in Guangxi province.	- Increasing trade relations between China and Cambodia, up to 3.75 billion USD in 2014, 4.31 billion USD in 2016, predicted to increase to 5 billion USD in 2016.	- China is Myanmar's second destination export	- China is Laos' top export destination.
Finance Agreement	- Baiduri Bank launched RMB Payment Services.	- Vietnam keeps an eye on cross-linkage exchange rates between the RMB and other major currencies. - Vietnam doesn't have currency swap agreement with China.	- In mid-2010, the RMB was widely accepted by shops in many tourist spots of Cambodia. - Cambodia has announced that RMB is welcome in their markets.	- Myanmar doesn't have a currency swap agreement with China. - Feb 2014, the PBOC branch helped in the establishment of CITIC RMB Capital in Yunnan Province.	- Nov 2012, ICBC Vientiane Branch was granted RMB clearing center status. - 2011, two Chinese banks started

Source : Summarized from Hongfang (2013), Tuazon (2014), Shipat (2015)

Results and Discussion

1 The Impact of Renminbi on the Movement of ASEAN Member

Exchange Rates

For identifying the impact of Chinese Yuan/RMB exchange rate to the ASEAN member exchange rate, a simple regression following Frankel and Wei (1994) and Ogawa and Shimizu (2006) is used. We ran the regression for ASEAN-5 countries.

Table 4. Regression Result with Full Sample in ASEAN 5 countries

Country	Sample	USD/CHF	JPY/CHF	EUR/CHF	CNY/CHF	GBP/CHF	Constant	Adj R ²	DW
Indonesia	2000M1-								
	2015M12	0.446*** (3.537)	0.045 (0.440)	0.326* (1.878)	-0.064 (-0.125)	0.222 (1.519)	0.003 (1.501)	0.247	1.702
Malaysia	2000M1-								
	2015M12	0.617*** (10.674)	0.265*** (7.176)	0.073 (1.140)	5.476*** (6.302)	-0.096 (-1.487)	-0.032 (-0.202)	0.920	0.311
Singapore	2000M1-								
	2015M12	0.539*** (15.494)	0.095*** (3.329)	0.146*** (3.056)	0.551*** (3.915)	0.124*** (3.080)	-0.001 (-1.199)	0.828	1.616
Thailand	2000M1-								
	2015M12	0.933*** (8.672)	-0.056 (-0.733)	0.060 (0.548)	0.493* (1.709)	-0.150 (-1.036)	0.002 (1.121)	0.745	1.326
Philippines	2000M1-								
	2015M12	0.846*** (13.169)	0.003 (0.056)	0.138 (1.569)	0.302 (1.163)	-0.008 (-0.102)	0.001 (0.838)	0.683	1.355

Source : Author's own

Note: Full sample 2000M1-2015M12

In all five ASEAN countries, the USD is statistically significant in determining the change of each exchange rate ASEAN members. What about Chinese Yuan (CNY)/Renminbi? CNY is statistically significant for ASEAN-5 members, except for Indonesia and Philippines. On the other hand, the Japanese Yen is significant only for Malaysia and Singapore. The Euro is significant only for Indonesia and Singapore. The Pound Sterling is not significant in ASEAN 5 members, except for Singapore. All currencies included in SDR (USD, Yen, Euro, Pounds, CNY) are significant in explaining the movement of the Singapore Dollar. The above result is the first general result with a complete model and full

sample and should be explored further. First, we should be careful of the multi co-linearity problem. There are potential correlations between each currency, especially with USD as the main international currency. Second, the sample could be divided into two sub-samples concerning the impact of ASEAN-China FTA. Increasing trade relations with China could increase the use of its currency.

The results of correction for the multi co-linearity problem are as follow.

Table 5: Regression Result Correcting For Multi co-linearity (Full Sample)

Country	Sample	Reg	USD/CHF	JPY/CHF	EUR/CHF	CNY/CHF	Constant	Adj R 2	DW
Indonesia	2000M1- 2015M12	(a)	0.535***	0.032	0.441***	-	0.003	0.258	1.663
			(4.781)	(0.313)	(2.823)	-	(1.613)		
		(b)	-	0.048	0.454***	0.521***	0.004*	0.252	1.654
			-	(0.469)	(2.903)	(4.598)	(1.891)		
Malaysia	2000M1- 2015M12	(a)	0.823***	-0.058	0.069	-	0.001	0.713	1.238
			(16.919)	(-1.315)	(1.017)	-	-1.162		
		(b)	-	-0.007	0.062	0.861***	0.002**	0.747	1.279
			-	(-1.579)	(0.329)	(18.673)	(2.247)		
Singapore	2000M1- 2015M12	(a)	0.590***	0.088***	0.211***	-	-0.000	0.808	1.559
			(18.133)	(2.958)	(4.667)	-	(-0.989)		
		(b)	-	0.089***	0.212***	0.606***	0.000	0.820	1.588
			-	(3.113)	(4.846)	(19.113)	(0.843)		
Thailand	2000M1- 2015M12	(a)	0.690***	0.064	0.170**	-	0.000	0.642	1.326
			(12.599)	(1.262)	(2.222)	-	(0.008)		
		(b)	-	0.080	0.183**	0.686***	0.000	0.637	1.393
			-	(1.644)	(2.418)	(12.652)	(0.721)		
Philippines	2000M1- 2015M12	(a)	0.844***	0.004	0.135*	-	0.000	0.684	1.348
			(14.858)	(0.939)	(1.707)	-	(0.816)		
		(b)	-	0.017	0.146*	0.844***	0.001	0.679	1.355
			-	(0.325)	(1.828)	(14.625)	(1.733)		

Source : Author's own

Note : *** significant in 1%, ** significant in 5%, * significant in 10%

Table 6.Summary of Two Period Samples Results

Country	Before ACFTA		After ACFTA		CNY Share
	CNY	USD	CNY	USD	
Indonesia	0.356	0.368	0.816	0.828	Increase
Malaysia	0.877	0.870	0.861	0.772	Decrease
Singapore	0.573	0.564	0.637	0.607	Increase
Thailand	0.579	0.581	0.894	0.895	Increase
Philippines	0.820	0.808	0.826	0.851	Increase

Source : Author's own

between China and ASEAN, but also contributed to the regionalization of the renminbi.

From the several regression experiments, we have four of ASEAN-5 countries that have an increasing share of CNY in their currency after ACFTA implementation. The only country that has a decreasing share is Malaysia. The finding of increasing share is similar to Gui (2012). He also found that the effect of renminbi on ASEAN currencies has experienced a significant growth during the two sample periods while the effects of Japanese yen diminished. The renminbi is more likely to be the Asia anchor currency than Japanese yen. Gui (2012) also stressing the role of ASEAN-China Free Trade Area that not only increased the trade volume

2.The Factors Affecting Currency Invoicing: The Case of Indonesia

The additional objective of the research is to analyze the factors that affecting currency invoicing for RMB/CNY But we apply only to the case of Indonesia because of data availability reasoning.

Table 7. Regression Result Factor That Determine Currency Invoicing

Dependent : LTOTAL_USED=total Renminbi used in Indonesia trade

Sample: 2012M01 2015M12

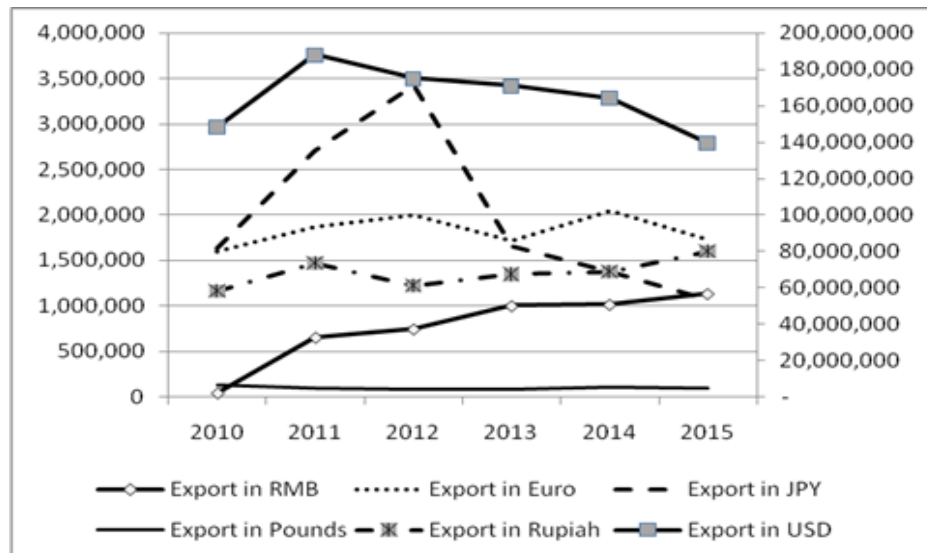
Variable	<i>Model 1</i>		<i>Model 2</i>	
	Coefficient	t statistics	Coefficient	t statistics
C	-27.915	-1.681	-4.710	-0.576
LRESERVE	0.994*	1.818	0.354	0.935
LTOTAL_TRADE	0.579**	2.059	0.428	1.586
LMPI_PI	0.139	0.096	-0.550	-0.389
LEXCHRATE	4.581	1.597	-	-
LTOTAL_USED(-1)	0.578***	4.339	0.568***	4.189
Adjusted R ²	0.317		0.292	
DW stat	1.637		1.604	
F statistic	5.358		5.848	

Source : Author's own**Note :** *** significant in 1%, ** significant in 5%, * significant in 10%

In theory of the demand for currency, the use of a country's currency is influenced by internal factors, external factors and an inertia factor. In the case of demand for RMB, an internal factor is China's foreign exchange reserve and China Manufacture Production Index. External factors are trade between Indonesia and China, and the inertia factor is the use of RMB in the previous period.

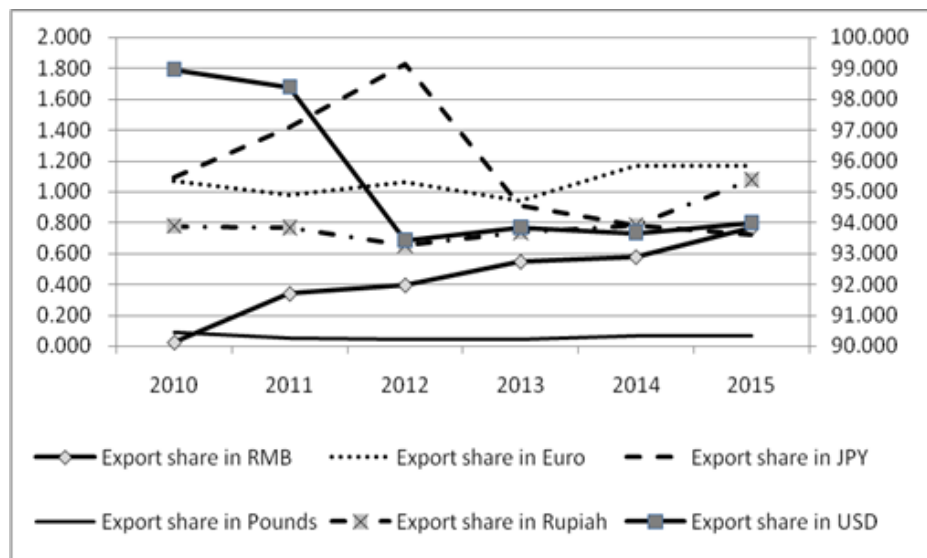
Based on the result of the regression, China's international reserve, total trade with China, and log of the RMB exchange rate are significant in determining the use of RMB. The China Manufacture Production Index did not significantly affect the RMB currency invoicing either in Model 1 or Model 2. Again, we find that trade could boost the use of RMB.

In Indonesia's case, it is clear that the export share in RMB invoicing has an increasing trend. On the other hand, the export share in USD and Japanese Yen has a decreasing trend. However, USD invoicing is still dominant in terms of number (still above 90 per cent, Figure 6 and 7).

Figure 6: Export Share in Five SDR Currencies and Indonesian Rupiah

Note: LHS: Export Share in Euro, Pounds, JPY, RMB, Rupiah; RHS : Export Share in USD

Source: Central Bank of Indonesia Financial Statistics (External Sector)

Figure 7: Import Share Five SDR Currencies and Indonesian Rupiah

Note: LHS: Import Share in Euro, Pounds, JPY, RMB, Rupiah; RHS : Import Share in USD

Source: Central Bank of Indonesia Financial Statistics (External Sector)

In contrast to exports, RMB used in Indonesian imports is still low (even with a small increase) but still far from the other four SDR currencies. USD also has different trend. After tapering off, the decreasing trend diverts to an increasing trend. A strong USD is the reason for this diversion in pattern. Another interesting fact is that the import share in Rupiah has increased significantly in the observation period. The phenomenon is called local currency invoicing.

The fact that import invoicing for RMB is still low showed that even Chinese exporters still do not prefer to receive payments from Indonesian importers in the RMB denomination. To increase RMB internationalization in the future, Chinese exporters should have the preference of also using RMB (their own currencies) and not only USD. Indonesian imports from China have an increasing trend which is large in terms of value, but the use of RMB invoicing was very far from expected.

Conclusion

From the data, we can conclude an increasing RMB role in ASEAN economies through the significance of RMB/CNY in explaining ASEAN member exchange rate movements. With the Asian financial crisis lessons learned, the Chiang Mai initiative, the increasing role of China in the world economy, increasing global turbulence, and also greater integration between ASEAN countries and China through ASEAN China FTA, and the strong USD and lack of USD liquidity, together could enforce the increasing use of RMB in ASEAN economy transactions. The regression results show the increasing importance of RMB in explaining ASEAN member exchange rate movements.

Increasing trade relations could boost the use and intensity of RMB used and diversify invoicing currencies in reducing exchange rate volatility to USD. The evidence comes from the increasing CNY/RMB share in the majority of ASEAN member countries after ASEAN China FTA. The increasing use of RMB/CNY also could relate to the effort from China in making BCSA with ASEAN members. BCSA could possibly facilitate the increasing use of RMB/CNY. The Indonesian case also gives empirical evidence for the significance of trade in the story of RMB used (even with sample limitations). For the next research topic, using all ASEAN member currency invoicing models, we could extend more comprehensive analysis in finding the factors that affect currency invoicing and also assess the effectiveness of BCSA in increasing the use of RMB in ASEAN countries.

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Tourist Arrivals to Muslim Countries: Pre- and Post-September 11

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The incident that occurred on 11 September 2001 changed tourist arrival patterns directly afterwards, not only in the United States but also in the Middle East. In the longer run, the negative media portrayal of Islam and Muslim countries after the 9/11 incident also effected tourist travel patterns. This paper examines whether the 9/11 incident affected tourist arrival patterns in Muslim countries using the bilateral tourism flows gravity model. The result indicates that the Muslim country effect was only visible after 2001. Before the September 11 incident, the patterns of tourist arrival between a pair of Muslim and non-Muslim countries were similar.

Keywords: 9/11, Islamic Tourism, Terrorism, Shariah Compliant Tourism, OIC.

1. Introduction

The 9/11 incident took 2,996 lives.² It reduced confidence in the safety and security of travel (Flyod et al, 2004; Simmons Market Research Bureau, 2001), hence affecting tourists' decisions, particularly immediately after the incident. Tourists are sensitive to safety issues; they tend to change their travel destinations upon sensing irregularities (Brunt & Cousins, 2000). Globally, the incident reduced the number of tourist arrivals by 0.6% in 2001, the only decline since 1982 (WTO, 2002a). The reluctance to travel affected the tourism industry negatively, as hotel occupancy rates plummeted and business trips and vacations were cancelled. Even though the 9/11 incident took place in the United States, its effects were global, especially in the Middle East. The number of tourist arrivals in the Middle East was reduced, as the incident changed

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² "Nine facts about terrorism in the United States since 9/11". *The Washington Post*. 11 September 2013. Retrieved 3 May 2017

the perception about Muslim countries in a negative way. While North America confronted a 27% decline in international tourist arrivals from September until December 2001, the reduction in the Middle East was 30% (WTO, 2002a). Many tourists, especially those from non-Muslim countries, perceived the Muslim world as homogeneous and associated the perception from the incident with an entire region and religion (Santana, 2004).

However, Al-Hamarneh and Steiner (2004) suggested that the 9/11 incident was an opportunity for Islamic or Shariah-compliant tourism to thrive. Muslim tourists tend to feel unwelcome in non-Muslim countries due to the many negative portrayals by the Western media (Powell, 2011). Indeed, Muslim-friendly tourism initiatives have grown rapidly. In 2015, it was estimated that the Muslim travel market accounted for \$145 billion of international tourism spending (Tripfez, 2016). In addition to the negative media portrayals, the tightening of restrictions on visa approvals and additional security measures inconvenienced many travellers, especially those from Muslim countries.

The aim of this paper is to examine whether the 9/11 incident has changed the pattern of tourist arrivals from Muslim countries to Muslim countries. The incident had negatively affected the United States and Middle East countries in the short run, as indicated by the statistics. In the medium to long run, the incident is an opportunity for Muslim countries to divert tourists from Muslim countries who used to travel to non-Muslim countries, as suggested by Al-Hamarneh and Steiner (2004). This diversion will change the pattern of tourists travelling to Muslim countries by increasing the number of tourists from Muslim countries.

2. Background

An initial reaction to the 9/11 incident was that tourists from Western Europe avoided travelling to the United States and the Middle East; instead, tourists chose domestic holidays which were perceived to be safer (WTO, 2002b). Exacerbating the negative reaction from the incident, many Western media outlets pointed to religion as the main factor causing the 9/11 incident (Kellner, 2004; Powell & Abadi, 2003), ignoring the fact that Muslims and Christians, especially in the Middle East, have peacefully coexisted for centuries (Maximiliano, 2014). The Western media portrayals about Islam and the Middle East are "often articulated

via frames of terrorism, fanaticism, Islamic radicalism and an overall threat to Western society" (Buzinde, 2014). These images created enmity between the East and the West (Powell & Abadi, 2003) and distorted attitudes towards Muslims and Islam. The media portrayals sustained the fear of terrorism, associating it repeatedly to Muslims and thus contributing to the reduction of arrivals to Muslim countries from non-Muslim countries. The negative media portrayals persuaded and affected tourist decisions, as travel decisions are usually not based on any kind of objective risk assessment, but on an individual's level of perceived safety (Santana, 2001).

However, the negative portrayals also swayed some Muslim tourists from travelling to non-Muslim countries, as the bad press created unease and feelings of unwelcome. Some Muslim tourists changed their travel destinations to places that are more welcoming, especially other Muslim countries, thus resulting in improvement in inter and intra Muslim country tourism. The additional stringent requirements with regards to visa and security checks further intensified the unwelcome feeling. In some cases, Muslim tourists changed their travel decisions and visited Muslim countries with similar religious and cultural backgrounds. Indeed, studies have shown that religion is an important determinant of tourist travel (Ghani, 2016; Fourie, 2015; Fourie, Rosello and Santana-Gallego, 2014). Tourists prefer to visit countries that are religiously and culturally similar. As suggested by Al-Hammarmeh and Steiner (2004), the incident has served as a catalyst for Shariah-compliant tourism. For example, Malaysia established the Islamic Tourism Centre (ITC) to spur Islamic tourism and has successfully attracted them, especially from the Middle East. Muslim-friendly tourism standards have also been introduced in Turkey, Malaysia and Croatia (COMCEC, 2017).

3. Empirical Model

This study uses the bilateral tourism flows gravity model to examine the effect of 9/11 on tourist arrivals to Muslim countries. The bilateral tourism flows gravity model was derived from the individual utility maximization model, as shown by Morley et al. (2014). It has been used to study different factors that explain tourist arrivals and expenditures (see Santana, Ledesma, Pérez & Cortés, 2010; Fourie & Santana-Gallego, 2011; Vietze, 2012; Fourie & Santana-Gallego, 2013; Ghani, 2016). Two bilateral tourism flows gravity models are used in this study:

$$\ln(Arrivals)_{ijt} = \beta_0 + \beta_1 \ln(GDP)_{it} + \beta_2 \ln(GDP)_{jt} + \beta_3 \ln(Dist)_{ij} + \beta_4 Border_{ij} + \beta_5 Lang_{ij} + \beta_6 Colony_{ij} + \beta_7 Muslim_{ij} + \beta_8 Sept11 + \beta_9 Sept11 * Muslim_{ij} + \varepsilon_{ijt} \quad (1)$$

$$\ln(Arrivals)_{ijt} = \alpha_0 + \alpha_2 \ln(GDP/Capita)_{it} + \alpha_3 \ln(GDP/Capita)_{jt} + \alpha_4 \ln(Pop)_{jt} + \alpha_5 \ln(Pop)_{it} + \alpha_6 \ln(Dist)_{ij} + \alpha_7 Border_{ij} + \alpha_8 Lang_{ij} + \alpha_9 Colony_{ij} + \alpha_{10} Muslim_{ij} + \alpha_{11} Sept11 + \alpha_{12} Sept11 * Muslim_{ij} + \mu_{ijt} \quad (2)$$

where i denotes the tourist destination country and j denotes the origin country of tourists. $Arrivals_{ijt}$ is the number of tourists from origin country j to destination country i in year t , GDP is the gross domestic product measured in constant USD, and $GDP/Capita$ is gross domestic product per capita. Pop is population size. $Dist_{ij}$ is the geographical distance in nautical miles between origin country j and destination country i . $\ln$ indicates the value is in natural log. $Border_{ij}$ indicates whether two countries are bordering each other. $Lang_{ij}$ indicates whether the destination and origin country use the same language. $Colony_{ij}$ indicates whether country i and j were colonized by the same colonizer. $Muslim_{ij}$ indicates whether both countries are Muslim majority countries; it equals 1 when both countries i and j are OIC (Organisation of Islamic Cooperation) member countries and 0 otherwise. Membership in the OIC was used as a proxy for Muslim countries. After the United Nations (UN), the OIC is the largest intergovernmental organisation in the world, with 57 member states spread across four continents. The primary objective of the organisation is to strengthen solidarity and cooperation among member states. The variable $Muslim$ will indicate whether there is a Muslim country effect (i.e. whether tourist arrivals to a pair of Muslim countries are higher than non-Muslim countries). $Sept11$ is equal to 1 when the year is greater than 2001 and 0 otherwise, representing before and after the 9/11 incident. Equation (1) and (2) also include an interaction between $Sept11$ and $Muslim$ that measures whether the Muslim country effect depends on the 9/11 incident.

The period of study is 1995–2012. The arrival countries are OIC member countries, while the origin countries are all countries with data availability (151 countries). The data for bilateral tourist arrivals are from the United Nation World Tourism Organization (UNWTO). The data for GDP and population are from World Bank World Development Indicators.

Distance, common language, colony and border are from the Centre de recherche français dans le domaine de l'économie internationale (CEPII).

This study uses two measures of economic size: GDP and GDP per capita. Tourism is generally an individual-based or family-based activity; hence, it is appropriate to use GDP per capita to measure the purchasing power of tourists. Furthermore, the disaggregation of GDP into GDP per capita and population enabled this study to examine the effects of population size on the number of arrivals. The economic size of the country was expected to be positively related with the number of arrivals, as more of the origin country's residents can afford to visit other countries. This positive relationship is supported by many studies (see Zhang & Jensen, 2005; Croes & Vanegas, 2005). Several studies have also shown that international tourism is a luxury expense (Kim, Park, Lee & Jang, 2012; Lanza, Temple & Urga, 2003; Lim, 1997; Smeral, 2003); consequently, international tourist arrivals are positively related with income. Similar to GDP, population size was expected to have a positive relationship with tourist arrivals, as countries with higher populations are expected to have greater numbers of tourists (Fourie, Rosello & Santana-Gallego, 2015). Distance was expected to be negatively related with tourist arrival, since distance is related to cost, especially the cost of transportation. An increase in travel cost can lead to a decrease in tourist flow; however, as the cost of air travel decreases, its effect on tourist flow can also be expected to decrease (Fourie et al., 2015). Language, border and colony are expected to be positively related with arrival. The Muslim country dummy was expected to be positive, and the 9/11 incident was expected to increase the arrival of Muslim tourists to Muslim countries.

4. Result

Table 1: Interaction between Muslim Country and 9/11 Effect

	OLS	OLS	OLS	OLS	Random	Random	Random
<i>GDP/Capita</i> ^b	0.678** (0.019)			0.674* (0.019)	0.962* (0.023)		0.915* (0.022)
<i>GDP/Capita</i> ^b	0.766** (0.018)			0.764* (0.018)	0.824* (0.020)		0.792* (0.020)
<i>Pop</i> ^b	0.697** (0.014)			0.697* (0.014)	0.846* (0.016)		0.812* (0.015)
<i>Pop</i> ^b	0.796** (0.016)			0.796* (0.016)	0.826* (0.018)		0.792 (0.017)
<i>GDP</i> ^b		0.695** (0.013)	0.694* (0.013)			0.901* (0.015)	0.858* (0.014)
<i>GDP</i> ^b		0.782* (0.013)	0.781* (0.013)			0.831* (0.014)	0.794* (0.014)
<i>Dist</i>	-1.557* (0.040)	-1.555* (0.040)	-1.556* (0.040)	-1.557* (0.040)	-1.607* (0.040)	-1.587* (0.039)	-1.601* (0.039)
<i>Muslim</i>	0.174* (0.076)	0.181* (0.075)	0.013 (0.087)	0.003 (0.087)	0.161* (0.073)	0.175* (0.071)	0.043 (0.075)
<i>Sept11</i>			0.058* (0.025)	0.069* (0.025)		0.057* (0.015)	0.048* (0.015)
<i>Muslim*Sept11</i>			0.240* (0.059)	0.246* (0.059)		0.128* (0.033)	0.133* (0.033)
<i>ComLang</i>	1.494* (0.080)	1.500* (0.080)	1.507* (0.079)	1.502* (0.079)	1.795* (0.080)	1.834* (0.077)	1.770* (0.079)
<i>ComBorder</i>	1.926* (0.188)	1.949* (0.188)	1.950* (0.188)	1.924* (0.188)	1.898* (0.206)	1.830* (0.202)	1.896* (0.203)
<i>Colony</i>	0.969* (0.263)	0.966* (0.262)	0.974* (0.262)	0.977* (0.262)	0.815* (0.257)	0.7784* (0.253)	0.923* (0.254)
<i>Constant</i>	-16.903 (0.580)	-16.929 (0.579)	-16.901 (0.579)	-16.864* (0.580)	-22.418 (0.609)	-23.120 (0.623)	-20.746* (0.582)
<i>R</i> ²	0.63	0.63	0.63	0.63	0.64	0.64	0.64
Observation	57276	57609	57609	57276	57276	57609	57276

Table 2: Muslim Country Effect Pre and Post 9/11

	Before 2001			After 2001		
	OLS	OLS	Random	Random	OLS	Random
<i>GDP/Capita</i> ^p		0.718 (0.022)		0.673 (0.025)	0.652 (0.020)	0.943 (0.020)
<i>GDP/Capita</i> ^o		0.739 (0.021)		0.724 (0.020)	0.777 (0.018)	0.809 (0.018)
<i>Pop</i> ^p		0.723 (0.016)		0.690 (0.016)	0.685 (0.015)	0.796 (0.015)
<i>Pop</i> ^o		0.773 (0.019)		0.764 (0.018)	0.806 (0.016)	0.848 (0.017)
<i>GDP</i> ^b	0.723 (0.015)		0.685 (0.016)		0.681 (0.013)	0.860 (0.013)
<i>GDP</i> ^o	0.756 (0.016)		0.745 (0.015)		0.794 (0.013)	0.831 (0.013)
<i>Dist</i>	-1.527 (0.047)	-1.532 (0.047)	-1.508 (0.044)	-1.511 (0.044)	-1.570 (0.041)	-1.571 (0.040)
<i>Muslim</i>	0.014 (0.088)	0.003 (0.088)	0.040 (0.083)	0.025 (0.083)	0.246 (0.078)	0.204 (0.074)
<i>ComLang</i>	1.581 (0.092)	1.584 (0.092)	1.615 (0.087)	1.621 (0.087)	1.458 (0.080)	1.784 (0.079)
<i>ComBorder</i>	1.637 (0.221)	1.613 (0.222)	1.666 (0.213)	1.633 (0.214)	2.095 (0.190)	1.917 (0.215)
<i>Colony</i>	0.925 (0.280)	0.924 (0.280)	1.061 (0.278)	1.059 (0.278)	1.016 (0.270)	0.827 (0.269)
<i>Constant</i>	-17.248 (0.708)	-17.310 (0.706)	-16.455 (0.708)	-16.538 (0.712)	-16.608 (0.587)	-22.089 (0.593)
<i>R</i> ²	0.61	0.61	0.62	0.62	0.64	0.64
Observation	18437	18437	18437	18437	38839	39172
						38839

Table 3: Yearly Muslim Country Effect (1995 - 2012)

Year	<i>Muslim</i>	Year	<i>Muslim</i>
1995	-0.068 (0.120)	2004	0.327*** (0.095)
1996	-0.046 (0.118)	2005	0.166** (0.091)
1997	-0.053 (0.110)	2006	0.285*** (0.086)
1998	0.115 (0.106)	2007	0.251*** (0.094)
1999	-0.016 (0.098)	2008	0.308*** (0.096)
2000	0.039 (0.098)	2009	0.232*** (0.089)
2001	0.113 (0.092)	2010	0.171** (0.089)
2002	0.213*** (0.096)	2011	0.202*** (0.082)
2003	0.183*** (0.093)	2012	0.360*** (0.081)

Table 1 reports the results from ordinary least squares with clustered standard error and random effect with robust standard error for the two set of equations. All of the coefficients behave as expected except for *Muslim*. The discussion of the results is concentrated only on the variables *Muslim*, *Sept11* and their interaction term, as the behaviour of the other variables are as expected (i.e. a negative relationship for the distance and a positive one for the other variables). The coefficient for *Muslim* was positive when 9/11 and the interaction term were not included; however, when both were added, *Muslim* was statistically non-significant. This means that the effect of Muslim countries on the arrival of tourists to Muslim countries depended on the 9/11 incident. Before the 9/11 incident, the Muslim country effect was not important in explaining arrivals to Muslim countries; the behaviour of tourist arrival depended on whether the pair of countries were Muslim countries only after the 9/11 incident.

Table 2 breaks up the period of study into pre- and post-2001. The result in Table 2 is based on an estimate that excludes the variable *Sept11* and the interaction between *Muslim* and *Sept11*. The variable *Muslim* is significant only after 2001, and it is not statistically significant before 2001. This result further supports the Table 1 data suggesting that the Muslim country effect depends on the 9/11 incident, where the incident has changed the pattern of arrival from Muslim countries to Muslim

countries. Table 3 further supports the conclusion from the results in Table 1 and Table 2 when yearly cross-section regressions are estimated. The coefficients for *Muslim* are statistically significant only after 2001.

5. Conclusion

Negative media portrayals of Islam and Muslim countries after the 9/11 incident changed the pattern of tourist arrivals in Muslim countries. The Muslim country effect was only visible after 2001, as the number of arrivals from a pair of Muslim countries was more than the non-Muslim pair only after the 9/11 incident, after taking into account the "gravity" factors. Given these results, it should be no surprise that Muslim-friendly tourism initiatives have been introduced by many hotels in many countries, not only in Muslim countries, to attract Muslim tourists.

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Workers' Ability Index and Optimal Level of Schooling in Malaysian Service Sector

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The objective of this paper is to examine the impact of workers' ability index on wages and optimal level of schooling in the service sector. Empirical analysis in this study is conducted on 611 households' data in Peninsular Malaysia collected in 2015. In this analysis, workers' ability index is divided into two categories, namely index of ability during schooling and index of ability at workplace. The analysis involves estimating four regression models comprising of the wage model, the marginal return to schooling model, the marginal cost model and the optimal level of schooling model. The result demonstrates that workers' ability index does not affect wages significantly but it is a positive and significant determinant for years of schooling. The study shows that the optimal years of schooling for the Malaysian service sector is about 14 years or at diploma level. The actual data reveals that 28.2 percent of respondents have actual years of schooling lower than the optimal level, while about 46.5 percent of them having actual years of schooling higher than the optimal level. The implication from this study is that workers in the service sector, particularly who are with level of schooling lower than the optimal level must increase their educational level in order to achieve the optimal wage.

Keywords: Workers' ability index, wages, optimal level of schooling, family education, service sector.

1. Introduction

Human capital investment is the central of economic development strategies. This investment will produce a better quality person and

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increase lifetime earnings of the investors. Education is a form of human capital investment that influences both the current consumption and future earnings prospect of its investors. Human capital theory postulates that individuals will invest in human capital to the extent where their marginal return (internal rate of return) and discounted rates of interest (cost of investment in human capital) are equal. Eventually, the level of schooling will be chosen in order to maximize their expected discounted future earnings stream.

Most of past studies used earnings function to calculate returns to education based on individual's characteristics such as years of education and experience, i.e. the demand side of human capital investment, and excluded the role of individual's ability. However, ability is particularly important in influencing individual's wage as well as the demand for human capital investment. Heckman (2006) has argued that high earnings are influenced by non-academic skills, personality and interaction between cognitive and non-cognitive skills.

Cognitive skill is the ability for understanding a complex idea, learning through experience, involving in various types of thinking, and solving problems through thinking. Cognitive ability is classified into numeric, abjad, computer, language, planning skills and ability to solve problems. These are considered to be brain-based skills (Michelon, 2006) that are required for completing tasks by different levels of complexity. For example, one needs perception in answering a phone call upon hearing the ring tone, and needs to decide if the call should be answered. By lifting the phone receiver and talking into the phone with the appropriate language, one actually practises motor skill and language skills. Finally, it takes one's social skill when interacting with the caller.

On the other hand, non-cognitive ability involves characteristics such as social, emotion, personality, behaviour, attitude and so on. These characteristics can be judged from working behaviour (efforts, discipline and commitment), social behaviour (confidence, friendship and emotional stability) and physical ability (physical strength, efficiency and capability). Rothstein *et al.* (2008) have identified a list of soft skills and behavioural skills as the potential example for non-cognitive ability, such as critical thinking skills, problem solving skills, emotional health, social skills, work ethic, and community responsibility. Besides that, as observed by Pianta *et al.* (2005), non-cognitive ability that affects

interpersonal relationship includes closeness, affection, open communication, self-control, and self-regulation. Non-cognitive ability represents one's "patterns of thought, feelings and behaviour" (Borghans et al. 2008) that are connected to one's educational process via schooling and cognitive skills development. However, characteristics of non-cognitive ability are not directly represented by cognitive skills since one's socio-emotional or behavioural characteristics are not unchangeable. Finally, technical skill is a combination of cognitive and non-cognitive abilities that is used to perform any kinds of tasks (Margolis, 2011).

An increase in the ability differences will affect income equality. Sensitivity of output towards ability is varied by jobs. Therefore, to increase output, firms will allocate their high-ability workers to jobs that are more difficult and complex (Costrell & Loury, 2004; Sattinger, 1975). The effect of workers' ability on income depends on, firstly, the sensitivity of work performance towards output (either performed by low- or high-ability workers), and secondly, the degree of complementarity of the teams towards job tasks. If they are highly complement, then the effect of ability on wage will be higher.

Empirically, income maximisation from individual human capital investment is achieved at a point where marginal returns equal to marginal cost (Regan et al. 2007; Biltagy, 2011). According to Becker and Thomas (2007), the low optimal level of schooling occurs for those who have low marginal benefit and high marginal cost, whereas those who have high marginal benefit and low marginal cost will obtain high optimal level of schooling and subsequently they will receive high returns from education. Optimal level of schooling shows years of schooling that would maximise individual's wage without causing over- or under-education for an individual to hold a specific job. In a way, optimal level of schooling will reflect the non-existence of educational mismatch in the labour market.

In the Malaysian context, the incidence of educational mismatch could be reflected by a comparison between the percentage composition of employed persons with different educational qualification and at different occupational categories. The percentage of employed persons with an educational qualification at the degree level (9.86% on average) is lower than that of employed persons working in managerial and professional categories (average of 14.42% in total). However, when combining with

those with diploma qualification, the percentages (18.29% on average) exceed that of the managerial and professional categories (Ministry of Finance, 2015). If it is a norm for workers at the managerial and professional level to possess at least a degree qualification, the statistic may indicate that workers at these occupational categories may have possessed educational qualification that is lower than degree, implying the incidence of under-education. With working experience, these undereducated workers may have advanced into higher positions through time. As such, the wage impact of under-education may not have been substantial.

On the other hand, percentages of employed persons working in clerical and sales and service categories (average 28.94% in total) are lower than percentages of employed persons with secondary school educational qualifications (average 54.12% in total) (Ministry of Finance, 2015). While these qualifications are commonly deemed to be minimum entry requirement for clerical and sales and services categories, one might question about the career path of these over-supplied secondary school leavers. It is, however, very unlikely for them to advance their career by holding managerial and professional job positions where a degree or at least a diploma is needed as minimum entry requirement. As such, one might question if these over-qualified workers had been distributed into any occupational categories requiring lower level of education than what they have readily possessed. In fact, the percentages of employed persons holding jobs as operator, assembler and elementary worker are large (average 24.16% in total). Had this speculation been valid, it may give rise to the incidence of over-education that may influence their labour market outcomes.

This paper attempts to construct an index of workers' ability and analyse the role of ability on returns to schooling in the service sector in Malaysia based on a field survey on 611 respondents conducted in 2015. In addition, the study will compute marginal returns to schooling and equate it with the discounted rate of interest to examine the effect of family background on the supply of schooling (proxied by discounted rate of interest). Finally, the study aims to determine optimal level of schooling in the service sector. In this study, individual's ability index is constructed and incorporated into the wage and schooling models. We will estimate the wage models to identify individual rates of returns to schooling. In order to identify the optimal years of schooling we need to know the discounted rates of

interest or the marginal cost of investment. Therefore, the model of marginal cost of investment in human capital (which reflects the ability to invest) is estimated using family characteristics such as parent's schooling level and family size, which have been empirically tested to have influenced the marginal opportunity cost of individual's schooling attainment. Finally, the optimal level of schooling is estimated by equating the marginal returns with the marginal cost of human capital investment to solve for the schooling model. The paper contains five sections. The next section reviews the literature related to the present study. Methodology and results will then follow. Finally, the discussion and conclusion will be presented in the last section.

2. Literature Review

This section reviews literature on two main topics, which are the role of ability on wages and returns to schooling and the role of ability and family background on years of schooling. In the second topic, the literature on the optimal level of schooling is also discussed.

The Role of Ability on Wages and Returns to Schooling

Empirical studies examining the effect of ability on the demand for schooling have pointed to the fact that more abled person tended to invest more in schooling (Akresh *et al.*, 2012; Biltagy, 2012). However, ability may in turn exert positive and negative impact on the returns to schooling (Bronars & Oettinger, 2006; Sandewall, 2014). Notwithstanding the mixed results of the ability-returns nexus, failing to control for the measure of ability may bias the estimate of returns to schooling upward (Glewwe, 1996; Rouse, 1999; Patrinos & Sakellariou, 2011).

For instance, when specifying the demand functions for schooling in Egypt, Biltagy (2012) concluded that the number of years of schooling, ability differences and quality of education were the main explanatory variables in the individual's demand function for schooling. This result confirms that of Akresh *et al.* (2012) in that children would have higher likelihood to be enrolled in school if their ability was one standard deviation higher than the average ability of their siblings, thus giving rationale to their parents to allocate their limited resources to the most abled child rather than distributing them evenly among all children. These findings are based on the ground that schooling and test scores were dependent upon a common unobserved latent ability (Hansen *et al.*, 2004).

Therefore, the impact of schooling on test scores, and hence, the demand for schooling, varies by levels of ability. Such an argument underscores the need to include ability in the analysis of schooling.

Besides benefitting the pre-market demand for education, ability plays a positive role in improving the post-market returns to schooling. Using sibling data, Bronars and Oettinger (2006) found that the ability-proxied aptitude test score generated large returns to schooling both for within and between families. This is because more abled persons tended to receive higher returns to college wage premium (Tobias, 2003) and that the shifts in relative supply of and demand for college labours have increased their returns to cognitive skills (Cunha et. al., 2011). The positive wage effect of ability lies with the possession of mechanic abilities (Anger & Heineck, 2010), literacy and numeracy skills (Vignoles et al., 2011), and personality traits like adulthood extraversion and childhood constructiveness (Viinikainen et al., 2010). In fact, the importance of ability outweighs that of education when Patrinos and Sakellariou (2011) showed that a lack of adult functional literacy skills had lowered the earnings contribution of education.

On the other hand, twins-based estimates of the return to schooling by Sandewall et al. (2014) revealed a negative role of ability when proxied with adolescent IQ test scores and birth weight, casting doubt to the validity of twins-based estimates. The declining role of ability on wage formation could be the result of the growth of technology use in the 2000s (Castex & Dechter, 2014), a competency that can be obtained through formal schooling. As such, education can act as a substitute for both observed and unobserved ability in reducing income inequality (Denny & O'sullivan, 2007).

Despite producing mixed results, the importance of incorporating ability measure into earning-schooling nexus is empirically and statistically justifiable on the ground of measurement bias resulted from omitting this variable. For instance, a Chilean's study of the effect of cognitive skills confirmed the returns-increasing role of ability which might otherwise inflict classical ability bias in the typical earnings function if ability measure was excluded (Patrinos & Sakellariou, 2011). This Chilean study echoes those of the earlier works in the measurement of biased returns, such as Glewwe (1996) and Isacson (1999) who found positively-biased estimates of the returns to schooling when ability measure was omitted.

Such an upward bias and overestimation of returns, as observed by Rouse (1999) and Behrman and Rosenzweig (1999) based on twins study, was due to the omission of individual-specific component such as genetic ability. In fact, recent study has shown that the inclusion of childhood cognitive test scores has substantially accounted for the increasing income inequality among graduates within the same subject of study (Lindley & McIntosh, 2015).

Nordman et al. (2015), included cognitive ability (numeric and reading) and personality (open, conscientious, extrovert, agreeable, neurotic) in a wage model. They found that only the cognitive ability on reading was significant in affecting wages. The effect of personality on wages was quite weak. Castex dan Dechter (2011) on the other hand, used Arm Force Qualifications Test (AFQT) score which included mathematic and verbal as proxy for cognitive ability. Based on US data in 1979 and 1997, they found that a rise in AFQT score of 10 points had increased male's wage by 2.7 percent for 1979 cohort and 1.1 percent for 1997 cohort. For females, however, an increase of 10 points of AFQT score had decreased their wages from 3.6 percent to 2.2 percent. Meanwhile, Park (2012) supported the finding that AFQT score had positive effect on wages.

The inclusion of ability in the wage model will also reduce gender wage differentials (Grove et al. 2010, Paglin & Rufolo 1990). However, Heineck and Anger (2010) found that cognitive ability such as fluid intelligence did not statistically and significantly determine female wage, but it is a significant determinant of male wage. On the other hand, Heineck and Anger (2010) also found that non-cognitive abilities in terms of personality traits rewarded males and females differently. For instance, openness and positive reciprocity generated wage premiums for females, while conscientiousness and extraversion generated wage premiums for males. Besides that, agreeableness was not statistically related to males' wages while it affected females' wage adversely. Other personality traits affected males and females in a similar manner, such as neuroticism which was consistently not associated to wages for both males and females, while locus of control impacted both of them adversely. Following the outcome of these studies, it comes to us that both cognitive and non-cognitive abilities affect males and females differently, complicating further the extent to which gender wage differentials are accounted for by abilities.

The Role of Ability and Family Background on Years of Schooling

Empirical studies have emphasized the varying effects of years of schooling on the economic returns for individuals who are deemed to be comparable in human capital (Heckman and Vytlačil, 1998; Card, 1999). In fact, Behrman and Knowles (1999) have proven the significant role of family background in schooling outcome among children, while school quality plays an insignificant role in school performance (Hanushek, 1997) and socioeconomic outcomes (Glewwe, 2002). A more direct link between family background and accomplishment among their children has also been proven empirically (Deschenes, 2007; Regan et al., 2007; Chen, 2009). As educational resources of better quality are affordable among the well-affluent families, Behrman and Knowles (1999) contended that the household income is positively associated with the marginal benefits from educational investment in their children. Moreover, child education is given priority by parents who are better-educated, thus increasing their capability and willingness in nurturing their children. Given the greater role of family background and smaller role of school quality in accounting for one's educational outcome, the emphasis on family-side factor should be as relevant for academic research as it is for designing governmental intervention programs in developing countries.

Family background plays vital role in determining the level of children's education. Raitano and Vona (2015) argued that parents' background affected the wage of their children through three channels – probability of having higher level of education, probability of securing better jobs and a direct residual effect as a result of imperfection in market structure (Hudson and Session, 2011). Heineck and Riphahn (2009) studied education opportunity for children and found that education level of children from the low income group did not increase since the past 25 years. They concluded that the level of educational outcomes among children depended upon the parental educational background. Besides education, parents' wealth will also determine children's jobs and income (Karagiannaki, 2012; Kyui, 2013).

Regan et al. (2007) used human capital model to determine the optimal level of schooling which was basically explained by two important variables, namely family background and individual's ability. They found that individuals from wealthy family had higher optimal level of schooling and more able individuals would complete their schooling

faster than those with low ability. Using the United States data and AFQT as a measure of ability, they found that the mean of optimal schooling was 11.4 years. Biltagy (2011) suggested that the important determinants for the demand for schooling (rate of returns to schooling) in Egypt were years of schooling, ability differences and quality of education, while the supply for schooling (discounted interest rate) depended on family background (parental educational levels as proxies for family income) and family size. He found that all variables were positively and significantly determining the optimal level of schooling and the mean of optimal schooling was 12.6 years. The level of optimal schooling increased about 0.16 and 0.12 when the level of father's and mother's education increased by one year, respectively. Moreover, when family size increased by one person, the level of optimal schooling increased about 0.011. Finally when individual's ability increased by one point, the optimal level of schooling increased by 3.4 years. In a nutshell, the results of these studies underscore the importance of incorporating factors like family background and individual ability in determining the optimal level of schooling.

3. Theoretical Background, Model Specification and Source of Data

The following theoretical framework follows that of Regan et al. (2007).

Theoretical Framework

Earnings function

$$E = F(S, A) \quad (1)$$

Where, E is earnings, S is years of schooling and A is ability. The assumptions are positive returns to ability and diminishing marginal returns to schooling.

$$F_S, F_A > 0 \text{ and } F_{SS} < 0 \quad (2)$$

and individual with greater ability will obtain higher returns to schooling

$$F_{SA} = F_{AS} > 0 \quad (3)$$

In terms of $\ln$ equation (1) becomes

$$\ln E = \ln F(S, A) \quad (4)$$

and marginal rate of returns to schooling

$$r = \partial \ln F(S, A) / \partial S \quad (5)$$

All relevant costs are assumed to be forgone earnings, and an individual tries to maximize his lifetime earnings that are discounted to the present value, subject to constraints of equation (1).

$$\begin{aligned} & \text{Max } V \int_0^{\infty} E e^{-it} dt \\ & \text{Subject to } E = F(S, A) \end{aligned} \quad (6)$$

where, V denotes the lifetime earnings discounted to a present value, i denotes a fixed discounted rate of interest, and t represents the index of integration.

Simplify the present value of lifetime earnings in equation (6) and taking $\ln$, we derive;

$$\ln V = \ln E - iS - \ln i \quad (7)$$

Taking derivative with respect to S , we derive first order condition;

$$r = i \quad (8)$$

Optimal level of schooling for an individual is achieved at the point where his or her marginal rate of return to schooling and discounting rate of interest are equal.

An individual inverse demand function for schooling will be derived when taking the derivative of equation (4) with respect to schooling, as shown in Eq. (9).

$$r = r(S, A) \quad (9)$$

or

$$S^d = S^d(i, A)$$

Based on Eq. (7), we can derive the individual supply function for schooling investment as follows,

$$\ln E = \ln(iV) + iS \quad (10)$$

Differentiate with respect to S , and taking explanatory variables that can influence i , like family background we derive;

$$i = i(X) \quad (11)$$

Combining demand equation of (9) with supply equation (11) and considering at the equilibrium between demand and supply we obtain optimal level of schooling;

$$S^* = f(X, A) \quad (12)$$

Model Specification

In achieving the objectives of the paper, six equations are established. The first model is wage model that is based on Mincer Earnings Model, which includes years of schooling and experience as independent variables. Model 2 adds ability variables, which comprise of ability during schooling and ability at workplace. The interaction term between ability during schooling and years of schooling is also added to look at the effect of ability on returns to schooling. In Model (3), we add workers' characteristics variables like gender, job status, training attendance and state where they are working to look at the effect of these variables on wages.

When Model (3) is differentiated with respect to years of schooling, Model (4), which is the marginal returns to schooling, is derived. The equation for the marginal returns to schooling which is denoted by r is shown in Eq. (16a). It should be noted that Eq. (16a) is calculated rather than estimated. By substituting years of schooling (SCH) and index of ability during schooling (ABLS) for each individual respondent into Eq. (16a), the marginal returns to schooling for each individual respondent can be calculated. Equation (16b) is presented to show the marginal effect of SCH and ABLS on r , and value of the marginal effect is presented in column 4 of Table 4. Subsequently, the calculated individual marginal

returns to schooling will set to be equalled to the marginal cost of schooling, i , to reflect the property of equilibrium in the demand and supply for schooling as shown in the Eq. (8) above. Since the i is not directly observable in our study, it is proxied by the calculated r and treated as the dependent variable in Model (5). By so doing, the individual value of i in Eq. (17) is directly obtained from the individual value of r calculated by Eq. (16a) – a procedure that is consistent with the notion that the marginal cost is equal to marginal returns to schooling in equilibrium. Finally, Eq. (16a) in Model (4) and Eq. (17) in Model (5) are equated to solve for years of schooling (S) in Model (6), which represents the optimal level of schooling.

Model 1

$$\ln W_i = \beta_{01} + \beta_{11}SCH_i + \beta_{21}EXP_i + \beta_{31}EXP_i^2 + \mu_1 \quad (13)$$

Where, $\ln W$ is the monthly wage expressed in its natural logarithmic form, SCH denotes years of schooling, EXP denotes years of work experience, and EXP^2 is the square of years of work experience.

Model 2

$$\ln W_i = \beta_{02} + \beta_{12}SCH_i + \beta_{22}SCH_i^2 + \beta_{32}EXP_i + \beta_{42}EXP_i^2 + \beta_{52}ABLW_i + \beta_{62}ABLS_i + \beta_{72}ABLSSCH_i + \mu_2 \quad (14)$$

Where SCH^2 is years of schooling squared, $ABLW$ is workers' ability index at workplace, $ABLS$ is workers' ability index at school, and $ABLSSCH$ is interaction between ability index at school and years of schooling.

Model 3

$$\ln W_i = \beta_{03} + \beta_{13}SCH_i + \beta_{23}SCH_i^2 + \beta_{33}EXP_i + \beta_{43}EXP_i^2 + \beta_{53}ABLW_i + \beta_{63}ABLS_i + \beta_{73}ABLSSCH_i + \beta_{73}GEN_i + \beta_{83}FULL_i + \beta_{93}TRN_i + \beta_{103}STATE + \mu_3 \quad (15)$$

Where GEN is dummy variable for gender (male=1 and female=0), $FULL$ is dummy variable for job status (full-time=1 and part-time=0), TRN is dummy variable for training attendance (ever attended training=1 and never attended training=0), and $STATE$ is dummy variable for states (1= more developed states, i.e. Federal Territory of Kuala Lumpur, Selangor, Penang and Johor, and 0= less developed states, i.e. Melaka, Perak,

Pahang and Terengganu).

Model 4

$$r = \beta_{13} + 2\beta_{23}SCH_i + \beta_{73}ABLS_i \quad (16a)$$

$$r = \gamma_{01} + \gamma_{11}SCH_i + \gamma_{21}ABLS_i \quad (16b)$$

Where $\beta_{13} = \gamma_{01}$, $2\beta_{23} = \gamma_{11}$, and $\beta_{73} = \gamma_{21}$.

Model 5

$$\hat{t} = \gamma_{02} + \gamma_{12}SCHF_i + \gamma_{22}SCHM_i + \gamma_{32}FS_i + \mu_5 \quad (17)$$

Model 6

$$S_1 = \gamma_{03} + \gamma_{13}ABLS_i + \gamma_{13}SCHF_i + \gamma_{23}SCHM_i + \gamma_{33}FS_i + \mu_6 \quad (18)$$

Where SCHF is father's years of schooling, SCHM is mother's years of schooling, and FS is family size. The subscript i denotes i^{th} individual, while μ is the error term in each model.

Source of Data

Structured questionnaires have been distributed in a field survey to collect the data used for empirical analysis in the present study. Based on Israel (1992), the minimum sample size was calculated. Sample selection was based on stratified sampling method. Labour Force Survey Report, Department of Statistics Malaysia, 2013, was where the sampling frame was obtained. We have chosen eight states in Peninsular Malaysia to represent four zones in this study – North (Penang and Perak), East (Pahang and Terengganu), West (Selangor, Federal Territory of Kuala Lumpur and Melaka) and South (Johor). The five major service subsectors selected were education, information and communication technology (ICT), tourism, finance and health. There were 611 workers surveyed in the services sector; out of the number, 116 were in the education subsector, 123 in health, 108 in finance, 78 in ICT and 186 in tourism. The data was collected between February and June 2015. A number of 20 respondents in Selangor and Federal Territory of Kuala Lumpur were selected to facilitate for pilot test aiming at validating the instruments used. The Cronbach's alpha is calculated for all four personal quality constructs measuring 'locus of control', 'type A behaviour', 'self-monitoring' and 'sensation seeking'. The results of the reliability test on all personality traits are greater than 0.7, indicating that all instruments used are of good fit in the present study due to their high reliability values.

Constructing Workers' Ability Index

In this study, index of ability during schooling and index of ability at workplace are constructed. Three dimensions are incorporated into constructing the index of ability during schooling, namely, experience at school, and the development of core skills and process skills. On the other hand, the index of ability at workplace constitutes two skill dimensions, namely, the competency in both core skills and process skills, and four other dimensions on personality traits comprising of 'locus of control', 'type A behaviour', 'self-monitoring', and 'sensation seeking'. The above mentioned dimensions are computed into indices that are normalised with the following equation:

$$\frac{(\sum_{s=1}^j X_{is}) - (\sum_{s=1}^j Min_{is})}{(\sum_{s=1}^j Max_{is}) - (\sum_{s=1}^j Min_{is})} \quad (19)$$

Where X_{is} denotes the actual score, Min_{is} denotes the minimum score, and Max_{is} denotes the maximum score expressed by i^{th} respondent for s^{th} item covered in an array of j items measuring each dimension, respectively. Different weight, based on its relative importance in terms of its proportion to the total, is assigned to different dimensions when constructing the index of ability during schooling. On average, the proportion of the dimensional index of experience of schooling, core skills development and process skills development is around 25 percent, 40 percent and 35 percent out of the total. As such, weights of 0.25, 0.40 and 0.35 are assigned to experience of schooling, core skills development, and process skills development, respectively, when constructing the index of ability during schooling. On the contrary, equal weight is assigned to all six dimensions when constructing the index of ability at workplace, since the proportion of each dimension is almost equal out of the total. As such, the weight of 1/6 is assigned to each dimensional index when constructing the index of ability at workplace. It follows that the choice of weight is indeed not arbitrary in nature but is statistically justifiable.

The corresponding ability indicator indices are constructed by incorporating their respective dimensional indices based on two-step procedure. First, calculate the geometric mean with the assigned weight as proposed by the United Nations Development Programme [UNDP] (2015) when constructing the Human Development Index (HDI). The

formula is as follows:

$$(D_{i1})^{w1} \times (D_{i2})^{w2} \times (D_{i3})^{w3} \times \dots \times (D_{in})^{wn} \quad (20)$$

Where D_i represents the first to n^{th} dimensional indices for i^{th} respondent while w represents the weight that is assigned for each of the n dimensional indices.

Second, identify the maximum value and minimum value for the dimensional indices that have been combined in Eq. (20) and apply Eq. (19) again when constructing the indices for the two ability indicator. Eq. (21) shows the formula used:

$$\text{Indicator Index of Ability} = \frac{[(D_{i1})^{w1} \times (D_{i2})^{w2} \times (D_{i3})^{w3} \times \dots \times (D_{in})^{wn}] - (Min)}{(Max) - (Min)} \quad (21)$$

Where Min represents the minimum value of the combined dimensional indices, while Max represents its maximum value. Meanwhile, $(D_{i1})^{w1} \times (D_{i2})^{w2} \times (D_{i3})^{w3} \times \dots \times (D_{in})^{wn}$ represents the actual value of the dimensional index for each of the i^{th} respondent that has been combined with geometric mean.

Equations 19 to 21 add value to this paper because they are the formula we used to construct the ability indices to be incorporated into the model proposed by Regan et. al. (2007). In another word, we augment the existing model by incorporating new elements for wage determination – i.e. ability during schooling and ability at workplace.

By definition, ‘experience at schooling’ elicits respondents’ exposure in forming study group at school, participating in extra-curricular activities at school, representing their school in competition and the like. ‘Core skills’ and ‘process skills’ development elicit the perception held by respondents on how well their previous schooling experience had developed those skills, while ‘core skill’ and ‘process skill’ competency elicit the perception held by respondents on the level of their current competency on those skills. ‘Locus of control’ measures respondents’ ability to control things happening around them. Respondents’ aggressiveness towards their work is measured by ‘Type A behaviour’. ‘Self-monitoring’ measures the extent to which respondents are adaptable

to their surrounding). Lastly, 'sensation seeking' measures the extent to which respondents are risk-takers and are able to take up challenging tasks. Table 1 shows the dimensions and sub-dimensions of the ability indicators considered in the present study.

Table 1: Dimensions and Sub-dimensions for Each of the Ability Indicators

Ability Indicator (Index)	Dimension for each Indicator	Sub-dimension for each dimension (no. of items)
Ability during schooling	Experience at schooling	10 items measuring respondents' involvement during their previous school time.
	Core Skill Development	Numeracy; Language skills; Critical analysis; Creativity; Written communication; Oral presentations
	Process Skill Development	Computer literacy; Planning; Applying subject understanding; Problem solving; Decision making ; Team work
Ability at Workplace	Core Skill Competency	Numeracy; Language skills; Critical analysis; Creativity; Written communication; Oral presentations
	Process Skill Competency	Computer literacy; Planning; Applying subject understanding; Problem solving; Decision making ; Team work
	Personality Traits	Locus of Control (7)
		Type A behaviour (10)
		Self-monitoring (10)
		Sensation Seeking (9)

4. Results

Descriptive statistics of variables in the model are shown in Table 2. The monthly wage has a mean value of about MYR2491. Respondents have, on average, 14 years of schooling and 7 years of work experience. The mean value of workers' ability at work and ability at school are almost of about 0.6. This shows a balance between these two abilities at the moderate level. About 41.9 per cent of respondents are males and 95 percent are working as full-time. About 72.5 percent have ever attended training and 61.2 percent are working in the more developed states like Federal Territory of Kuala Lumpur, Selangor, Johor and Penang. On average, educational level of fathers and mothers are almost equal at about 10 years and family size at about 6 persons per household. Number of observation for family background is less than 611 because there are some missing data for these three variables.

Table 2: Descriptive statistics

Variables	Mean	Standard deviation	Minimum	Maximum	N
Wage (W)	MYR2490.72	MYR2940.96	MYR400	MYR60000	611
Years of schooling (SCH)	14.2128	2.51759	6	21	611
Work Experience (EXP)	7.2081	6.69135	0.1	37	611
Ability at workplace (ABLW)	0.6501	0.12693	0	0.9401	611
Ability at schooling (ABLS)	0.6633	0.15795	0	1	611
Ability at schooling * Years of schooling (ABLSSCH)	9.5220	2.9949	0	17.8091	611
Gender dummy (GEN)	0.4190	0.49380	0	1	611
Job status dummy (FULL)	0.95	0.220	0	1	611
Training attendance dummy (TRN)	0.7250	0.44686	0	1	611
States dummy (STATE)	0.6121	0.48767	0	1	611
Mother's years of schooling (SCHM)	10.1414	2.95162	6	18	568
Father's years of schooling (SCHF)	10.4622	3.26571	6	18	568
Family size (FS)	5.8204	2.54888	1	19	568

The Estimation Results

Before the regression analysis is performed, the concepts of diagnostic tests for multicollinearity and heteroscedasticity are discussed. Heteroscedasticity problem occurs when variances are unequal and this will bias the regression estimates. To solve this problem, the Breuch-Pagan test is performed on the models and it is shown that models (1) to (3) have problem of heteroscedasticity when the test is significant at 5 percent level, while there are no heteroscedasticity problem for models (5) and (6). Therefore, heteroscedasticity-consistent white-test is performed on models (1), (2) and (3) to adjust the values of standard error and t-values for each variable to better reflect its significance. Table 4 shows the results after the white-test is performed.

Another problem suffered by the regression models is multicollinearity when there is a linear relationship between the explanatory variables. The presence of this problem will produce a high standard error. This will reduce t-values towards insignificant level even though the R^2 is relatively high. To tackle this problem, the Variance Inflation Factor (VIF) is calculated to see if its value for each variable is greater than 10. Multicollinearity problem occurs when the VIF is greater than 10. The VIF value of more than 10 is found for the interaction terms and the multicollinearity problem is solved through estimating the interaction term models to obtain their residual and replace it into the model. After this treatment, all VIF values are between 1 and 8.2 as shown in Table 3.

Table 3: Multicollinearity Test

Variable	Value of VIF				
	Model 1	Model 2	Model 3	Model 5	Model 6
Years of schooling (SCH)	1.007	1.075	1.175		
Ability at workplace (ABLW)		1.323	1.331		
Ability at schooling (ABLS)		1.432	1.508		
Ability at schooling * Years of schooling (ABLSSCH)		1.200	1.213		1.026
Work experience (EXP)	7.857	7.886	8.123		
Father's years of schooling (SCHF)				2.234	
Mother's years of schooling (SCHM)				2.253	2.234
Family size (FS)				1.018	2.276
Gender dummy (GEN)			1.066		1.018
Job status dummy (FULL)			1.049		
Training attendance dummy (TRN)			1.078		
States dummy (STATE)			1.156		

Table 4 presents the final regression results after solving the heteroscedasticity and multicollinearity problems. The R^2 for models (1) model (2) and model (3) are 0.378, 0.381 and 0.470 which indicate that 37.8 percent, 38.1 percent and 47.0 percent of the variation in the dependent variables are explained by the independent variables, respectively. However, for model (5) and model (6) the independent variables can only explain 14.9 percent and 19.4 percent of the dependent variables respectively. The results for model 1 show that years of schooling and working experience affect wages positively and significantly. A year increase in schooling rises wages by about 12.6 percent⁴.

⁴ The percentage is obtained by taking the exponent of the coefficient value of years of schooling, i.e. $[\exp(0.119) - 1] \times 100$.

According to Psacharopoulos (1994), returns to investment in education decline by a country's per capita income. This implies that countries with lower per capita income, such as the less-developed countries and developing countries would generate higher returns to education since the increase in the private cost of education in these countries is slower than that of the social cost of education, while the increase in the private benefit of education is faster than that of the social benefit of education – a speculation that is supported by Todaro (1997). Since Malaysia is regarded as a developing country, higher returns to education is therefore justifiable.

In fact, the coefficient on years of schooling estimated for Malaysia in an international study done by Psacharopoulos and Patrinos (2004) using 1979 data was already 9.4 percent almost 40 years back. A recent international update carried out by Montenegro and Patrinos (2014) shows that the coefficient for Malaysia has been increased to 11.7 percent, 11.5 percent, 12.7 percent and 12 percent using 2007, 2008, 2009 and 2010 data, respectively. On the contrary, the coefficient on years of schooling estimated for developed countries like United Kingdom was 6.8 percent using 1987 data and 6.4 percent for Netherlands using 1994 data. The coefficient has only been increased to 10.8 percent, 11.8 percent, 11.4 percent and 9 percent for United Kingdom using 2007, 2008, 2009 and 2010 data, respectively, and increased to 8.9 percent, 9.2 percent, 9.3 percent and 9.5 percent for Netherlands in the respective years. In a nutshell, the coefficients on years of schooling for the developed countries are still lower than that for a developing country like Malaysia in the recent decade.

The 12.6 percent of the returns to education estimated in the present study is highly consistent with the returns estimated for Malaysia in comparison with other countries around the world. Moreover, our estimate for the returns to education is also similar to other empirical study conducted in Malaysia *per se*, such as Liew and Zulridah (2015) with the returns of 12.6 percent. The higher returns to education in Malaysia is due to the higher wage premium paid to workers with tertiary education as opposed to the lower cost of obtaining tertiary education following the provision of low-interest study loan by Malaysian government to almost all qualified Malaysian students pursuing their tertiary education in the public and private institutions. It follows that there is an incremental effect

of the returns to education in Malaysia for every subsequent level of education (Zainizam, Norasibah & Khoo, 2017), and it is higher for females than for males (Kenayathulla, 2013).

Meanwhile, a year increase in working experience rises wage by about 6.8 percent. The result is consistent with human capital theory and many past studies in Malaysia (see for example Zainizam, 2014). When years of schooling squared and workers' ability variables are included in model 2, return to schooling increases, but there is no affect from years of schooling squared and the effect of years of working experience does not change. The ability variables do not have any significant effect on wages.

Additional explanatory variables are added into the model 3, which includes gender, job status, training attended and states. Returns to schooling maintains its positive and significant effect but slightly lower. It is interesting to observe that in this model returns to schooling squared is significantly positive, which is against the theory. The human capital theory states that returns to schooling squared is negative due to diminishing returns on education, whereby the higher is the level of schooling, the higher will be the returns but the increase is at a decreasing rate and finally becomes negative. The contradictory result obtained from this study reflects that in Malaysian labour market higher level of education will not jeopardize wages but lowers returns. Workers still get rewarded from their higher level of education but at the decreasing rate. Male workers receive about 20.9 percent higher wage than the females and full time workers receive 52.9 percent higher wage than the part-time workers. Meanwhile, workers who ever attended training receives 12.5 percent higher wage than their colleague who do not attend any training and those who work in the developed states received 19.8 percent higher wage compared to those working in the less developed states.

The result for model (4) is just the first differential of model (3). In model (5), it is shown that mother's schooling, father's schooling and family size are positive and significant in affecting the marginal cost of human capital investment. But the impact is quite small. A one-year increase in schooling among fathers and schooling among mothers will increase schooling among children by 0.0005 year and 0.001 year, respectively. Also, a one-unit increase in family size will increase worker's schooling by 0.0005 year.

Model (6) presents the estimation results for the optimal years of schooling. This equation is derived from the equilibrium in human capital investment. Workers' ability during schooling plays a positive and significant role in determining optimal level of schooling. A one-point increase in worker's ability will increase years of schooling by 3.22 years. Father's education, mother's education and family size also positively and significantly determine the optimal level of schooling. The role of educational qualification among mothers is even greater than that of fathers, but all of these family background factors are significant only at 10 percent level. As shown in Table 3 a one-year increase in schooling among mothers will increase schooling among children by 0.096 but the effect from the schooling among fathers is 0.085. This study finds that the mean of optimal years of schooling in the Malaysian service sector is about 14 years or at diploma level.

Results from this study can determine if a worker in Malaysian service sector is over or under educated. Past studies compared workers' actual years of schooling with the level they perceive to be appropriate for their job to determine if there is any incidence of educational mismatch. This measure of educational matching is called the subjective method, which compares the respondents' actual educational attainment with the educational qualification self-perceived to be required in their jobs. In some other instances, respondents are also asked directly about the adequacy of the match between their educational qualifications and those required in their jobs. This method has been discussed in many studies in the past (see for example, Halaby, 1994; Hartog, 2000; Verhaest & Omey, 2006; Tsai, 2010; Kiersztyn, 2013). However, this approach may be biased because it is based on perception. In this analysis, optimal level of schooling is derived from the equilibrium condition in the human capital investment. Based on this finding, which is envisaged to be more accurate, the study shows that about 46.5 percent of respondents are overeducated and 28.2 percent are under educated. Only 17.4 percent respondents are having level of education that matches with their current jobs.

Table 4: Regression result

Variables	Wage model			r (4)	Estimated <i>i</i> (5)	Years of schooling model (6)
	1	2	3			
Constant	5.517*** (48.625)	5.597*** (40.076)	5.108*** (37.475)	0.103*** (13.187)	0.163*** (62.506)	9.884*** (16.756)
Years of schooling (SCH)	0.119*** (15.549)	0.120*** (15.280)	0.103*** (13.187)	0.0114** (5.53)		
Years of schooling squared (SCH ²)		0.003 (1.374)	0.0057* (2.765)			
Ability at schooling (ABLS)		-0.108 (-0.729)	0.038 (0.273)	-0.0112 (-0.296)		3.220*** (4.980)
Ability at schooling * Years of schooling (ABLSSCH)		-0.014 (-0.344)	-0.0112 (-0.296)			
Ability at workplace (ABLW)		-0.046 (-0.254)	-0.083 (-0.505)			
Work experience (EXP)	0.073*** (8.689)	0.073*** (8.631)	0.068*** (8.655)			
Work experience squared (EXP ²)	-0.001*** (-4.700)	- 0.001*** (-4.696)	-0.001*** (-4.971)			
Father's years of schooling (SCHF)					0.0005* (1.895)	0.085* (1.887)
Mother's years of schooling (SCHM)					0.001** (2.112)	0.096* (1.905)
Family size (FS)					0.0005* (1.818)	0.071* (1.825)
Gender dummy (GEN)			0.190*** (4.859)			
Job status dummy (FULL)			0.425*** (5.760)			
Training attendance dummy (TRN)			0.118*** (3.047)			
States dummy (STATE)			0.181*** (4.363)			
R ²	0.381	0.384	0.470		0.154	0.199
Adjusted R ²	0.378	0.377	0.461		0.149	0.1935
Number of Observation	611	611	611	611	568	568
Optimal Years of schooling						14.296
Breusch-Pagan test (Heteroscedasticity)	0.0077** [4.004]	0.0651** [1.913]	0.0239** [2.027]		0.5344 [0.730]	0.9076 [0.253]

Note: (t-statistic value), [f- statistic value]

*** Significant at 1% level of significance

** Significant at 5% level of significance

* Significant at 10% level of significance

5. Discussion and Conclusion

The paper examines the effect of workers' ability on wages and years of optimal level of schooling. Analysis also looks at the equilibrium level of human capital investment when the marginal returns to schooling is equal to marginal cost. Individuals and job characteristics are included in the wage model, while the family background is included in the years of schooling model. The results show that human capital variables like education, experience and training affect wage positively and significantly, which is in accordance with the human capital theory.

Workers' ability during schooling and at workplace do not affect wage significantly, which implies that the Malaysian service sector still relies on formal education in rewarding workers. While this finding seems to be inconsistent with some previous studies discussed earlier, it could be justifiable on the ground of higher returns to schooling found in the present study. Malaysia is a developing country that allocates greater amount of government spending on education each year to nurture knowledge-based workers, as a way of attracting foreign investors and to promote high-value production. As such, knowledge and skills obtained from the formal education and technical proficiency are much sought after in the labour market. While core skills and process skills competency can be nurtured through formal education at school, especially at the tertiary level, technical proficiency may not be directly nurtured through formal education, resulting in the incidence of skill mismatch and educational mismatch in Malaysia that impose much wage penalty on the affected workers (Zainizam, 2014; Zainizam et al., 2017).

Technical proficiency could be better nurtured through vocational education and workplace learning – an element that is absent and that falls out of the scope of the present study. In addition, all the nine ability dimensions considered in constructing the index of ability at schooling and index of ability at workplace are reflective of those abilities that could be obtained through formal education, but not those technical proficiency that could be obtained through vocational education and workplace learning. As such, the wage effect of ability may have been masked by the importance of years of schooling in the present study. Future study may consider incorporating technical skills obtained through vocational education and workplace learning as the measure of ability, as opposed to the set of ability used in the present study. Besides that, future study may

examine the wage effect of each separate dimension of ability used in the present study per se, as opposed to a combination of several ability dimensions used in the present study.

On the contrary, ability during schooling does affect optimal years of schooling significantly and the effect is quite substantial. Workers' and job characteristics do affect wages and the results are supportive of the hypothesis.

Parent's education affects optimal level of schooling, where educational attainment among fathers and mothers contribute positively towards years of schooling of their children. The family size also has a positive effect on years of schooling, indicating that the larger the family size is, the longer will be an individual's years of schooling. This could be due to the fact that larger family size reflects wealthier family status, which in turns supports for greater extent of investment in schooling. However, one should take such speculation with a grain of salt in the absence of family income as an intervening variable. This serves as the avenue for future research. A number of policy implications can be resulted from the outcome of this analysis. Based on the results, longer years of education and involvement in training are particularly needed to boost individual's wage. Education is also crucial for getting wage reward in the labour market since ability is not a significant determinant. However, individual's ability during schooling is important to guarantee longer years in schooling system. This can be improved through a better co-curriculum in school programmes and activities. There are some limitations of the study. Further study may include instrumental variable to capture other determinants of individual's wage.

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Workers' Remittances and Economic Growth in Palestine: Evidence from A Computable General Equilibrium Model

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While few people would differ on the economic benefits of remittances to recipients in home economies, the level to which remittances add to economic growth and development is another question. Workers' remittances are one of the largest sources of external financial flow to developing economies. This paper analyzes the impacts of workers' remittances on the Palestinian economy using a computable general equilibrium model. A simulation of workers' remittances increase is carried out using a 2015 Palestinian Social Accounting Matrix (SAM). The simulation results show that real GDP increases by 0.42 percent . The level of real private consumption increases by 4.95 percent . Import increases by 4.28 percent and export declines by 6.86 percent in real term. Net taxes increases by 2.29 percent , the trade deficit increases by 10.16 percent and absorption increases by 3.24 percent in real terms. In addition, the real exchange rate appreciated by 1.6 percent from the base line.

Keywords: Computable general equilibrium, remittances, Labor mobility, Palestine

JEL Classifications: C68, J61, J00, F16, F22

Introduction

Since the occupation of the West Bank and the Gaza Strip in 1967, vast numbers of Palestinian workers have looked for employment in Israeli labor market, due to the high rate of unemployment in Palestine and the enormous difference in wages between the two countries. Palestinian employment in Israel in the late 1980s accounted for one third of Palestinian labor force and contributed a quarter of Palestinian gross national income. PLO and Israel signed the Paris Protocol in 1994, leading to applying the Israeli trade policy on Palestine (customs union between the West Bank Gaza Strip and Israel). This, together with Israeli

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control of the borders, led to Palestinian economic dependence on the Israeli economy and policies. Workers' remittances from Israel are affected by the political environment. Political volatility led to a remarkable decrease in Palestinian labor flows to the Israeli labor market. The number of Palestinian workers in the Israeli labor market declined due to the restrictions on the movement of Palestinian labor imposed by Israel. The restricted entrance of Palestinian workers to the Israeli labor market is an enormous negative shock for the Palestinian economy. At present, Palestinians employed in the Israeli labor market amount to only 10% of the Palestinian labor force. Workers from Gaza Strip, which used to depend on the Israeli labor market to employ 40% of its labor force, were prohibited from working in Israel in 2006 (Palestine Economic Policy Research Institute , 2014).

Workers' remittances is defined as a transfer of money by a foreign worker to his home country. Workers' remittances are essential external source of financial inflows for most developing countries. In many developing countries, worker's remittances are a significant source of income for households, external capital and foreign exchange. The flow of remittances is the least affected by local economic decline and a steady source of income. Remittances have recognized as a source of development and contribute to poverty reduction in various developing economies as workers' remittances is a large source of funding, second to foreign direct investment, and more than foreign aid. Workers' remittances are an essential element of global capital flows, mainly to labor exporting countries. The World Bank (2017) estimates that officially registered remittances to developing countries totaled \$429 billion in 2016. Global remittances, which contain flows to high-income countries, totaled \$575 billion in 2016. Surges in worker remittance flows have significantly helped countries to minimize the problem result from lacks of foreign exchange reserve which is necessary to pay for import requirements (Guiliano and Ruiz-Arranz, 2009). The remittances have a welfare enhancing impact, mainly when they maintain consumption, education and human development, and poverty reduction. As a result, researcher and policy makers have given increasing attention to workers' remittances.

The biggest Palestinian export has been labor service primarily to Israel (see table 1). Due to the proximity of Israeli labor market for Palestinian

worker and the high rate of unemployment in Palestine has caused the Palestinian workers to look for employment in the Israeli labor market. Workers' remittance inflows to Palestine are an important source of foreign exchange. Workers' remittances from Israel represent the most of workers' remittance inflows which is remitted to the Palestinian economy. In 2016, workers' remittance inflows amounted to US \$1.57 billion (see table 1). On average, workers' remittances are almost equal to exports and more than twice the value of foreign aid. This study investigates empirically the impact of increasing workers' remittance inflows by 30 percent on macroeconomic variables such as: private consumption, export, imports, and GDP growth. To quantify the impact of increasing workers' remittance inflows on the Palestinian Economy, we constructed a general equilibrium model that captures the economic conditions and characteristics of the Palestinian economy, and we constructed a 2015 social accounting matrix for Palestine. The study focuses on the impacts of 30 percent increase in workers' remittance inflows as relative to the baseline, which could happen due to the Palestinian reconciliation agreement that may allow to worker from Gaza Strip, to participate in the Israeli labor market.

Palestinian Labor Force

The population growth rate in Palestine is 2.9 percent. The Palestinian population grew to 4.8 million in 2016 (2.9 in the West Bank and about 1.9 in Gaza Strip). The participation rate for the Palestinian labor market is reasonably low related to global and regional rates. This is due to low female participation rate 19.3 percent , while, male participation is 71.6 percent in 2016. Despite the low participation rate, the Palestinian labor market is incapable to create the needed jobs. In 2016, there were 42 thousand new entrants to the labor market, which is far more than the new jobs generated during the same period (17 thousand), of which five thousand offered for the West Bank workers, however, the bulk of them are in Israel and the settlements not in the local economy. In Gaza 12 thousand new jobs were available, as workers in Gaza have been prohibited from working in Israel since 2006. The Palestinian labor force increased to 1341 thousand, of which 360 thousand unemployed in 2016. Subsequently, the unemployment rate increased in Palestine to 26.9 percent in 2016. In the West Bank, the unemployment rate increased to 18.2 percent whereas the unemployment rate increased in Gaza Strip to 41.7 percent in 2016 (Palestine Monetary Authority , 2017).

The high rate of unemployment and the big difference in wages between the Israeli and Palestinian economies have caused the Palestinian workers to look for employment in the Israeli labor market since the Israeli occupation of the West Bank and Gaza Strip in 1967. The number of Palestinian workers has varied in relationship to the Israeli restrictions over the years. In the 1970s and 1980s, third of the Palestinian labor force employed in Israel. However, as the closure regime in the 1990s was intensified the number of Palestinian workers who were allowed to work in Israel dropped significantly. After, the second Intifada in 2000, rate of Palestinian worker has severely declined because of Israeli closure and barriers that made against Palestinian workers. In 2006, Palestinian workers from Gaza were banned from employment in the Israeli labor market, and only the West Bank worker have been allowed employment in the Israeli labor market. The number of Palestinian workers in Israel has been increasing since 2006. At the end of 2016, about 117 thousand Palestinians from the West Bank were working in the Israeli labor market. Remittances of Palestinian workers in Israel consist of more than 90 percent of the remittances of workers' compensation (Palestine Economic Policy Research Institute, 2014; Palestine Monetary Authority, 2017).

Table 1: Palestine: Labor Market Indicators and the Balance of Payment

	2011	2012	2013	2014	2015	2016
Population (thousand)						
Palestine	4,169	4293	4,421	4,550	4,682	4,816
West Bank	2,580	2,649	2,719	2,790	2,862	2,935
Gaza Strip	1,589	1,644	1,702	1,760	1,820	1881
Labor Force (thousand)						
Palestine	1,059	1114	1155	1255	1299	1341
West Bank	718	743	759	811	828	845
Gaza Strip	341	371	396	444	471	496
Unemployment: Percent of Labor Force						
Palestine	20.9	23.0	23.4	26.9	25.9	26.9
West Bank	17.3	19.0	18.6	17.7	17.3	18.2
Gaza Strip	28.7	31.0	32.6	43.9	41.1	41.7

Distribution of Palestinian workers (thousand)						
Total workers	837	858	885	917	963	980
Workers in Israel	84	83	99	107	113	117
Workers in Palestine	753	775	786	810	850	873
West Bank	510	519	519	561	572	574
Gaza Strip	243	256	267	249	278	289
Palestine: balance of payments: Current Account (USD Million)						
Current Account (Net)	-	-	-	-	-	-1348.0
	2,069.5	1,820.8	2,383.4	2,149.0	2066.0	
Goods (Net)	-	-	-	-	-	-4282.1
	3,779.3	4,135.6	4,682.7	4,830.2	4300.5	
Exports (Fob)	1,053.0	1,135.3	1,133.7	1,383.6	1756.7	1827.4
Imports (Fob)	4,832.3	5,270.9	5,816.4	6,213.8	6057.2	6109.5
Services (Net)	-144.5	-293.1	-49.5	-206.5	-899.1	-888.4
Exports	746.5	735.8	938.1	788.6	581.4	604.8
Imports	891.0	1,028.9	987.6	995.1	1480.5	1493.2
Income (Net)	749.5	857.4	1,160.3	1,482.4	1712.2	1578.6
Receipts	843.6	941.3	1,263.8	1,618.4	1803.0	1716.7
Compensation of employees	736.5	822.9	1,140.5	1,449.4	1663.9	1579.9
Of which from Israel	662.8	762.8	1,079.8	1,435.3	1650.7	1527.7
Investment Income	107.1	118.4	123.3	169.0	139.1	136.8
Payments	94.1	83.9	103.5	136.0	90.8	138.1
Current Transfers (Net)	1,104.8	1,750.5	1,188.5	1,405.3	1421.8	2243.9
Inflows	1,668.9	2,331.5	1,862.9	2,013.2	1875.4	2702.6
To Public Sector	709.1	643.3	735.4	614.6	487.3	564.6
To Private Sector	959.8	1,688.2	1,127.5	1,398.6	1388.1	2138.0
Outflows	564.1	581.0	674.4	607.9	454.0	458.7

Source: Palestine Monetary Authority 2016, 2017

Theoretical Framework

The inquiry of whether workers' remittances inflows promote economic development can be explained theoretically and empirically. Thus, whether worker remittances stimulate economic growth is a very important subject for consideration between economists. Some economists (structuralists) believe that remittances impact economic growth negatively. The negative effect of the remittances on the economic

growth is due to not utilizing the remittances in the productive investment, but utilizing the remittances for the consumption. Therefore the remittances are considered as a substitution for labor income; the remittances recipient increase leisure times and thus impact the economic activity negatively by reducing the motivation to work, which results in smaller labor force participation and economic growth. In addition the negative effect of the remittances on the economic growth is due to the exchange rate appreciation which leads to resource reallocation between tradable and untradeable goods and services (Dutch disease). The exchange rate appreciation reduces the competitiveness of the economy and consequently reduces the export and increase the import (Acosta et al., 2009; Lopez et al., 2007; Stahl and Arnold 1986). On the other hand, various economists (the neo-classical) maintain that there is a positive impact of remittances on output growth and economic development. Those who believe in the positive impact of worker remittances emphasis on the multiplier effects of expenditure; the remittances may impact the economic growth positively by improving the capital accumulation and by enhancing the development of financial sector. Also, Households benefit from workers' remittances by spending in human capital and education, and productive investment that would not have happen otherwise. Workers' remittances inflows impending growth feature is the task of remittances in eliminating poverty and decreasing income inequality. Moreover, remittances may have positive effect on the economic growth by expanding the aggregate demand; however this might increase the import. In addition, the utilization of remittances as source of foreign exchange and as a substitute to debt which improve individuals' credit limitations (Aggarwal et al. 2011; Elbadawy and Roushdy 2010; Guilamo and Ruiz-Arranz 2009).

Various theories have illuminated the impact of remittances on economic growth and development. Between these are the neo-classical, the structuralist and the pluralist theories. The Neo-Classical theory appeared in the 1950s and 1960s with the assumption that the developing economies would be able to improve their developmental progression due to capital transfer and industrialization. It argues that the transfer of investment capital will assist development through the inflow of capital (remittances) which could boost productivity and incomes. From this viewpoint, remittances are considered vital since they lead to change in household incomes, raise investments and innovations. In differ to the

neo-classical theory, the structuralist theory believe that migration and remittances produce underdevelopment in migrants' economies. This opinion appeared in the 1970s and the 1980s. It holds that remittances make receiving economies dependent on the sending countries as well as making receivers of remittances dependent on the donors. The structuralist theory argues that migration depletes the human capacities of economies, and it leads to passive development and create economies that are remittance dependent rather than enhancing economic growth. The Pluralist theory emerged in the 1980s and 1990s in reaction to the neo-classical and the structuralist theories. The pluralist theory connects the neo-classical and the structuralist theories. It claims that remittances have both positive and negative effects. According to the pluralist theory, migration performs an important role in the economy by making capital available through remittances. Therefore, remittances impact economic growth positively if remittances are used for productive activities and negatively if remittances are used for consumptions (De Haas, 2009; De Haas, 2010).

Literature Review

Empirically, remittances have a growth enhancing and a poverty alleviation potential in some economies. For instance, Kato and Dadson (2016) analyzed the impact of remittances and the brain drain on the Ghanaian economy. By using computable general equilibrium (CGE) framework, the study found that the effect of remittances have reduced poverty and developed the Ghanaian economy; however, they also caused income inequality. The impact of the brain drain was negative to both poverty reduction and income inequality in Ghana. Salahuddin and Gow (2015) examined the relations between remittances and economic growth in Bangladesh, India, Pakistan and the Philippines, 1977- 2012. They found a positive relationship between remittances and economic growth in the long run. Elseoud (2014) verified the existence of relationship between workers' remittances and macroeconomic variables in the Egyptian during the period 1991-2011. He found causality between output growth and workers' remittances. Palestine Economic Policy Research Institute (2014) examined the development of personal remittance inflows to the Palestinian economy during the period 1995-2013. It used a Keynesian-type econometric model to study the impact of remittances on macroeconomic activities. It found that remittance inflows to the Palestinian economy significantly impacted the macroeconomic

variables considered in the study and markedly contributed to the economic growth in the period 1995-2013. Barai (2012) found that remittances are mainly used for consumption as a means to overcome poverty in Bangladesh. Azam and Khan (2011) examined the impacts of workers' remittances on economic growth of Azerbaijan and Armenia's economies. They used simple log linear regression model. They found that worker remittances are significant and have positive impacts on economic growth and development in Azerbaijan and Armenia. Aggarwal et al. (2011) studied 99 economies over the period 1975-2003 and they found that remittances have a positive influence on bank deposits and credit to GDP, and therefore on economic growth. Lin (2011) examined the determinants of remittances in Tonga from 1994 to 2009; he found that the remittances decrease with the appreciation of Tongan currency however has positive relationship with the growth of real GDP and rate of unemployment in the host countries. Flaig et al. (2011) estimated the impacts for both the Israel and Palestine economies from lifting movement restrictions between Israel and the West Bank. They used a single country CGE model, and a 2004 Social Accounting Matrix (SAM) of Israel to simulate the impacts of different Israeli labor policy regimes. They found positive welfare impacts for the Israel and Palestine economies, when removing the movement restrictions and increasing Palestinian employment in Israel. Fayissa and Nsiah (2010) examined the impact of remittances on the economic growth of 18 Latin American economies for the period from 1980 to 2005. They found a positive and significant impact of remittances on the growth of Latin American economies. Raihan (2010) examined the impact of global financial crisis on remittances using Computable General Equilibrium (CGE) simulation approach. He found that the decline in remittances was 20 percent during the financial crisis according to simulated results. He evaluated that the negative shock in remittances will decrease GDP by 0.1 percent. Gupta et al. (2009) evaluated the impact of remittances in Sub-Saharan Africa within the context of financial development and poverty alleviation and found that remittances have a direct poverty alleviation impact and the potential to support financial development. Atamanov et al. (2009) analyzed the income impacts of remittances in selected CIS economies. The study is based on computable general equilibrium (CGE) models for Moldova, Ukraine, Georgia, Kyrgyzstan, and Russia. They found that all net emigration economies would experience a big reduction of private consumption in the absence of remittances. They concluded that the

remittances had important contribution of to stabilizing and sustaining incomes in many CIS economies. Giuliano and Ruiz-Arranz (2009) investigated the relationship between remittances and growth for 100 economies and found that remittances can improve growth in economies with a less developed financial system by providing a different method to finance investment and assist in reducing liquidity constraints. Qayum et al. (2008) examined effect of remittances on economic growth and poverty in Pakistan from 1973 to 2007. They found that remittances have positive and significant relationship with economic growth and reduce of poverty in Pakistan. Acosta (2008) evaluated ten economies in Latin America and the Caribbean and found that remittances enhance growth and decrease inequality and poverty. Jones and Skeldon (2007) examined the impact of remittances on Tajikistan development. They found that remittances have been taking a task of a shock absorber that has been reducing socioeconomic difficulties in Tajikistan. On the contrary, some studies found that remittances have a negative or no impact on growth. For instance, Jouini (2015) examined the relations between remittances and economic growth in Tunisia, between 1970 and 2010. He found that remittances had no impact on the economic growth.

Djiofack et al. (2013) analyzed the impact of remittances and the brain drain on the Cameroonian economy. They found using a CGE model that the negative effect of the brain drain would surpass the positive effect of remittances on income. They determined that the overall effect of migration on poverty reduction is negative in Cameroon even though the positive effect of remittances is taken into account. Giritli and Ugural (2013) analyzed the impact of unskilled labor remittances using Computable General Equilibrium (CGE) simulation approach in North Cyprus. They found that despite the positive impact on the demand side, the supply side of the economy is deteriorated and output declined. Bhaskara and Takirua (2010) studied the possible sources of growth in a small island economy of Kiribati. They found that remittances have a negative impact on economic growth. Barajas et al. (2009) estimated the effect of remittances on economic growth using a panel data on 84 economies during 1970-2004. They found that no effect of remittances on economic growth. Freund and Spatafora (2005) found that there is no direct connection between per capita output growth and remittances. Chami et al. (2003) considered the task of remittances in economic growth. They found that remittances have a negative impact on economic growth due to the moral hazard problem in remittances.

Astrup and Dessus (2005) used a general equilibrium model to evaluate the impact of restricted access to the Israeli labor market on the Palestinian export and on GDP growth. They found that exporting large flows of Palestinian workers to Israel inclines to reduce the ability of the Palestinian industry to export goods.

Methodology and Data

Computable general equilibrium (CGE) methodology is a strong methodological instrument for examining the impacts across multiple markets of modifications in policy variables or exogenous shocks. The CGE presents an economy-wide structure for policy analysis to evaluate variety of policy issues. Computable general equilibrium modeling uses general equilibrium theory as an instrument for evaluating empirically resource allocation in market economies (Shoven and Whalley, 1984). The computable general equilibrium model that we use is neoclassical. Consumers demand commodities and supply their endowments to maximize their utility, subject to their endowments. Producers demand inputs and supply outputs to maximize their profits, subject to production technologies (Dervis et al., 1982). The computable general equilibrium structure presents a theoretical quantification that brings together the general equilibrium arrangement structured by Arrow and Debreu (1954) with real economic data presented by a social accounting matrix. A social accounting matrix is a comprehensive, economy wide data framework, which represent the economy of a country. It details the economy-wide circular flow of incomes and payments in the economy and represents the structure, internal and external links of the economy. A social accounting matrix is a square matrix in which each account is represented by a row and a column. The elements of the matrix represent the payment from the account of a column to the account of a row. The incomes are placed in the row accounts and expenditures in the column accounts, the total of rows and columns must be equal. The sources of data for the social accounting matrix are an input-output matrix, national income accounts, household income, and expenditure statistics (King, 1985; Roland-Holst, 2008; Eltalla, 2017). The standard CGE model is written as a set of simultaneous equations. It explains all of the payments recorded in the social accounting matrix. The model follows the social accounting matrix disaggregation of factors, activities, commodities, and institutions. To carry out the CGE analysis, a Palestinian CGE model and a 2015 social

accounting matrix for Palestine have constructed. The model is based on the standard model used by the International Food Policy Research Institute (IFPRI). Lofgren et al. (2002) has a complete description of the IFPRI's standard model. The 2015 social accounting matrix is used as the initial data for the calibration of the Palestinian CGEmodel.

Transfer in the Model: Institutions Block

Equation (1) describes the total income of each factor. In equation (2), this income is divided between domestic institutions in fixed shares after payment of direct factor taxes and transfers to the rest of the world. Transfers to the rest of the world are fixed in foreign currency and transformed into domestic currency by multiplying by the exchange rate. This equation presents reference to the set of domestic institutions (households and the government), a subset of the set of institutions, which also contains the rest of the world. The total income of any domestic nongovernment institution is the sum of factor incomes (describes in equation 2), transfers from other domestic nongovernment institutions (describes in equation 3), transfers from the government (indexed to the CPI), and transfers from the rest of the world.

$YF_f = \sum_{a \in A} WF_f \cdot \overline{WFDIST}_{fa} \cdot QF_{fa}$			Equation 1
income of factor f	=	sum of activity payments (activity-specific wages times employment levels)	

$YIF_{if} = shif_{if} \cdot [YF_f - trnsfr_{rowf} \cdot EXR]$					Equation 2
income of institution i from factor f	=	share of income of factor f to institution i	*	income of factor f (net of tax and transfer to RoW)	

$YI_i = \sum_{f \in F} YIF_{if} + \sum_{i' \in INSDNG} TRII_{ii'} + trnsfr_{igov} \cdot \overline{CPI} + trnsfr_{irow} \cdot EXR$						Equation 3		
income of institution i	=	Factor income	+	Transfers from other domestic non government institutions	+	transfers from government	+	transfers from Rest of the World

Where, Y_f is income of factor f , $i \in \text{INS}$ is a set of institutions (domestic and rest of the world), Y_i is income to domestic institution i from factor f , sh_i is share of domestic institution i in income of factor f , t_f is direct tax rate for factor f , tr_{fi} is transfer from factor f to institution i , Y_i is income of institution i (in the set INSDNG), and TR_{ii} is transfers from institution i to i (both in the set INSDNG).

The current account balance, which is articulated in foreign currency, requires equality between the nation's spending and its revenues of foreign exchange.

$\sum_c p_{wm} \cdot QM + \sum_f \text{transfr}_{row,f} = \sum_c p_{we} \cdot QE + \sum_f \text{transfr}_{i,row} + \text{FSVA}$								
Equation 4								
import spending	+	Factor transfers to Rest of theWorld	=	export revenue	+	institutional transfers from Rest of the World	+	foreign savings

Where: FSAV is foreign savings, QM is quantity of imports, QE is quantity of exports, p_{wm} is import price (foreign currency), p_{we} is export price, $\text{transfr}_{row,f}$ is factor transfer to the world and $\text{transfr}_{i,row}$ is institutional transfers from the world (Lofgren et al., 2002).

Simulation and Empirical Results

We simulate the impact of a 30 percent increase in worker' remittances, which could come due to the Palestinian reconciliation agreement that may remove the restrictions on the worker from Gaza from entering the Israeli labor market. A simulation in a CGE model that alters the level of worker' remittances impact prices and quantities in all markets, in a way consistent with economic theory. The simulation generates estimation of the impact on different economic factors, such as exports and imports, prices, GDP; and economic welfare. We used the General Algebraic Modeling System (GAMS) to perform the simulation. Table 2 shows the effects on selected variables of the Palestinian economy for a 30 percent increase in worker' remittances. The base-year (benchmark) values correspond to the values found in the Palestinian social accounting matrix. The simulation results show that real GDP increases by 0.42 percent. The level of real private consumption increases by 4.95 percent. Import increases by 4.28 percent and export decline by 6.86 percent in

real term. Net taxes increases by 2.29 percent, as a percentage of GDP the trade deficit increases by 10.16 percent (Table 3). The shock can considerably change the real exchange rates, which in turn affect the trade balance. Real exchange rate appreciated by 1.6 percent from the base line. In addition, absorption increases by 3.24 percent in real terms.

Table 2: Effects of a 30 percent increase in worker' remittances

	millions USD		% Change	As percent of GDP	
	Base line	Change		Base line	Change
Absorption	10847.159	11198.609	3.24	140.76	144.72
Private consumption	7099.800	7451.250	4.95	92.13	96.29
Gov. consumption	2090.400	2090.400	-	27.13	27.01
Investment	1656.959	1656.959	-	21.50	21.41
Exports	1660.900	1546.911	-6.86	21.55	19.99
Imports	4801.900	5007.163	4.28	62.31	-64.71
Net Taxes	1501.052	1531.125	2.29	19.48	19.79
GDP	7706.159	7738.357	0.42	100.00	100.00
GDP at factors cost	6205.107	6209.251	-	80.52	80.24
Trade Deficit	3141.000	3460.252	10.16	40.76	44.71

Source: Authors' calculations.

Table 3: The Macro 2015 Social Accounting Matrix of Palestine

	1	2	3	4	5	6	7	8	Total
Activities-1		13522.8							13522.8
Commodities-2	7064.6	3129.1		7099.8	2090.4	1657		1660.9	22701.8
Factors-3	6205.1								6205.11
Households-4			6205.1		484.77			1064.2	7684.62
Government-5							1939.4	732.07	2699.66
Saving-Invest-6				146.47	124.48			1344.8	1656.96
Taxes-7	253.1	1247.96		438.35					1939.41
ROW-8		4801.9							4801.9
Total	13523	22701.8	6205.1	7684.6	2699.7	1657	1939.4	4801.9	

Source: Authors' calculations.

Conclusion

The economic and socioeconomic result of worker' remittance inflows in an economy depend on political and economic institutions, and culture; the degree of the moral hazard problem and consumption is impacted by culture. This paper quantified the impacts of a 30 percent increase in worker' remittances in the Palestinian economy by using a computable general equilibrium model. The simulation results show that real GDP increases by 0.42 percent. The level of real private consumption increases by 4.95 percent. Import increases by 4.28 percent and export declines by 6.86 percent in real term. The trade deficit increases by 10.16 percent. The Real exchange rate appreciated by 1.6 percent from the base line. The empirical results of the study shows the existence of small positive relationship between worker' remittances and economic growth (RGDP increases by 0.42 percent). However, private consumption increases by 4.95 percent. Imports increase by 4.28 percent and exports decline by 6.86 percent in real term. The implication from these results is that worker' remittances is an important tool for poverty alleviation and not a significant instrument for economic growth in Palestine. This is due to majority of worker' remittances come from unskilled Palestinian workers in Israel, where most of their incomes go to the consumption of goods and services. The majority of these goods come as imports from Israel (Imports increase by 4.28 percent). Thus, a major share of Palestinian worker' remittances in Israel spends on imported Israeli goods (the Palestinian economy on a path of dependence in which increased expenditure, leads to increase the imports from Israel). Therefore, there is a trade of the Palestinian export labor services to Israel and Israel export goods and services to Palestine. The small impact of the worker' remittance on the economic growth is due to utilizing the remittances for the consumption not for the productive investment. In addition the effect of the remittances on the economic growth is due to the exchange rate appreciation, which leads to resource reallocation between tradable and non-tradeable goods and services (Dutch disease). The exchange rate appreciation reduces the competitiveness of the economy and consequently reduces the export and increase the import.

Our results have several policy implications. Workers' remittances from Israel are impacted by the political environment. The Palestinian policy makers should put more importance on the worker' remittances as a

instrument which the government can use to solve various economic problems, influence the performance of the economy and boost the economic growth. For this purpose, there is a need to implement policies that may increase the efficiency of worker' remittances and improve productivity which in turn influences positively the economic growth. Policy makers should implement policies that support Palestinian worker' remittances and the growth creating capacity of these remittances. These policies should encourage investment and capital accumulation rather than consumption. Otherwise, the policy makers should look at the question of whether an alternative strategy to exporting labor services is feasible and give similar income prospects. For instance, energizing the Palestinian manufacturing sector by implementing a strategy of structural transformation, that begins with an import substitution through support of production phase, followed by an export promotion phase. The export promotion phase include global marketing support, reliable policies helpful in maintain prices stability and competitiveness, and subsidies to research and development.

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Macroeconomic Factors and Equity Market of Pakistan: Evidence from Bound Testing Technique

Zobia Israr Ahmed¹ and Khalid Mustafa²

This essay appraised an influence of macroeconomic variables on stock market returns using monthly time-series data from November 1993 to December 2016 for Pakistan. Macroeconomic variables are represented by the exchange rate change, inflation rate, interest rate, industrial production growth, and the crude oil price. The ARDL bound testing approach to cointegration associating with Granger causality was conducted to reveal such relationship. This study displayed single bidirectional causativeness in stock returns and exchange rate changes, while inflation and interest rate Granger-caused stock market returns. Main findings revealed that variables are cointegrated and evident that industrial production and interest rate are negative determinants of stock returns in the long run. Yet the findings in short-term clearly support that all the macroeconomic indicators in the model drive stock market return. Moreover, the error correction coefficient suggested a very high magnitude of convergence headed for the long run equilibrium after experiencing shocks in a month. As observed, the stock market is mainly fluctuated by its own influences and the downfall situations that exist in Pakistan since 1998 to 2000 and 2008 to 2013 owing to internal and external administrative and economic unrest happened during the period. This analysis can facilitate investors for making optimal decisions regarding their business investments. Furthermore, this study would provide eloquent insights in the body of literature, policy makers as well as the practitioners.

Keywords: Stock Market; Macroeconomics; Causality; ARDL; Bound Testing Approach

I. Introduction

The stock market in developed economies is a major channel of financial resources from surplus elements to deficit elements. This transfer of funds

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is mutually advantageous to both groups. The recipients (publicly owned entities) of these funds are enabled to employ them in profitable investments, while the surplus elements (households) shared in the future profits of these firms (Khilji; 1993). On the other hand, smaller markets (particularly developing countries) have still not received that much attention. This is probably owing to the fact that these markets more often lack the profundity, regulatory framework, consistency in macroeconomic factors and structural precautions that characterize capital markets in developed economies. Trading in stock markets of developing countries is generally thin and inconsistent thus lack continuous and systematic nature of price movements. There is no controversy that unanticipated changes in macroeconomic environments generally effect on stock returns, hence less agreement is noticed in the context of a relationship in macroeconomic variables and equity market performance. Recently the augmenting prominence of equity markets in the world has unveiled a new direction of research. Therefore the perpetual deliberations in economics are whether financial progression instigates economics growth or it is the repercussion of increased economic endeavor (Nishat and Shaheen; 2004).

The previous studies attributed mixed and contrasting empirical results by applying different statistical methods. With a view to circumvent the “omitted variable” problem as the regression models were mostly based on two variables yet, there was need of other macroeconomic variables in the model. The major concern of investors for managing their portfolios is to make a choice regarding stocks available in the equity market while considering the performance of macroeconomic factors causing substantial influence on future returns. Many experiential studies divulge that influence of macroeconomic indicators on stock prices do not properly identify by the asset pricing theories [Fama (1981), Chen, et al. (1986) and Maysami and Koh (2000)]. Generally, these researches employ Eagle and Granger (1987) technique or Johanson and Jusilieus (1990, 1991) system in Vector Autoregressive (VAR) context. Similarly, Fazal (2006) and Nishat (2001) used Johanson and Jusilieus (1990, 1991) method for analyzing the connection amongst stock prices and macroeconomic indicators in Pakistan.

After an extensive appraisal of the literature on the upshot of macroeconomic factors on stock return, the study opted to embrace other pertinent economic indicators for instance; inflation, interest rate,

industrial production growth rate and crude oil prices beside exchange rate changes for robust tests. The present study examined that relationship in the context of Pakistan by performing an Auto Regressive Distributive Lag (ARDL) bounds testing approach intended by Pesaran, Shin, and Smith (1996, 2001). This technique extensively used for evaluating the consequence of macroeconomic indicators on economic growth, though underperformed in relation to the capital market filament of literature. This technique is more favorable to the other methods. Primarily, the order of integration is not an essential requirement for this approach as the estimates of long-run coefficients are consistent. Moreover, ARDL approach investigated an accurate dynamic structure whereas other econometric methods not evidently distinguished between short-run and long-run relations.

This paper studies the data covering the timeframe since the 1990s to date, which embraces several turbulent events encompassing Asian and global financial crisis, continuing financial liberalization in the region, the imposition of economic sanctions on account of nuclear tests, political unrests, and devaluation in currency value etc. Therefore an improved understanding and the evaluation of pertinent stock returns to the profound influence of macroeconomic factors is the aim of this research. The residual part of this paper is followed as; Section II and III endow with Pakistan stock market overview and the literature review. Section IV covers the sources of data and model specification. Section V describes methodology and techniques of analysis. Empirical results are discussed in section VI, while the summary and conclusion are contained in section VII.

II. An overview of Stock Market of Pakistan

In the developing Asian countries, Pakistani stock market is considered as an embryonic market due to its superficiality, asymmetrical trading behavior, information deficiency and high volatility in nature. Further markets cannot ignore the presence of insiders and market makers.

Stock exchange of Pakistan formerly named as Karachi stock exchange (KSE) established in September 1947 and became functional in 1949 with five companies and total paid up capital of Rs. 37 million, which then reached to Rs. 117 million with 15 companies in 1950. Trading in KSE started with 50 shares index, which improved to 100 shares indexes in

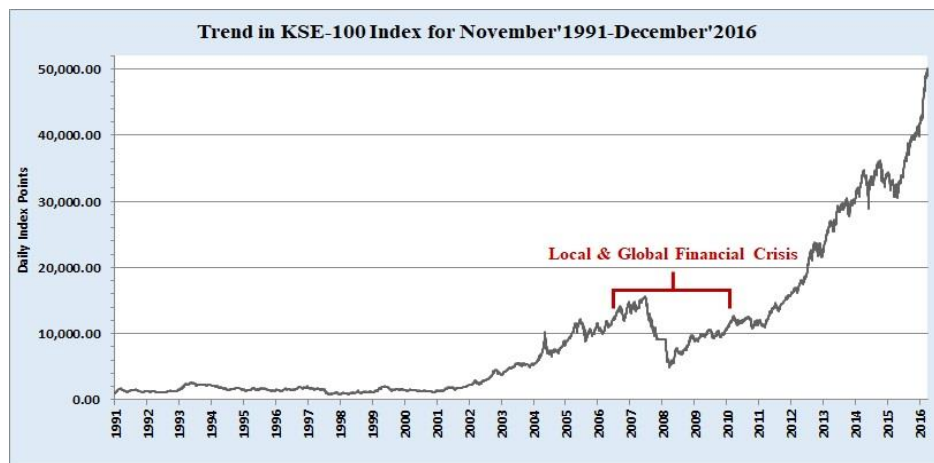
1990. KSE rapidly grew after ten years' time when the listed companies reached to 81 with the market capitalization of Rs. 1.9 million in 1960, which was five times greater than 1950. The stock market spotted growth in the early 1990's on account of the huge progress mainly includes; the financial liberalization due to increase in foreign portfolio investment, and the massive privatization process hence introducing new portfolios in the market. In 1998 the capital market crashed viciously and touched the lowest ebb in July 1998. The number of factors were responsible for this sharp decline included: contagion effects of South East Asian financial debacle, global recession, crash of stock markets of some leading economies, economic sanctions imposition on account of nuclear trials in May 1998, and other local factors such as, withdrawal of many institutional foreign and law and order situation. After touching the lowest position the capital market displayed some modest recovery. In the smooth continuation of that rising flow level in 2000's, the economy observed a consistent and gradual increase in productivity. The KSE introduced in 2002 a computerized trading system, i.e. KATS (Karachi Automated Trading System) with one million trades per day volume for the provision of the transparent and cost-efficient marketplace for stockholders.

The market followed a descending inclination and became extremely volatile during the fiscal year 2008 and 2009. Major macroeconomic factors showed least satisfactory execution owing to frequent deviations in the political environment and global financial crisis. The financial year 2007-08 instigated with the incident of Red Mosque, subsequently the reinstatement of Chief Justice of Pakistan. The presidential election proclamation and subsequently Mr. Musharraf re-appointed in October 2007 responded positively to the stock market. The market reaction to the bomb blasts incident during reception pageant of Ms. Benazir Bhutto on October 18, 2007. A single day biggest collapse in the market recorded on November 5, 2007, as a result, an emergency act executed in the country. Suspension of Pakistan from the Commonwealth and Moody's downgraded the country's position from steady to negative which headed to a sharp decline in stock prices. Karachi stock market, woe on the shooting of Benazir Bhutto, witnessed the all-time biggest crash.

From 2009 onwards, market started experiencing bullish trends by following several steps towards recovery. After two decades of reforms in August 2012, KSE reported a total of 591 listed companies with the

total market capitalization of Rs. 3755 billion. During this period capital markets in Pakistan have been through several embellishments, counting; announcement of new Securities Act, 2015, demutualization of exchanges and amalgamation of three indigenous stock exchanges into a one integrated stock exchange, named Pakistan Stock Exchange (PSX). A significant and smooth rise in the stock market indices was recognized in the year 2016 due to an induction of investment projects backed by CPEC.

Figure 1:



Source: State Bank of Pakistan

III. Literature Review

In the recent years, a research trend shifted more towards an application of advanced econometric techniques and ease of access to data. This led an extensive discussion on the subject of stock market progress in the developed and now more in emerging economies. The outcomes of ample econometric research explained variable conclusions for correlation holding in development of the stock market and different sets of macroeconomic variables of an economy. The impact of these variables was noticed either individually or collectively. In the initial studies, Fama (1981) inspected an effect of variable factors on stock prices and found strong positive correlation between them. Similarly, Levine and Zevos (1988), Levine (1991), and Levine and Zervos (1995, 1996 and 1998) reported positive correlation in the performance of the stock market and economic growth mainly in evolving economies. Hitherto various studies concentrated on the relationship using only two variables, whereas limited

studies explored an influence on capital market by multiple economic variables. The research study of Aggarwal (1981) advocated that variations in exchange rates result positive changes in stock prices. Focusing on emergent economies, Abdalla and Murinde (1997) observed unidirectional causations in Korea, Pakistan, and India from exchange rates to stock prices; though in Philippines causal effect was in the reversed direction. Rafay et al. (2014) also observed one-way link in exchange rate and KSE 100 index. In most findings, it was observed that when currency appreciated it led to increases stock prices or vice versa. In few researches association in stock prices and interest rates has also been empirically analyzed for the period of time. Mukherjee and Naka (1995) disclosed that there is a negative correlation between interest rates and equity market returns by employing VECM model.

Consistent with Fisher's Hypothesis (Fisher, 1930), most of the studies have concluded either positive or negative impact of inflation on stocks subject to the aptitude to hedge by investors and the application of pecuniary policies. However, strong positive causation in stock returns exhibited by unexpected inflation during financial shrinkages in the economic cycle, indicating larger instability in stock movements explained by rise in price indices. In India Chatrath et al. (1997) noticed negative relation between inflation and stock returns. Hasan and Javeed (2009) explored similar results for Pakistan. However, positive relationship between these variables was spotted in Ratanapakorn and Sharma (2007). Moreover, industrial production explained mainly a positive relation with stock market returns (Nishat and Shaheen; 2004 and Sohail and Hussain; 2009). Correspondingly, numbers of economic and financial findings are presently available endorsing the significant association amid crude oil prices and equity returns, Pinho and Madaleno (2016). Shahzadi and Chohan (2011) concluded an inverse relationship amidst Karachi stock returns, crude oil, and gold prices. However, on the contrary to this, other studies found a direct relation between equity returns and oil prices as well Pönkä (2016).

In the current studies, more vigorous procedures were used to provide a better evaluation of the consequence of an assortment of macroeconomic variables on equity prices. In pursuit of appraising growth of equity market in Pakistan, Nishat and Shaheen (2004) revealed that macroeconomic variables influence on stock price movements by scrutinizing long-term connection amid such indicators for Pakistan.

Similarly, Ali and Ahmed (2008); and, Sohail and Hussain (2009) explored an association between economic growth indicators and KSE index of Pakistan in the long-term. The result for Mohammad et al (2009) displayed significant stimulation of foreign exchange reserve, foreign exchange rate, interest rate and money supply (M2) with stock prices. Few studies explained insignificant outcomes of macroeconomic components on share markets, include; gay (2008) proved inefficiency in stock market while examining the given relationship for India, Russia, Brazil, and China.

This relationship has been observed in various empirical studies in the framework of ARDL bound testing cointegration. In the same ground, Akbar et al. (2012) found short-term positive cointegration of stock prices with interest rates and negative relation with inflation and foreign exchange reserves. Kaleem and Shahbaz (2009) also revealed long run and short run positively significant influence of FDI on stock market capitalization. Similarly, Khan (2008) by employing ARDL approach elaborated a positive cointegration of financial improvement and investment on economic growth.

IV. Data description and Methodology

The dataset consists of monthly averages³ of stock market returns (SR_t), exchange rate changes (ER_t) and monthly observations for inflation rate (IR_t), interest rate (DR_t), industrial production growth (IPG_t) and crude oil prices (COP_t) for Pakistan. The equity market price indices for Pakistan (Karachi Stock Exchange-KSE100 Index) have taken from the State Bank of Pakistan. The foreign exchange rates have taken in terms of local currency with respect of Dollar (PKR/USD) have been adopted from oanda.com. The Entire sample size for interest rate and industrial production growth have undertaken from State bank of Pakistan, inflation rate data have taken from Pakistan bureau of statistics and oil prices (with price index (2005 = 100), simple average of three spot prices; Dated Brent, Dubai Fateh and the West Texas Intermediate) in terms of Pak Rupee per Barrel earned from indexmundi.com. Furthermore, owing to unavailability of statistics for all variables, the sample period for Pakistan ranges from November 1993 to December 2016.

³ Monthly averages calculated from the daily closing observations taken for share prices and currency rates.

Due to the nature of the research question, model specifications and the estimation techniques, the size of the sample has been restricted. The exchange rate changes ER_t and stock returns SR_t are calculated from the following equation:

$$SR_t = \ln S_t = \ln \left(\frac{S_t}{S_{t-1}} \right) \quad (1)$$

$$ER_t = \ln E_t = \ln \left(\frac{E_t}{E_{t-1}} \right) \quad (2)$$

Where exchange rates (E) and stock market prices (S) at time t and $(t - 1)$.

Multivariate Cointegration

The incidence of a long-run equilibrium amongst the set of time series which converges over time is explained by an econometric notion called cointegration. Consequently, cointegration determines a dynamic foundation for error correction system, which generates both short-term and long-term evidence in demonstrating variables. There are several tests of cointegration, among them, Autoregressive Distributed Lag cointegration technique becomes the focal point of this paper.

When one cointegrating vector exists, Autoregressive Distributed Lag (ARDL) technique become necessary to be applied for a long run relationship proposed by Pesaran and Shin (1995) and Pesaran et al (1996), regardless of either the concerned variables are stationary at the level, at first difference, or a blend of both. This condition elaborates more accurate and effectual estimates using the application of ARDL approach.

The specification for ARDL $(p, q_1, q_2, \dots, q_k)$ paradigm given as follows;

$$A(L, p)y_t = a_0 + \sum_{i=1}^k B_t(L, q_i)x_{it} + \delta w_t + \mu_t \quad (5)$$

Where;

$$A(L, p) = 1 - \alpha_1 L - \alpha_2 L^2 - \dots - \alpha_p L^p$$

$$B(L, q) = 1 - \beta_{i1}L - \beta_2L^2 - \dots - \beta_qL^q \quad \text{for } i=1, 2, \dots, k, \quad u_t \sim \text{iid}(0; \delta^2)$$

y_t is the regressand alongside its lags as regressor, and x_t is the lagged exogenous variable and μ_t being the random error. In general, L is the lag used for each element of a vector. $L^k x_t = x_{t-k}$, it explains the lag polynomial $A(L)$ and polynomial vector $B(L)$. w_t is $s \times 1$ vector of regulating elements for constant term, slope, recurrent dummies, or independent variables with the static lags, $p = 0, 1, 2, \dots, m$, $q = 1, 2, \dots, m$, and, $i = 1, 2, \dots, k$: explicitly a total of $(m+1)^{k+1}$ diverse ARDL models. The largest lag orderliness m is taken automatically by the EVIEWS 9 software. Sample time is $t = m+1, m+2, \dots, n$. Provided that error margin μ_t is a white noise process, or static and impartial of $x_t, x_{t-1}, \dots$, and $y_t, y_{t-1}, \dots$.

Hence the empirical link between Pakistan stock returns, and the relevant macroeconomic indicators to be estimated in this study is customized from a simple demonstration explained by Mukherjee and Naka (1995), Gjerde and Sættem (1999), Narayan (2004), Narayan (2005) and Kandir (2008).

$$SR_t = f(ER_t, IR_t, DR_t, IPG_t, COP_t)$$

A detailed description of the model considering all the selected number of variables of this study is presented below, considering the equation (5);

$$\begin{aligned} \Delta SR_t &= a_0 + \sum_{i=1}^p \alpha_1 \Delta SR_{t-i} + \sum_{i=0}^{q_1} \alpha_2 \Delta ER_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta IR_{t-i} + \sum_{i=0}^{q_3} \alpha_4 \Delta DR_{t-i} \\ &+ \sum_{i=0}^{q_4} \alpha_5 \Delta IPG_{t-i} + \sum_{i=0}^{q_5} \alpha_6 \Delta COP_{t-i} + \delta_1 SR_{t-1} + \delta_2 ER_{t-1} + \delta_3 IR_{t-1} \\ &+ \delta_4 DR_{t-1} + \delta_5 IPG_{t-1} + \delta_6 COP_{t-1} \\ &+ \mu_t \end{aligned} \quad (6)$$

where Δ states the first difference operator and μ_t is the random error. The F-statistic for the joint null hypothesis is performed describing that coefficients of the lagged variables are zero. δ narrates the long-term relationship, while $(\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6)$ symbolize the short-run details of the model.

Once the valuation of the given model is carried out, the long-term causativeness appraised by the outcomes from the F-statistics of the Wald test. Intimating null hypothesis of the experiment will be:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0 \text{ (no long-run relationship).}$$

Against the alternative hypothesis;

$$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq 0 \text{ (a long-run relationship occurs hence cointegration).}$$

The results obtained from F-statistics for this experiment is then analyzed on the suggested critical observations of the Narayan within the boundaries of the decided level of significance through unrestricted and no trend series.

The ARDL model is re-parameterized into Error Correction Model (ECM) when amid the variables there exist a single cointegrating vector, and produced short-run and long-run dynamics of the underlying variables. The regression of long-run variables and inclusion of error term as an exogenous variable developing error correction model (ECM) is spotted below;

$$\begin{aligned} \Delta SR_t = & a_0 + \sum_{i=1}^p \alpha_1 \Delta SR_{t-i} + \sum_{i=0}^{q_1} \alpha_2 \Delta ER_{t-i} + \sum_{i=0}^{q_2} \alpha_3 \Delta IR_{t-i} \\ & + \sum_{i=0}^{q_3} \alpha_4 \Delta DR_{t-i} + \sum_{i=0}^{q_4} \alpha_5 \Delta IPG_{t-i} + \sum_{i=0}^{q_5} \alpha_6 \Delta COP_{t-i} \\ & + \Psi ECM_{t-1} \\ & + \mu_t \end{aligned} \quad (7)$$

The term ECM_t since the adjustment constraint of speed towards equilibrium is the consequent of error margin in the cointegration model, where the variables are gained by standardizing the equation for SR_t . The ECM_t explains the extent of the level to which the disequilibrium is being corrected, that is, how disequilibrium in the preceding period is modified in the SR_t . Positive value of coefficient stipulates a divergence, however convergence is the resultant of negative coefficient.

V. Empirical Explanations

The analyses begin by providing descriptive statistics for each variable. The statistical characteristics of the sample are set out in Table 1.

Table 1: Descriptive Statistics For All The Variables

Notes: This table shows means, median, maximum and minimum, standard deviations, skewness, kurtosis, coefficients of variation, Jarque-Bera and probabilities for the Stock Market Returns, Exchange Rate Changes, Inflation Rate, Interest Rate, Industrial Growth and Crude Oil prices for the Entire period of observations. The sample consists of average monthly observations Pakistan. The critical value Jarque-Bera statistic for normality from a χ^2 distribution with 2 degrees of freedom is 5.99 for the 5% level of significance.

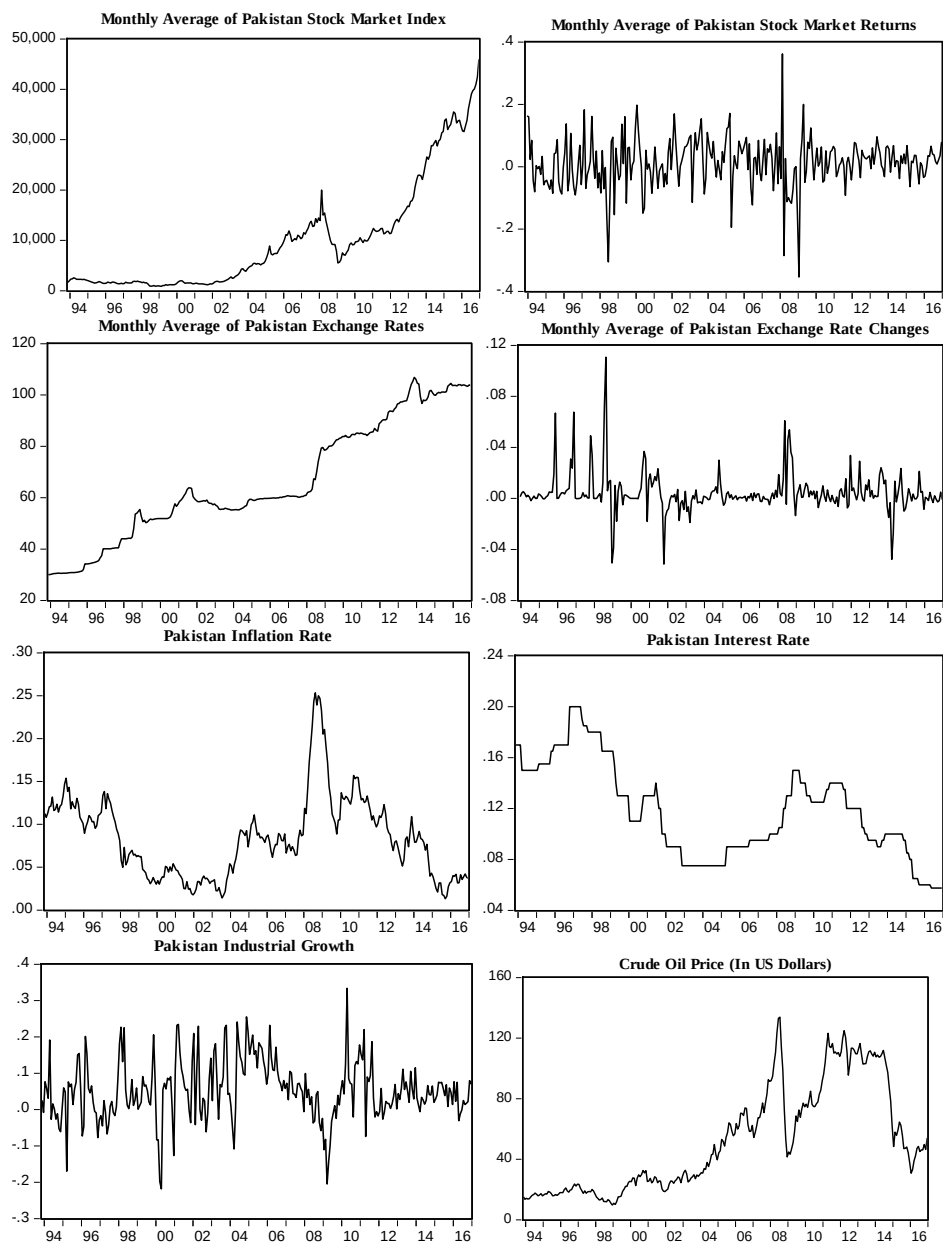
Statistics	Stock market returns	Exchange rate changes	Inflation rate	Interest rate	Industrial production growth	Crude oil price
Mean	0.0120	0.0045	0.0842	0.1175	0.0531	52.3192
Median	0.013013	0.001803	0.0822	0.11	0.05167	43.38
Std. Dev.	0.0781	0.0154	0.0473	0.0368	0.0821	34.9159
Skewness	-0.4716	2.0089	0.9913	0.3629	0.0955	0.6400
Kurtosis	6.8245	15.5799	4.4774	2.2406	4.0180	2.0631
Jarque-Bera	179.0861	2012.8270	70.5554	12.7337	12.3816	29.0376
Probability	0.0000	0.0000	0.0000	0.0017	0.0020	0.0000
Coefficient of Variation	652.6800	343.9929	56.1575	31.3465	154.4659	66.7364
Observations	277	277	277	277	277	277

Source: Author's Calculations

The mean values and standard deviations for all variables were observed small signifies variables are clustered closely around the mean explaining volatility in the financial market of Pakistan. Skewness coefficient for only stock returns, interest rate, and Industrial production growth is found normally distributed and symmetrical. However, exchange rate changes and crude oil prices witnessed highly positively skewed, and positively moderate skewness noted in the inflation rate. The kurtosis coefficient for almost all the variables is Leptokurtic demonstrating series are slim and have fatter tails, though interest rate and oil prices series found Platykurtic with slim and a long tail. All variables observed positive and higher value of Jarque Bera (JB) with their respective probability values lower than 0.05 specifying not normal distributions. Similarly, the coefficient of variation for stock returns and the macroeconomic variables are noted significantly high expresses more volatility which implies that the series is less stable or less uniform. Figure 2 represents the trend charts for stock

market index and stock market returns trends, exchange rates and exchange rate changes, inflation rate, interest rate, industrial production growth and crude oil prices for Pakistan for the overall size ranges.

Figure 2: Pakistan Financial Markets



Prior to exerting ARDL cointegration approach, this study begins with examining the time series properties of the variables. Though it is not an obligation for bound testing, hence the integration of all variables in the similar order is required for an unbiased estimation of Granger causality. The results exhibits in Table 2 for Augmented Dickey-Fuller⁴ tests explain that three variables SR_t , ER_t , and IPG_t were found stationery at I(0) and I(1) including with constant, and constant and linear trend. However, IR_t , DR_t and COP_t elucidated that the null hypotheses is reject for unit root only at first difference embracing in both constant, and constant and linear trend.

Table 2: Augmented Dickey-Fuller Stationary Tests

Variables	Augmented Dickey-Fuller Stationary Test		Test Statistics	
Stock Market Returns	Constant	Level Series	t Statistics	-14.1463***
			Probability	0.0000
		First Difference	t Statistics	-6.6752***
			Probability	0.0000
	Constant and Linear Trend	level Series	t Statistics	-14.2211***
			Probability	0.0000
		First Difference	t Statistics	-6.6646***
			Probability	0.0000
Exchange Rate Changes	Constant	level Series	t Statistics	-7.8023***
			Probability	0.0000
		First Difference	t Statistics	-10.2497***
			Probability	0.0000
	Constant And Linear Trend	level Series	t Statistics	-7.8972***
			Probability	0.0000
		First Difference	t Statistics	-10.2333***
			Probability	0.0000
Inflation Rate	Constant	level Series	t Statistics	-1.3045
			Probability	0.6281
		First Difference	t Statistics	-8.8964***
			Probability	0.0000
	Constant and Linear Trend	level Series	t Statistics	-1.2995
			Probability	0.8858
		First Difference	t Statistics	-8.8786***
			Probability	0.0000
Interest Rate	Constant	level Series	t Statistics	-1.1850
			Probability	0.6816
		First Difference	t Statistics	-9.9898***
			Probability	0.0000

⁴ For calculating ADF an automatic lag length has been followed considering Akaike information criterion by the statistical Eviews 9 software.

	Constant and Linear Trend	level Series	t Statistics	-1.6343
			Probability	0.7770
		First Difference	t Statistics	-9.9725***
			Probability	0.0000
Pakistan Industrial Growth	Constant	level Series	t Statistics	-3.6493***
			Probability	0.0054
		First Difference	t Statistics	-6.5890***
			Probability	0.0000
	Constant And Linear Trend	level Series	t Statistics	-3.6294**
			Probability	0.0292
		First Difference	t Statistics	-6.5933***
			Probability	0.0000
Crude Oil Prices	Constant	level Series	t Statistics	-1.9625
			Probability	0.3035
		First Difference	t Statistics	-10.8953***
			Probability	0.0000
	Constant and Linear Trend	level Series	t Statistics	-2.5552
			Probability	0.3014
		First Difference	t Statistics	-10.8888***
			Probability	0.0000
Test critical values	Constant		Constant and Linear Trend	
	1% level	-3.6010	1% level	-4.2050
	5% level	-2.9350	5% level	-3.5266
	10% level	-2.6058	10% level	-3.1946

Source: Author's Calculations

Note: *, **, *** denote significant at 10%, 5% and 1% significance levels, respectively.

Granger Causality test

Granger Causality experiment is performed to know there exist any type of causal relationship among the variables in Pakistan. Taking into account the results derived may be sensitive to the lag length selection⁵, the lag four has been chosen for Pakistan where the optimal value of Akaike Information Criterion (AIC) is obtained.

⁵ The optimum lags length chosen on the criteria aboriginally proposed by Campbell and Perron (1991). The selection of an adequate lag order has been considered amongst the classical practices of information criteria, for instance Akaike (AIC), Schwarz (SC) and Hannan-Quinn (HQ) (Lutkepohl, 1993). The optimal lag length has been selected from the results obtained for each information criterion on the ground of minimum value. In general AIC produced a lowest value of lag length for estimating the quality of each model.

Table 3: Granger Causality Test

Pairwise Granger Causality Tests	PAKISTAN		
Lag Length	Lags: 4		
Null Hypothesis:	Obs.	F-Statistic	Prob.
$ER_t \nRightarrow SR_t$	273	2.9535**	0.0206
$SR_t \nRightarrow ER_t$		11.9912***	0.0000
$IR_t \nRightarrow SR_t$	273	4.7605***	0.0010
$SR_t \nRightarrow IR_t$		0.8450	0.4977
$DR_t \nRightarrow SR_t$	273	4.8765***	0.0008
$SR_t \nRightarrow DR_t$		1.0010	0.4075
$IPG_t \nRightarrow SR_t$	273	0.5161	0.7240
$SR_t \nRightarrow IPG_t$		1.8857	0.1133
$COP_t \nRightarrow SR_t$	273	1.0683	0.3726
$SR_t \nRightarrow COP_t$		2.2052*	0.0688
$IR_t \nRightarrow ER_t$	273	2.4890**	0.0438
$ER_t \nRightarrow IR_t$		0.2393	0.9159
$DR_t \nRightarrow ER_t$	273	2.0275*	0.0909
$ER_t \nRightarrow DR_t$		2.6704**	0.0326
$IPG_t \nRightarrow ER_t$	273	0.4531	0.7701
$ER_t \nRightarrow IPG_t$		1.6986	0.1507
$COP_t \nRightarrow ER_t$	273	0.9997	0.4082
$ER_t \nRightarrow COP_t$		3.5045***	0.0083
$DR_t \nRightarrow IR_t$	274	1.1645	0.3268
$IR_t \nRightarrow DR_t$		6.1061***	0.0001
$IPG_t \nRightarrow IR_t$	274	0.1597	0.9585
$IR_t \nRightarrow IPG_t$		1.2877	0.2751
$COP_t \nRightarrow IR_t$	274	2.6912**	0.0316
$IR_t \nRightarrow COP_t$		1.5602	0.1853
$IPG_t \nRightarrow DR_t$	274	0.3709	0.8293
$DR_t \nRightarrow IPG_t$		0.8538	0.4923
$IPG_t \nRightarrow DR_t$	274	0.4393	0.7802
$DR_t \nRightarrow COP_t$		0.7587	0.5530
$COP_t \nRightarrow IPG_t$	274	0.5153	0.7246
$IPG_t \nRightarrow COP_t$		0.5669	0.6869

Source: Author Calculations

Note: *, **, *** denote significant at 10%, 5% and 1% significance levels, respectively. Null Hypothesis for no causal relationship is rejected. Appropriate lag length was determined by Akaike Information Criterion.

The results of Granger Causality test for stock returns with the impact of different macroeconomic indicators reflected interesting outcomes. The results presented in Table 3 are quite indifferent. Bidirectional relationships were only noticed between exchange rates changes and stock market returns ($ER_t \leftrightarrow SR_t$) and exchange rate changes and

interest rate ($ER_t \leftrightarrow DR_t$). However unidirectional causality was witnessed from inflation rates to stock market returns ($IR_t \rightarrow SR_t$), from interest rate to stock market returns ($DR_t \rightarrow SR_t$), from stock market returns to crude oil prices ($SR_t \rightarrow COP_t$), from inflation rates to exchange rate changes ($IR_t \rightarrow ER_t$), from exchange rate changes to crude oil prices ($ER_t \rightarrow COP_t$), from inflation rates to interest rates ($IR_t \rightarrow DR_t$) and from crude oil prices to inflation rates ($COP_t \rightarrow IR_t$). These results gave a direction to examine the incidence of both long-run and short-run correlation in macroeconomic variables and stock returns. In this regard, Autoregressive Distributive Lag Model (ARDL) approach was found more appropriate.

Cointegration test

From the findings obtained for unit root test, all the series produced a combination of mixed outcomes and likewise the performance of Granger causality test witnessed very weak casual relationships among the variables in Pakistan led to pursue an Autoregressive Distributive Lag Model (ARDL) for further evaluations.

According to Pesaran and Shin (1999), and Narayan (2004) the optimal lag length order in the ARDL technique is chosen by using Akaike Information Criterion (AIC)⁶ to be included in the conditional ECM considering lowest value of criterion, while confirming the absence of autocorrelation in the model as emphasized by Pesaran et al. (2001).

Bound testing for cointegration analysis

The cointegration test outcomes exhibited in Table 4, evident that the calculated F-statistics for Pakistan $F_{PK} = 38.8606$, is found greater than the upper bound critical values⁷ using unrestricted constant and no drift.

Table 4: Bound testing for cointegration

Computed F- Statistics	Critical Bounds					
	10%		5%		1%	
38.8606	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.2600	3.3500	2.6200	3.7900	3.4100	4.6800

Source: Author's Calculations.

⁶ Ibid., 17.

⁷ Critical value bounds are obtained from Pesaran and Shin (2001).

These results indicate that stock markets of Pakistan have shown binding of cointegration for its respective currency changes and other macroeconomic variables in their equity markets during the selected time span. Hence, the study proceeds for further ARDL procedure.

Elasticities and Re-parameterization to the ECM

The ARDL model for Pakistan with the lag order (1, 2, 3, 5, 0, 4)⁸ is followed while taking Pakistan stock market returns (SR_{PK}) as the dependent variable. The Table 5 reported long-run and short run elasticities respectively including with error correction term and diagnostic tests performances. In the long-run exchange rate changes (ER_{PK}) showed negative and insignificant relationship with the stock returns in Pakistan, while in short-run 1percent increase in Exchange rate changes with one period lag raised stock returns by 0.5 percent. This implied positive though weakly significant relationship between the two variables expressing volatility in PKR/USD causing only short-term impact on stock returns. Inflation rate showed negatively insignificant impression on stock returns in long-run though in the short-run inflation rate produced negatively significant influence, indicating one percent reduction in inflation caused 0.87 percent increase in stock returns. The regression model further explained negatively significant impact of interest rate and industrial production growth in the long run and short on the dependent variable. These outcomes signified longtime internal political and economic volatility, the distrust of investors for continuous changes in governments, and for the imposition of international sanctions on the showcase of atomic power in the region. Although crude oil prices found insignificant in long run though oil prices with three periods lag reflects positively significant impact on stock returns expressing very minor impact as this is mainly an import item.

The mechanism of error correction (ECM) accustomed to validate the short-run liaison between the variables. According to Bannerjee et al. (1998), the occurrence of a stable long-run relationship is further corroborated by the significant value of error correction term. The error correction coefficient is -0.94 , suggests that convergence concerning to

⁸ Due to the presence of heteroskedasticity, HAC variances are used in the model. Whether there exist an autocorrelation or heteroskedasticity in the model no biasness exists in the coefficient estimates though only variance inflated. Therefore this situation can be cured by applying HAC test.

the long-run equilibrium is very strong. This means that approximately 94 percent of disequilibria from the previous month's shock unite back to the long-run equilibrium in the prevailing month. This, further, supports the contention that long-run causality is contending from economic growth variables to stock returns.

Diagnostic statistics for autocorrelation, heteroscedasticity and normality tests were performed. The results showed absence of autocorrelation in the model though heteroskedasticity is found beside the model reported not normal. Since the problem of variability of the variables was corrected by using HAC⁹ (Newey-West) standard errors & covariance test for remedying the model, therefore, it became more data congruent and free from specification errors. Thus, the strong link between stock market returns and economic growth indicators no more observed spurious.

Table 5: Results of ARDL (1, 2, 3, 5, 0, 4) for a Long run and Short run Form selected based on AIC for Pakistan.

Note: Dependent variable is Pakistan Stock Market Returns (PKMSR). The critical value Jarque-Bera statistic for normality from a χ^2 distribution with 2 degrees of freedom is 5.99 for the 5% level of significance. HAC standard errors & covariance (Pre-whitening with lags = 6 from AIC max lags = 6, Bartlett kernel, Newey-West automatic bandwidth = 8.0606, NW automatic lag length = 4).

Long run Coefficients				
Regressors	Coefficients	Std. Error	t Statistics	Probability
Exchange Rate Changes	-0.3648	0.3263	-1.1179	0.2647
Inflation Rate	-0.1508	0.1471	-1.0253	0.3062
Interest Rate	-0.4040*	0.2077	-1.9451	0.0529
Industrial Growth	-0.1118*	0.0583	-1.9190	0.0561
Crude Oil Price	0.0000	0.0001	0.1523	0.8790
Constant	0.0758	0.0209	3.6201	0.0004
Short run Impact of Macroeconomic Indicators on Pakistan Stock Market Return - Results of ECM model.				
Regressors	Coefficients	Std. Error	t Statistics	Probability
ΔExchange Rate Change	-0.5212	0.3371	-1.5460	0.1234

⁹ NeweyWest is a suitability line to vcovHAC treating Bartlett kernel weights portrayed in Newey & West (1987, 1994). The automatic bandwidth choice was made as default (Newey & West; 1994). HAC test is used to solve an issue of significance in the model. The HAC robust Wald p-value is marginally greater than the F-statistic p-value, yet observed significant at standard test levels.

ΔExchange Rate Change(-1)	0.4625*	0.2773	1.6680	0.0966
ΔInflation Rate	-0.8748**	0.4114	-2.1264	0.0344
ΔInflation Rate(-1)	1.9430*	1.0455	1.8584	0.0643
ΔInflation Rate(-2)	-1.2334*	0.6787	-1.8173	0.0704
ΔInterest Rate	-2.1704**	1.0937	-1.9844	0.0483
ΔInterest Rate(-1)	-1.0079	1.3295	-0.7581	0.4491
ΔInterest Rate(-2)	-2.7090*	1.3805	-1.9623	0.0508
ΔInterest Rate(-3)	-0.1346	1.5142	-0.0889	0.9293
ΔInterest Rate(-4)	1.9115	1.2289	1.5555	0.1211
ΔIndustrial Growth	-0.1052**	0.0534	-1.9706	0.0499
ΔCrude Oil Price	0.0013	0.0010	1.3309	0.1844
ΔCrude Oil Price(-1)	-0.0008	0.0016	-0.5277	0.5982
ΔCrude Oil Price(-2)	-0.0026	0.0023	-1.1157	0.2656
ΔCrude Oil Price(-3)	0.0029**	0.0014	2.0983	0.0369
ΔECM(-1)	-0.9405***	0.0952	-9.8748	0.0000
Adjusted R Squared	0.1569			
DW Test	1.9935			
Diagnostics Statistics	Chi Square		Probability	
LB (12)	13.0110		0.3680	
LB Square (12)	38.3790***		0.0000	
Serial Correlation Test	2.5263		0.7725	
ARCH Test	19.8386***		0.0013	
Jarque Berra Test	85.0508***		0.0000	

Source: Author Calculations

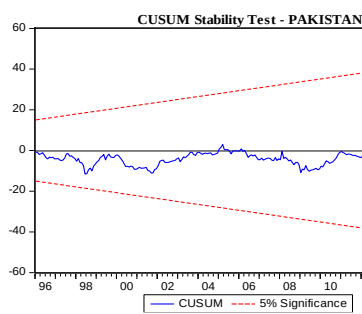
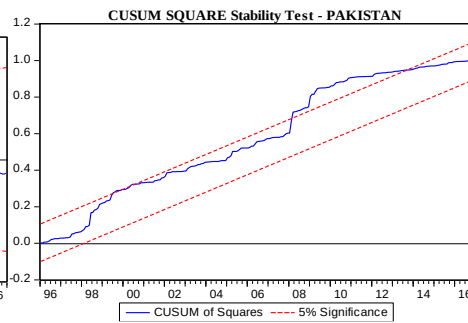
*, **, *** denote significant at 10%, 5% and 1% significance levels, respectively.

Stability Analysis: (CUSUM and CUSUM square Tests)

The stability of the relationship between the variables is assessed by applying the recursive estimates at five percent level of significance. The most used tests of steadiness are the CUSUM and CUSUM square tests. The parameters of the equation are thought to be stable if the sum total of recursive errors moves outside the two critical boundary lines. Figure 3 (a & b) have shown test statistics of cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMsq). CUSUM test confirms that the equation is dynamically stabilized. Nevertheless, the CUSUM square line found on and outside the critical upper band explained instability in the mannequin. The CUSUM line first touched the upper band from October 1999 to August 2000. Many factors were responsible for this instability in the model, which includes; contagion effects of South East Asian financial debacle, global recession, crash of stock markets of some leading economies, enforcement of economic sanctions on account of nuclear tests in May 1998, and other local factors such as, withdrawal of institutional foreign investors from the market, law and order situation,

government froze foreign currency accounts and unresolved dispute with the Independent Power Projects. After touching the lowest decline capital market displayed meek retrieval when government took several measures to rehabilitates the distraught economy, such as commencement of prompt privatization process, allowed foreign direct investment, reduced interest rate, and substantial progress in economic rudiments like; better collection of revenue, dampening inflation, mounting export balances and industrial progression, etc.

For the duration from March 2008 to August 2013, CUSUM square line again led outside the upper margin of significance level explaining unsteadiness in the model. This instability was caused as many macroeconomic indicators unveiled inadequate performance in the region due to hasty deviations in the political panorama and global financial crisis. On the incident of the assassination of Benazir Bhutto, the KSE witnessed its unprecedented massive clash. Other factors involved pitiable law enforcement condition beside enormous insurgence upraised the uncertainties of foreign capital evasion, depreciation of the Pak - rupee and increasing fiscal deficit. However, after this period, CUSUM line seems within the critical bands indicating stability in the economy over time.

Figure 3 (a)**Figure 3 (b)**

VI. Conclusion

The dynamic influence of macroeconomic variables on the Pakistan stock market returns has interpreted in conjunction with the socio-economic climate prevalent in the country during the period of this study. Using monthly time-series data, the macroeconomic variables are represented

by the exchange rate change, inflation rate, interest rate, industrial production growth, and the crude oil price. The Granger causality and bound testing approach to cointegration were conducted to reveal the interesting conclusions. The results indicated a weak “causal” relationship between the variables. This study displayed a bidirectional relation only between stock returns and exchange rate changes, while inflation and interest rate Granger-caused stock market returns. Main findings for the long-run and short-run estimates of ARDL also bring out variable conclusions. The results evident that in the long run industrial production and interest rate are the negative determinant of Pakistani stock returns proving downfall situations that exist in Pakistan 1998 to 2000 and 2008 to 2013 caused by changes in internal and external economic structure. Yet the findings clearly support the view that all the macroeconomic indicators in the model drive stock market returns in short-run. Moreover, the error correction coefficients suggested a very strong convergence concerning to the long-run steadiness explaining high adjustment of speed to the equilibrium after experiencing a shock in the economy (Puatwoe & Piabuo, 2017).

As observed, the stock market mainly fluctuates by its internal influences, changes in political situations within the country and due to the impact of external financial crises happened during the period. The study suggests that monetary legislatures should attempt suitable monetary procedures to regulate inflation, currency devaluation, and interest rates so that the variability in the stock markets can be curtailed. Additionally, concerned authorities ought to formulate such policies which support industrial production to promote stock market. Since the results emitted mixed response to capital market performance, it provides potential researchers ample opportunity for further research where other methodologies could also be suggested.

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Does Foreign Aid Promote Economic Growth in Sudan? Evidence from ARDL Bounds Testing Analysis¹

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Ebaidalla Mahjoub Ebaidalla⁴

This study examines the relationship between foreign aid and economic growth in Sudan using autoregressive distributed lag (ARDL) bounds tests. Relying on time series data spanned over the period 1980 to 2015, the findings reveal that there is a long run relationship between variables under consideration. Specifically, the findings show that foreign aid in the form of official development assistance (ODA) has a positive and significant long run impact on economic growth in Sudan. However, the interaction between aid and corruption in public institutions imposes a negative and significant long run impact on economic growth. Interestingly, the findings indicate that aid deters economic growth in the short run. This outcome may stand as indication that aid spurs economic growth via its contributions to human capital and improving infrastructural facilities both of which become rewarding in the long run. The paper concludes with the importance of utilizing aid in enhancing human capital capacities in order to boost economic growth.

Keywords: GDP, Growth, Foreign Aid, ARDL, Sudan

JEL Classification: F14, F15

1. Introduction

It has been widely acknowledged that the key target of the official development assistance (ODA) is to help developing countries exist the prolonged poverty and economic backwardness. Specifically, the ultimate goal of sending these resources is to provide these countries with financial

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and technical assistances in order to put their economies on the track of sustainable economic development. Theoretically, the contribution of aid in achieving these targets also has been strongly emphasized. Many of the leading development scholars (e.g. Harod-Domar, Rosenstein-Rodan and Rostow), claim that aid, whatever the form it takes, establishes a great deal in filling the capital gap experienced by developing economies. Furthermore, those scholars argue that apart from its contributions in capitalizing undercapitalized economies, aid can boost economic growth through the opportunities it offers for building the capacities of local cadres, elevating healthiness of human capital and establishing enhanced infrastructures.

Owing to these claims, huge amounts of aid have been transferred regularly to developing nations. During a one decade, for instance, the amounts of aid disbursed to developing countries increased 2.27 times, from US\$ 33.7132 billion in the 1960 to US\$ 76.5664 billion in the 1970, to US\$ 83.7002 billion in the 1980 (twice that of the 1970) and to US\$ 74.8361 in the 2000. According to OECD's reports, real ODA inflows to these countries rose by 6.1% to 134.8 billion in 2013, reaching its ever recorded peak (OECD, 2013). However, although the disbursed aid is less than those amounts hoped and called for by development scholars and leading international organizations, aid resources seem to be not performing effectively in achieving the desirable targets. The high illiteracy rates, breakouts of diseases, severe poverty and extremely low standards of livings are still dominant in the majority of aid's recipient countries. The obvious ineffectiveness of aid is manifested in the failure to realize sustainable and reasonable levels of economic growth in these countries. This argument finds support in the paradoxical findings on aid-led growth hypothesis which represents one of the hotly debated issues in the contemporary literature on aid (Papanek, 1972; Bauer, 1976; Bauer, 1982; World Bank, 1985; Mosley et al. 1987 and Newlyn, 1990). These controversies were not restricted to whether aid does or doesn't have a positive effect on economic growth, but it surpasses that to question the contexts in which aid being allocated. Some scholars argued that the effectiveness of aid is likely to depend on the suitability of policies and institutional settings in recipient countries (Bauer, 1991; Collier and Dollar, 2002 and Burnside and Dollar, 2000).

Sudan, like other developing countries, has received and continues to receive considerable ODA from different donors. The stylized facts show

that the real net ODA inflows into Sudan, although fluctuate and appear to be conditioned by political and humanitarian developments, keep on growing during last decades. According to Nour (2011) Sudan occupies a position among the top ODA's recipient countries. Aid as a percentage of gross national income (GNI) grew dramatically from representing 2.44% in the 1960 to 6.16% in the 1975 to 8.88% in the 1980 and to 7.44% in the 1990. During the last five decades (i.e. 1960 and 2014) ODA grew by an annual average of, approximately, 22%, demonstrating the generous assistance from donors to Sudan. These aid inflows, if utilized effectively, are supposed to contribute greatly in upgrading country's economic performance to the level that could possibly free it from poverty trap. Specifically, the effectiveness of aid in all fronts can be better materialized through its direct contributions in boosting GDP growth to the levels that allow the country to graduate from its current unfavorable positions development ranking. In fact, the country's economy remains stagnant, GDP rotates around moderate rates of growth and labor market fails to absorb the army of unemployed. Arguably, since its independence in 1956, the country has suffered severe economic, political and social obstacles that have worked collectively in confining its economy in a vicious circle of lowest economic growth rates. These obstacles, however, wouldn't justify the negligible contributions of aid to economic growth. In view of that, the question may arise here is that: does aid contribute in promoting economic growth in Sudan during last three decades?

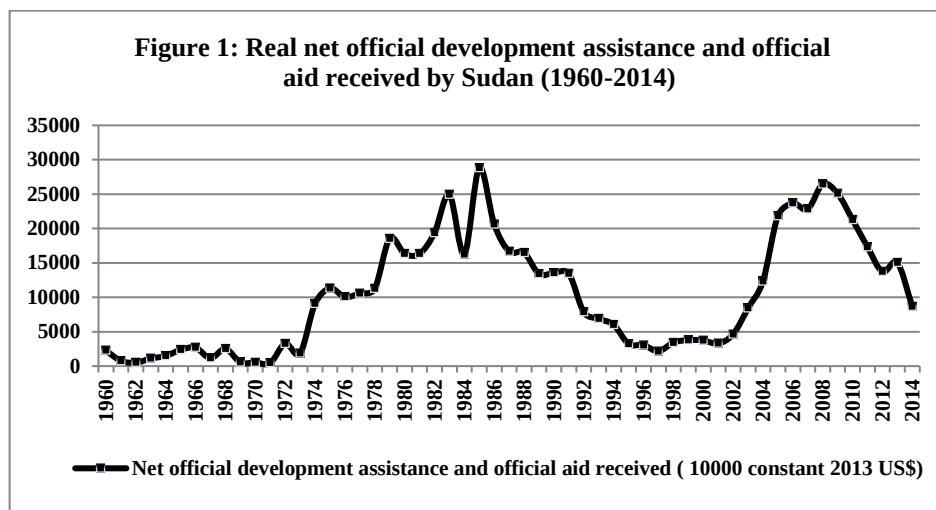
No doubt, this question is also motivated by the deep controversies in the existing literature on the contribution of aid to economic growth. Given these concerns, this paper represents an empirical endeavor to investigate the contribution of aid in promoting economic growth in Sudan. Towards this aim, the paper applies the autoregressive distributed lag (ARDL) bounds tests for co-integration and utilizes a time series data extended over the period 1980 to 2015 to carry out the intended empirical investigation.

The rest of this paper is organized as follows: Section 2 presents a detailed picture about the evolution of aid inflows into Sudan with the emphasis on its interactions with the key economic parameters. Section 3 introduces the related literature. Section 4 sets the method on which the analysis is performed, while Section 5 discusses and introduces empirical results. Finally, Section 6 concludes and sketches some policy implications.

2. Patterns of Aid Inflows into Sudan Economy

Like the case of other countries, the patterns of ODA received by Sudan reflect, to a large extent, the economic, political and social circumstances that the country had undergone. Specifically, the amounts of aid received rise when the country exposes to instability and shrink when the reverse is hold. For instance, during the period followed independence in which the country had enjoyed a relatively good economic performance, ODA inflows were at minimum. During the 1970s, the net ODA inflows decreased and, as Figure 1 indicates, troughed in the 1970. Undoubtedly, the reason behind the decline of ODA inflows was the dominance of the socialist believes branded the first two years of May regime. However, after the abortion of cough arranged by communists in the 1971 and the elimination of communists from government, ODA began to increase.

Driven by donors' humanitarian concerns, the country's ODA record has improved significantly with the incidence of natural disasters. The period of the 1980s, in which the country was hit by one of the toughest waves of drought, has witnessed one of the historical peaks of ODA inflows. Similarly, and as Figure 1 shows, ODA inflows has been affected by the political developments prevailing in the country. For example, at the beginning of the 1990s when Sudan became vulnerable in its international relations, the ODA registered its lowest records. In contrast, in 2000s, when the country conducted national conciliations and attempted to pacify its connections with the rest of the world, ODA has increased considerably. Agreeing with this argument, the signature of the General Peace Agreement between government of Sudan and Sudan People Liberation Movement (SPLM) in 2005 qualified the country to be one of the notable destinations for the ODA in SSA region. As can be read from Figure 1, these changes in political atmosphere led the country to register its second peak in terms of ODA reception.



Source: World Bank Indicators (2015), World Bank (2015)

Whatever the forms it takes, aid inflows are argued to elevate economic performance in recipient countries. In the context of a country lagging behind in terms of physical capital like Sudan, aid inflows are anticipated to do a lot in mitigating these shortcomings. However, the stylized facts on the country's macroeconomic indicators may don't support such assertion. Table 2.1 exhibits the interactions between some of key macroeconomic indicators in Sudan economy and ODA during the period 1960 to 2014. Over these five decades, as the table shows, the overall correlations between aid presence and these indicators were not strong. Picking one, the reported figures indicate great divergences between ODA inflows and GDP growth rates. The exceptions were the 1960s and the 1970s, the periods in which there was a considerable conformity between aid presence and GDP growth. Specifically, during this period, aid growth rose from an annual average of 10.9% during 1960 -1964 to an annual average of 11.80% during the period from 1965 to 1969. In the same time period, GDP growth rates rose from an annual average of 0.59% during 1960 -1964 to an annual average of 1.60% in the next five years, proving a considerable consistency with aid performance. The decade of the 1970s also saw the same positive co-movements between ODA inflows and GDP growth. This consistency in the patterns of ODA inflows and GDP growth may, in part, arose due to the relative political stability that the country had perceived after the signature of Addis Ababa

Agreement between the government and Sudan People's Liberation Army (SPLA) in 1972.

As mentioned earlier, during the second half of the 1980s, the country has exposed to hard waves of drought that hit a large portion of population's livelihoods. Stirred by that event, donors surged a huge amounts of humanitarian assistance leading ODA growth rates to jump by 77% in a one year (i.e. from 1984 to 1985). However, these increases in ODA were not in a complete match with the GDP growth rates. Specifically, while GDP grew by 4.39% during 1985 -1989, ODA grew at an annual average of only 2.02%. Furthermore, the inconsistency between aid flows and GDP growth can be proven by the positive economic growth rates had been achieved in the 1990s, the decade in which ODA inflows declined sharply.

Summing up, many interpretations can be proposed to justify aid's ineffectiveness in stimulating economic progresses in Sudan. First, the positive impact of aid on indicators such as, economic growth and capital accumulation is likely to depend on the type of ODA received. In this regard, considerable portions of ODA received by Sudan were in the form of food and other humanitarian assistance. Second, the poor absorptive capacities characterized Sudan economy, particularly the aspects related to human capital, may slow the digestion of benefits arising from aid presence. Third, the actual amounts of ODA inflows received by Sudan may turn out to be negligible compared to the capital gap experienced by the country. Fourth, the perception of corruption may also hinder the contribution of aid to economic growth. Yet, concluding that aid is ineffective in spurring economic enhancements in Sudan based on the above mentioned stylized facts, is largely subject to the doubts. Therefore, a sophisticated analysis performed via an advanced econometric technique can be called up to challenge this conclusion.

Table 2.1: GDP growth, domestic capital formation and ODA inflows into Sudan (1960-2014)

(1) Period	(2) GDP Growth	(3) ODA (%GDK)	(4) ODA (%GNI)	(5) ODA (% imports)	(6) ODA Growth (%)	(6) ODA per capita (current US\$)	(7) GDK/ (%GDP)
1960-1964	0.59	11.03	1.39	-	10.9	1.58	13.40
1965-1969	1.60	-	1.58	-	11.8	1.96	-
1970-1974	3.04	-	1.98	-	192	4.26	-
1975-1979	5.53	34.98 ^a	5.53	36.8 ^b	18.0	22.0	15.8 ^c
1980-1984	2.39	57.15	8.39	53.8	0.10	35.1	15.2
1985-1989	4.39	79.30	6.24	85.7	2.02	39.1	9.7
1990-1994	2.83	37.99	6.79	61.2	-13.3	22.9	17.1
1995-1999	5.98	12.63	1.98	16.9	-2.37	6.58	15.4
2000-2004	6.18	10.02	2.91	10.7	31.2	12.40	26.4
2005-2009	8.02	19.64	5.66	16.7	18.5	51.25	26.7
2010-2014	1.14	10.60	2.39	12.6	-17.5	37.70	20.9

Source: World Bank Indicators (2016), World Bank (2016), ^a calculated for the period 1976-1979, ^b calculated for the period 1978-1979, ^c calculated for the period 1976-1979.

3. Literature review

The relationship between foreign aid and economic growth has been extensively analyzed by researchers. Theoretically, the spectrum of the debate extends from viewing aid as a mask hiding the exploitation by former colonizers for their past colonies (Frank, 1963; Taylor and Frank, 1971; Hayter, 1971; Stevenso, 1972; Hayter and Watson, 1985 and Hayter 2013), to advocating it as a kind assistance intends to assist developing nations to exist the miserable economic realities (Papanek, 1972 and World Bank, 1985). This theoretical disagreement found its ways to the empirical evidence. On the one hand, several studies have reached to an outcome that aid encourages economic growth (Levy, 1988; Murthy et al., 1994; Fayissa and El-Kaissy, 1999; Gounder, 2001; Karras, 2006; Fasanya and Onakoya, 2012; Mekasha et al., 2013 and Adams and Atsu, 2014). On the other hand, many researchers have found that aid is inversely related to economic growth in targeted countries (Griffin and Enos, 1970; Cassen, 1994; Dhakal et al., 1996; Nyoni, 1998; Burke and Ahmadi-Esfahani, 2006; Mallik, 2008 and Kimura et al., 2012).

In the midst of this conflicting empirical evidence, several explanations have been picked up to justify the failure of aid in producing the desirable outcome on economic growth. First, numerous works have repeatedly reported that the contribution of aid to economic growth is conditioned by political, institutional and economic settings prevailing in recipient countries (Burnside and Dollar, 2000; Collier and Dollar, 2002; Collier and Hoeffler, 2004; Guillaumont and Chauvet, 2001; Svensson, 1999; Islam, 2003; Dalgaard et al., 2004 and Elbadawi et al., 2012). However, although some studies confirm the effectiveness of aid in spurring economic growth, they fail to detect the contribution of institutions and policies in deciding the exact thresholds of this effectiveness. Of these studies, Islam (2003) found that aid has a negative effect on economic growth in tinpot countries and a robust positive in totalitarian countries. Agreeing with Islam's study, Boone (1996) analyzed the effectiveness of aid in 96 recipient countries. His findings showed no significant differences between democratic and totalitarian regimes in managing aid ineffectively. In the same way, some studies have argued that aid accelerates economic growth in countries with bad institutional environment and that the good policies have no effects on aid effectiveness (Guillaumont and Chauvet, 2001). Second, some authors linked aid effectiveness to a certain period of time. Agreeing with this line of argument, Mosely (1980) claimed that the positive association between aid and economic growth has occurred and disappeared in the decades followed 1970s. Third, another strand of research contends that aid turns out to be ineffective in promoting economic growth when aggregated data has been used. Supporting this point of view, some authors argued that it is difficult to quantify the effect of aid on recipient economies at macro levels due to the incidence of fungibility (Mosley, 1987; Boone, 1994; 1996 and Devarajan et al., 1999).

Summing up, the disagreement among previous studies indicates that the empirical evidence on the nexus between aid and economic growth is largely inconclusive. This indecisive relationship calls the attention to the falseness of drawing one conclusion for all countries particularly when the case of a single country is considered. Taking the aim of this paper into account, studying the case of Sudan is of a great importance for both policymakers and donors. To the best of authors' knowledge, the only cited empirical study on aid effectiveness in Sudan has been done by Nour (2011). Depending on data collected at micro level, the author investigated the contribution of Chinese resources (i.e. loans, grants and

aid) to improve the performance of Sudan economy. Her results showed that these resources exercise both a negative and a positive impact on Sudan economy. Specifically, the positive impact results from the fact that the Chinese resources crowds in domestic capital and offer funds for developmental projects. In contrast, the negative effects emerge from the fact that these financial resources accumulate Sudanese foreign debts. However, the conclusions established by Nour (2011) face many limitations. First, her study limits its scope to one type of aid (i.e. project aid) and, thus, doesn't allow to induct a concise conclusion on the full impact of aid on economic growth in Sudan. Second, Nour's study used project level data and restricted the analysis to one donor, while Sudan used to receive ODA from different donors. Finally, analyzing the impact of aid on economic growth using descriptive statistics without resorting to sophisticated econometric methods may undermine the ability of the analysis to capture the marginal effects among the variables studied and, hence, raises doubt on the accuracy of the outcomes obtained.

4. Methodological Procedures

4.1 Model Specification

Both Lucas (1988) and Romer (1989) argue that the neoclassical growth model developed by Solow (1956) fails to explain a large portion of growth in the output because it treats technological innovation and population growth as exogenous variables. This criticism, combined with other empirical drawbacks experienced by the model, gave birth to the endogenous growth model in which output growth has been set as a function of physical capital, labor and human capital. According to Rana (1987) and Tallman and Wang (1994), the basic neoclassical growth model of Solow (1956) and Swan (1956) can be expressed in an augmented aggregate production function as follows:

$$Y_t = A_t K_t^\alpha (H C_t L_t)^\beta \quad (1)$$

Where Y_t represents real aggregate output; L and K denote, respectively, labor and physical capital inputs; H represents human capital; A is a measure of technology and exogenous knowledge; α is the share of capital; β is the share of labor and the subscript t represents time. Taking the natural logarithm for the underlying variables, the estimated form of equation 1 can be derived as:

$$\ln Y_t = \alpha \ln(K_t) + \beta \ln(L_t) + \delta \ln(H_t) + \ln(A_t) \dots \quad (2)$$

Taking the aim of investigating the effect of aid on the economic growth into account, the aggregate capital (K_t) can be disaggregated into domestic and foreign capital in the form of aid. In addition, the variables that conventionally appear in economic growth model such as export, availability of banking credit can be also added. Moreover, we see that the model we intend to investigate must take into consideration the changes that occurred in economic policies during the period being investigated as well as the level of institutional quality. Accordingly, a dummy variable is included to represent the adoption of privatization policy, while the institutional quality is measured by interacting public corruption index and ODA. Applying these changes to equation 2, the final model can be rewritten as follows:

$$\begin{aligned} \ln GDP_t = & \beta_0 + \beta_1 \ln LAB_t + \beta_2 \ln HC_t + \beta_3 \ln K_t + \beta_4 \ln ODA_t \\ & + \beta_5 \ln(ODA_t * PUBCORR_t) + \beta_6 \ln REXP_t + \beta_7 CRD_t \\ & + \beta_8 PRIV_t + \varepsilon_t \dots \end{aligned} \quad (3)$$

Where $\ln GDP$, $\ln LAB$, $\ln HC$, $\ln K$, $\ln ODA$, $\ln(ODA * PUBCORR)$, $\ln REXP$, CRD , and $PRIV$ are respectively, real GDP, labor measured by total labor force, human capital (measured by average years of schooling), real gross domestic capital formation, real ODA, real exports, financial credit provided to the private sector by banks as a percentage of GDP, and the interaction term between public corruption index and real ODA all in natural logarithms. $PRIV$ is a dummy variable used to capture the effect of implementing privatization policy on economic growth and ε_t is disturbance term which is assumed to be normally distributed. The β coefficients of the explanatory variables, excluding the dummy variable, reflect the elasticity of the real GDP with respect to each of these variables. Therefore, the generated coefficients of the log explanatory variables represent the percentage change in the dependent variable resulting from a one percent change in the corresponding regressor. The financial credit provided to private sector by banks (CRD) which is expressed in ratios can be interpreted as semi-elasticity where its generated coefficient is multiplied by 100 to give the percentage change in the regressed variable (Wooldridge, 2006).

Based on economic theory, a priory expectation is that $\ln LAB$ is likely to be associated with a positive sign ($\beta_1 > 0$) because increases in labor force lead to increases in economic activities and thus boost GDP growth. Similarly, the growth can be also influenced by the level of education (Barro and Lee, 1993; Barro, 1991 and Benhabib and Spiegel, 1994). Accordingly, the coefficient of human capital variable (HC) is expected to carry a positive sign ($\beta_2 > 0$). Similarly, the amount of physical capital ($\ln K$) would have a major impact on GDP growth as increases in capital create a substantial rise in total factor productivity. Therefore, the estimated value of domestic capital coefficient is expected to be positive ($\beta_3 > 0$).

In the context of this study, aid represents the variable of interest. It has been included in the above equation so that its role in augmenting GDP growth can be captured. As an input in the production function, aid is expected to exercise a positive impact on total output thus the coefficient of the variable is expected to be positive. However, as stressed in the reviewed literature, the empirical evidence points out that aid could have a positive or negative effect on economic growth depending on the existence of some conditions. Therefore, the sign of its coefficient is anticipated to be undecided and waiting for empirical investigation ($\beta_4 > ?$). Moreover, the effect of ODA on GDP is likely to be affected by the level of institutional quality. As shown in the literature section, several studies have emphasized that the full utilization of aid resources requires a minimum level of institutional development in recipient countries. To include this complementary relationship between aid and institutional quality, the model has extended by including an interactive regressor $\ln(ODA * PUBCORR)$. The $PUBCORR$ represents the public corruption index which used to proxy the institutional quality in Sudan. The coefficient β_5 represents the elasticity of GDP with respect to $ODA * PUBCORR$ interactive term. The sign of β_5 's coefficient would depend on the level of corruption prevailing in the country and, therefore, remain undecided ($\beta_5 > ?$).

The previous researches have concluded that exports play an important role in advancing economic growth (Balassa 1985; Ram, 1985; Balassa, 1978 and Bhagwati, 1988). Thus, the coefficient of the real exports variable is expected to be accompanied by a positive sign ($\beta_6 > 0$). Furthermore, there is a large body of empirical literature on the role of the financial development in escalating economic growth. The availability of

credit may determine the extent to which domestic firms are able to borrow in order to extend innovative activities. Besides, the capable banks would attract and mobilize public saving and offer it to other sectors at lower interest rates. Accordingly, the coefficient of banking credit variable is supposed to be associated with a positive sign ($\beta_7 > 0$).

Finally, the model also takes the adoption of the privatization policy that initiated in 1992 into account. Its impact has been delivered by the coefficient of the dummy variable (β_8). We see that it is feasible to include an exogenous variable to deliver the impact of privatization policy on economic growth. First, the privatization increases the level of accountability in business environment, decreases corruption and, therefore, expands domestic businesses. Second, the presence of a successful private sector is likely to motivate the managers of publicly owned projects to adopt the same managerial and technical methods adopted by private sector to achieve business success. Adopting such efficient managerial techniques can boost productivity and accelerates GDP growth.

4.2 Estimation Method

We employ the autoregressive distributed lag (ARDL) cointegration procedures, as proposed by Pesaran and Shin (1999) and Pesaran et al. (2001), to investigate the effect of aid on economic growth in Sudan. We have chosen the ARDL co-integration technique because it possesses several superior merits compared to other cointegrating techniques. First, the ARDL bounds test facilitates obtaining consistent estimates even in small samples. Second, ARDL permits dealing with both stationary and non-stationary variables, as long as their order of integration doesn't exceed one $I(1)$. Third, ARDL approach overcomes both serial correlation and endogeneity problem among variables, allowing the estimation of both the short-run and long run coefficients simultaneously and with lagged dependent and predictors variables. Fourth, according to Marques et al. (2016), the asymptotic theory built in the ARDL bounds test will not be affected even when one-zero dummy variables are included in the model being estimated. Fifth, the main concern of this analysis is to examine aid effectiveness on economic growth in Sudan economy. As foreign aid doesn't materialize as a spot effect on GDP growth but also leads to long run effects, some studies, when modeling aid effectiveness, apply lagged forms of both dependent and independent variables as

additional predictors. In the ARDL sense, this matter can be handled automatically since the approach is dynamic in nature and openly considers the behavior of the variable over measurable period of time.

To investigate the long relationship among the variables pertaining to equation 3, the ARDL bounds test for the cointegration can be specified as follows:

$$\begin{aligned}
 \Delta \ln GDP_t = & \alpha_0 + \sum_{i=1}^{n-1} \alpha_{1i} \Delta \ln GDP_{t-1} \\
 & + \sum_{i=1}^{n-1} \alpha_{2i} \Delta \ln LAB_{t-1} + \sum_{i=1}^{n-1} \alpha_{3i} \Delta \ln HC_{t-1} + \sum_{i=1}^{n-1} \alpha_{4i} \Delta K_{t-1} \\
 & + \sum_{i=1}^{n-1} \alpha_{6i} \Delta \ln ODA_{t-1} + \sum_{i=1}^{n-1} \alpha_{5i} \Delta \ln (ODA_t * PUBCORR_t)_{t-1} \\
 & + \sum_{i=1}^{n-1} \alpha_{7i} \Delta \ln REXP_{t-1} \\
 & + \sum_{i=1}^{n-1} \alpha_{8i} \Delta CRD_{t-1} + \sum_{i=1}^{n-1} \alpha_{9i} \Delta PRIV_{t-1} + \beta_1 \ln GDP_{t-1} \\
 & + \beta_2 \ln LAB_{t-1} + \beta_3 \ln HC_{t-1} + \beta_4 \ln K_{t-1} + \beta_5 \ln ODA_{t-1} \\
 & + \beta_6 \ln (ODA_t * PUBCORR_t) + \beta_7 \ln REXP_{t-1} + \beta_8 CRD_{t-1} \\
 & + \beta_9 PRIV_{t-1} + \varepsilon_t \dots \quad (4)
 \end{aligned}$$

Where Δ denotes the first difference operator of the respective variable; α_0 represents the drift component and ε_t is the error term. The dynamics for the error correction in the short run are denoted by the terms with summation symbols while the long-run relationship is represented by β s. The ARDL approach to cointegration involves two phases. In the first phase, the hypothesis of no cointegration is tested. Specifically, to detect the presence of cointegration relationship among the variables, we test the null hypothesis that $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$ against the alternative hypothesis $H_a: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$ by implementing the join F-statistic suggested by Pesaran et al. (2001) and Narayan (2005). Then, the calculated F can be compared with critical values given by Pesaran et al. (2001) for cointegration test. Accordingly, when the computed F-statistic exceeds their upper bounds critical values, then null hypothesis is rejected. In contrast, the null hypothesis cannot be

rejected if the F-statistic is below the lower bound critical value. The test will be inconclusive if the F-statistic lies between the lower and upper bound critical values.

After confirming the existence of co-integrating relationship among the variables under examination, the second phase in the ARDL approach encompasses estimating the long run coefficients. Thus, the vector error correction model will be estimated to identify the causality direction between economic growth and aid presence. However, before proceeding with the ARDL bounds test, it is necessary to determine the order of integration of the variables. This step is undertaken to ensure that the variables are not $I(2)$ stationary so as to avoid spurious results and, thus, allows the analysis to produce the optimal inference. Both Augmented Dickey-Fuller (ADF) and Phillip and Perron (PP) tests are used for this purpose.

4.3 The data

To investigate the impact of aid on economic growth in Sudan, a time series data set containing annual observations for the period 1980-2015 has been used. The majority of the data used is obtained from the World Bank Development Indicators (WDI) published by World Bank. Specifically, data on real gross domestic product, real exports, domestic banking credit to the private sector, and gross domestic capital formation are sourced from World Bank. The data on ODA is obtained from OECD database. The basic source of data on labor force is the statistics on population and labor force issued by United Nation Conference on Trade and development (UNCTAD). The data on human capital, which is measured by average years of schooling, has been obtained from Barro and Lee educational database. All monetary variables are in real values.

5. Empirical results and discussion

Before proceed with estimating the ARDL bounds test, we start the analysis by examining the stationarity characteristics of the variables used. The results of ADF and PP unit roots tests are summarized in Table 5.1. As the tests statistics indicate, except human capital variable ($\ln HC$) which seems to be of order $I(0)$ at level, the rest of the variables are found

to have unit roots at levels when these two tests are conducted⁵. However, after differencing the series once, all variables become stationary.

Having confirmed that the variables satisfy the stationarity conditions, the next step is to run the bounds test to determine the levels of cointegration. The results reported in Table 5.2 show that the calculated value of F-statistic is 7.09 which is greater than the upper level of bounds critical values of 3.13, 3.50, 3.84 and 4.26 at the 1%, 5%, and 10% levels of significance. Obviously, this outcome implies that the null hypothesis of no cointegration cannot be accepted and there exists a cointegration relationship among the set of variables concerned. However, these results represent a preliminary evidence for the existence of cointegration. Thus, the ARDL model can be further expanded by estimating the long and the short run in order to ratify this result.

Table 5.1: Summary of ADF and PP unit roots tests

Variable	Augmented Dickey-Fuller (ADF)		Phillips-Perron (PP)	
	Level		Level	
	With intercept but without trend	With intercept and trend	With intercept/no trend	With intercept and trend
LnGDP _t	0.356(0)	-3.133(7)	0.355(5)	-1.990(6)
LnLAB _t	1.691(0)	-1.261(0)	1.741(1)	-1.261(0)
LnHC _t	-2.177(1)	-1.734(1)	-14.03(3) ^a	-3.195(3)
lnODA _t	-1.983(2)	-1.938(2)	-1.326(4)	-1.593(4)
LnREXP _t	-0.023(0)	-1.784(1)	-0.327(3)	-1.945(3)
LnK _t	-0.674(0)	-1.344(0)	-0.743(2)	-1.539(1)
CRD _t	-1.334(0)	-1.636(1)	-1.534(3)	-1.431(2)
PUBCORR _t	-1.409(0)	-1.246(0)	-1.409(0)	-1.537(1)
The first difference				
ΔLnGDP _t	-4.928(0) ^a	-4.957(0) ^a	-4.883(5) ^a	-4.911(6) ^a
ΔLnLAB _t	-5.857(0) ^a	-6.055(0) ^a	-5.857(1) ^a	-6.125(4) ^a
ΔLnODA _t	-5.178(0) ^a	-5.110(0) ^a	-5.372(4) ^a	-5.301(4) ^a
ΔLnREXP _t	-4.305(0) ^a	-4.279(0) ^a	-4.289(2) ^a	-4.266(2) ^b
ΔLnK _t	-4.587(0) ^a	-4.516(0) ^a	-4.586(4) ^a	-4.517(4) ^a
ΔCRD _t	-3.456(0) ^b	-3.716(0) ^b	-3.456(0) ^b	-3.781(1) ^b
ΔPUBCORR _t	-3.733(0) ^a	-3.753(0) ^b	-3.673(3) ^a	-3.674(3) ^b

⁵ Since the computed F-statistics provided by Pesaran et al. (2001) is based on the assumption that the variables are $I(0)$ or $I(1)$, finding that education variable is purely $I(0)$ at level and not at first difference wouldn't lead to spurious results. Instead, these dissimilarities in the order of integration of variables support the usage of ARDL as an appropriate cointegration technique to execute the empirical investigation.

Lag order is shown in parenthesis based on SIC. ^{a, b and c} represents 1%, 5% and 10% level of significance, respectively.

Table 5.2: Results of bounds test

Null hypothesis :No co-integration		
Significance	Critical value	
	Lower bound	Upper bound
10% significance level	2.03	3.13
5% significance level	2.32	3.50
1% significance level	2.96	4.26
Computed F-statistic: 7.09, k = 7		
Decision: <i>Reject the null hypothesis at 1% significance level.</i>		

Note: the critical values are obtained from Pesaran et al. (2001). Table CI case III based on unrestricted intercept and no trend, p. 300.

The results of estimated long-run ARDL cointegration model (1, 1, 0, 2, 2, 0, 1, 0), which selected automatically from 20 models based on Akaike Information Criterion (see Appendix B), are presented in Table 5.3. As reported results indicate, the long run coefficient of ODA variable (*lnAID*) is positive and statistically significant indicating that foreign aid boosts GDP growth. Specifically, the findings indicate that a one percent increase in ODA disbursement pushes GDP to grow by, approximately, 0.38 percent. In light of this finding, some theoretical aspects on the relationship between aid and economic growth need to be acknowledged. As argued by many scholars, aid has a potentiality to contribute directly and indirectly to economic growth. Directly, aid probably expands the existing physical capital pushing GDP to grow beyond the levels that could otherwise be achieved without aid inflows. Indirectly, aid improves human capital and, hence, boosts the absorption of new knowledge and modern business practices that are likely to spillovers from sources such as foreign investment and other know-how sources. It is worth to note that the contributions of foreign aid to human capital development in Sudan cannot be overlooked. The schools, universities, health care centers (i.e. hospitals, dressing points and diagnostic units) and other social overhead capital facilities are extensively spread throughout the regions constituting the country.

However, regardless of the contribution gained from aid, there may be many hidden explanations behind its significant effect on economic growth in Sudan. First, this significant contribution may reflect the

weakness in domestic capital formation. In other words, the negligible contribution of domestic capital to the total output may boom the contribution of aid to economic growth. Second, the high dependency on aid may increase the fragility of the country's economy by making it subject to changes and fluctuations in the international relations.

Interestingly, the coefficient associated with the interaction between ODA and public corruption variable is negative and statistically significant. This indicates that the spread of corruption in Sudanese public institutions undermines the contributions of aid in promoting economic growth. It is worth noting that in the last four decades, Sudan has experienced a severe deterioration in the quality of its public institutions. The nepotism, embezzlements, abuses against public properties, and bad institutional practices became strongly institutionalized. Accordingly, in the midst of such corrupt environment, aid wouldn't be used effectively and, consequently, fail to enhance economic capabilities in a manner that sustain economic growth. Moreover, the lack of accountability is likely to make aid resources act as a substitute for public spending leading to significant deterioration in economic growth. Many researchers have frequently confirmed the existence of fungibility of aid particularly in institutionally less developed countries (Bauer, 1976; Khilji and Zampelli, 1991; Farag et al. 2009 and Ke et al, 2011).

Turning to the rest of the variables, the findings show that the coefficients associated with human capital ($\ln HC$), real export ($\ln REXP$), banking credit (CRD) and privatization ($PRIV$) variables are all correctly signed and statistically significant. Specifically, the coefficient of human capital variable is positive and statistically significant indicating that the enhancements in the capabilities of human cadres via increasing years of schooling lead to progressive increases in economic growth. Likewise, in tune with the well-established proposition that economic liberalization increases economic growth, we find that implementing privatization policy generates significant increases in GDP.

As expected, the coefficient of the real exports variable is positive and statistically significant indicating that the returns from exports have a significant contribution to economic growth. Similarly, and in line with prior expectations, the coefficient of banking credit variable is positive and statistically significant. It demonstrates that the provision of barrowing facilities via banking system contributes positively to

economic growth. This outcome is expected since the country suffers from a prolonged gap between national savings and the actual demand for capital. Conversely, the results indicate that GDP has a negative elasticity with respect to the expansion in labor force. As the coefficient in front of labor force variable ($\ln LAB$) indicates, an increase in labor force by a one percent, decreases GDP growth rates by 0.37 percent. This may endorse that aggregate production function in Sudan economy exhibits decreasing returns to scale with respect to labor input. This outcome can be justified by the fact that the capital input is proportionally smaller than the labor force. Accordingly, regardless of the proportions of other inputs, increases in labor force add less to the GDP giving birth to decreasing returns to scale in the long run.

The results on the estimates of the error correction representation don't diverge significantly from those obtained for the long run. As Table 5.4 shows, the short run coefficients of human capital ($\ln \Delta HC$), real exports ($\ln \Delta REXP$), banking credit (ΔCRD) and privatization ($PRIV$) variables preserve their positive and statistically significant signs. In contrast, the short run coefficient appears in front of aid variable turns out to be negative and statistically significant.

Table 5.3: Estimates of the long run coefficients, ARDL (1, 1, 0, 2, 2, 0, 1,0)

Dependent variable	Log(GDP)			
Variable	Coefficient	Standard Error	t-ratio	P-value
$\ln LAB_t$	-0.366***	0.054	-6.698	0.000
$\ln HC_t$	0.729***	0.163	4.467	0.000
$\ln K_t$	0.075	0.101	0.741	0.468
$\ln ODA_t$	0.376**	0.158	2.381	0.027
$\ln REXP_t$	0.214**	0.084	2.553	0.019
$\ln ODA_t * BUCOR_t$	-0.327**	0.156	-2.102	0.049
CRD	0.019*	0.0106	1.814	0.085
PRIV	0.613***	0.161	3.799	0.001
Constant	18.851***	1.562	12.07	0.000

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

Table 5.4: Estimates of the Error Correction Representation, ARDL
(1, 1, 0, 2, 2, 0, 1,0)

Dependent variable	Log GDP			
Variable	Coefficient	Standard Error	t-ratio	P-value
ΔLnLAB_t	-0.066**	0.026	-2.509	0.021
ΔLnHC_t	0.283***	0.078	3.623	0.002
ΔLnK_t	0.054**	0.024	2.255	0.036
ΔLnK_{t-1}	0.093***	0.029	3.205	0.005
ΔLnODA_t	-0.216***	0.052	-4.126	0.001
$\Delta \text{LnODA}_{t-1}$	-0.053***	0.017	-3.199	0.005
ΔLnREXP_t	0.083**	0.034	2.452	0.024
$\Delta \text{Ln ODA} \cdot \text{BUCOR}_t$	0.210**	0.052	4.069	0.001
ΔCRD_t	0.007*	0.004	1.908	0.072
ΔPRIV_t	0.238***	0.043	5.533	0.000
ect_{t-1}	-0.388***	0.068	-5.691	0.000

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

The coefficient of the lagged error correction term (ecm_{t-1}) is negative and statistically significant lending further support to the existence of cointegration between variables under consideration. Its coefficient is -0.39 demonstrating that in each year, about 39% of shocks in the equilibrium can be adjusted to restore the long run equilibrium.

Finally, and as suggested by Brown et al. (1975), we investigate the stability of the model by using Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) tests. As can be read from Appendices A.3 and A.4, the straight lines plots of both CUSUM and CUSUMSQ are situated between the two dashed lines. Since these two lines signify that both test stay within 5% levels of significance it can be inferred that the relationship between the variables concerned is stable and the model is correctly specified.

6. Conclusion and Policy Implications

Driven by the current debates on the effectiveness of foreign aid in mitigating economic illnesses in recipient countries, this study aims at investigating the impact of aid on economic growth in Sudan. To make this aim reachable, the intended study applies the ARDL cointegration

technique to a time series data set pertain to Sudan and spans over the period from 1980 to 2015.

The result of ARDL F-statistic bounds tests conclusively reveals the existence of cointegrating relationship between variables used. Accordingly, the study proceeds to estimate the error correction model to verify the short and the long run relationships. Expectedly, the results show that aid in the form of ODA has a positive and significant long run influence on GDP growth. This result is consistent with the voluminous number of previous studies arguing that aid presence spurs economic growth in recipient countries. In the same vein, it challenges the findings brought by a strand of well-established studies rejecting the contribution of aid to economic growth. Interestingly, the results also show that the interaction between aid and corruption in public institutions debilitates economic growth.

As predicted, improvement in human capital, the expansion in exports, making banking credit available to private sector, implementing privatization policy are all found to be positively and significantly related to economic growth. In addition, the results show that domestic capital formation has no long run significant impact on GDP. This finding agrees with the new classical growth theory which argues that the contribution of capital to economic growth can be only hold in the short run.

The results obtained by this study have many policy implications. First, Sudan as one of the highly aided countries needs to lighten its reliance on aid as a key promoter for economic growth. This is because the dependence on such unguaranteed resources has negative consequences on the future economic performance of the country. For instance, aid, particularly when it turns out to be conditioned or fluctuated, would draw government to take some measures that may oppose nation's higher economic goals. Second, policymakers should use aid resources to develop soft infrastructures such as educational facilities, health care services and rebuilding the capacities of cadres. Third, the above findings may be indicative for the severity of corruption in public institutions on the country's economic performance. Yet, there is much evidence that high institutional quality increases the desirable impact of foreign aid on the national economy. Accordingly, policymakers should work on establishing a transparent public environment. Specifically, the levels of accountability in the public institutions must be enforced and sustained. This would help maximize the contributions of aid in accelerating and sustaining economic growth in the long run.

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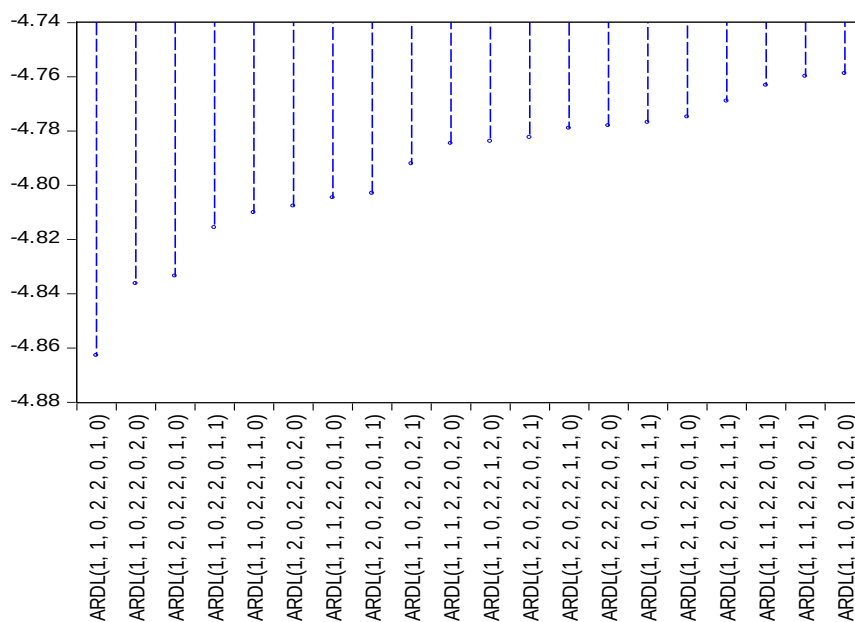
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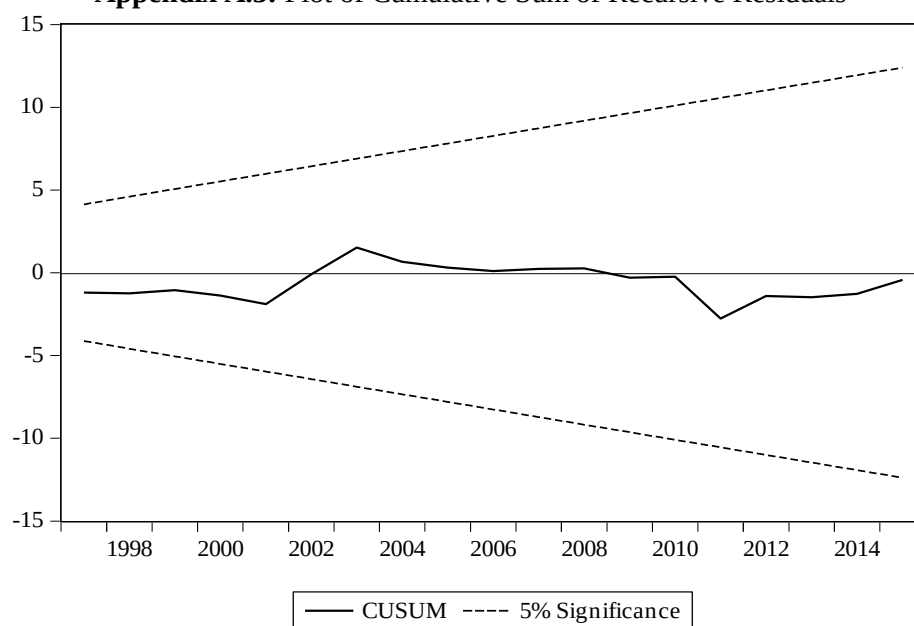
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Appendices

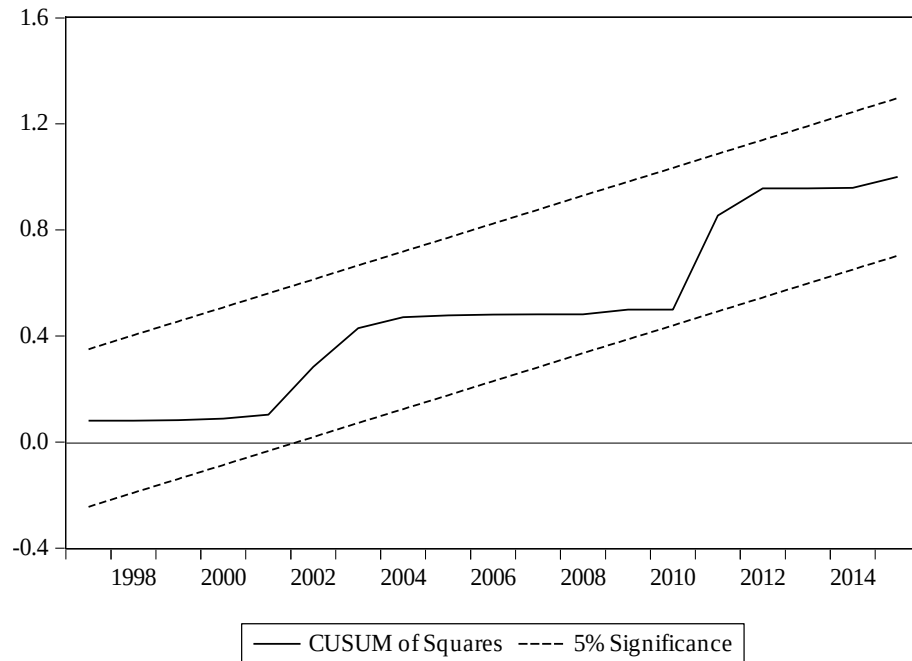
Appendix A.2: Akaike Information Criteria (top 20 models)



Appendix A.3: Plot of Cumulative Sum of Recursive Residuals



Appendix A.4: Plot of Cumulative Sum of Squares of Recursive Residuals



Private Sector Development Index of OIC Countries

Elvin Afandi¹, Ahmed Nassar² and Reham Hassan³

Private sector development is a multidimensional process both conceptually as well as empirically. It involves many efficiency, quality, sustainability, performance and dynamism features. However, there is no a single country-level measure that captures all these dimensions or features of private sector development. Our paper contributes to the current literature by introducing new composite index of private sector development and its four sub-indices: environment, penetration, sophistication and accountability. These indices are first time created for 57 OIC countries, which can be recalculated on annual basis and should offer a useful analytical tool for policy makers and researchers.

Keywords: Private Sector, Private Sector Development, Index

i. Introduction

There is a growing recognition of the critical importance of the vibrant private sector in sustainable, inclusive and fair development. Private sector development involves improvements in such features or functions provided by the private sector as: quality goods and services, resources and capital allocation, new and sustainable jobs, pays and compensations, fiscal budget revenues, market efficiency and productivity, innovation and knowledge transfers, competitive economy etc.

Generally, there are two types of measures that try approximate private sector development: a) aggregate level objective indicators (i.e., share of private sector in GDP or employment; volume of private sector investment) and b) composite indices developed by international agencies (i.e., Doing Business Index of the World Bank; Global Competitiveness Index of the World Economic Forum).

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Nevertheless, private sector development is a multidimensional process both conceptually as well as empirically. Private sector has gradually evolved across the world, and it involves now many quality, sustainability, performance and dynamism features. However, there is no a single country-level measure that captures all these dimensions or features of private sector development.

In this study, we introduce a four-dimensional Private Sector Development Index of OIC countries to overcome the shortcomings of single indicators or indices. The composite index and its four sub-indices (environment, penetration, sophistication and accountability) are significant improvement over the traditional and single measures and indices of private sector development. We construct the composite index and its sub-indices for 57 OIC countries for the year 2017, using 24 distinct indicators. The paper contributes to the empirical literature as follows. First, we summarize the diverse set of indicators in one easy to use index and four sub-indices. To the best of our knowledge, this is the first ever indicator in that sense. It helps us to avoid the burden of tracking a diverse set of indicators individually. Second, it allow us to assess comprehensively a particular dimension of private sector development and pin down where deficiencies or strength lie. This conclusion could then be further investigated using the disaggregated data from original sources.

The remaining part of the paper is structured as follows. Section 2 provides a brief Literature Review, which is followed by Data and Methodology in Section 3. It continues with Section 4 that reports the main results and discusses some robustness checks. We conclude the paper with high level recommendations and limitations.

ii. Literature review

According to the literature, the private sector involves a broader range of activities, and sometimes it is difficult to draw clear borders between public and private sector. According to Department of International Development (DFID) (2007), the private sector includes agents from farmers to street traders to foreign investors. The Organization for Economic Cooperation and Development (OECD) (1995) defines the private sector as “people organizing themselves into enterprises to carry out production of goods and services to meet market demands and in

process creating jobs, income and wealth for the economy that provide support to enable them to perform these functions”. Lienert (2009) defines the private sector based on ownership of institutional units and argues that “Economic Ownership” is an essential factor to avoid ambiguity of allocating entities to either the Public or Private sectors. Hood (2007) implies that the private sector includes formal and informal economic units and enterprises that are directly or indirectly owned by non-governmental entities. For sake of simplicity, we also follow Hood’s definition, but limit it to only formal economic agents.

There are a number of indicators or indices that allow us to approximate country-level status of private sector development across the globe. Those indicators, can be grouped under two categories: a) aggregate level objective indicators (i.e., share of private sector in GDP or employment; volume of private sector investment) and b) composite indices developed by international agencies (i.e., Doing Business Index of the World Bank; Global Competitiveness Index of the World Economic Forum). Nevertheless, all these traditional indicators in general, tend to capture only partially the various features/dimensions of the private sector development. Empirically, there is not a single indicator, when taken its own, would offer a comprehensive understanding of the level of private sector development. And yet, private sector development is a multidimensional process. For example, an enabling business environment is a prerequisite for well-functioning private sector (Federal Ministry for Economic Cooperation and Development (BMZ), 2013). Conceptually, physical and financial infrastructure, regulatory and legal frameworks are underlying drivers of private sector landscape. According to Hood (2007), private sector development outputs include policies, practices, laws, regulations, infrastructure, and other factors necessary to foster businesses.

Private sector presence, penetration and integration into the global economy is another dimension to be considered (DFID, 2011). Improved business environment as an immediate outcome, in its turn results in a better contribution of the private sector to the economy. The sector gets better integrated to economy through creating value addition, employing people and allocating resources.

With the passage of time, private sector has evolved across the world and modern private sector has embedded with new qualities and social

features. In addition to traditional dimensions of private sector development (i.e., environment and penetration), facets such as sophistication (i.e., efficiency, innovation, competitiveness) and social accountability (social entrepreneurship, ethical behavior, social values) now play substantive roles in explaining the level of private sector development. BMZ (2013) for example, stresses on the advancement level of the economy for a more accommodative business environment and better ideas creation. Labuschagne; Brent; and van Erck (2005) focuses on the value addition through ethical practices that directly feed into sustainable development.

As discussed above, multidimensional nature of private sector development requires us to look at a diverse set of indicators and indices. In order to avoid a burden of tracking a multiple indicators individually and to overcome the shortcomings of single indicators as proxies for private sector development, we propose a composite index, which is a summary of four sub-indices namely, Private Sector Environment (PSE); Private Sector Penetration (PSP); Private Sector Sophistication (PSS); Private Sector Accountability (PSA) Indices (Figure 1).

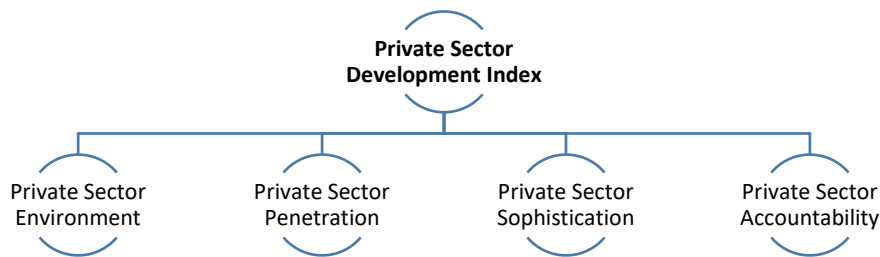


Figure 1: Composition of Private Sector Development Index

These four sub-indices and the final composite index pull together multiple indicators and allow a comprehensive assessment of particular features and the overall level of private sector development. This lets us to pin down where deficiencies or strength in private sector development lie, which could then be examined in greater detail using the disaggregated data at individual level.

iii. Methodology and data

3.1. Methodology

We construct the composite index of the private sector development by using the following three-step approach which is proposed in OECD Handbook on Constructing Composite Indicators (OECD, 2008) and effectively utilized by Svirydzienka (2016):

- a) Normalization of variables that were used under particular dimension of private sector development;
- b) Aggregation of normalized variables into the sub-indices representing different functional dimensions;
- c) Combine the sub-indices into the final composite index.
- d)

Firstly, all indicators are normalized between 0 and 1, using the min-max procedures:

$$I_x = \frac{x - x_{min}}{x_{max} - x_{min}} \quad (1)$$

$$I_x = 1 - \frac{x - x_{min}}{x_{max} - x_{min}} \quad (2)$$

Where x is the underlying raw data and I_x is the transformed continuous 0-1 indicator.

Normalization procedure facilitates aggregation over variables expressed in different measurement units and brings their values into an identical range [0, 1]. It relates country performance on an indicator to all countries' minimum and maximum, and thus, the highest (lowest) value of a given variable across countries is equal to one (zero). We use some

indicators (i.e., time to start a business, time to get electricity, time to resolve insolvency), where higher value indicates less development. For these cases, we apply the formula 2 of min-max procedure, in order to rescale the ratings.

Secondly, normalized variables are then aggregated into the four sub-indices of the private sector development index. These aggregations are weighted linear averages of the underlying series, where the weights are obtained from principal component analysis. The principal component analysis (PCA) reflects the contribution of each underlying series to the variation on the specific sub-index. As a statistical method, the PCA does not allow one to prejudge the importance of particular indicators in measuring private sector development. The PCA groups together individual indicators which are collinear to form an aggregate indicator that carries as much as possible of the information common to individual indicators. It allows to account for greatest possible variation in the indicator set using the smallest possible number of indicators.

Thirdly, using the same procedure above, the sub-indices then combined into the final composite index of private sector development.

3.2. Data

The Private Sector Development (PSD) index draws on a number of data sources: Doing Business Report of the World Bank; Enterprise Surveys of the World Bank; Global Competitiveness Report of the World Economic Forum; and World Development Indicators of the World Bank. The composite index contains 24 distinct indicators, split among four sub-indices or categories: environment, penetration, sophistication and accountability. Indicators for each sub-indices are selected based on the following five criteria:

- a) Suitability – data relevance for selected category (sub-index)
- b) Availability – data availability across countries and time periods
- c) Consistency – data consistency across time and the countries
- d) Reliable – data accuracy for intended use
- e) Verifiable—so that processes that produce the indicators can be validated

In total, we have selected 24 indicators based on the above mentioned criteria. The data sources and definitions of each indicator are provided in Annex 1, while Annex 2 reports the summary statistics of the underlying data.

iv. Results

In this section, we report and discuss the results of relative ranking of countries on overall, as well as on four dimensions private sector development: PS environment, PS penetration, PS sophistication and PS responsibility. Table 2 reports the state of overall private sector development in 2017 across 57 OIC countries. As we see, the United Arab Emirates (UAE) is the country with the highest PSD index score of 0.8762, while Turkmenistan closes the ranking with the overall score of 0.0018. In terms of composite private sector development index, top 10 OIC countries are: the UAE, Malaysia, Qatar, Bahrain, Jordan, Azerbaijan, Indonesia, Morocco, Kingdom of Saudi Arabia and Turkey. Moreover, there are some differences in terms of country ranking across various dimensions of the private sector development. Some countries might present fairly high ranking in some dimensions, while could lack behind in other dimensions. For example, Gabon ranks 3rd in PSP sub-index, while stay far behind (37th) when it comes to the ranking in PSE. Another example is Qatar, which is ranked 2nd in the PSA index, while it stands at 14th place in terms of PSP sub-index. Likewise, there is a high divergence for other countries like Morocco (2nd in PSP versus 19th in PSA), Kingdom of Saudi Arabia (6th in PSS versus 23rd in PSP), Azerbaijan (4th in PSS versus 12th in PSP).

Table 1: Country Rankings on Private Sector Development, 2017

	PS Development		PS Environment		PS Penetration		PS Sophistication		PS Accountability	
	rank	score	rank	score	rank	score	rank	score	rank	score
United Arab Emirates	1	0.8762	1	0.9018	1	0.7555	1	0.9061	1	0.9416
Malaysia	2	0.8078	2	0.8834	4	0.5598	2	0.8895	3	0.8984
Qatar	3	0.7361	4	0.7745	14	0.4016	3	0.8333	2	0.9353
Bahrain	4	0.6662	3	0.8043	7	0.4772	5	0.6927	5	0.6904
Jordan	5	0.6258	11	0.6949	5	0.5566	8	0.6269	8	0.6248
Azerbaijan	6	0.6182	10	0.7043	12	0.4146	4	0.6950	7	0.6591
Indonesia	7	0.6110	12	0.6326	10	0.4546	7	0.6562	4	0.7006
Morocco	8	0.5993	5	0.7484	2	0.6135	12	0.5224	19	0.5130
Saudi Arabia	9	0.5617	16	0.6039	23	0.3101	6	0.6608	6	0.6720
Turkey	10	0.5475	6	0.7478	19	0.3376	10	0.5566	15	0.5482
Albania	11	0.5413	7	0.7088	15	0.3984	19	0.4699	11	0.5879
Oman	12	0.5263	8	0.7077	31	0.2869	13	0.5155	10	0.5950
Gambia	13	0.5250	17	0.6019	11	0.4421	17	0.4771	12	0.5787
Cote d'Ivoire	14	0.5110	13	0.6223	6	0.4829	25	0.4049	16	0.5338
Guinea	15	0.5073	34	0.4792	8	0.4683	15	0.4806	9	0.6011
Senegal	16	0.4930	20	0.5704	13	0.4029	14	0.4855	18	0.5133
Lebanon	17	0.4924	14	0.6142	26	0.3058	9	0.5920	24	0.4577
Brunei	18	0.4841	15	0.6100	32	0.2722	16	0.4796	13	0.5745
Kazakhstan	19	0.4698	18	0.5832	28	0.3041	18	0.4718	17	0.5198
Tunisia	20	0.4620	9	0.7074	24	0.3097	27	0.3966	28	0.4344
Uganda	21	0.4591	19	0.5774	16	0.3763	28	0.3959	21	0.4869
Gabon	22	0.4515	37	0.4405	3	0.6095	36	0.2999	25	0.4560
Egypt	23	0.4483	24	0.5529	30	0.2957	21	0.4367	20	0.5079
Tajikistan	24	0.4454	22	0.5601	29	0.2999	31	0.3515	14	0.5702
Cameroon	25	0.4381	36	0.4544	9	0.4624	29	0.3712	22	0.4647
Guyana	26	0.4370	23	0.5567	20	0.3311	24	0.4135	27	0.4466
Pakistan	27	0.4263	28	0.5163	22	0.3142	20	0.4423	29	0.4326
Nigeria	28	0.4220	32	0.4875	17	0.3720	26	0.4042	30	0.4242
Kuwait	29	0.4201	21	0.5637	40	0.1293	11	0.5289	23	0.4586
Iran	30	0.3928	25	0.5501	36	0.2010	23	0.4232	32	0.3967
Benin	31	0.3904	30	0.4977	27	0.3047	34	0.3113	26	0.4480
Mali	32	0.3891	33	0.4796	25	0.3058	30	0.3554	31	0.4157
Mozambique	33	0.3807	26	0.5275	18	0.3682	35	0.3059	37	0.3212
Bangladesh	34	0.3638	38	0.4372	34	0.2447	22	0.4261	35	0.3473
Kyrgyzstan	35	0.3638	27	0.5247	21	0.3205	38	0.2520	34	0.3579
Algeria	36	0.3310	39	0.4292	35	0.2348	32	0.3449	40	0.3150
Burkina Faso	37	0.3267	35	0.4778	33	0.2599	39	0.2484	38	0.3205
Syria	38	0.3181	29	0.5040	39	0.1321	37	0.2615	33	0.3750
Suriname	39	0.2995	40	0.4213	38	0.1441	33	0.3132	39	0.3193
Sierra Leone	40	0.2794	31	0.4900	45	0.0676	40	0.2144	36	0.3457
Yemen	41	0.1857	54	0.2199	46	0.0636	41	0.1733	41	0.2861
Chad	42	0.1701	51	0.2769	41	0.1216	43	0.1050	42	0.1768
Libya	43	0.1608	49	0.3063	47	0.0599	42	0.1125	43	0.1645
Mauritania	44	0.1529	43	0.3874	42	0.0948	44	0.1046	44	0.0249
Togo	45	0.1219	41	0.4174	48	0.0545	49	0.0155	45-57	0.0000
Maldives	46	0.1149	42	0.4081	49	0.0515	53	0.0001	45-57	0.0000
Djibouti	47	0.1090	44	0.3626	44	0.0733	54-57	0.0000	45-57	0.0000
Afghanistan	48	0.0993	48	0.3193	52	0.0374	45	0.0402	45-57	0.0000
Uzbekistan	49	0.0987	47	0.3273	51	0.0379	47	0.0296	45-57	0.0000
Niger	50	0.0968	45	0.3378	54	0.0366	51	0.0128	45-57	0.0000
Guinea Bissau	51	0.0934	53	0.2635	43	0.0742	46	0.0357	45-57	0.0000
Comoros	52	0.0852	46	0.3342	57	0.0066	52	0.0001	45-57	0.0000
Palestine	53	0.0795	50	0.2920	55	0.0114	50	0.0144	45-57	0.0000
Sudan	54	0.0783	52	0.2759	53	0.0372	54-57	0.0000	45-57	0.0000
Somalia	55	0.0770	56	0.1263	37	0.1815	54-57	0.0000	45-57	0.0000
Iraq	56	0.0673	55	0.2031	50	0.0467	48	0.0195	45-57	0.0000
Turkmenistan	57	0.0018	57	0.0000	56	0.0072	54-57	0.0000	45-57	0.0000

In the Table 2 below we aggregate the summary statistics by regions, which help us to drive some region-specific conclusions with regard to the divergence in the level of private sector development and its dimensions.

Table 2: Summary Statistics of the Private Sector Development, by region

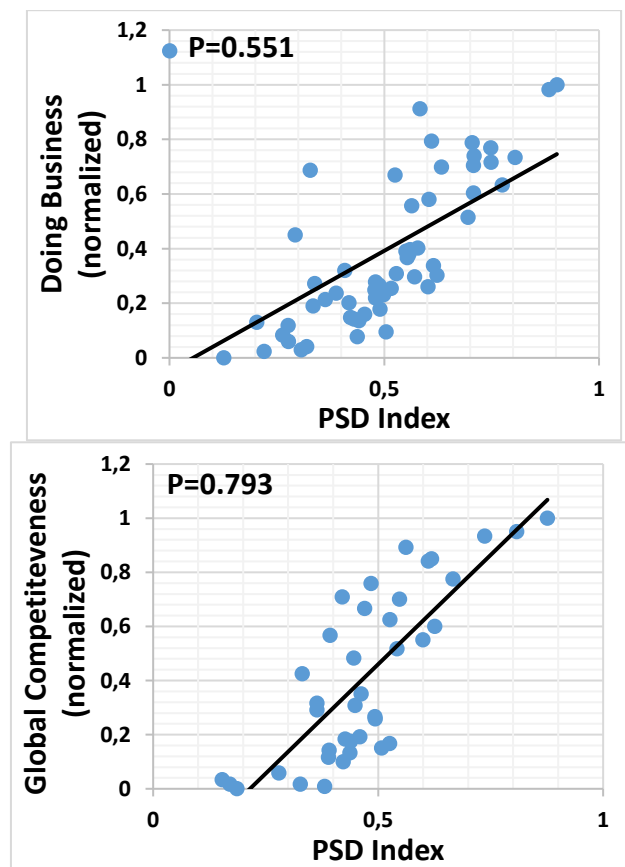
ASIA						Eastern Europe and Central Asia					
	PSE	PSP	PSS	PSA	PSD		PSE	PSP	PSS	PSA	PSD
Min	0.319	0.037	0.000	0.000	0.099	Min	0.000	0.007	0.000	0.000	0.002
Max	0.883	0.560	0.890	0.898	0.808	Max	0.748	0.415	0.695	0.659	0.618
Mean	0.532	0.268	0.407	0.413	0.405	Mean	0.520	0.265	0.353	0.405	0.386
Median	0.516	0.272	0.426	0.433	0.426	Median	0.572	0.312	0.411	0.534	0.458
Std. Dev.	0.517	0.164	0.261	0.279	0.212	Std. Dev.	0.233	0.145	0.231	0.247	0.208
Middle East and North Africa						Sub-Saharan Africa					
	PSE	PSP	PSS	PSA	PSD		PSE	PSP	PSS	PSA	PSD
Min	0.203	0.011	0.000	0.000	0.067	Min	0.126	0.007	0.000	0.000	0.077
Max	0.902	0.755	0.906	0.942	0.876	Max	0.622	0.610	0.485	0.601	0.525
Mean	0.550	0.275	0.424	0.440	0.423	Mean	0.439	0.265	0.239	0.291	0.309
Median	0.564	0.287	0.437	0.458	0.448	Median	0.478	0.305	0.300	0.346	0.381
Std. Dev.	0.206	0.206	0.265	0.270	0.227	Std. Dev.	0.120	0.178	0.176	0.222	0.164

As presented in Table 2, the MENA region and Asia regions have the highest average score for the composite index of the private sector development, while Sub-Saharan Africa demonstrates the lowest score. Nevertheless, some dimensions of private sector development appear to be similarly high (low) across all regions. For example, scores of Private Sector Environment index are relatively high across all regions, while a contrary picture is observed for the scores of Private Sector Penetration index.

In Figure 1 we discuss some robustness checks. We believe that the composite index and its four sub-indices are an improvement over the traditional measures and indices of private sector development. Conceptually, they incorporate information on a broader range of features of private sector development. For example, as Figure 2 demonstrates, while our overall PSD index and four sub-indices are correlated with the most wide-spread traditional indices, the correlation is not perfect or one

for one. Therefore, one could argue that our indices contain more information.

Figure 1: Correlation of Private Sector Development Index and Traditional Indices



v. Conclusions

In this study, we introduced the composite Private Sector Development (PSD) index and its four sub-indices – environment, penetration, sophistication and accountability – for 57 OIC countries for the year 2017. This is the first ever constructed composite index (and its four sub-indices) that offers significant improvement over the traditional measures and it serves as an important step towards measuring private sector development more comprehensively than before.

According to the results, top 10 OIC countries in terms of composite PSD index are: UAE, Malaysia, Qatar, Bahrain, Jordan, Azerbaijan, Indonesia, Morocco, Kingdom of Saudi Arabia and Turkey. However, this ranking differs, sometimes drastically, when it comes to the various dimensions of the PSD, being its environment, penetration, sophistication and accountability. Finally, further robustness checks prove the strength of our indices over the traditional measures and indices of private sector development.

A challenge for all empirical literature is that the broad measures of private sector development capture only partially the various functions of private sector and no one of them merits exclusive reliance. However, our new PSD index and its sub-indices help one to avoid the burden of tracking a diverse set of indicators individually. It also allows to assess comprehensively a particular dimension of private sector development and pin down where deficiencies or strength lie. These outcomes could then be further investigated using the disaggregated data from original sources.

Nevertheless, there are a number of limitations to the Private Sector Development index that need to be taken into account in future studies. First, our broad set of indicators capture only formal private sector development. Although the significance of shadow or informal private economy is still imperative in many OIC countries, we did not factor it in to the index simply due to insufficient data across countries and time. Second, again due to the data shortages, the index has not incorporated some potentially relevant features of private sector development: financial performance or efficiency of private sector (i.e., profit, growth).

While there are limitations of the composite PSD index and its four sub-indices, it should aid policy makers as an important tool to more accurately diagnose the status of the private sector development and devise the policies and reforms accordingly. Having it calculated every year would also assist OIC states in gauging the progress toward healthier and more pro-growth private sector and determine the effectiveness of their reforms. Last but not the least, it should also serve development practitioners and researchers analyzing the various relationship between private sector development and economic outcomes.

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Annex 1. Data sources and definitions

SUB-INDEX	INDICATOR	DEFINITION	SOURCE
PS Environment	Time to start a business (days)	The median duration (calendar days) that incorporation lawyers or notaries indicate is necessary in practice to complete a procedure with minimum follow-up with government agencies and no unofficial payments.	Doing Business Report
	Time to export (hours)	It is the time taken for documentary compliance, border compliance and domestic transport. Time is measured in hours, and 1 day is 24 hours.	Doing Business Report
	Time to get electricity (days)	The median duration (calendar days) that the electricity utility and experts indicate is necessary in practice, rather than required by law, to complete a procedure with minimum follow-up and no extra payments.	Doing Business Report
	Time to resolve insolvency (years)	Time for creditors to recover their credit is recorded in calendar years. The period of time measured by Doing Business is from the company's default until the payment of some or all of the money owed to the bank.	Doing Business Report
	Business impact of rules on FDI	How restrictive are rules and regulations on foreign direct investment (FDI)? [1 = extremely restrictive; 7 = not restrictive at all]	Global Competitiveness Report
	Domestic credit to the private sector (% of GDP)	Financial resources provided to the private sector by financial corporations, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	World Development Indicators
	Quality of overall infrastructure	How do you assess the general state of infrastructure (e.g., transport, communications, and energy) in your country? [1 = extremely underdeveloped—among the worst in the world; 7 = extensive and efficient—among the best in the world]	Global Competitiveness Report

SUB-INDEX	INDICATOR	DEFINITION	SOURCE
PS Penetration	Gross fixed capital formation, private sector (% of GDP)	Private investment that covers gross outlays by the private sector (including private nonprofit agencies) on additions to its fixed domestic assets measured as percent of GDP.	World Development Indicators
	Investment in infrastructure with private participation (millions)	The value of infrastructure projects in telecommunications, energy, transport, and water and sanitation that have reached financial closure and directly or indirectly serve the public.	The Little Data Book on Private Sector Development
	New business density	The number of new limited liability corporations registered in the calendar year per 1,000 working-age population	World Development Indicators
	Prevalence of foreign ownership	How prevalent is foreign ownership of companies? [1 = extremely rare; 7 = extremely prevalent]	Global Competitiveness Report
	Extent of market dominance	How do you characterize corporate activity? [1 = dominated by a few business groups; 7 = spread among many firms]	Global Competitiveness Report
SUB-INDEX	INDICATOR	DEFINITION	SOURCE
PS Sophistication	High technology export (% of total manufacturing exports)	Products with high Research and Development, D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery measured as percent of total manufacturing exports.	World Development Indicators
	Firm level technology absorption	To what extent do businesses adopt the latest technologies? [1 = not at all; 7 = to a great extent]	Global Competitiveness Report
	Internet usage, %	People who used the internet from any location and for any purpose, irrespective of the device and network used.	Global Competitiveness Report
	Capacity of innovation	To what extent do companies have the capacity to innovate? [1 = not at all; 7 = to a great extent]	Global Competitiveness Report
	Value chain breadth	How broad is companies' presence in the value chain? [1 = narrow, primarily involved in individual steps of the value chain; 7 = broad, present across the entire value chain]	Global Competitiveness Report

	State of cluster development	How widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1 = nonexistent; 7 = widespread in many fields]	Global Competitiveness Report
	Capacity utilization (%)	Share of the current output in the maximum output possible using the current inputs.	Enterprise Survey
SUB-INDEX	INDICATOR	DEFINITION	SOURCE
PS Accountability	Ethical behavior of firms	How do you rate the corporate ethics of companies (ethical behavior in interactions with public officials, politicians and other firms)? [1 = extremely poor—among the worst in the world; 7 = excellent—among the best in the world]	Global Competitiveness Report
	Efficacy of corporate boards	To what extent is management accountable to investors and boards of directors? [1 = not at all; 7 = to a great extent]	Global Competitiveness Report
	Company spending on R&D	To what extent do companies invest in research and development (R&D)? [1 = do not invest at all in R&D; 7 = invest heavily in R&D]	Global Competitiveness Report
	Willingness to delegate authority	To what extent does senior management delegate authority to subordinates? [1 = not at all; 7 = to a great extent]	Global Competitiveness Report
	Degree of customer orientation	How well do companies treat customers? [1 = poorly—mostly indifferent to customer satisfaction; 7 = extremely well—highly responsive to customers and seek customer retention]	Global Competitiveness Report

Annex 2. Summary statistics of the data

#	INDICATOR	Obs	Max	Min	Mean	Median
1	Time to start a business (days)	56	84.0	4.5	18.3	13.5
2	Time to export (hours)	55	589.0	15.0	151.3	132.0
3	Domestic credit to private sector (% of GDP)	54	123.9	3.6	36.9	27.0
4	Time to resolve insolvency (years)	48	5.0	1.0	2.8	2.7
5	Business impact of rules on FDI	44	5.5	2.9	4.3	4.3
6	Time to get electricity (days)	55	428.9	10.0	96.7	78.0
7	Quality of overall infrastructure (value)	44	6.2	1.5	3.6	3.8
8	Gross fixed capital formation, private sector (% of GDP)	45	63.3	1.0	16.9	15.8
9	Investment in infrastructure with private participation (% of GDP)	43	0.0	0.0	0.0	0.0
10	New business density (new registrations per 1,000 people ages 15-64)	35	29.7	0.0	1.9	0.8
11	Prevalence of foreign ownership (value)	42	5.6	2.2	4.1	4.1
12	Extent of market dominance (value)	44	5.0	2.1	3.6	3.6
13	High-technology exports (% of manufactured exports)	45	43.0	0.0	5.2	2.1
14	Firm-level technology absorption (value)	44	5.7	2.6	4.2	4.3
15	Individuals using Internet (%)	44	98.0	4.4	41.4	30.1
16	Capacity for innovation (value)	44	5.4	2.1	3.9	3.9
17	Value chain breadth (value)	44	5.3	2.1	3.6	3.6
18	State of cluster development (value)	44	5.4	2.7	3.6	3.6
19	Capacity utilization (%)	38	84.0	52.6	69.5	70.7
20	Ethical behavior of firms (value)	44	6.0	2.6	3.9	3.7
21	Efficacy of corporate boards (value)	44	5.7	2.3	4.5	4.6
22	Company spending on R&D (value)	44	5.1	1.8	3.2	3.0
23	Willingness to delegate authority (value)	44	5.3	2.1	3.6	3.6
24	Degree of customer orientation (value)	44	5.9	2.4	4.4	4.4

Endogenous Monetary Transmission in Islamic Financial Economics

Masudul Alam Choudhury¹ and NirDukita Ratnawaty²

This paper is a continuation of the recent papers by Choudhury (2017), Choudhury (2015), and Choudhury and Hoque (2017) on the topic of endogenous nature of money (Choudhury, 1997) and monetary transmission as micro-money in Islamic financial economics. These papers have projected an Islamic economic theory of endogenous money that pursue the financing of projects in the real economy by bringing such project-specific spending to attain several much wanted goals of economic stability and performance. Among these is the 100 per cent circulation of bank-savings that banks otherwise hold back into the liquid form of spending. A 100 per cent Reserve Requirement Monetary System is maintained in Islamic monetary transmission and circulation with appropriate methodology and policies. Consequently, debt reduces to zero; the market transformation by the diversification of projects, the portfolio diversification of financing instruments to mobilize monetary units as micro-money into projects, and the increase in stakeholding altogether make the real output level statistically elastic. Thereby, prices stabilize in the absence of all forms of interest rates. The end result is the generalized inter-causality among the endogenous inter-variable relations.

Objective

This comprehensive picture is shown by the following sequence of effects: $S(r/i,y) = M(r/i,y)*v = p.y \Rightarrow$ 100 per cent conversion of bank-savings into money that is circulated fully via projects by financing instruments into the real economy. The symbols are defined as follows: S denotes bank-savings as deposits that are held by banks as liquidity that

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is not mobilized into the real economy. 'r' denotes rate of return in the real sector mobilization of savings and money circulating via financing instruments. 'i' denotes rate of interest. 'r' and 'i' may be in nominal or real terms. 'y' denotes real output. M denotes real quantity of money as a function of the real values of y and r/i (Cagan, 1989). 'p' denotes the price level. 'v' denotes the velocity of circulation of money. As the circulation of a quantity of money in the above-mentioned relations equates with bank-savings liquidated into real-economy financing (spending), then v tends to 1 as the signal of full mobilization of bank-savings into productive spending.

Micro-money formalism in Islamic 100 per cent reserve requirement monetary system

There are important social implications as endogenous ones linked with the economic ones of the above-mentioned relations. The fact of price stabilization with the perfectly elastic growth of the economy as a permanent phenomenon of the money, financing (spending), and real economy circular relations in respect of their endogenous inter-causal relations, means that the economic integration of this type has feedback with a life-fulfillment needs-economy and an increasingly privatizing economy. In the case of the macroeconomic general equilibrium system, this kind of adjustment is equivalent to an elastic form of non-inflationary economic growth and the complementary relations between aggregate demand with predominating spending (fiscal) stimulation and monetary policy induction (Friedman, 1953).

The project-specific expansion of monetary transmission complementing with the financing activity causes real output expansion. The results then are the market dominated transformation with public sector discursive coordination. Thereby, the real output expands along the intersection of the resulting aggregate demand and aggregate supply curves. Such a movement causes an elastic increase in productive employment and price-stability. In the Keynesian jargon (Mankiw, 1986) the full impact of the income multiplier is realized along such non-inflationary growth paths. Finally, price-stability as a result also causes simultaneously a stability in (r/i)-price relative.

Monetary transmission model of Islamic 100 per cent reserve requirement monetary system

In Islamic economic and real economy theory, the complementary coordination of money, finance, with the above-mentioned inner results in the variables causes reduction in 'i' even as the circulation of money, that is monetary transmission between banks and the real economy, enhances productive transformation. Figure 1 points out the nature of money and monetary transmission between the banks and the real economy in respect of liquidating the bank-savings into productive mobilization by spending. The well-known theory of Money (M)-Commodity (C)-Money (M) model (Heilbroner, 1986) is now extended to $\{(M-F-RE)_{\text{transmission 1}}-(M-F-RE)_{\text{transmission 2}} \text{ etc}\}(\theta)$.

Symbolizing the basic model of Tawhidi unity of knowledge and its conceptualization in money, finance, and real economy endogenous interrelationship

Symbol 'θ' denotes consciousness parameter of knowledge based on the episteme of unity of knowledge. In Islamic epistemological worldview, the derivation of 'θ' is discursively determined by way of the foundational reference to the Islamic primal ontology of oneness of God (Tawhid). This premise is explained by the precept of unity of knowledge in endogenously circular causal interrelations between the good choices identified by their multidimensional variables. Briefly we write this foundational knowledge-deriving epistemological methodology from the primal ontological roots as follows:

$\Omega \rightarrow_S \rightarrow \theta = \text{plim}\{\theta \text{ by discourse interactively with the learned ones}\}$
(Qur'an, 4:59).

Ω denotes the primal ontology as the Qur'an, emphasizing oneness of Allah represented as unity of knowledge by organic interrelations between the permissible choices while avoiding the impermissible ones (Qur'an, 36:36).

'S' denotes the transmission of the monotheistic knowledge in the Qur'an into worldly specifics denoted by 'θ'. 'S', called Sunnah, comprises the teachings of Prophet Muhammad, who Allah appointed by his Qur'anic

command as the chosen messenger of Allah for enlightening access to ‘everything’. The meaning of ‘everything’ could be noted in Barrow (1991).

$\theta = \text{plim}\{\theta\}$ is the consensual derivation of unity of knowledge. It can be ordinally represented in the derived model of (M-F-RE)[θ] model by discourse in reference to the law of monotheism explained by the episteme of unity of knowledge as an organic process of knowing in the Qur’an and Sunnah.

The knowledge evolutionary discursive system of multidimensional evolutionary learning processes of diverse world-systems, all induced by knowledge arising from the episteme of unity of knowledge, and contrarily from the differentiated worldview of disjoint diversities not guided by $\Omega \rightarrow_s \rightarrow \theta$, both carry on inducing the generality and details of the specific world-systems under study. In this paper, the specific world-system under study under the ontological and epistemological determination by $\Omega \rightarrow_s \rightarrow \theta$ is the (M-F-RE-....)[θ] complementary problem under the guidance of 100 per cent reserve requirement monetary system.

The evaluation of the effectiveness of the organization and realization of the (M-F-RE-....)[θ], as explained above, is carried out by the wellbeing function, referred to in the methodology of $\Omega \rightarrow_s \rightarrow \theta = \text{plim}\{\theta\}$ as Maslaha. The evaluation is made by estimation and simulation of this function, subject to the system of endogenously related inter-variable equations of circular causation relations in the light of the episteme of unity of knowledge, and vice-versa as established in $\Omega \rightarrow_s \rightarrow \theta = \text{plim}\{\theta\}$. The Maslaha function as wellbeing objective criterion is denoted by $W(\text{M-F-RE}, \theta)[\theta]$ with the inner variables.

Monetary transmission in the 100 per cent reserve requirement monetary system

Central Bank intervention to create marginal gold stock to stabilize created stocks, L_2 , L_3 ,

and thereby total monetary circulation by financial instruments in RE. Y_{jus} , finally, $v \approx 1$

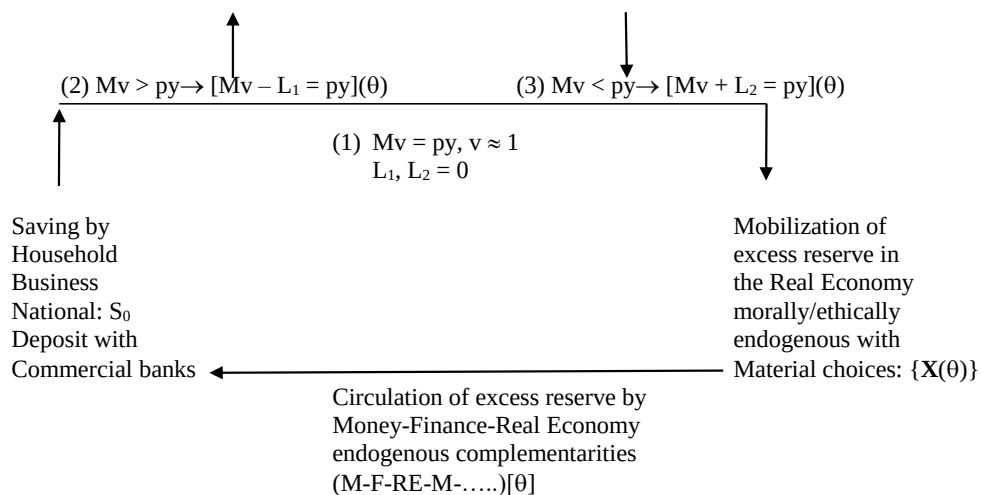


Figure 1: Monetary transmission in 100 per cent reserve requirement monetary system of $(M-F-RE)(\theta)$ endogenous complementary relations.

A brief explanation of monetary transmission circulating in the 100 per cent reserve requirement monetary system is as follows. The initiation of savings is by productive activity in the national income, by way of which savings S_0 are deposited in the commercial banks. In the 100 per cent reserve requirement system, the savings become deposits in banks ready to be circulated as money via financial instruments (F) into the real economy, RE. Now there are three different scenarios in such a circulation of money by financial instruments into the real economy. Firstly, the full amount of savings as deposits can circulate in the real economy by financing instruments aimed at specific projects. This kind of monetary circulation results in micro-money pursuing projects. Thereby, with the full mobilization of savings as deposits as money and financing is the feedback consequence of v tending to unity. The micro-money project-

specific circulation causes the otherwise case of fractional reserve requirement to withhold all the required deposits for the full circulatory purpose of spending by micro-money. The underlying episteme of unity of knowledge is thus implied to prevail in sustaining this complementary or participatory organic relationship between Money, Finance (Spending), and Real Economy [M-F-RE](θ).

This dynamic is represented by the parameterization of the unity of relations by θ -values (Choudhury, Pratiwi, Hossain, and Adenan in Toseef, forthcoming). The origin of such parameter-based inter-causal relations between the activities along with their inner variables is denoted by (M-F-RE)[θ]; and $M=py$, with interrelated $M = A * \prod_{i=1}^n M_i^{a_i}$ (θ); [$p.y$ = spending = $B * \prod_{i=1}^n (p.y)_i^{b_i}$] (θ). Both of these expressions apply in terms of project-specific micro-money and real-economy spending in them according to Islamic recommended choices (1 to n). Thus the context of θ -induction appears.

The other cases of monetary transmission shown in Figure 1 are firstly, of excess quantity of money adjusted by a withdrawal of L_1 of quantity of money to restore the equation of exchange: ($Mv > py \rightarrow [Mv - L_1 = py](\theta)$). The other case is of excess demand for money with adjustment thereby with injection of loanable fund by the Central Bank of L_1 . In every case, the adjusted equation of quantity theory of money and spending is restored. The result then is identical to the 100 per cent mobilization of money into the real economy via financial instruments and banking institutions. The central bank applies a marginal quantity of gold as numeraire to stabilize the currency value of all monies in circulation, including L_1 , L_2 and the rest.³

³ The dynamics of monetary transmission under 100 per cent reserve requirement monetary system imply that there is an inverse relationship between creation of gold (G) and trade (py). Thereby, gold creation comes to end as the adjustments in limiting amounts of L_1 and L_2 restore the 100 per cent mobilization in (M-F-RE)[θ]. We write: $L_1 - L_2 = \Delta M = \Delta py = G$. We rewrite this expression as, $\Delta py/py = G/M$. That is, currency value of money in circulation, py , equals G/M . Now as monetary transmission increases, M increases in quantity, G declines in volume. Thereby, $G/M = a$, as a declining parameter. Change in currency value, $g(py)$ is therefore stabilized around 'a' the total amount of money in circulation. That is $G = a * M$, with G declining asymptotically, as 'a' and M movement establish a rectangular hyperbola.

The complementary dynamics of [M-F-RE](θ) prevails always. The result in monetary transmission then is 100 per cent reserve with commercial bank to match monetary flow through financial instruments with real economy activity. This is the meaning of 100 per cent reserve requirement monetary system. The central bank thereby ceases to have monetary governance on monetary transmission. Only marginally there exist the management of L_1 and L_2 , and the overseeing and guidance of the states and policies of the economy with micro-money. In such money-finance-real economy interrelations the central bank establishes a discursive environment of consultation and policy guidance with commercial banks (Islamic banks), financial institutions, the real economy agencies, and all participants in economic activity.

A focused review of the literature

100 per cent reserve requirement monetary transmission of the [M-F-RE](θ) type appears in the seminal works of Maritain (1985). Maritain's contribution on a nature of money recommends unlimited tokens representing money for circulation in the real economy, so that all individuals and households would benefit from these tokens by exchange of goods and services. Monetary control by the central bank, commercial banks, and other monetary authorities would disappear. In 100 per cent reserve requirement monetary system with the gold standard as a stable numeraire the circulation of micro-money is similarly recommended to be unlimited so as to be circularly related with real exchange in goods and services. Thereby, the wellbeing effect will be optimized and asset-backing by gold would be minimal in volume. Gold would be required by the central bank only to stabilize the circulatory currency value and the residual amount of excess reserves in the central bank (Fig. 1).

The praise for expansionary monetary supply for meeting the demand for spending in goods and services in the real economy was also proposed by the Austrian School of Economists (Yeager, 1997; Hayek, 1999). The unit of micro-money was named as Unit. It was thus the numeraire to match up with a unit value of spending in goods and services in the real economy. On the side of the wellbeing contribution of such micro-money Schumpeter's (1961) entrepreneurial growth model is an example of micro-money being in high supply to finance sustainable microentrepreneurial projects.

In recent times, it is surmised by hind sight that the monetarism of an easy rather than a counter-cyclical contraction in the quantity of money into the real economy could have stemmed the tide of the Great Depression. In a growing economy, the complementarities between fiscal and monetary policies can be best fitted for non-inflationary economic growth.

In all such states of [M-F-RE](θ) model within the regime of 100 per cent reserve requirement monetary system, there remains the consistency of the effect of declining interest rates on the complementarities between money, finance, and real economy. Furthermore, the expanded release of monetary supply to endogenously support entrepreneurship, sustainability of non-inflationary economic growth, and thereby wellbeing. The early work of Friedman (1960) pointed out the possibility of such a holistic possibility of monetary arrangement.

The [M-F-RE](θ) model along with its early prototypes in the history of money, monetary policy, and institutional control over quantity of money for the real economy suggest that this model is consistent with the state of a productive and ethically sustainable economic regime with wellbeing as monetary and financial resources increased to complement with the real economy. Thereby a circular causation exists between the dynamics of money, finance, and real economy interrelations and the phasing out of all forms of interest rates causing release of resources for sustaining the holistic consequences of the wellbeing criterion. This yields the situation whereby a dynamic evolutionary learning by endogenous interrelations between the inner variable of [M-F-RE](θ) type monetary transmission model is attained (Hayek, 1990).

Economic stability by means of the relationship between [M-F-RE](θ) and the wellbeing function

Economic stability caused by the [M-F-RE](θ) is explained in the case of the theory of monotheistic unity of knowledge in Islamic economics and finance by evaluation of the wellbeing function called the maslaha. Maslaha as wellbeing function parameterizes and explains the degree of pervasive positive complementarities that ought to exist between the variables denoting the good things of life and avoiding the negative complementarities with the respective variables signifying the undesired

things. The maslaha objective function also has the properties of inter-variable complementarities of the two kinds. It is continuously differentiable because of the same nature of the learning parameter derived from the ontological and epistemological foundations of unity of knowledge of the monotheistic methodology. That is, $\theta = \text{plim}\{\theta\} \leftarrow (\Omega, S)$. Due to the properties of interactive, integrative, and evolutionary learning of θ in the maslaha function (Choudhury, 2013), the maslaha function has non-optimal and non-steady state properties. Only evolutionary equilibriums caused by the force of ' θ ' in generating estimated and simulated complementarities apply.

The ontological-epistemological (Spencer, 2000) origin of ' θ '-induced maslaha function also gives rise to endogenous circular causation relations between the maslaha variables. Thereby, the maslaha function is evaluated by estimation and simulation of coefficients in the 'as is' and 'as it ought to be' states of the problems under study in the light of pervasive complementarities between variables subject to the system of circular causation relations in evaluating the maslaha function.

Summarizing the properties

One vector of selected variables in the $[M-F-RE](\theta)$ complementary problem in 100 per cent reserve requirement monetary system: $\mathbf{x}(\theta) = \{m, y, \mathbf{f}, p, e, r/i, \theta\}[\theta]$, with induction of all variables by ' θ '. The variables are, 'm' as real money, 'y' as real output, 'f' as vector of financial instruments conducive of M-F-RE complementary relations in the circular flow of goods and finances, 'p' as output price signifying level stability, 'e' as employment, 'r/i' as relative between rate of return and interest rate, ' θ ' as knowledge parameter inducing all these variables in terms of their inter-causal complementarities.

The conceptual maslaha function, subject to circular causation relations between the variables is $W(\theta, \mathbf{x}(\theta))$.

The circular causation relations between the variables are, $x_i(\theta) = A + \sum a_j(\theta) \cdot \ln x_j(\theta) + a(\theta) \cdot \ln(\theta)$;

$i, j = 1, 2, \dots, n; i \neq j$. Except for the last term, the θ -inductions of the variables and coefficients signify the sequential data of the variables corresponding to the θ -variables.

The quantitative form of the wellbeing function that can be evaluated (estimated in 'as is' state; and simulation in 'as it ought to be') is, $\theta = B + \sum a_i(\theta) * \ln x_i(\theta)$. This equation provides the sequence of $x(\theta)$ -variables that are estimated (simulated) as predictor variables from the circular causation estimated (simulated) results in the variables.

The full description of the evaluation system of the maslaha function is given by,

$$\text{Evaluate } W(\theta, x(\theta)) = \text{Const.} \prod x_i^{\alpha_i} * \theta^\beta.$$

$$\text{This is converted to natural logarithmic form, } \ln W(\theta, x(\theta)) = \text{Const.} \sum \alpha_i * \ln x_i + \beta * \ln \theta \quad (1)$$

$$\text{subject to the circular causation equations in natural logarithmic form, } \ln x_i(\theta) = A + \sum a_j(\theta) * \ln x_j(\theta) + a(\theta) * \ln(\theta). \quad (2)$$

The quantitative form of the maslaha function to evaluate is,

$$\theta = B + \sum a_i(\theta) * \ln x_i(\theta) \quad (3)$$

$$i, j = 1, 2, \dots, n; i \neq j$$

Economic stability attained by the model of unity of knowledge generated by pervasive complementarities between the inner variables of [M-F-RE](θ) endogenous circular flow interrelations is explained further as follows. By some amount of simplification of expression (1) in mathematical differentiation form we write in the form of rate of change, $g(.)$ with respect to ' θ ' in view of degrees of inter-variable complementarities:

$$g(W) = \sum \alpha_i * g(x_i) + \beta * g(\theta) > 0 \quad (4)$$

Now because every variable is positively complementary with θ -value, therefore, economic stability in the midst of ethically induced variables of the [M-F-RE](θ) model is implied.

The explanation of economic stability is made by the ontology, epistemology, and phenomenology of Tawhid as law in respect of the Qur'anic meaning of monotheism and its methodological representation in terms of unity of knowledge between recommended complementary variables. Yet this result is not true of the shari'ah based framework of Islamic economics and finance. Two examples are given here to establish the inability of shari'ah, fiqh, and fatwa misguided claim of economic stability.

Firstly, we take the case of the absence of ijara-type pricing, such as rental in ijara (assets acquired by deferred payments), premiums (as of takaful), deferred payments (as of mark-up pricing by murabaha), risk and return pricing on credit sale (as in the case of twarruq, innah, istisna). There are also the many cases that are daily conjured up by so-called 'shari'ah-compliance' legitimization of Islamic financial instruments.

All such deferred rental kinds of rates as prices on financial instruments, and thereby their pricing relations with goods and services in market exchange, are indeterminate. This problem is true at the initial point of a mutual contract, unless such prices are forward-looking prices that can be realized only 'nearest' to the point of exchange transactions. Forward-looking pricing is tantamount to interest rate (riba), for it remains undetermined at the present time of a contract. Thereby, real economic transactions remain equally undetermined in valuation. On the other hand, if goodwill of donations is used to form financial capital, this is not feasible under continued conditions of uncertainty and financial limitations of groups and individuals as donors for free-ridership. Feasibility and sustainability demand organized forms of pricing for risk, return, and transactions in the intertemporal sense. No formula has been derived according to shari'ah to resolve this critical outstanding problem of forward-looking ijara type pricing. There is no evidence of shari'ah instruments regarding their stability role in financing during global financial crises, as otherwise claimed. The only other way how this could happen is by relying upon large inflow of rich shareholders' funds. Such a case was implied in the greater than unit value of (Finance/Deposit)-ratio in shareholding of Islamic banks during the financial crises.

Twarruq as an example of micro-money in Islamic financial mobilization

One of the kinds of micro-money that has been debated by shari'ah-compliance institutional financial innovations in recent times is called twarruq. Twarruq is a short-selling financial credit arrangement. The buyer of an asset buys on credit without paying now. Upon financial need, the buyer sells the credited asset at a lower price to raise the needed funds. In the light of the Tawhidi law of unity of knowledge derived from the monotheistic origin of Islamic worldview, twarruq is both ridiculous and unlawful and inefficient mode of financing. Thereby, the use of such a fund is contrary to achieving economic stability. How and Why? The principle of relational unity between Money (M), Finance (F), Real Economy (RE), and thereby such sustained continuity by the [M-F-RE-M](θ) symbiotic relationship is foregone. The ijara-type pricing problem of intertemporal interest rate, as mentioned above, reappears and remains unresolved.

It can be explained that twarruq causes devaluation of assets by lowering the effective prices in short-selling of assets. There also appears a smaller available financial need to meet the increasing asset transaction demand. The economy thereby comes to have two adverse effects. Lesser amounts of funds into the economy by asset devaluation cause a less productive economy with lower funds-flow into the real economy. The explanation of such marginal substitution between credited assets and their short-selling at lower price follows a neoclassical approach.⁴

⁴ A 'marginal substitution' form of the neoclassical production possibility curve between credited assets (superior, A) and cheaply sold same asset to raise cash (inferior, A') can be shown along the shifting production possibility curves with resource allocation increasingly into A'. The respective prices being are p and p'. We note the marginalist formula of 'optimal' resource allocation along the shifting production possibility curve caused by optimal resource allocation along the inferior asset curve, A'-trajectory: $-(\Delta A/\Delta A')\downarrow = (p'/p)\downarrow$, as $\Delta A\downarrow$ and $\Delta A'\uparrow$. Thereby, $(p'/p)\downarrow$. Twarruq allocation of resources abides in this case of marginalism along the inferior goods trajectory for the credited item by the short-selling items. The (M-F-RE)-circular relations in continuity are annulled. The truly Islamic epistemological inference of unity of knowledge between these variables is annulled in the cantankerous shari'ah approach. All the implications of social and economic stability arising from the wellbeing objective criterion are annulled.

All the tenets of [M-F-RE](θ) are thus lost. The Tawhidi Law of relational unity superseding the legitimacy given to the differentiated ways of shari'ah, is violated. The shari'ah, fiqh, and fatawa (jurisprudence, opinionated religious verdicts) in all such various cases of pricing and asset valuation and dynamic resource allocation by inter-causal learning between the critical variables are untenable.⁵

Empirical results of Islamic monetary transmission model for Bank Indonesia

A monetary transition model for the Bank of Indonesia defined as the degree of effectiveness of mobilizing depositors' funds as bank-savings into productive transformation of the real economy, has been estimated and statistical results derived. The real economy is further disaggregated for the Primary Sector, Secondary Sector, and Tertiary Sector. The variants of such a model are given below (NirDukita, 2018). In terms of the [M-F-RE](θ), the Tawhidi methodological tenets of continuity in respect of the Tawhidi episteme of unity of knowledge is satisfied if there are sustained complementarities in the suggested model between their inner variables. The vector of variables would comprise socioeconomic variables, financial instruments of resource mobilization, and epistemic value parameters denoted by ' θ '. The specific methods to evaluate the resulting statistical models of [M-F-RE](θ) with their inner endogenously interactive, integrative, and evolutionary learning variables as adduced in

⁵ On the contrary, the neoclassical result is negated in the precept of unity of knowledge with interactive, integrative, and evolutionary learning dynamics. Now ' θ ' as knowledge inducing parameter of complementarities between A and A' causes both of these to increase continuously along with the increase in resource allocation by learning. Thereby, $(p'/p)[\theta] > 0$, also causes $(\Delta A/\Delta A')[\theta] > 0$, along the continuously increasing resource allocation with θ -induction increasing in the neighbourhood of probabilistic occurrence of complementary inter-variables relations of (M-F-RE)[θ]. The neoclassical results of optimal resource allocation and marginal rate of substitution (opportunity cost) are annulled in the Tawhidi dynamics of unity of knowledge along all continuums of complementary allocation of resources between the selected variables. Twarruq type allocation is dispelled from acceptance in the Tawhidi methodological worldview by the epistemological dynamics of θ -induction of complementarities in the (M-F-RE)[θ] circular causation relations of the wellbeing objective criterion. Thereby, economic and social stability is attained, as explained in the text.

the wellbeing function of inter-variable complementarities signifying Tawhidi episteme of monotheistic unity of knowledge, are tried out. The endogenous inter-variable equations form the circular causation models signifying degrees of interactive integration attained by the force of evolutionary learning. Finally, the wellbeing function for $[M-F-RE](\theta)$ for the three real economy sectors are determined. Thus all the phenomenological attributes of Tawhidi methodological worldview are activated for a critical examination of the $[M-F-RE](\theta)$ model, followed by its recommendations in the monetary transmission model tested for Bank Indonesia.

Description of variables (symbols) in the monetary transition model:

1. PS (Primary Sector) denotes the total of sectoral GDPs for the following sectors -- agriculture, mining, processing industry, electricity, gas and construction.
2. Y (real GDP) is based on constant prices of 2010.
3. PS/Y denotes the ratio of Primary Sector GDP to Real GDP (real output).
4. SS (Secondary Sector) denotes the total of GDPs of the trade, transportation, and business services obtained by summing up the GDPs for the trade, hotel and restaurant; transport and communication; finance, real estate and business services sectors.
5. SS/Y denotes the ratio of Secondary Sector to Real GDP (real output)
6. TS (Tertiary Sector) denotes the total of GDPs for services (Government and private services).
7. TS/Y denotes the ratio of Tertiary Sector to Real GDP (real output)
8. Fin/M denotes the ratio of total financing by Shari'ah banks in Indonesia to total money supply ($M_0 + M_1$)
9. SIMA denotes Interbank Mudarabah Investment
10. SIMA/TotFin denotes the ratio of SIMA to total financing by shari'ah banking in Indonesia interpreted as portion of liquid funds in money market.
11. Theta ' θ ' denotes the knowledge variables. ' θ ' is obtained by determining the parametric weight of data for the variables. The weight of each of the different variables is based on an understanding of the highest rank say 10 assigned for the best data values in the light of Tawhidi methodology (Choudhury & Rahim, 2016). The formula for calculating values in each column is:

$\theta = (10 / \text{corresponding observation value. } \theta = 10 \text{ for best value of the variable}) * (\text{observed variable values in the column})$. After getting all computations of such weights from each column variables, they are averaged across columns by rows to obtain the average ‘ θ ’ of all variables.

Results of Data Analysis

Simultaneous Ordinary Least Square (OLS)

Hereinafter, the prerequisite test results presented from the entire regression model are as follows:

(i) Normality test

The results obtained from the test of the normality assumption with the Jarque-Bera normality test for transmission model data show that the error follows the normal distribution with p -value values of 0.378; which is greater than $\alpha = 0.01$. This means that with a 99% confidence level it can be said that the error term is normally distributed.

(ii) Multicollinearity Test

Results of tests on the assumption of absence of multicollinearity showed that in the monetary transmission mechanism model no presence of multicollinearity is noted. This is indicated by the correlation coefficient between each independent variable in each model being smaller than 0.8.

(iii) Heteroscedasticity Test

Homoscedasticity test results with white heteroscedasticity in the transmission mechanism model showed p value square of 0.2863, greater than $\alpha = 0.01$. It can be concluded that no heteroscedasticity exists in the regression model with a 99% confidence level.

(iv) Autocorrelation Test

The results obtained from the tests on the assumption of the absence of autocorrelation with the Breusch-Godfrey Serial Correlation LM Test showed that the regression model contained autocorrelation. The value of

ρ -value in the data of transmission model is 0.0000, which less than $\alpha = 0.01$, meaning that there is autocorrelation in the regression model.

The monetary transmission model is further estimated by the VAR method to accommodate lag effect, especially by the use of VAR Granger Causality to get the next picture from the transmission mechanism path.

Vector Autoregressive (VAR)

The VAR stability test is required to determine the stability of VAR estimation. The results of the VAR stability test in the following models show that a stable VAR model is shown by the modulus value, being less than one. (Gujarati, 2010)

Discussion of the monetary transmission model of [M-F-RE](θ)

The [M-F-RE](θ) monetary transmission model uses an Islamic methodology approach with a view of the unity of divine knowledge (Choudhury, 2010). A model that is always anchored in the Tawhid methodology based on the Quran and the Sunnah. The Qur'an was revealed to the Prophet to bring grace and welfare to all the universes (Qur'an, 21:107). The Qur'an presents a model of development within the framework of wellbeing system with the spirit of participation, paired in a process of circular causation. (Qur'an: 42:38). The strong base is circular causation in the evaluation of wellbeing (maslaha) according to the Tawhidi episteme of unity of knowledge. The relations of circular causation result in sustainability explained by simulations along the Tawhidi String Relation (TSR) up to the Hereafter. In a saying of Prophet Muhammad (PBUH), it is declared that the search and discovery of the sources of the Qur'an and the Sunnah will prevail until the end of time. The Qur'an provides a conceptual basis of analysis involving the inherent morality in economics, society, and government (Qur'an 2: 261-83). In its implementation, the complementary participatory concept between the variables of each model is accommodated by including the parameter θ in each of the monetary transmission model. The θ value of each estimated relation is the average of the weighted index θ inducing each variable in the [M-F-RE](θ) monetary transmission model.

Furthermore, the discussion of the results according to this Islamic framework follows the stages of analysis given here:

1. Using Ordinary Least Square Analysis Methods for Effectiveness Analysis, the estimation result of monetary transmission mechanism model refers to the mainstream econometric concept, which does not involve ' θ ' as an indicator of the degree of complementarities, which symbolizes learning between the variables in the model. The [M-F-RE](θ) monetary transmission mechanism model includes θ to represent the presence of the learning process of each economic agent (represented by each variable) in the model. The first evaluation method used is the simultaneous OLS method, firstly without and next by entering the ' θ '-effect to give comparison between these two aspects of the monetary transmission model, firstly without and then with learning process.

2. Next the Vector Auto Regressive (VAR) with Granger Causality method is used to get a transmission mechanism path. This model is a dynamic model of quantitative behavioral type.

Empirical analysis of the monetary transmission model without 'θ'-parameter

The estimation result of the monetary sector linkage model to the real economy by three sectors is carried out without learning parameter 'θ'. Statistical software Eviews 9 yields the following regression estimation in natural loglinear form:

Primary Sector:

$$\text{LNPS_Y} = 0.99444 - 0.08993 \cdot \text{LNFIN_M} - 0.00216 \cdot \text{LNSIMA_FIN} - 0.00017 \cdot \text{RSBIS} + 1.43272e-05 \cdot \text{INF}$$

t-stat: (632.8512)*** (-28.1313)*** (-2.9518)** (-6.4277)*** (0.1528)
 $R^2 = 0.924073$; DW= 0.284522 (5)

$$\text{LNFIN_M} = 9.66382 - 9.65612 \cdot \text{LNPS_Y} - 0.03158 \cdot \text{LNSIMA_FIN} - 0.00129 \cdot \text{RSBIS} - 0.00037 \cdot \text{INF}$$

t-stat: (29.5546)*** (-28.1313)*** (-4.3202)** (-4.2606)*** (-0.3791)***
 $R^2 = 0.916643$; DW=0.263233 (6)

$$\text{LNSIMA_FIN} = 32.38641 - 31.32116 \cdot \text{LNPS_Y} - 4.26216 \cdot \text{LNFIN_M} - 0.01621 \cdot \text{RSBIS} - 0.02004 \cdot \text{INF}$$

t-stat: (3.0778)*** (-2.9518)*** (-4.3202)** (-4.6535)*** (-1.7992)*
 $R^2 = 0.390041$; DW=0.454567 (7)

$$\text{RSBIS} = 1455.45599 - 1469.08676 \cdot \text{LNPS_Y} - 101.54637 \cdot \text{LNFIN_M} - 9.42822 \cdot \text{LNSIMA_FIN} - 0.18678 \cdot \text{INF}$$

t-stat: (6.3942)*** (-6.4277)*** (-4.2606)** (-4.6535)*** (-0.6877)
 $R^2 = 0.510917$; DW=0.335029 (8)

$$\text{INF} = -10.17250 + 13.58620 \cdot \text{LNPS_Y} - 3.250919 \cdot \text{LNFIN_M} - 1.31103 \cdot \text{LNSIMA_FIN} - 0.02102 \cdot \text{RSBIS}$$

t-stat: (0.1151) (0.1528) (-0.3791) (-1.7992)* (-0.6877)
 $R^2 = 0.041533$; DW=1.183478 (9)

Note: *** denotes significance at 99% confidence level
 ** denotes significance at 95% confidence level
 * denotes significance at 90% confidence level
 No asterisk (*) denotes not significant

The coefficients of each equation show the magnitude of elasticity in relation to the endogenous dependent variable in circular causation. The above equations can be rewritten in the Cobb-Douglas form:

$$\text{PS_Y} = 4,199 \text{Fin_M}^{-0.0899} \text{Sima_Fin}^{-0.0022} \text{rSBIS}^{-0.0002} \text{Inf}^{0.00001} \quad (10)$$

$$\text{Fin_M} = 15737,47 \text{PS_Y}^{-9,6561} \text{Sima_Fin}^{-0.03158} \text{rSBIS}^{-0.0013} \text{Inf}^{0.0004} \quad (11)$$

$$\text{Sima_Fin} = 1,16\text{E}+14 \text{PS_Y}^{-31,3212} \text{Fin_M}^{-4,2621} \text{rSBIS}^{-0,02} \text{Inf}^{0,02} \quad (12)$$

$$\text{rSBIS} = \text{PS_Y}^{-1469,08} \text{Fin_M}^{-101,54} \text{Sima_Fin}^{-9,428} \text{Inf}^{0,1867} \quad (13)$$

$$\text{INF} = 3,38\text{E}-05 \text{PS_Y}^{13,58} \text{Fin_M}^{-3,251} \text{Sima_Fin}^{-1,311} \text{rSBIS}^{-0,02} \quad (14)$$

Secondary Sector:

$$\begin{aligned} \text{LNSS_Y} &= 0.81899 + 0.23129 \cdot \text{LNFIN_M} + 0.00236 \cdot \text{LNSIMA_FIN} + 0.000366 \cdot \text{RSBIS} - 7.815456\text{e-} \\ &06 \cdot \text{INF} \\ \text{t-stat: } &(276.3376)*** (38.3602)*** (1.7053)* (7.0387)*** (-0.0442) \\ \text{R}^2 &= 0.957741; \text{DW} = 0.247737 \end{aligned} \quad (15)$$

$$\begin{aligned} \text{LNFIN_M} &= -3.23895 + 3.99779 \cdot \text{LNSS_Y} - 0.01555 \cdot \text{LNSIMA_FIN} - 0.00122 \cdot \text{RSBIS} - 0.00026 \cdot \text{INF} \\ \text{t-stat: } &(-33.5036)*** (38.3602)*** (-2.7595)*** (-5.3563)*** (-0.3522) \\ \text{R}^2 &= 0.952266; \text{DW} = 0.238512 \end{aligned} \quad (16)$$

$$\begin{aligned} \text{LNSIMA_FIN} &= -6.93076 + 10.04756 \cdot \text{LNSS_Y} - 3.8376 \cdot \text{LNFIN_M} - 0.01488 \cdot \text{RSBIS} - 0.02137 \cdot \text{INF} \\ \text{t-stat: } &(-1.4301) (1.7053)*** (-2.7595)*** (-3.9869)*** (-1.8779)* \\ \text{R}^2 &= 0.361234; \text{DW} = 0.435553 \end{aligned} \quad (17)$$

$$\begin{aligned} \text{RSBIS} &= -669.8449 + 811.5558 \cdot \text{LNSS_Y} - 158.615988 \cdot \text{LNFIN_M} - 7.86099 \cdot \text{LNSIMA_FIN} - \\ &0.1914 \cdot \text{INF} \\ \text{t-stat: } &(-7.1088)*** (7.0387)*** (-5.3563)*** (-3.9869)*** (-0.7227) \\ \text{R}^2 &= 0.534652; \text{DW} = 0.347672 \end{aligned} \quad (18)$$

$$\begin{aligned} \text{INF} &= 5.04529 - 2.08377 \cdot \text{LNSS_Y} - 3.9915 \cdot \text{LNFIN_M} - 1.3357 \cdot \text{LNSIMA_FIN} - 0.02264 \cdot \text{RSBIS} \\ \text{t-stat: } &(0.1306) (-0.0442) (-0.3522) (-1.8779)* (-0.7227) \\ \text{R}^2 &= 0.41362; \text{DW} = 0.183129 \end{aligned} \quad (19)$$

The Cobb-Douglass form is written as:

$$\text{SS_Y} = 2,265 \text{Fin_M}^{0,231} \text{Sima_Fin}^{0,002} \text{rSBIS}^{0,0003} \text{Inf}^{-0,000007} \quad (20)$$

$$\text{Fin_M} = 0,039 \text{SS_Y}^{3,997} \text{Sima_Fin}^{-0,015} \text{rSBIS}^{-0,0012} \text{Inf}^{0,0003} \quad (21)$$

$$\text{Sima_Fin} = 0,0009 \text{SS_Y}^{10,047} \text{Fin_M}^{-3,837} \text{rSBIS}^{-0,0148} \text{Inf}^{0,021} \quad (22)$$

$$\text{rSBIS} = 1,2\text{E}-291 \text{SS_Y}^{881,55} \text{Fin_M}^{-158,615} \text{Sima_Fin}^{-7,860} \text{Inf}^{0,191} \quad (23)$$

$$\text{INF} = 155,244 \text{SS_Y}^{-2,083} \text{Fin_M}^{-3,991} \text{Sima_Fin}^{-1,335} \text{rSBIS}^{-0,0226} \quad (24)$$

Tertiary Sector:

$$\begin{aligned} \text{LNTS_Y} &= 0.7825 + 0.0818 \cdot \text{LNFIN_M} + 0.0086 \cdot \text{LNSIMA_FIN} - 1.1412\text{e-}05 \cdot \text{RSBIS} + \\ &0.0005 \cdot \text{INF} \\ \text{t-stat: } &(59.6468)**** (3.0629)*** (1.4107) (-0.0504) (-0.5797) \\ \text{R}^2 &= 0.081240; \text{DW} = 0.136003 \end{aligned} \quad (25)$$

$$\begin{aligned} \text{LNFIN_M} &= -0.2614 + 0.88700 \cdot \text{LNTS_Y} - 0.0831 \cdot \text{LNSIMA_FIN} + 0.0028 \cdot \text{RSBIS} - \\ &0.0040 \cdot \text{INF} \\ \text{t-stat: } &(-1.0982) (3.0629)*** (-4.4124)*** (3.9203)*** (-1.5508) \\ \text{R}^2 &= 0.412828; \text{DW} = 0.085567 \end{aligned} \quad (26)$$

$$\begin{aligned} \text{LNSIMA_FIN} &= -0.1725 + 1.8917 \cdot \text{LNTS_Y} - 1.6799 \cdot \text{LNFIN_M} - 0.0113 \cdot \text{RSBIS} - 0.0225 \cdot \text{INF} \\ \text{t-stat:} & \quad (0.1604) \quad (1.4107) \quad (-4.4124)^{***} \quad (-3.5495)^{***} \quad (-1.9659)^* \\ R^2 &= 0.356427; \text{DW}=0.398679 \end{aligned} \quad (27)$$

$$\begin{aligned} \text{RSBIS} &= -5.8859 - 1.8544 \cdot \text{LNTS_Y} + 41.2349 \cdot \text{LNFIN_M} - 8.3899 \cdot \text{LNSIMA_FIN} - 0.2786 \cdot \text{INF} \\ \text{t-stat:} & \quad (-0.2011) \quad (-0.0504) \quad (3.9203)^{***} \quad (-3.5495)^{***} \quad (-0.8846) \\ R^2 &= 0.342542; \text{DW}=0.219064 \end{aligned} \quad (28)$$

$$\begin{aligned} \text{INF} &= -1.4131 + 6.0608 \cdot \text{LNTS_Y} - 4.9569 \cdot \text{LNFIN_M} - 1.3893 \cdot \text{LNSIMA_FIN} - 0.0233 \cdot \text{RSBIS} \\ \text{t-stat:} & \quad (-0.1670) \quad (0.5797) \quad (-1.5508) \quad (-1.9659)^* \quad (-0.8846) \\ R^2 &= 0.043942; \text{DW}=1.183592 \end{aligned} \quad (29)$$

The Cobb-Douglass form is:

$$\text{TS_Y} = 2,186 \text{Fin_M}^{0,082} \text{Sima_Fin}^{0,008} \text{rSBIS}^{-1,141e-05} \text{Inf}^{0,0005} \quad (30)$$

$$\text{Sima_Fin} = 0,841 \text{TS_Y}^{1,891} \text{Fin_M}^{-1,679} \text{rSBIS}^{-0,011} \text{Inf}^{-0,023} \quad (31)$$

$$\text{rSBIS} = 0,0027 \text{TS_Y}^{-1,854} \text{Fin_M}^{41,23} \text{Sima_Fin}^{-8,389} \text{Inf}^{-0,278} \quad (32)$$

$$\text{INF} = 0,2434 \text{TS_Y}^{6,06} \text{Fin_M}^{-4,9561} \text{Sima_Fin}^{-1,389} \text{rSBIS}^{-0,023} \quad (33)$$

Monetary transmission model as linkage model of the monetary sector with the three-sector real economy with θ -parameterization

The estimation results of the monetary sector linkage model to the sectoral domestic product processed using Eviews 9 using ' θ '-parameterization yields the following regression equations:

Primary Sector:

$$\text{LNPS_Y} = 0.9615 - 0.0474 \cdot \text{LNFIN_M} - 0.0062 \cdot \text{LNSIMA_FIN} + 0.0004 \cdot \text{RSBIS} + 0.0008 \cdot \text{INF} + 0.0033 \cdot \theta_1$$

$$\begin{aligned} \text{t-stat: } & (332.4868)*** (-11.6095)*** (-10.4715)*** (8.1853)*** (8.6713)*** (12.2111)*** \\ \text{R}^2 = & 0.953301; \text{DW}=0.403580 \end{aligned} \quad (34)$$

$$\text{LNFIN_M} = 11.0913 - 11.1985 \cdot \text{LNPS_Y} - 0.04747 \cdot \text{LNSIMA_FIN} + 0.00037 \cdot \text{RSBIS} + 0.0020 \cdot \text{INF} + 0.0105 \cdot \theta_1$$

$$\begin{aligned} \text{t-stat: } & (12.3785)*** (-11.6095)*** (-4.0258)*** (0.3614) (1.1947) (1.7090)* \\ \text{R}^2 = & 0.918640; \text{DW}=0.275288 \end{aligned} \quad (35)$$

$$\text{LNSIMA_FIN} = 73.7758 - 77.6088 \cdot \text{LNPS_Y} - 2.5250 \cdot \text{LNFIN_M} + 0.0540 \cdot \text{RSBIS} + 0.0809 \cdot \text{INF} + 0.3894 \cdot \theta_1$$

$$\begin{aligned} \text{t-stat: } & (10.2359)*** (-10.4715)*** (-4.0258)*** (9.7632)*** (8.02519)*** (13.7971)*** \\ \text{R}^2 = & 0.765370; \text{DW}=0.418890 \end{aligned} \quad (36)$$

$$\text{RSBIS} = -768.1288 + 830.0516 \cdot \text{LNPS_Y} + 2.9799 \cdot \text{LNFIN_M} + 8.2299 \cdot \text{LNSIMA_FIN} - 1.3407 \cdot \text{INF} - 5.8088 \cdot \theta_1$$

$$\begin{aligned} \text{t-stat: } & (-7.7128)*** (8.1853)*** (0.3614) (9.7632)*** (-14.3349)*** (-32.5914)*** \\ \text{R}^2 = & 0.950723; \text{DW}=0.391352 \end{aligned} \quad (37)$$

$$\text{INF} = -476.9551 + 510.8124 \cdot \text{LNPS_Y} + 5.8161 \cdot \text{LNFIN_M} + 4.3406 \cdot \text{LNSIMA_FIN} - 0.47235 \cdot \text{RSBIS} - 3.0083 \cdot \theta_1$$

$$\begin{aligned} \text{t-stat: } & (-8.2657)*** (8.6713)*** (1.1947) (8.02519)*** (-14.3349)*** (-16.0713)*** \\ \text{R}^2 = & 0.697690; \text{DW}=0.788236 \end{aligned} \quad (38)$$

Note: *** denotes significance at 99% confidence level

** denotes significance at 95% confidence level

*denotes significance at 90% confidence level

No asterisk (*): not significant

The Cobb-Douglass form is:

$$\text{PS_Y} = 2,6156 \text{Fin_M}^{-0,047} \text{Sima_Fin}^{-0,006} \text{rSBIS}^{0,0004} \text{Inf}^{0,0008} \theta_1^{0,003} \quad (39)$$

$$\text{Fin_M} = 65597,96 \text{PS_Y}^{-11,199} \text{Sima_Fin}^{-0,047} \text{rSBIS}^{-0,0003} \text{Inf}^{0,002} \theta_1^{0,01} \quad (40)$$

$$\text{Sima_Fin} = 1,09\text{E}+32 \text{PS_Y}^{-77,608} \text{Fin_M}^{-2,525} \text{rSBIS}^{-0,054} \text{Inf}^{0,08} \theta_1^{0,389} \quad (41)$$

$$\text{rSBIS} = \text{PS_Y}^{380,052} \text{Fin_M}^{2,979} \text{Sima_Fin}^{8,229} \text{Inf}^{-1,341} \theta_1^{-5,808} \quad (42)$$

$$\text{INF} = 7,29\text{E}-208 \text{PS_Y}^{510,81} \text{Fin_M}^{5,82} \text{Sima_Fin}^{4,34} \text{rSBIS}^{-0,472} \theta_1^{-3,008} \quad (43)$$

Secondary Sector:

$$\begin{aligned} \text{LNSS_Y} &= 0.8367 + 0.13657*\text{LNFIN_M} - 0.0075*\text{LNSIMA_FIN} + 0.00112*\text{RSBIS} + \\ &0.0013*\text{INF} + 0.0057*\theta_1 \\ \text{t-stat: } &(231.7306)*** (9.2824)*** (-4.0491)*** (9.4165)*** (5.3583)*** (6.8668)*** \\ R^2 &= 0.969734; \text{DW}=0.238579 \end{aligned} \quad (44)$$

$$\begin{aligned} \text{LNFIN_M} &= -2.4447 + 3.0751*\text{LNSS_Y} - 0.0357*\text{LNSIMA_FIN} + 0.0009*\text{RSBIS} + \\ &0.0028*\text{INF} + 0.0132*\theta_1 \\ \text{t-stat: } &(-8.5087)*** (9.2824)*** (-4.0590)*** (1.1541) (2.2031)** (2.92445)*** \\ R^2 &= 0.955467; \text{DW}=0.283460 \end{aligned} \quad (45)$$

$$\begin{aligned} \text{LNSIMA_FIN} &= 14.9043 - 16.1188*\text{LNSS_Y} - 3.4042*\text{LNFIN_M} + 0.0547*\text{RSBIS} + \\ &0.0831*\text{INF} + 0.3988*\theta_1 \\ \text{t-stat: } &(4.5383)*** (-4.0491)*** (-4.0590)*** (10.3436)*** (8.3636)*** (14.5386)*** \\ R^2 &= 0.769916; \text{DW}=0.447484 \end{aligned} \quad (46)$$

$$\begin{aligned} \text{RSBIS} &= -330.7727 + 380.7830*\text{LNSS_Y} + 12.9198*\text{LNFIN_M} + 8.656*\text{LNSIMA_FIN} - \\ &1.369*\text{INF} - 5.9243*\theta_1 \\ \text{t-stat: } &(-10.0512)*** (9.4166)*** (1.1541) (10.3436)*** (-14.3983)*** (-31.3656)*** \\ R^2 &= 0.949786; \text{DW}=0.395021 \end{aligned} \quad (47)$$

$$\begin{aligned} \text{INF} &= -130.8673 + 149.5695*\text{LNSS_Y} + 14.153*\text{LNFIN_M} + 4.456*\text{LNSIMA_FIN} - \\ &0.4640*\text{RSBIS} - 3.0351*\theta_1 \\ \text{t-stat: } &(-5.6593)*** (5.3583)*** (2.2031)** (8.3636)*** (-14.3983)*** (-16.306)*** \\ R^2 &= 0.703628; \text{DW}=0.812723 \end{aligned} \quad (48)$$

The Cobb-Douglass form is,

$$\text{SS_Y} = 2,308\text{Fin_M}^{0.136}\text{Sima_Fin}^{-0.007}\text{rSBIS}^{0.0011}\text{Inf}^{0.0013}\theta_1^{0.005} \quad (49)$$

$$\text{Fin_M} = 0,086\text{SS_Y}^{3.075}\text{Sima_Fin}^{-0.0357}\text{rSBIS}^{-0.0009}\text{Inf}^{0.0028}\theta_1^{0.013} \quad (50)$$

$$\text{Sima_Fin} = 2970676 \text{SS_Y}^{-16.11}\text{Fin_M}^{-3.404}\text{rSBIS}^{0.054}\text{Inf}^{0.083}\theta_1^{0.389} \quad (51)$$

$$\text{rSBIS} = 2,2\text{E}-144\text{SS_Y}^{380.7}\text{Fin_M}^{12.91}\text{Sima_Fin}^{8.65}\text{Inf}^{1.36}\theta_1^{-5.92} \quad (52)$$

$$\text{INF} = 1,4\text{E}-57 \text{SS_Y}^{149.56}\text{Fin_M}^{14.15}\text{Sima_Fin}^{4.45}\text{rSBIS}^{-0.464}\theta_1^{-3.035} \quad (53)$$

Tertiary Sector:

$$\begin{aligned} \text{LNTS_Y} &= 0.7646 - 0.0228*\text{LNFIN_M} - 0.0247*\text{LNSIMA_FIN} + 0.0025*\text{RSBIS} + \\ &0.0038*\text{INF} + 0.0163*\theta_1 \\ \text{t-stat: } &(186.1819)^{***} \quad (-2.5758)^{***} \quad (-11.5462)^{***} \quad (24.5238)^{***} \quad (14.3573)^{***} \\ &(33.5673)^{***} \\ R^2 &= 0.912237; \text{DW}=0.404019 \end{aligned} \quad (54)$$

$$\begin{aligned} \text{LNFIN_M} &= 2.138 - 2.3168*\text{LNTS_Y} - 0.1622*\text{LNSIMA_FIN} + 0.0112*\text{RSBIS} + \\ &0.0093*\text{INF} + 0.0562*\theta_1 \\ \text{t-stat: } &(3.1441)^{***} \quad (-2.5758)^{***} \quad (-5.8563)^{***} \quad (4.7581)^{***} \quad (2.1588)^{**} \quad (3.7412)^{***} \\ R^2 &= 0.474624; \text{DW}=0.096971 \end{aligned} \quad (55)$$

$$\begin{aligned} \text{LNSIMA_FIN} &= 16.7742 - 21.3661*\text{LNTS_Y} - 1.3791*\text{LNFIN_M} + 0.0577*\text{RSBIS} + \\ &0.0824*\text{INF} + 0.3986*\theta_1 \\ \text{t-stat: } &(12.1860)^{***} \quad (-11.5462)^{***} \quad (-5.8563)^{***} \quad (10.9016)^{***} \quad (8.03239)^{***} \\ &(14.0453)^{***} \\ R^2 &= 0.757849; \text{DW}=0.380576 \end{aligned} \quad (56)$$

$$\begin{aligned} \text{RSBIS} &= -251.4946 + 329.0075*\text{LNTS_Y} + 14.2799*\text{LNFIN_M} + 8.6595*\text{LNSIMA_FIN} \\ &- 1.3759*\text{INF} - 5.9434*\theta_1 \\ \text{t-stat: } &(-24.2346)^{***} \quad (24.5238)^{***} \quad (4.7581)^{***} \quad (10.9016)^{***} \quad (-14.9623)^{***} \\ &(-37.977)^{***} \\ R^2 &= 0.949888; \text{DW}=0.399031 \end{aligned} \quad (57)$$

$$\begin{aligned} \text{INF} &= -127.4214 + 168.3883*\text{LNTS_Y} + 4.0723*\text{LNFIN_M} + 4.2659*\text{LNSIMA_FIN} - \\ &0.4746*\text{RSBIS} - 3.0061*\theta_1 \\ \text{t-stat: } &(-13.8999)^{***} \quad (14.3573)^{***} \quad (2.1588)^{***} \quad (8.03239)^{***} \quad (-14.9623)^{***} \\ &(-16.0924)^{***} \\ R^2 &= 0.698992; \text{DW}=0.788969 \end{aligned} \quad (58)$$

The Cobb-Douglas form is:

$$\text{TS_Y} = 2,148 \text{Fin_M}^{-0,0228} \text{Sima_Fin}^{-0,024} \text{rSBIS}^{0,0034} \text{Inf}^{0,004} \theta_1^{0,0163} \quad (59)$$

$$\text{Fin_M} = 8,48 \text{TS_Y}^{-2,316} \text{Sima_Fin}^{-0,162} \text{rSBIS}^{0,011} \text{Inf}^{0,009} \theta^{0,056} \quad (60)$$

$$\text{Sima_Fin} = 19191922 \text{TS_Y}^{21,36} \text{Fin_M}^{-1,37} \text{rSBIS}^{0,057} \text{Inf}^{0,082} \theta^{0,398} \quad (61)$$

$$\text{rSBIS} = 6,6\text{E-}110 \text{TS_Y}^{329,00} \text{Fin_M}^{14,279} \text{Sima_Fin}^{8,659} \text{Inf}^{-1,375} \theta^{-5,943} \quad (62)$$

$$\text{INF} = 4,59\text{E-}56 \text{TS_Y}^{168,38} \text{Fin_M}^{4,072} \text{Sima_Fin}^{4,072} \text{rSBIS}^{-0,475} \theta^{-3,006} \quad (63)$$

Wellbeing Function

Primary Sector:

$$\begin{aligned} \Theta_1 = & -157.4784 + 168.3749 \cdot \text{LNPS_Y} + 2.2742 \cdot \text{LNFIN_M} + 1.5803 \cdot \text{LNSIMA_FIN} - \\ & 0.1548 \cdot \text{RSBIS} - 0.2276 \cdot \text{INF} \\ \text{t-stat: } & (-11.4830)^{***} (12.2111)^{***} (1.7090)^* (13.7971)^{***} (-32.5914)^{***} (-16.0713)^{***} \\ R^2 = & 0.984777; \text{DW} = 0.422095 \end{aligned} \quad (64)$$

Secondary Sector:

$$\begin{aligned} \Theta_2 = & -43.6322 + 49.4925 \cdot \text{LNSS_Y} + 5.0699 \cdot \text{LNFIN_M} + 1.6043 \cdot \text{LNSIMA_FIN} - \\ & 0.1506 \cdot \text{RSBIS} - 0.2276 \cdot \text{INF} \\ \text{t-stat: } & (-7.3859)^{***} (6.8668)^{***} (2.92445)^{***} (14.5386)^{***} (-31.3656)^{***} (-16.306)^{***} \\ R^2 = & 0.953019; \text{DW} = 0.450415 \end{aligned} \quad (65)$$

Tertiary Sector:

$$\begin{aligned} \Theta_3 = & -42.2396 + 55.3807 \cdot \text{LNTS_Y} + 1.8738 \cdot \text{LNFIN_M} + 1.5646 \cdot \text{LNSIMA_FIN} - \\ & 0.1554 \cdot \text{RSBIS} - 0.2279 \cdot \text{INF} \\ \text{t-stat: } & (-32.1785)^{***} (33.5673)^{***} (3.7412)^{***} (14.0453)^{***} (-37.977)^{***} (-16.0924)^{***} \\ R^2 = & 0.972389; \text{DW} = 0.422267 \end{aligned} \quad (66)$$

Statistical Analysis: Results

Primary Sector

From the above estimation results, the rank of each endogenous variable is the value of their inter-elasticity. In the primary sector equation without ‘ θ ’ parameterization the magnitude of elasticity of all variables i.e. financing (Fin_M), SIMA, SBIS rate and inflation is less than one. This means that the response of primary sector change is inelastic to the change in every independent endogenous variable. Among the overall determinants of the primary sector results, financing is the largest contributor relative to the primary sector, compared to other variables that negatively affect. This is indicated by the greatest number of powers.

The financing elasticity of -0.0899 means that, every 1% increase in shari’ah financing will decrease primary sector yield by 0.0899 of 1%, and vice versa, ceteris paribus. Meanwhile, the variables of monetary instrument and macro-inflation variable are inelastic and have little effect on the primary sector. The role of Islamic monetary instruments, the rate of Bank Indonesia Syariah Certificates (rSBIS) is negatively influenced by the primary sector variables. That is, if the primary sector declines, it

will cause rSBIS to increase and vice versa, *ceteris paribus*. In fact, one of the objectives of Bank Indonesia intervention regulated by Law no. 3 year 2004 Article 7 with monetary instruments held is for stabilization of rupiah value, including inflation. In the event of inflation, Bank Indonesia will tend to withdraw the money supply. Meanwhile, if we look at the role of rSBIS to inflation, we find that rSBIS is inelastic to inflation. This shows that the transmission mechanism is differentiated between the monetary sector and the real sector, especially noted for the primary sector.

In the estimation results in the secondary sector, the complementary results are found for transportation and trade, showing the secondary sector result is positively influenced significantly by the financing. This is in contrast to the primary sectors that are negatively affected by shari'ah financing. The role of monetary instrument, rSBIS is inelastic with a relatively small coefficient value on secondary sector outcomes. Although legally monetary instruments are intended for the purpose of stabilizing inflation, the estimates show that rSBIS does not significantly affect inflation. The strong effect of financing in the secondary sector is also shown by the value of the coefficients of secondary sector being greater than one. The significant positive effect is elastic with Islamic bank financing, while correlated negatively in the primary sector. This implies that, Islamic bank financing has not been aligned to the industry as otherwise would be expected. This result indicates that there is an imbalance between the primary sector and the secondary sector. It can be caused by three financing factors in the profit orientation of the sectors: (i) murabaha; (2) short term; and (iii) high turnover. In the secondary sector however, the positive impact of shari'ah financing in the secondary sector is shown by positive and elastic influence of Interbank Mudarabah Investment (SIMA) and rSBIS.

Tertiary Sector

Furthermore, in the tertiary sector, the monetary instrument of rSBIS also has no significant effect on inflation. The increase in tertiary sector output is supported positively by shari'ah financing, although it is inelastic. So it can be said that, the effectiveness of shari'ah monetary instrument is relatively low. There is lack of circular causation linkage between the monetary and real sectors, even though with the monetary instruments of shari'ah.

Wellbeing Models

Primary sector

The monetary transmission model for all three sectors of the real economy gives better result by accommodating ‘ θ ’ in the circular causation equations. This is seen from the overall R²-value being higher. The role of knowledge, the learning process of a participatory attitude implied by ‘ θ ’ showed more responsiveness of the endogenous dependent variables to changes in almost all the explanatory variables in every model equation.

The Cobb-Douglas forms of the three-sector estimated wellbeing models result in Cobb Douglas forms:

$$\theta = \log(-157.4784)PS_Y^{168.37}Fin_M^{2.27}Sima_Fin^{1.58}rSBIS^{-0.155}INF^{-0.22} \quad (67)$$

$$\theta = \log(-43.6322)SS_Y^{49.49}Fin_M^{5.06}Sima_Fin^{1.604}rSBIS^{-0.150}INF^{-0.227} \quad (68)$$

$$\theta = \log(-42.2396)TS_Y^{55.38}Fin_M^{1.874}Sima_Fin^{1.564}rSBIS^{-0.155}INF^{-0.22} \quad (69)$$

In Cobb Douglas form, the sum of the variable-specific elasticity coefficients of the wellbeing function gives the indicator of economies of scale of wellbeing. This total elasticity value of each variable to wellbeing provides the measure interpreting whether economic activity is sustainable by complementarities and stable in the long run or not. Overall, the sum of the coefficients in θ -parameterized equations (estimated wellbeing functions) of all sectors shows a positive magnitude, greater than one.

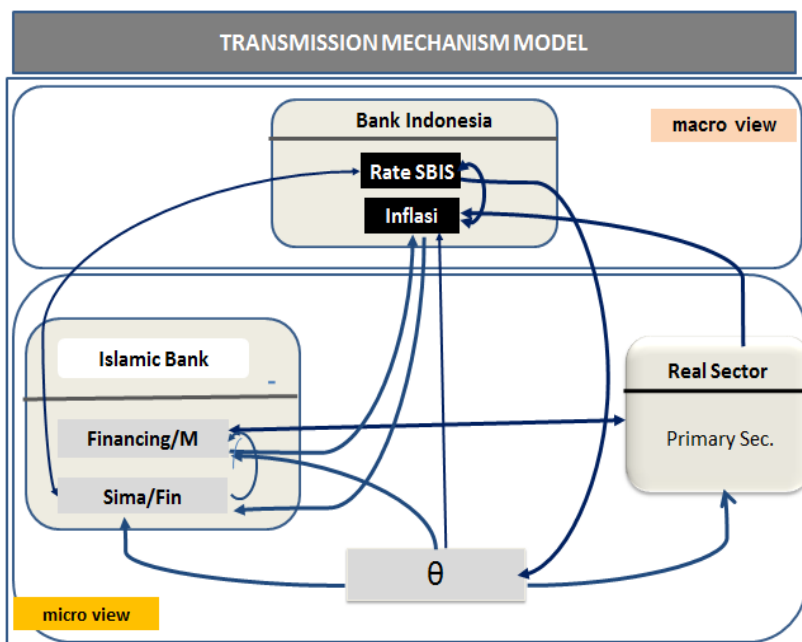


Figure 2: The Relationship of the Monetary Sector to the Primary Sector

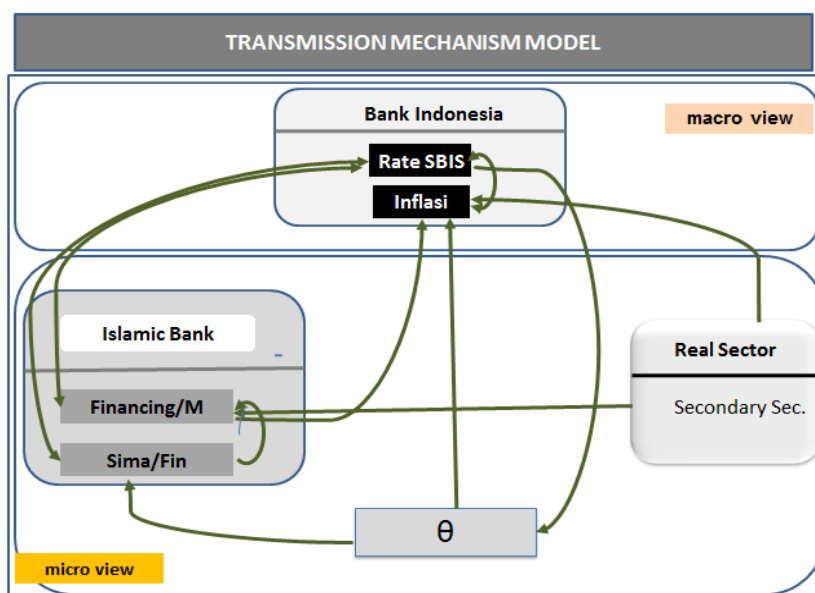


Figure 3: The Relationship of the Monetary Sector to the Secondary Sector

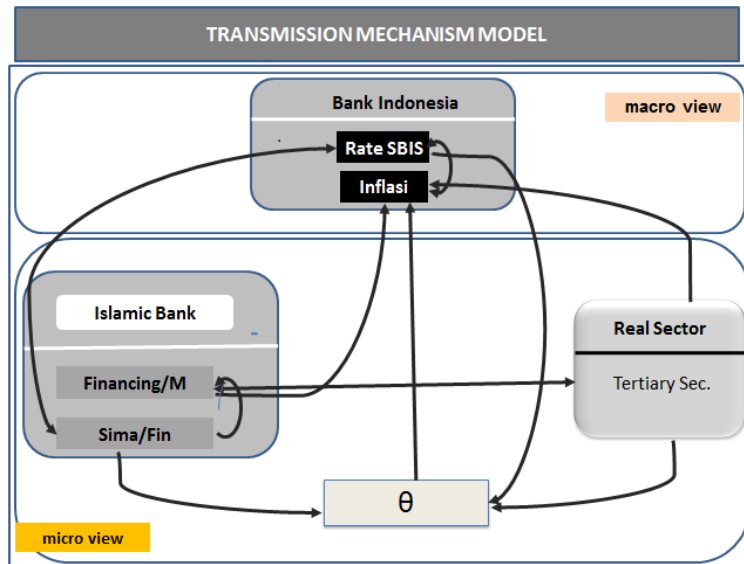


Figure 4: The Relationship of the Monetary Sector to the Tertiary Sector

In the monetary transmission mechanism model it appears that, the pattern of relationship between the monetary sector and the real sector is unclear. Figures 2-4 show the flow of influence of monetary instrument to SIMA for the three economic sectors. However, the next process cannot be seen in the structure of interaction in banking and then to the real sector.

The real sector activity is shown by the influence of financing and inflation and vice-a-versa. This pathway reinforces the proof that, the role of monetary instruments is not yet effective in driving the real sector. The disjoint relationship between the monetary and real sectors is still visible for all the three sectors, as shown in Figures 2-4. This result also indicates a weak level of participation and complementarities among activities in the transmission mechanism system. It takes effort to get a path that shows the direction of circular causation of each activity. The simulation of the circular causation equations should be structured according to the participatory process of the activities. In this case, the role of regulator becomes quite important.

For that reason, confirmation of the results of this estimation has been made with the suggested improvement by conducting an interview with the regulator of Bank Indonesia. Several remarks can be made regarding the estimation result and the idea given that, (i) unresponsive relationship

between rSBIS in shari'ah bank and finally to real sector indicates that shari'ah monetary policy is relatively small to the real sector. The idea is the need to change the monetary instruments of shari'ah into instruments directly related to the development of the real sector. (ii) the relatively inelastic role of financing to the real sector, especially the primary sector (productive sector) shows that in fact, shari'ah banking has not supported the industry. This happens because Islamic banks take advantage of only three financing instruments, namely, (1) murabaha; (2) short term; (3). high turnover.

Conclusion

This paper is among the first of its kind, sparing the contributions by Professor Choudhury (1997, 2015, 2017a, 2017b) and Choudhury, Hossain & Mohammad (forthcoming 2018) to address the critical theme of how to stabilize the economy by the use of endogenous relationship involving abstracto-empirical methodological approach. This paper brings out the elegantly brief definition of the nature of money and the role Islamic banking institution in monetary transmission for real economy stabilization and attaining of wellbeing (maslaha).

What then is money in Islam? This paper has shown that, money identifies with the mobilization of bank-savings as deposits into spending in the good things of life and the avoidance of the socially unwanted choices. Thus the quantitative policy-theoretic formulation and analysis of the $[M-F-RE](\theta)$ in evaluating the wellbeing objective criterion of unity of knowledge between the inner variables of this model and their complementary interrelationships to theorize and recommend economic stability constitutes the centrally most focused objective of Islamic methodological worldview.

From the empirical work in this paper we can learn about the affirmation and the corrective for change into $[M-F-RE](\theta)$ based on factual case study of Bank Indonesia. Thereby, the potentiality of the $[M-F-RE](\theta)$ model and its recommendations in Islamic monetary transmission from Money to Real Economy via the mobilization of Depositor bank-savings is established. This abstracto-empirical gateway towards monetary transmission within 100 per cent reserve ratio monetary system transformation comprises the great Islamic transformation and its evolutionary learning centered Tawhidi methodological worldview.

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