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Divergence? A Study on Selected
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EDITORIAL NOTE

Six papers make up this issue at hand. The first one, titled “Host Country Characteristics and FDI: Are OIC Countries Different?”, by Muhammad Tariq Majeed and Eatzaz Ahmad, uses panel data for 75 developing countries -including 25 Member Countries of the Organisation of the Islamic Conference (OIC) - over the period 1970 – 2004 and analyzes a variety of host country characteristics that determine FDI inflows. The results show that GDP, economic growth and domestic absorption positively affect FDI, a result consistent with market seeking behaviour of multinational corporations (MNCs). External debt and BOP deficit negatively affect FDI, since these indicators reflect fragile financial conditions in the host economies.

The second paper “Income Convergence or Income Divergence? A Study on Selected OIC Countries”, by Jarita Duasa, investigates the existence of income convergence or income divergence on ten selected OIC economies. The results are then linked to the degree of openness of the countries using globalization indices. In order to investigate the existence of either income convergence or divergence, income differentials between selected OIC Countries and the benchmark country are computed.

The third paper titled “Assessing Performance of Mutual Funds in Indonesia”, by M. Shabri Abd. Majid and Hartomi Maulana, empirically assesses the relative efficiency of mutual funds in Indonesia during the period 2004 - 2007. To measure their efficiencies, the output-input data consisting of a panel of 23 mutual funds are empirically examined based on the most commonly used non-parametric approach, namely, Data Envelopment Analysis (DEA). The study finds that, on average, the mutual funds experienced a decrease in total factor productivity (TFP) growth.

The fourth paper under the title of: “Real Exchange Rate Misalignment in WAMZ Countries” by Tamsir Cham, investigates the potential costs of membership in a monetary union. The cost is quantified by examining the degree of exchange rate variability of WAMZ Member Countries, especially for the period since 2000 - the run-up period.

The fifth paper in this issue titled “Potential Diversification Benefits across Global Islamic Equity Markets”, by M. Shabri Abd. Majid Salina Hj. Kassim, assesses the degree of integration among five major Islamic stock markets, namely Malaysia, Indonesia, Japan, the UK and the US. It also

attempts to empirically explore the nature of the long-run equilibrium relationship among the major Islamic stock indexes and to examine the dynamic causal linkages among them. The study finds that investors who are interested to diversify their portfolio can gain benefits by diversifying in the Islamic stock markets across economic grouping such as that in the developed and developing countries.

The last paper titled “Impact of Capitalization on Asset Price Bubble in Dhaka Stock Exchange”, by Mohammad A. Ashraf and Muhammad S. I. Noor, investigates whether any of the financial intermediary factors treated as outliers (which stand here as a proxy of capitalization that results through the public policies and huge liquidity of fungible investment funds in the stock market of Dhaka Stock Exchange (DSE) came through easy bank-loans) play any role for the surge in stock prices which is termed as stock market bubbles. The result exhibits non-trend fluctuations that are influenced by a stochastic process of surge in the stock prices shaping in bubbles in the capital market. It is also shown that huge capital availability in the DSE through easy bank loans and other informal sources has a significant influence on asset prices inflating them often into bubbles.

Host Country Characteristics and FDI: Are OIC Countries Different?

Muhammad Tariq Majeed and Eatzaz Ahmad*

Using a panel data for 75 developing countries-including 25 OIC countries-over the period 1970-2004, this paper analyzes a variety of host country characteristics that determine FDI inflows. The results show that GDP, economic growth and domestic absorption positively affect FDI, a result consistent with market seeking behavior of multinational corporations (MNCs). External debt and BOP deficit negatively affect FDI, since these indicators reflect fragile financial conditions in the host economies. Open economies provide a platform for exports and allow imports of plant machinery which attract MNCs and our results confirm openness as an important determinant of FDI. We find a trade-off between domestic and foreign investment that is also supported by the negative influence of credit facilities on FDI since credit facilities promote domestic investment. In a separate modeling for OIC countries, our results show that similar host country characteristics also matter for FDI in OIC countries. However, the trade-off between domestic and foreign investment is not valid in OIC countries. The role of exchange rate and official development assistance is comparatively more crucial in OIC countries.

1. Introduction

As most developing countries experience a shortage of capital, this is reflected in their respective savings-investment and import-export gaps, which implies that developing countries have insufficient savings and/or foreign exchange to finance their investment needs. In addition, developing countries also face the problem of fiscal deficits. To bridge these gaps they need inflow of foreign capital. FDI is an important source of external funding for developing countries.

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In the 1960s and 1970s many countries maintained a rather cautious and sometimes an outright negative position with respect to foreign investment. In the 1980s, however, the attitudes shifted radically towards a more welcoming policy stance. This change was mainly due to economic problems facing the developing world. While FDI is surging, other forms of capital flows to developing countries are diminishing. Aid has continuously declined as a share of capital inflows since the 1960s. Commercial loans, a major source of capital flows in the 1970s have virtually disappeared since the debt crisis of the 1980s.

The assumption is generally made that FDI can contribute to economic growth and restructuring in developing economies. However, there is increasing competition between developing (and developed) countries to attract FDI flows in order to either enter into, or consolidate their position within, an increasingly integrated world production, trading and investment system. In this study we focus on the inflow of FDI in developing countries including OIC countries. In order to overcome constraints in the supply of FDI, we identify the most important host country characteristics that determine FDI inflows. In this study we follow panel data estimation procedure for 75 developing countries.

In earlier literature the determinants of FDI were described theoretically without giving empirical results [see, for example, Lall (1978)]. Later on, the studies based on empirical analysis have increasingly appeared in the literature. These studies differ from the earlier studies on the basis of theory. Earlier the pure economic theory, that of international trade and the theory of firm were adopted as the theoretical base for empirical study of FDI determinants. These theories assume the presence of perfect competition and identical production function and attribute FDI flows to difference in the interest rates across countries. However, these theories hardly explain the large volume of FDI flows across countries.¹

Recent theories as a base for FDI, and in particular of MNCs (multinational corporations) growth, have turned to the explanations based on market imperfections, oligopolistic interdependence and the possession of the monopolistic advantage. It is assumed that for FDI to

¹The FDI flows to developing countries increased manifold, rising from US \$ 33.7 billion in 1990 to \$ 172.9 billion in 1997 [Government of Pakistan (2000-2001)].

take place a necessary condition is that the investing firms have some monopolistic advantages, not possessed by local competitors.

Wang and Swain (1995) point out that most literature published in both the West and East on the determinants FDI and joint ventures (jvs) in Eastern Europe and China is of rather general nature and is based on the author's own experience and news paper clippings. These "quick – shut" studies are not very useful for the purpose of building up a good research base. They, therefore, design to shed light on these issues by exploring and analyzing the factors that explain foreign capital inflow into Hungary and China during the period 1978-92. More specifically, they test the relative importance of independent variables, including market size, cost of capital, labor costs, tariff barriers, exchange rates, import volumes and economic growth in OECD countries as well as political stability, within the framework of a one-equation model.² Time series data between 1978 and 1992 for Hungary and China were fitted into one equation models and were estimated by ordinary least squares (OLS) regression. Estimates suggest that the size of host country market plays a positive role, while the cost of capital variable and political instability are negatively correlated with investment inflows. These results support the hypotheses that low-cost labor and currency depreciation are important factors in explaining how much capital inflow in to a particular country. There is little evidence to support classical hypotheses concerning tariff barriers and import variables.

In a survey article, De Mello (1997) discusses the latest development in literature on the determinants of FDI and impact of inward FDI on growth in developing countries. The study argues that policy regime of the host countries is a potentially important FDI determinant. The recent literature has provided policy makers in developing countries with more adequate tools and more accurate benchmarks for cross-country comparisons and policy evaluation. The foreign investors are motivated primarily by international rent seeking under standard profit maximizing

² Except the cost of capital and the average growth rates in home countries, most of these independent variables could be found in Agrawal's (1980) article. Many empirically studies (for example, Petrochilos1989; Huang1992) have supported Jorgenson's (1963) hypotheses that FDI is determined by cost of capital. Other suggests that faster growth of the home countries has played a role in promoting FDI in host countries (Jeon1992). A variable OECD growth rate is, therefor, applied to test whether economic prosperity in the major FDI home countries helps directly or indirectly parent firms to get bigger and accumulate assets for both licensing and FDI in both Hungary and China.

assumptions. The most important factors explaining the FDI inflows into the developing countries in recent years have been the foreign acquisition of domestic firms in the process of privatization, the globalization of production, and increased economic and financial integration.

Mello (1997) also present a brief summary of the case studies such as O, Sullivan (1993), Bajorubio and Sovilla-Rivero (1994), Wang and Swain (1995), Milner and Pentecost (1996), and Lee and Mansfield (1996), which specify inflation, exchange rate, domestic expenditures, and net trade ratio as important determinants of FDI.

Zhang and Markusen (1999) explain characteristics of the host countries that attract FDI. Main motivating factor for study was the empirical observation that the poorest countries attract a far smaller share of FDI. The study offers at least two explanations, one involving direct costs and factor requirements of firms and the other indirect requirements. The first involves multinationals' for local skilled-labor and the second involves public or private infrastructure. The study find that the number of multinational firms active in the DCs relative to that country's GNP bears an inverted U-shaped relationship to the relative endowment differences between the two countries.

In a recent study, Majeed and Ahmad (2008) analyze FDI determinants for 23 developing countries. Their study finds human capital, market size, government spending, military spending and urbanization as determinants of FDI. However, results of this study base on a small sample of developing countries. In the present study we extend the sample of developing countries up to seventy five countries.

In empirical literature FDI determinants have been examined at both micro and macro levels. Studies mainly focus the following variables such as market size, openness, exchange rate, wage rate, borrowing cost and infrastructure variables. Many variables like domestic absorption, savings, official development assistance, dependency ratio, no of telephones and televisions, to our knowledge, are still unnoticed. At the same time studies do not incorporate maximum number of developing countries for panel data estimation and also studies do not conduct separate analysis for OIC countries.

The present study aims to find out a variety of host country characteristics that potentially explain the FDI flows in a large set of countries. In this study we follow panel data estimation procedure for 75 developing countries. The rest of the paper is organized as follows: section II explains the model and framework of analysis and section III describes data set and the construction of variables. Section IV presents findings from empirical analysis while section V presents a summary with some policy implications.

2. Methodology

In this chapter, we formulate a framework of analysis to determine the effects of various factors on FDI in developing countries, which we have taken in our sample. The underlying objective is to explain the rational behind foreign direct investment. It is generally believed that MNCs invest in those countries where they expect higher rates of return on their investments. We have introduces a variety of host country characteristics, which determine the profits of firms on foreign direct investment.

Justification of FDI Determinants

Market size

The market size hypothesis argues that inward FDI is a function of the size of the host country market, usually measured by GDP. We take gross domestic product as a proxy for market size. High demand, prospects for economies of scale, good economic health and absorptive capacity are the factors that give green signal to foreign investors. Combined effect of such factors can be captured by market size. Large market size is expected to have a positive influence on FDI. The positive influence is also justified in literature by a number of studies such as Reuber (1973), Schneider and Fry (1985), Wheeler and Mody (1992), Zhang and Markusen (1999), and Majeed and Ahmad (2007, 2008).

Growth of GDP

Market size exhibits existing demand in an economy while growth represents the future potential of the economy. A high level of economic

growth is a strong indicator of potential market opportunities. The growth of the host market is deemed to be significant for expansionary direct investment (Clegg and Scott-Green, 1998). Growth is also important because of higher rates of economic growth are usually associated with an increase of the profitability of corporations (Gold, 1989). There exists relatively little support in the existing literature for this determination of FDI as compared to market size variable (Goldberg, 1972; Scaperlanda and Balough, 1983; Culem, 1988 and Clegg, 1995).

Domestic Absorption

Higher the domestic absorption higher will be the inflow of FDI [De Mello (1999)]. We measure the domestic absorption as a sum of GDP and trade deficit. Since GDP is already present among the determinants of FDI, any variations in domestic absorption that are not explained by GDP, must be explained by trade deficit. In other words keeping GDP constant, changes in trade deficit translate one to one into changes in domestic absorption. Hence we expect the positive impact of this variable.

Exchange Rate

Exchange rate influences FDI in several ways. Froot and Stein (1991) explain relative wealth effect of exchange rates. A rise in the exchange rate in terms of host country currency over the home country currency implies a depreciation of the host country currency. A real depreciation of the host country currency favors home country purchases of host country assets and thereby leading an increase in inward FDI in the host country. Gushman (1985, 1987) and Culem (1988) emphasize the effect of exchange rate changes on relative labor cost. A real depreciation of the host country currency allows home country investors to hire more labor for a given amount of the home country currency, and therefore is associated with an increase in inward FDI in the host country. The study of Klein and Rssengren (1994) supports the significance of the relative wealth effect but fails to support the relative labor cost effect.

Balance of Payment Deficit

It is measured by current account balance. The expected sign of the coefficient of BOP is negative, because it indicates that larger deficit in accounts mean a country is living beyond its means and foreign investors feel the danger of restrictions on free capital movement and the profit of the firms will be difficult to transfer. (Schneider and Frey (1985)).

External Debt Burden

Another important determinant of FDI is the external debt burden that reflects external imbalances. Higher debt burden creates constraints not only in terms of new private lending but also in terms of FDI flows (Nunnenkamp (1991)). Hence it is expected to discourage FDI and the coefficient on external debt could be negative.

Openness

Higher the degree of openness is the cause of higher flow of FDI. The main reason underlying is the fact that more MNCs are export oriented. They acquire the benefits of export expansion policies and import the machinery for production procedure from the home country (see, for example, Majeed and Ahmad (2006, 2007)). We expect positive effect of this variable. Kravis and Lipsey (1982) report positive impact for host country 'degree of openness' on the location decisions of multinationals.

Savings

Feldstein and Horioka (1980) proposed that there should be no relationship between domestic saving and domestic investment. Saving in each country responds to the worldwide opportunities for investment while investment in that country is financed by the worldwide pool of capital. Conversely, if international savings tend to be invested in the country of origin, differences among countries in investment rates should correspond closely to saving rates. This relationship between domestic savings and domestic investment is an indirect approach to test the degree of capital mobility. We expect favorable effect of savings on FDI.

Domestic Investment

It may be a substitute or a complement for FDI it depends upon the investment climate of the host country and the types of FDI. However, the literature shows the mixed results. When domestic investment increases marginal productivity of investment decreases, if marginal productivity of FDI will also decrease then relationship will be substitute. This may happen when domestic investment dominates in production sector. On the contrary, if marginal productivity of FDI increases then relationship will be compliment. This may happen when domestic investment dominates in infrastructure. Further if domestic investors and foreign investors compete for joint ventures then this relationship will be substitute (see, for example, Buffie (1993)).

Credit Facilities

Credit facilities create investment climate for domestic investors. Better credit facilities mean more domestic investment. In this situation there will be little room for foreign investors. So we expect the negative influence of this variable on FDI.

Government Consumption

Government consumption leads to higher level of fiscal deficit that in turn generate macroeconomic instability and poor credit position of an economy. A rise in government consumption also leads to higher rate of interest, which crowds out investment including foreign investment (see, for example, (Majeed and Khan (2008))). Hence we expect adverse effect of this variable on FDI.

Official Development Assistance

Official development assistance expenditures are the indicator of development activities. Such expenditures favorably determine infrastructure and also indicate the good terms with international institutes that buildup the confidence of foreign investors. Luger and Shetty (1985) have presented suggestive evidence issue.³

³ See for more detail Luger and Shetty (1985)

Indirect Taxes

It is expected to have negative effect on FDI because high taxes increase the cost of production that is a disincentive for supply decisions of MNCs [Coughlin, Terza and Arromdee (1991)]. However, in empirical literature the effect of this variable is controversial.⁴

Communication Facilities

Communication facilities have profound and enduring effects on a society. A society seems to be developed and industrialized, if it has a sophisticated and widespread communication system. The presence or lack of these facilities shapes the boundaries of the nations, states and local governments. [Coughlin, Terza and Arromdee (1991)].

Urbanization

The extent of urbanization is a social variable, which is expected to have positive impact on FDI as proposed by Root and Ahmad (1979). Urban demand for manufacturing is higher than rural. Moreover, if a country covers a vast area under urbanization, the production environment for MNCs would be better. However urbanization also creates overcrowding, crime, and burden existing facilities, hence its negative influence on FDI is also expected.

Dependency Ratio

Higher dependency ratio means vacuum of skilled labor force. In developing countries the issue of dependency ratio has a great concern. A single person runs the living expenditures of a large family. Such persons do over work that has adverse effect on their health and productivity. Higher dependency ratio is an indicator of underdevelopment. We can expect the negative influence of dependency ratio on investment decisions.

⁴Evidence of conflicting results is plentiful. For example, Carlton (1983) concludes that taxes did not have major effects on the location of new plants. However, Bartik finds that taxes deter the location decisions of MNCs.

The model, which we have developed, takes into account those factors, which play an important role in the determination of FDI in the developing countries. Thus we have a single equation model:

$$FDI_{it} = f(EXP_{it}, X_{it}, \dots, X_n, \xi_{it})$$

where FDI_{it} represent the endogenous variable, FDI, while X_{it} is the vectors of exogenous variables. The subscript I ($=1, \dots, n$) represents country and t ($=1, \dots, T$) period of time (years). Notice that the vectors X_{it} , would generally contain some overlapping variables.

We identify the explanatory variables in the FDI equation. We select a large set of developing countries for empirical investigation. As for as, our explanatory variables are concerned, they are not enriching with observations all over the countries.

$$FDI = f(GDP_{it}, GROW_{it}, DA_{it}, EXCH_{it}, BOP_{it}, ED_{it}, OPEN_{it}, SAV_{it}, DI_{it}, CRED_{it}, GC_{it}, OD_{it}, IT_{it}, TV_{it}, TP_{it}, UP_{it}, DEP_{it}, FDI_{it-1})$$

Where,

FDI = Foreign Direct Investment as a percentage of GDP,

GDP = Gross domestic production in constant prices of 1989,

$GROW$ = Annual percentage of growth rate of GDP in percentage,

DA = Domestic absorption is equal to GDP plus trade deficit,

$EXCH$ = Real exchange rate. It is obtained by multiplying the nominal exchange rate with US CPI and then divided by domestic CPI,

BOP = Balance of payments as a percentage of GDP,

ED = External debt as a percentage of GDP,

OPEN = Openness measured as export plus import as percentage of GDP,

SAV = National savings as a percentage of GDP,

DI = Domestic investment as a percentage of GDP,

CRED = Credit facilities to domestic sector as a percentage of GDP,

GC = General government consumption expenditures as a percentage of GDP,

OD = Official development assistance as a percentage of GDP,

IT = Indirect taxes as a percentage of GDP,

T = Number of televisions per 1000 persons,

TP = Number of telephones per 1000 persons,

UP = Urban population as a percentage of total population,

DEP = Dependency ratio measured as the percentage of non working population to the working population,

FDI (-1) = Foreign Direct Investment as a percentage of GDP in the previous year,

3. Data and Estimation Procedure

The data for this study have been taken from world development indicators (WDI) 2005. Originally a sample of 155 countries was selected but after screening process 75 countries were chosen for which data on most of the variables were available for at least 15 years. All the variables are measured in US dollar at current prices.

Gross foreign direct investment is measured as percentage of GDP. Gross foreign direct investment is inflows of foreign direct investment recorded in the balance of payments financial account. We measure the domestic absorption as a sum of GDP and trade deficit. Since GDP is already present among the determinants of FDI, any variations in

domestic absorption that are not explained by GDP, must be explained by trade deficit.

Official exchange rate is measured as the number of local currency units per US\$, period average. Official exchange rate refers to the actual principal exchange rate and is an annual average based on monthly averages determined by country authorities or on rates determined largely by market forces in the legally sanctioned exchange market. We converted the nominal exchange rate into real exchange rate. For this we multiplied the nominal exchange rate with US CPI and then divided it by domestic CPI.

Balance of payments is the current account balance that includes the credit minus debit of goods, income and current transfers, given as percentage of GDP. Total external debt is measured as percentage of GDP. It is debt owed to nonresidents repayable in foreign currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private non-guaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt.

The variable openness is measured as exports plus imports and dividing by GDP. This variable measures the degree of trade liberalization. Gross national savings are measured as percentage of GDP. It includes net current transfers is equal to gross domestic savings plus net income and net current transfers from abroad.

Gross domestic investment is measured as percentage of GDP. It consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential dwellings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales.

Credit to private sector is measured as percentage of GDP. It refers to financial resources provided to the private sector-such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable-that establish a claim for repayment. For some countries these claims also include credit to public enterprises.

General government consumption is measured as percentage of GDP. General government consumption includes all current spending for purchases of goods and services (including wages and salaries). It also includes most expenditure on national defense and security, but excludes government military expenditures that are part of government capital formation.

Official development assistance and net official aid record the actual international transfer by the donor of financial resources or of goods or services valued at the cost to the donor, less any repayments of loan principal during the same period. Aid dependency ratios are computed using values in U.S. dollars converted at official exchange rates.

Net indirect taxes are measured as percentage of GDP. These taxes are the sum of indirect taxes less subsidies. Indirect taxes are those taxes payable by producers that relate to the production, sale, purchase or use of the goods and services. Subsidies are grants on the current account made by general government to private enterprises and unincorporated public enterprises.

We now discuss estimation procedure for our model. The use of pooled time-series and cross-section data provide large sample that is expected to yield efficient parameter estimates. Since political, structural and institutional characteristics vary from country to country, imposing a single relationship to all units is likely to suppress information. In order to overcome this problem we will use the approach of uniform shifts. The econometric literature suggests two approaches for uniform shifts [Green (1993), Kmenta (1986) and Maddala (1977)] the fixed effects and random effects model. In the present study we will follow fixed effects model.

The Fixed Effects Model

This approach assumes that the shifts are deterministic. Here the intercept term is allowed to vary while random variations are assumed to be independent across the cross sections. The formulation of the model for FDI is

$$FDI_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

Where α_i is country specific fixed effects. In this form X_{it} is vectors. By applying OLS with dummies is called fixed effects model.

4. Empirical Results and Interpretation

In this section we report the empirical results based on pooled data for 75 developing countries over the period 1970 to 2004. We select a large set of developing countries for empirical investigation. The panel data model is estimated by allowing the deterministic shifts across the countries. Since the model uses panel data, it is likely to suffer from autocorrelation as well as hetroskedasticity. Both are removed by applying appropriate econometric techniques. The results of estimation are presented in Tables 1a and Table 1b.

Table 1 (a): The Parameter Estimates of the Fixed Effects Model

Variables	Fixed Effects	Variables	Fixed Effects
GDP	8.79E-11 (11.05)*	CRED	-0.001 (-3.46)*
GROW	0.214 (11.05)*	GC	-0.385 (-3.11)*
DA	0.055 (1.65)**	OD	1.567 (1.42)
EXCH	-4.65E-07 (-0.79)	IT	-0.022 (-0.32)
BOP	-0.612 (-4.14)*	TV	1329.1096 (2.00)*
Ed	-0.059 (-3.30)*	TP	-1413.9848 (-1.01)
OPEN	0.346 (8.55)*	UP	0.0039 (4.45)*
SAV	0.188 (12.20)*	DEP	-0.479 (-8.78)*
DI	-0.182 (-1.6)***	FDI (-1)	0.508 (15.34)*
R²	0.68	Adjusted R²	0.64
F Statistics	274	D W	2.2311867

Note: The numbers in parentheses are the computed t-values. *, **, and *** denote statistically significant at the 1 %, 5%, and 10% levels, respectively

Table 1 (b): Intercepts of the Fixed Effects Model

Countries	Fixed Effects	Countries	Fixed Effects	Countries	Fixed Effects	Countries	Fixed Effects
Angola	0.567 (0.73)	Sri Lanka	0.599 (1.23)	Algeria	1.023 (1.32)	Paraguay	0.698 (0.96)
Argentina	0.908 (0.79)	Lesotho	0.530 (0.17)	Ecuador	0.940 (1.34)	Senegal	0.604 (1.22)
Burundi	0.386 (1.68)**	Madagascar	0.419 (1.0)	Egypt, Arab Rep.	1.128 (1.62)**	Sierra Leone	1.226 (1.89)**
Benin	0.338 (0.94)	Mexico	0.694 (0.78)	Fiji	2.624 (3.02)*	El Salvador	0.452 (0.76)
Burkina Faso	0.348 (0.92)	Mali	0.558 (1.30)	Gabon	2.359 (2.52)*	Swaziland	1.757 (2.28)*
Belize	1.165 (1.44)	Mozambique	0.493 (1.65)**	Ghana	0.438 (1.03)	Chad	0.635 (1.66)**
Bolivia	1.401 (1.79)**	Mauritania	0.333 (0.78)	Gambia, The	0.378 (0.61)	Thailand	0.391 (1.16)
Brazil	0.248 (0.36)	Mauritius	0.333 (0.82)	Guatemala	1.014 (1.53)	Togo	0.774 (1.53)
Botswana	1.654 (1.89)**	Malaysia	1.582 (2.07)*	Guyana	1.683 (2.02)*	Trinidad and Tobago	1.954 (2.21)*
Chile	1.292 (1.23)	Niger	0.628 (1.86)**	Honduras	0.805 (1.31)	Tunisia	0.719 (0.95)
China	0.215 (0.70)	Nigeria	1.085 (1.95)*	Haiti	0.407 (0.93)	Turkey	0.329 (0.91)
Cote d'Ivoire	0.793 (1.68)**	Nicaragua	0.968 (1.81)**	Indonesia	0.510 (1.11)	Tanzania	0.662 (1.68)**
Cameroon	0.676 (1.22)	Nepal	0.378 (1.10)	India	0.291 (0.89)	Uganda	0.649 (2.06)*
Congo, Rep.	1.215 (1.69)**	Pakistan	0.749 (1.44)	Iran,	0.776 (0.86)	Venezuela, RB	0.867 (0.76)
Colombia	0.791 (0.85)	Panama	2.263 (2.77)*	Jamaica	0.845 (1.38)	South Africa	1.154 (1.69)**
Cape Verde	1.048 (0.97)	Peru	0.940 (1.03)	Jordan	1.362 (1.33)	Zambia	1.333 (2.22)*
Costa Rica	1.054 (1.69)**	Philippines	0.495 (0.78)	Kenya	0.485 (1.34)	Zimbabwe	0.458 (1.09)
Czech Republic	0.465 (0.28)	Papua New Guinea	1.169 (2.09)*	Korea, Rep.	0.228 (0.11)		
Dominican Republic	0.630 (0.77)	Poland	0.830 (0.95)				

Note: The numbers in parentheses are the computed t-values. The statistics significant at 5 % level are indicated by *.

The variables that are statistically significant in the fixed effect model of panel data estimation are gross domestic product, GDP growth rate, urbanization, savings, trade deficit, dependency ratio, trade openness, external debt, balance of payments, indirect taxes, and communication.

One of the most important determinants which is found to have significant favorable effect on FDI in all the estimated equations is real gross domestic product. It is the most commonly used proxy for market size. This result emphasizes the necessity of large market size for efficient utilization of resources and exploitation of economies of scale. Large market size offers higher demand and absorptive capacity in an economy and therefore, foreign investors are attracted to put their stake in that concerned economy. MNCs are particularly attracted by large market size because they do not reship most of their products to parent countries. Once these foreign firms get established they can take the oligoplistic advantages due to their large size, technical know-how and other facilities they possess. These relative advantages pay them in the form of higher profits. Market size is also helpful in perpetuating foreign direct investment.

Unlike some empirical studies⁵, economic growth is also highly significant in affecting FDI. Therefore, our results are consistent with prior expectations. Growth is also important because higher rates of economic growth are usually associated with an increase in the profitability of corporations.⁶ The effect of government consumption on FDI is negative and significant. It implies that other things remaining the same, FDI decreases with rise in government consumption and vice versa. It can be interpreted that rise in government consumption leads to higher level of fiscal deficit and so instability and poor credit position of the economy which cause hindrance for foreign investment. In our estimation the positive and significant coefficient for saving implies that higher domestic savings lead to easy availability of funds and credible position of the concerned economy at international level.

⁵ See e. g. findings on the insignificant growth rate are in line with those presented by Clegg (1995) and Clegg And Scott-Green (1998). And findings on significant growth rate in line with those presented by Root and Ahmad (1979),

⁶ See gold, 1989, p. 213

The variable urbanization is quite consistent with prior expectations and an empirical study conducted by Root and Ahmad (1979). Urbanization creates effective demand for industrialization. Moreover, a higher degree of urbanization implies that public facilities are available. On the other hand congested population causes high level of domestic prices. All these factors are attached with the proposition that urbanization attracts foreign investors.

The variable official development assistance is considered favorable for FDI in the literature. Our estimates, however, show that association is insignificant, though positive. The reason for insignificance is the low level of structural development in LDCs, which dominate over sample of countries. It may be due to lack of revenues and high expenditures for debt servicing and defense.

Our results conclude negative insignificant parameter estimate for indirect taxes. It can be interpreted that foreign investors such as MNCs can shift these indirect taxes forward to consumers thereby minimizing their role in investment decisions MNCs. MNCs also avoid taxes by artificially inflating the prices they pay for intermediate products. This phenomenon, known as “transfer pricing” is a major practice of MNCs. Hence MNCs contribute little in the form of taxes.

The effect of balance of payment deficit is significant with negative sign, because adverse balance of payment implies that a country is living beyond its means. Furthermore, it indicates that a country is facing macroeconomic instability. In such countries governments and government policies are not stable and consistent. Therefore foreign investors hesitate to invest. The effect of external debt on FDI is negative and significant. The debt burdens adversely affect the investment climate of a country. In the long-run, external debt discourages or at least foreign investors hesitate to invest, because their profits are expected to be taxed at high marginal rate to finance debt repayments. The pronounced reaction of investors from other capital exporting countries indicates that solution to debt burden is required in order to improve the developing countries access to FDI significantly.

Communication facilities are measured with the number of televisions and telephones. The affect of television on FDI is significant with positive sign. Television is the source of advertisement for manufacture

products. The demand for production has a great deal with advertisement approaches. However the effect of telephone variable turns out to be insignificant.

The variable labor force is an important determinant of FDI. If we analyze only the size of labor force this may blur the true results because the quality of labor force is also important, besides the size of labor force. Keeping in view this fact we employ the variable dependency ratio for labor quality. Because higher dependency ratio implies lower the quality of labor force and vice versa. The effect of dependency ratio is negatively significant in explaining FDI inflows. This variable reflects the general phenomena of single person dependent families in the developing countries. In such situation productivity of labor force is negatively affected. Our empirical results are consistent with this phenomenon.

The effect of openness is highly significant with positive sign. Trade openness identifies the magnitude of trade liberalization in respective countries, this factor hold much importance because the developing countries are basically used as terminal. The MNCs are attracted to the countries to take the location advantages with the motive of exporting their products to large markets. Less trade barriers make imports of raw material, such as plant machinery, convenient. On the other hand they can easily export their intermediate and final products. Moreover, due to liberalization policy the MNCs also take advantage of export promotion facilities. With these factors in mind, we can conclude that our positive relation between openness and FDI is theoretically sound.

Unlike other empirical studies our results show inverse but insignificant, relationship between FDI and real exchange rate (RER). This result is consistent with Moore (1993). Usually devaluation is used as a tool to eliminate the deficit in the BOP, assuming that devaluation raises the price of import and lowers the price of export. So during devaluation we do not concentrate on the capital inflows and outflows. The devaluation raises the value of out standing foreign debt pushing the country into debt trap shaking the confidence of foreign investors, which will lead to unresponsive behavior of foreign investors. Further, regular devaluation creates the uncertain environment for foreign investors.

The effect of credit facilities in the host country is negative and significant. Such facilities promote the level of domestic investment. Higher level of domestic investment leaves little room for foreign direct investment and vice versa. The effect of domestic investment is negatively significant that means domestic investment and FDI are substitutes. Higher domestic investment mean there is little room for FDI.

The effect of domestic absorption is found to have significant favorable affect on FDI. We measure the domestic absorption as a sum of GDP and trade deficit. Since GDP is already present among the determinants of FDI, any variations in domestic absorption that are not explained by GDP, must be explained by trade deficit. In other words keeping GDP constant, changes in trade deficit translate one to one into changes in domestic absorption. Our results are consistent with prior expectations. In literature De Mello (1999) also proposes positive impact of domestic absorption on FDI.

Table 2: The Parameter Estimates of the Fixed Effects Model for OIC Countries

Variables	Fixed Effects	Variables	Fixed Effects
GDP	1.21 (4.04)*	CRED	-0.01 (-2.76)*
GROW	0.01 (1.17)	GC	-0.04 (-3.03)
EXCH	-0.0003 (-3.09)*	OD	2.36 (1.77)***
BOP	-0.04 (-4.32)*	TP	.001 (0.062)
Ed	-0.003 (-1.61)***	UP	5.46E-08 (2.27)**
OPEN	0.007 (1.61)***	DEP	-2.91E-08 (-2.47)*
SAV	-0.01 (-1.32)	FDI (-1)	0.61 (14.83)*
DI	0.002 (0.87)		
R²	0.70	Adjusted R²	0.67
F Statistics	25.10	D W	1.7

Note: The numbers in parentheses are the computed t-values. *, **, and *** denote statistically significant at the 1 %, 5%, and 10% levels, respectively.

In a separate modeling for selected OIC countries, our results show that most of the host country characteristics are similar to the parameter estimates for all selected developing countries. However in some cases differences have been noted such as domestic investment, exchange rate, official development assistance, economic growth and savings. The trade-off between domestic investment and FDI is not valid in the OIC countries. The effect of exchange rate was insignificant in full sample of countries while it is significant in OIC countries implying that the exchange rate is a crucial variable to determine the capital flows to OIC countries. The effect of official development assistance turns out to be significant in this sample while it was insignificant in full sample of developing countries. However, savings do not seem to affect FDI inflows in OIC countries contrary to the parameter estimates of full sample of countries.

5. Conclusion

The objective of this study has been to find out the main factors that are important in determining the location decisions of MNCs in developing countries. For this purpose we selected a sample of panel observations for 75 developing countries including 25 OIC countries over the period 1970-2004. The data are driven from the *World Development Indicators (WDI) 2005*. Fixed effects (country specific intercepts) model is employed for the estimation of the relationship of FDI with its potential determinants based on panel data. A number of conclusions can be drawn from the study, which are summarized as follow.

The variable GDP, which is a suitable proxy for market size, turned out to be significant. The effect of growth rate is also significant. The variable growth is much important because higher rates of economic growth are usually associated with an increase in the profitability of MNCs. The trade openness of developing countries, which indicates how much the borders of a country are free from restrictions on imports and exports and how much it is liberal, is also conducive in affecting FDI. The variables external debt and BOP have negative impact for FDI flow. The increasing debt burdens and persistent deficit in BOP mean a country is suffering financial crises. Further more debt service charges create financial disturbance. Such situation reflects that government will

less spend on development activities and increase debt burden and import duties that create negative effect for foreign investors.

The effect of domestic investment in explaining FDI flow is negative. This is so because an increase in domestic investment leaves little room for FDI. This inverse effect is also supported by variable credit facilities. The effect of credit facilities is also negative that implies higher credit facilities push up domestic investment.

The variables government consumption is significant with negative signs. The expansionary trends of this variable discourage market friendly approaches. Foreigner investors explore those countries where market friendly approaches are adopted. The effect of savings is also significant because savings are the source of capital inflow. Saving in each country responds to the worldwide opportunities for investment while investment in that country is financed by the worldwide pool of capital.

The official development assistance is significant in explaining FDI. The flow of such expenditures from international institutes buildup the confidence of foreign investor. Such expenditure has positive effect on infrastructure growth that has a favorable effect for export FDI flows. The impact of communication facilities is also turned out to be significant with positive signs in explaining FDI flow. Such facilities are helpful in exploring and access to new markets.

Finally, in a separate modeling for selected OIC countries, our study identifies the importance of above noted host country characteristics, however some differences hold in OIC countries. The trade-off between domestic and foreign investment is not valid. The effects of exchange rate and official development assistance are not significant in all developing countries but both of these variables turn out to be significant in OIC countries.

The policy implications that we are offered are:

- It is of critical importance to maintain a high and sustainable economic growth rate. The study shows that a sustainable growth patterns attract FDI.
- The developing countries can attract greater FDI inflows by removing the artificial barriers and control on exports and imports.
- Widening of the net of communication facilities is also instrumental in attracting FDI inflows. To this end subsidies may be provided to the communication sector.

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Income Convergence or Income Divergence? A Study on Selected OIC Countries

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In this paper, the existence of income convergence or income divergence is investigated on ten selected OIC (the Organisation of Islamic Conference) economies. The results are then linked to the degree of openness of the countries using globalization indices. In order to investigate the existence of either income convergence or divergence between selected Islamic countries, income differentials between selected OIC countries and the benchmark country are computed and a series of test is done. The tests include stationary linearity test using Augmented Dickey-Fuller (ADF) test for linear time-series and non-linear stationary test using Kapetanios et al. (KSS) tests for non-linear time series. The study finds that most of the countries experience income divergence except for three countries. By analyzing the degree of globalization in these economies, it is found that the results support the endogenous theory and depending approach which predict that globalization is likely to cause income divergence (inequality) rather than convergence (equality).

1. Introduction

It is hypothesized that despite the difference in initial income of countries/economies, poorer and richer economies may eventually converge in term of economic growth. This refers to income convergence. In specific, income convergence refers to the narrowing of income differential among poor and richer economies.

The issue of income convergence has drawn the attention of many empirical researchers and policy-makers. Most of the studies on this

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issue were done on developed and developing economies, such as among Western European economies by Salimano (2001) and on East Asian economies by Liew and Lim (2005) and Liew and Ahmad (2006).

The empirical evidence on the issue of income convergence is mixed, depending upon model characteristics, underlying assumptions, and the nature of data (either cross section or time series). Generally, studies using cross-section data provide evidence in support of the convergence hypothesis across nations such as studies by Baumol (1986), Barro and Sala-I-Martin (1991, 1992, 1995), Mankiw, Romer and Weil (1992), Taylor (1999), Rahman (2006) and others. In specific, using Madison's data covering the period 1870-1979, Baumol (1986) tested the convergence among 16 industrialized countries. He regressed output growth on a constant and an initial income that ended up with very strong evidence of convergence. Barro and Sala-I-Martin (1992, 1995), in their significant empirical studies based on the cross section approach of convergence, found evidence in favor of convergence. The test of convergence was done across different states of the United States, the prefectures of Japan and across the regions of eight European countries. They found evidence of absolute β -convergence is the norm for these regional economies. Taylor (1999) also found convergence pattern in sample of a group of seven countries in an alternative setting of neoclassical model termed as 'open-economy factor accumulation model' that allows capital and labor migration. Meanwhile, Mankiw et al. (1992) found evidence of conditional convergence in the sense that such convergence is evident for all sample groups when they controlled for investment, growth of the working age population, and school enrollment.

On the other hand, studies which use time series data mostly do not support income convergence (Quah, 1992; Bernard and Durlauf, 1995; Alvi and Rahman, 2005). Bernard and Durlauf (1995), for example, using Johansen's co-integration method to test the convergence of per capita income across 15 OECD countries. They argue that cross-sectional convergence is a weaker notion because such tests tend to spuriously reject the non-convergence hypothesis when economies have different long run steady states. Unlike the findings of cross-section studies, their investigation fails to reject the null hypothesis of no convergence across 15 OECD countries. However, they do find

evidence of substantial cointegration indicating the presence of some common long-run factors that jointly determine output growth. A study by Alvi and Rahman (2005) which examines income convergence across U.S. regions for the period 1929-2002 using unit root and cointegration techniques also suggests non-convergence in per capita incomes across U.S. regions even when endogenous breakpoints are included. They find evidence of cointegration among technology and incomes in the leading regions, but not in the lagging ones, identifying technology as a factor that contributes to the lack of convergence.

Nevertheless, very few studies is done extensively on Muslims economies in particular the member of the OIC (the Organisation of Islamic Conference) on the issue of income convergence and in particular, related to globalization. This is basically because Muslim economies tended to be more close off to the outside world in the past due to various cultural reasons. But, the impact of the current globalization on the Muslim world has been tremendous, with negative and positive outcomes for different nations in terms of transfer of goods, people, information and technology. Thus, it would be intriguing to see how globalization would affect the income convergence/divergence of those economies which motivates the conduct of the present study.

In the past, studies on income convergence of Muslim economies had also produced mixed results. For example, a study by Rahman and Hossain (n.d.) on Bangladesh which examines per capita income convergence across six divisions - Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, and Barisal using annual data covering 1977 - 2000 does not provide enough evidence in favor of the convergence hypothesis even though the regions have similar socio-economic background, physical infrastructure, and access to the same financial system, administrative institutions, and technology. Another study by Sameti, Farahmand and Koleyani (n.d.) examines income convergence between 22 MENA countries (Afghanistan - Algeria - Bahrain - Cyprus - Egypt - Iran - Iraq - Israel - Jordan - Kuwait - Mauritania - Morocco - Oman - Pakistan - Qatar - Saudia Arabia - Somalia - Sudan - Syria - Tunisia - Turkey - United Arab Emirates) during the period of 1970-2003 by using the neoclassical growth model of Barro - Salla - i - Martin. Non - linearity of the underlying relationships, the restrictiveness of assumptions of functional forms and econometric problems in the estimation and

application of theoretical models advocate for the use of Artificial Neural Networks (ANN) algorithms in this study. They show that by changing the quantitative tools of analysis and using ANN, the results become more precise and show that absolute convergence and conditional convergence are significant but the rate of convergence is low. It means that their analysis supports tendency of poor economies to grow faster than rich ones across the MENA countries. Similar method also used by Koleyni (2009) to test income convergence between 177 world countries (inclusive Muslim countries) during the period of 1980-2000, that is, using the neoclassical growth model of Barro-Sala-i-Martin for both kinds of convergence (absolute and conditional). Due to non-linearity of the underlying relationships, the restrictiveness of assumptions of functional forms and econometric problems in the estimation and application of theoretical models, the study also uses Artificial Neural Networks (ANN) algorithms. Results show that absolute convergence does not exist and conditional convergence is insignificant. A study on Malaysia and Indonesia as Muslim countries in ASEAN was done by Ismail (2008) on the issue of income convergence. This study investigates the issues of convergence and economic growth in the ASEAN. Preliminary graphical observations find strong evidence of β and σ convergence after the expansion of ASEAN membership. This results support the convergence theory that poor countries in ASEAN do catch up with the rich ones. The convergence and growth effects in the ASEAN integration is estimated by using the dynamic heterogenous panel approach namely Pooled Mean Group Estimator (PMGE). The empirical evidence supports unconditional and conditional convergence hypotheses in the ASEAN5 namely Indonesia, Malaysia, Singapore, The Philippines and Thailand, for the 1960-2004 period. The ASEAN5 tends to converge to a steady state growth rate of per capita GDP with a speed of convergence of between 1.6% and 16.6%. These mixed results obtained from previous studies of Muslim countries also motivate us to conduct further studies on this issue.

On similar issue, there are studies attempt to adopt various econometric approaches or methods, linear or non-linear, to test the income convergence hypothesis. Among many studies, are Coulombe and Tremblay (2001), Afxentiou and Apostolos (1998), Coulombe and Lee (1998), Hofer and Worgotter (1997), Petrakos and Saratsis (2000) and Barro and Sala-i-Martin (1992).

The validity of this hypothesis of income convergence could also be tested using stationary test of time series of income differential between poorer and richer countries. If there is evidence of stationarity (stable long-run movement) between two countries' incomes, this implies income convergence over time. Otherwise, the result would be interpreted as income divergence. One commonly employed stationary test is the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979). The empirical evidence based on the ADF test in most studies is generally in favour of income divergence. Some authors, including Li and Papell (1999), however, demonstrated that the ADF test is biased towards the non-rejection of stationary and therefore producing results that favour income divergence. In fact, in their study on the OECD economies, Li and Papell(1999), among others, able to provide more evidence of convergence after taking into consideration the structural breaks in their proposed stationary tests. Nonetheless, studies by Liew and Lim (2005) and Liew and Ahmad (2006) took a step further by looking the issue of convergence from non-linear point of view. Motivated by the findings of Liew et al. (2003) who argue that linear testing procedure may fail in non-linear context, Liew and Lim (2005) and Liew and Ahmad (2006) show empirically that non-linear stationary tests of Kapetoni et al. (2003) perform better than ADF in detecting stationarity in the presence of non-linearity.

Based on the fact that literature on Muslim developing countries on this issue is still scanty and particularly, non-linear approach adopted on studies on these economies is rare, this present study aims to investigate the existence of income convergence or divergence of selected Muslim countries (members of the OIC) using this latest method of non-linear test of stationary to produce robust results. Furthermore, motivated by mixed arguments on the relationship between income convergence/divergence and globalization in literature, the study attempts to relate the existence of convergence/divergence in these economies to openness of the economies (globalization). It is expected that the analysis on this relationship will, more or less, assist in setting up policy recommendation in these economies on reducing income gap and help to answer a question whether globalization policy is a better way to reduce the gap.

This study is organized as follows. Following the introduction in section 1, Section 2 reviews data and empirical work. Section 3 presents the empirical results. Section 4 attempts to relate the convergence/divergence of income of the countries in study to globalization and Section 5 concludes.

2. Data and Empirical Work

Sample period of this study covers 1970 to 2004 on 10 selected OIC members namely, Burkina Faso, Benin, Egypt, Malaysia, Oman, Bangladesh, Indonesia, Iran, Nigeria and Saudi Arabia. Unlike previous studies which mostly using sample countries base on regional group (MENA countries, ASEAN members and others), this study will select sample countries from various continents. The sample period is chosen based on the availability of data for all economies in study. To do a measurement of convergence/divergence, a neo-classical approach to convergence is used here based on the simple idea that convergence implies that poor countries grow faster than rich countries in terms of their per capita income. Note that empirical testing of the convergence hypothesis provides several definitions of convergence, and thus different methodologies to test it Islam (2003) provides a survey on the different definitions and methodologies relative to the concept of convergence. In the convergence debate, two definitions have emerged: the absolute convergence and the conditional convergence. The former occurs when the level of per capita income of the poor countries catch-up with the one of the rich ones. This can be achieved if the growth rates of developing countries are significantly higher than those of developed countries. The latter implies that each country is converging to its own steady state and that in the long run all the growth rates will be equalized. Since this study adopts the former definition, thus data on real per capita gross domestic product, denominated in common currency, for each country is used and US real per capita GDP is used to represent the rich country. Data on GDP and size of population are obtained from *International Financial Statistics* and the data are computed in common currency of US dollar by the author.

The present study examines the income convergence hypothesis in the context of US and the rest of selected OIC economies in the non-linear perspectives. The earlier literature on univariate analysis of

nonstationarity against stationarity has focused on the linear model, implicitly disregarding any possible non-linearities in the series under investigation. Recently, however, there has been increasing concern that the analysis of a linear model in a single time series may be inappropriate to give satisfactory inferences on important economic hypotheses. For example, the power of Dickey-Fuller (1979) unit root test has been called into question. Theoretical models of nonlinear adjustments have also been proposed in many areas of economics and finance. A growing number of studies have emerged along this line of research, see for example Enders and Granger (1998), Caner and Hansen (2001) and Lo and Zivot (2001). In particular, Kapetanios and Shin (2002) and Kapetanios et al. (2003) analyse the implications of the existence of a particular kind of nonlinear dynamics for unit root tests, and thus provide alternative frameworks for testing the null of a unit root against the alternative under which the time series of interest follow globally stationary processes. More specifically, Kapetanios and Shin (2002) consider self-exciting threshold autoregressive (SETAR) models and Kapetanios et al. (2003) examine nonlinear smooth transition autoregressive (STAR) models. Their Monte Carlo experiments clearly show that these types of nonlinear unit root tests are generally more powerful than the standard Dickey-Fuller unit root tests when the data follow either globally stationary SETAR or STAR processes.

The first empirical investigation on income convergence in this present study is done by conducting a formal linearity test of Luukkonen *et al.* (1988) (LST). If the results of this test suggest the presence of non-linearity, then the Kapetanios *et al.* (2003) (KSS) of non-linear test of stationarity is applied. Otherwise, the ADF linear test of stationarity is used.

The LST linearity test is adopted to determine whether the logarithm differences of real per capita GDP between two sample countries, $(\ln Y_{it} - \ln Y_{At})$ exhibits linear or non-linear behaviour. The test is specified as:

$$(\ln Y_{it} - \ln Y_{At}) = \alpha_0 + \sum_{k=1}^p \alpha_k (\ln Y_{it-k} - \ln Y_{At-k}) + \sum_{k=1}^p [\beta_{1k} (\ln Y_{it-k} - \ln Y_{At-k})(\ln Y_{it-d} - \ln Y_{At-d}) + \beta_{2k} (\ln Y_{it-k} - \ln Y_{At-k})(\ln Y_{it-d} - \ln Y_{At-d})^2 + \beta_{3k} (\ln Y_{it-k} - \ln Y_{At-k})(\ln Y_{it-d} - \ln Y_{At-d})^3] + v_t \quad (1)$$

where Y_{it} is the real GDP per capita of individual country under investigation and Y_{At} is the real GDP per capita of the US and v_t is white noise residuals with zero mean and constant variance assumption. Practically, the null hypothesis to be tested is that

$$H_0 : \text{all } \beta's = 0 \quad (2)$$

against the alternative that at least one β is non-zero. If the null hypothesis is not rejected, it implies the absence of non-linearity. Otherwise, the rejection of null hypothesis means the existence of a type of non-linearity in favour of the Smooth Transition Autoregressive, STAR(p), model. The F -type test statistics is employed for this test of non-linearity. The optimal lag length, p , and the delay parameter, d , have to be determined in advance. Following Taylor and Peel (2000), the optimal p is fixed based on partial autocorrelation functions (PACF). The linearity test is performed for a class of d ranges from 1 to 12. The optimal d is chosen from the one that minimizes the p -value of the F -test statistic. Results of this test are presented in Table 1.

In testing the convergence or divergence of income, the KSS non-linear stationary test is then conducted to detect the presence of non-stationarity against non-linear. The stationary STAR process can be specified as:

$$\Delta(\ln Y_{it} - \ln Y_{At}) = \delta(\ln Y_{it-1} - \ln Y_{At-1})^3 + \mu_t \quad (3)$$

or

$$\Delta(\ln Y_{it} - \ln Y_{At}) = \sum_{k=1}^p \beta \Delta(\ln Y_{it-k} - \ln Y_{At-k}) + \delta(\ln Y_{it-1} - \ln Y_{At-1})^3 + \omega_t \quad (4)$$

where μ_t and ω_t are stochastic error terms each with zero mean and constant variance assumption. Equation (3) and (4) correspond to the conventional Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) stationary tests with no intercept and trend terms in non-linear framework. The divergence or convergence could be tested on δ using the t -statistics with the null hypothesis of $H_0 : \delta = 0$ (divergence) against the alternative of $H_1 : \delta > 0$ (convergence). The results of t -statistics estimated from equations (3) and (4) are reported in Table 2 as t_{KSS1} and t_{KSS2} . As suggested in Kapetoni *et al.* (2003), test of equation (4) is done for $1 \leq p \leq 12$ repeatedly and t_{KSS2} will only report the maximum

test statistics (or the minimum p -value of t -statistic). All these KSS test statistics are to be compared with the same set of critical values simulated by Liew and Lim (2005). This is because the conventional t critical values are no more applicable in this non-linear framework due to the asymptotically distribution of δ which has been proven non-normal.

3. Empirical Results

Results of LST Linearity test, from Table 1, have shown that income differentials between the US and all selected 10 economies, except for Burkina Faso, Nigeria and Saudi Arabia, cannot be taken as linear in nature. The inferences are made as the null hypothesis of the absence of non-linearity in most cases has been rejected by the F -statistics at less than 1% or 5% significance level. This finding suggests that the conventional ADF linear stationary test, which does not capture non-linearity in the data, is inappropriate to be employed in examining the issue of income convergence between the US and countries of Benin, Egypt, Malaysia, Oman, Bangladesh, Indonesia and Iran (7 economies). Thus, the KSS test should be used instead. As for Burkina Faso, Nigeria and Saudi Arabia, the conduct of ADF test is remained to be done since income differentials which involve these economies are linear in nature

Table 1: Results of LST Linearity Test

Country	p	d	F	msv	$Q_{Ljung-Box} (msv)$
Burkina Faso	1	2	0.698	0.506	0.902
Benin	1	11	10.836***	0.000	0.045
Egypt	1	1	10.846***	0.000	0.537
Malaysia	1	12	5.997***	0.005	0.730
Oman	1	12	9.417***	0.001	0.150
Bangladesh	1	6	18.185***	0.000	0.675
Indonesia	1	12	3.191**	0.049	0.879
Iran	1	12	5.393***	0.007	0.515
Nigeria	1	1	2.051	0.129	0.599
Saudi Arabia	2	12	1.409	0.277	0.982

Notes: The optimal autoregressive lag length p is determined by inspecting the PACF of the series. The optimal delay parameter d is chosen from the one that minimizes the marginal significance value (msv) of the F test statistic. Ljung-Box portmanteau Q statistic is applied to test the presence of serial correlation up to 16 lags. Its msv is given in the last column.

Table 2 reports the results of stationary test for all countries using ADF test (for linear data) and KSS tests (for non-linear data). The t_{KSS1} test statistics, based on equation (3), have shown that the null-hypothesis of non-stationary (divergence) cannot be rejected in most cases, except for Bangladesh. As for t_{KSS2} test statistics, based on equation (4), the evidence of convergence is found in the case of Benin. Nevertheless, the Portmanteau Q statistics suggest that these KSS test statistics are not having a problem of serial correlation in its residuals.

In the case of Burkina Faso, Nigeria and Saudi Arabia, results of the ADF test suggest that income convergence is only be found for Burkina Faso, but not for Nigeria and Saudi Arabia.

Table 2: Results of Stationary Test

Country	Linear test	Non-Linear (KSS) tests			
	$ADF(p)$	t_{KSS1}	$Q_{Ljung-Box}$ (msv)	t_{KSS2}	$Q_{Ljung-Box}$ (msv)
Burkina Faso	-3.679(7)**	-	-	-	-
Benin		0.908	0.770	3.007(10)**	0.872
Egypt		2.232	0.115	1.531(8)	0.872
Malaysia		-1.117	0.839	-0.942(1)	0.979
Oman		-1.735	0.443	-1.697(3)	0.202
Bangladesh		3.397**	0.871	2.414(2)	0.793
Indonesia		1.031	0.985	2.179(7)	0.999
Iran		1.077	0.935	2.228(7)	0.948
Nigeria	-2.923(6)	-	-	-	-
Saudi Arabia	-2.622(1)	-	-	-	-

Notes: 1. In the t_{KSS2} , p is chosen from the one that maximizes the test statistics. For KSS test, the corresponding critical values are -2.66, -2.93 and -3.48 at 10%, 5% and 1% significance levels.

2. For the ADF test, p is automatically determined by computer programme based on the Minimum Akaike Information Criterion (AIC).

3. Ljung-Box portmanteau Q statistic is applied to test the presence of serial correlation up to 16 lags. Its marginal significance value (msv) is given for each t_{KSS}

4. *** denotes significant at 1% level, ** denotes significant at 5% level and * denotes significant at 10% level.

In summation, using linear and non-linear stationary tests (ADF and KSS tests), three countries, Burkina Faso, Benin and Bangladesh, are found exhibit convergence behaviour with respect to the US's income, whereas the rest of countries in study, namely, Egypt, Malaysia, Oman, Indonesia, Iran, Nigeria and Saudi Arabia show otherwise.

4. Income Convergence / Divergence and Globalization

The process of globalization is not occurring just recently. It has its roots in the second half of the eighteenth century. In O'Rourke (2001), O'Rourke and Williamson (2000) and Maddison (2001) and Williamson (2002), the period of 1870-2000 is classified into the first wave of globalization 1870-1913, the de-globalization period of 1913-1950, the golden age of 1950-1973 and the second wave of globalization of 1973 onwards.

The relation to world inequality, there are 3 main approaches distinguished by Wade (2001) on relationship of globalization and income inequality (divergence) or equality (convergence). The neoclassical growth models try to predict stylized facts of economic growth and one of them is convergence. It seems, empirically, that conditional on relevant characteristics for economic growth, there is a negative relation between initial income levels and growth rates of income of a certain period. This means that rich countries tend to grow less than poor countries, once some conditions are settled. This kind of convergence is known as conditional convergence and it is well forecasted by the NGM whenever economies have similar technologies and preferences. The NGMs are based on an economy with a specific production function and a utility function that represents its preferences. Under some assumptions, the economy will eventually arrive at an equilibrium called the steady-state, where it cannot grow anymore. If the economy is approaching its steady-state, there is convergence but if it is moving away from the steady-state, there is divergence. Neoclassical growth theory predicts that national economies will converge in their average incomes and average productivity levels because of increased mobility of capital. Earlier, the concept of conditional convergence was explained, which in short says that when the growth rate of a country is positively related to the distance from its initial level of income to its own steady-state. In other words, countries grow more if they are initially further away from their own steady-state.

Meanwhile absolute convergence exists when poor economies grow faster than rich ones, regardless of whether they have a common steady or not. So poor countries tend to "catch up" when time passes.

However, the endogenous growth theory predicts less convergence or divergence as diminishing returns to capital is offset by increasing returns to technological innovation in the developed countries. The endogenous models differ from the NGM in that they do not assume diminishing returns to capital. For example the one sector AK model is based on the following production function:

$$Y = AK;$$

(where Y is the output, K and A are the capital and technology respectively) which can be compared to a Cobb-Douglass when the share of capital is 1, $\alpha = 1$. This can be interpreted as a taking a broad definition of capital that includes human capital.

The third approach is the dependency approach which predicts that convergence is less likely and divergence more likely, because of differential benefits from economic integration and trade, restricted free market relations and locked developing countries to produce certain commodities.

The empirical evidence shows that convergence in per capita income did occur during the first wave of globalization due to an increase in international trade and massive international migration. However, the trend was not repeated in the second wave of globalization. Cornia and Court (2001) in a policy brief using the WIID database reports that inequality has risen since the early-mid 1980s. The non-traditional new causes of inequality identified are liberal economic policy regimes and the way in which economic reform policies have been carried out. Given the fact that rising inequality (divergence) threatens growth and poverty reduction, a study by Agenor (2003) has found the evidence of an inverted U-shape relationship between globalization and poverty in developing countries, indicating that at low (higher) levels tends to increase (reduce) poverty.

Table 3: 2003 Global Index (GI) Ranking (selected countries)

Rank	2003 GI	Rank	Economic	Rank	Technological	Rank	Personal	Rank	Political
18	Malaysia	8	Malaysia	26	Malaysia	14	Malaysia	27	Nigeria
37	Nigeria	22	Nigeria	43	S.Arabia	24	S.Arabia	35	Bangladesh
41	S.Arabia	47	Indonesia	48	Iran	43	Bangladesh	46	Malaysia
48	Egypt	49	S.Arabia	51	Indonesia	47	Egypt	49	Egypt
55	Bangladesh	58	Egypt	53	Egypt	52	Nigeria	53	Indonesia
59	Indonesia	59	Iran	61	Nigeria	61	Indonesia	59	S.Arabia
62	Iran	62	Bangladesh	62	Bangladesh	62	Iran	61	Iran

Notes: Burkina Faso, Benin and Oman are not included in the list of 2003 GI Rankings by A.T. Kearney(2003)

As for the 10 selected economies in this study, their evidence of income convergence/divergence is somehow related to their level of globalization. Using Globalization Index (GI) created by A.T. Kearney/Foreign Policy Magazine (2002, 2003), 7 countries in this study are ranked based on the 2003 GI Rankings. The rankings are displayed on Table 3 for only 7 countries as the other 3 countries (Burkina Faso, Benin and Oman) are not listed within 62 countries observed by Kearney.

The data used in the computation of the GI consists of a number of variables on economic integration, personal contacts, technology, political engagement and supplement data. These are expected to proxy the channels through which globalization affects world inequality, in particular, the dynamic convergence in per capita income growth towards the steady state[†].

It is shown on Table 3 that Bangladesh, who has proven to experience income convergence in this study, has lower ranking in the degree of globalization. Four countries (Malaysia, Nigeria, Saudi Arabia and Egypt) which proven to have income divergence, on the other hand, are among the countries who are highly ranked in the level of globalization. To be specific, high degree of globalization economically (refer to column 3 and 4 of Table 3) and technologically (refer to column 5 and 6 of similar table) are the causes of income divergence in the countries in study. Among seven countries, six countries (Malaysia, Nigeria, Indonesia, Saudi Arabia, Egypt and Iran) have higher level of globalization economically and technologically but they experience income divergence (inequality). In contrary, Bangladesh who is ranked the lowest in globalization economically and technologically, however, exhibits income convergence (equality). Note that this relationship between earlier results of income convergence/divergence and ranking of globalization is not been made without limitation. Due to limited data of 10 countries only, the regression could not be made to observe the relationship of the variables and therefore, no controlled variables are involved. The observation or relationship is only been made descriptively base on the movements of both variables. Thus, the results or inferences should be taken with precaution.

[†] See detail in Heshmati (2003) for sub-components of these variables.

The observation seems to support the endogenous growth theory which predicts divergence because of increasing return to technological innovation in developed countries and the dependency approach which predicts that divergence is more likely because of differentiated in benefits from economic integration and trade and locked production structure in less developed nations. Thus, not necessary globalization will lead to income convergence of a country with respect to another developed country. As argued by Pritchett (1996), developing countries need “policy-conditional” conditional convergence. This could be learned from the examples of Japan, Korea and recently, China. That is, if a country’s initial income is low and its government pursues growth-oriented policies, then very rapid growth rates may be possible. Sachs and Warner (1995) have also recently suggested that countries that adopted such policies did in fact exhibit very strong conditional convergence, while those poor countries that did not adopt them did not display any conditional convergence.

5. Conclusion

This study aims to investigate the existence of income convergence and divergence among ten selected OIC countries. Using linear and non-linear stationary tests on income differentials between these countries and the United States, it is found that only Burkina Faso, Benin and Bangladesh exhibit income convergence (equality) while the rest of the countries exhibit income divergence (inequality). In link to degree of globalization in these countries, it could be precautiously concluded that those countries which ranked higher in term of globalization economically and technologically are also those that experience income divergence. But those ranked lower in degree of globalization economically and technologically exhibit income convergence. These stylized facts seem to support predictions of endogenous growth theory and dependency approach on relationship between globalization and income inequality.

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Assessing Performance of Mutual Funds in Indonesia

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This study empirically assesses the relative efficiency of mutual funds in Indonesia during the period 2004 to 2007. To measure their efficiencies, the output-input data consisting of a panel of 23 mutual funds are empirically examined based on the most commonly used non-parametric approach, namely, Data Envelopment Analysis (DEA). The study finds that, on average, the mutual funds experienced a decrease in total factor productivity (TFP) growth. It is mainly caused by a declining in both efficiency and technical efficiencies, where the efficiency change is largely contributed by the changes in pure efficiency rather than scale efficiency. The findings of the study suggest that the mutual funds' industry in Indonesia has a great opportunity to promote its TFP by constantly optimizing and upgrading the educational and training programs intended to improve managerial ability and to speed up the adoption of new technologies.

1. Introduction

Assessing the performances of mutual funds has become a main concern for investors and managers in the finance industry.³ Information about the performances of mutual funds is one of the major considerations taken into account by investors in the fund-selection decision. Meanwhile, by referring to mutual funds' performances, it enables fund managers towards better pricing, attracting greater inflow of funds and improving their profitability. Thus, knowing their performances, fund managers can design a proper strategy and policy to improve their competitive ability against their competitors.

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³ Mutual Funds are also generally called 'Reksadana' in the Indonesia. As the term mutual funds are commonly used in Indonesia rather than the term unit trusts, thus this study adopts this terminology.

Despite there have been many empirical studies assessing the performances of conventional mutual funds in advanced economies, the study on the performance of mutual funds in Asian emerging markets has been meagre. Among the studies on the performances of mutual funds in Asian markets were conducted by Annuar et al. (1997), Hayat (2006), Md. Taib and Isa (2007), Abdullah et al. (2007). By using the model developed by Treynor and Mazuy (1966), Annuar et al. (1997) examined the performances of 31 mutual funds in Malaysia for the period 1990-1995. They found evidence that these Malaysian funds outperformed their benchmark but were poor at timing the market. Furthermore, they also found a positive correlation between the market timing ability and security selection ability. Meanwhile, Hayat (2006) utilized the Sharpe Ratio (SR), the Treynor Ratio (TR), the Information Ratio (IR), the Modigliani and Modigliani measure (MM), and the TT measure (TT) to empirically assess the performances of 44 mutual funds in Malaysia during the period from August 17, 2001 to August 25, 2006. He found that during the normal market condition, there were no significant different between the performances of Islamic and conventional funds. During the bear market of 2002, the Islamic equity funds however significantly outperformed the conventional markets. Furthermore, Islamic equity funds seemed to be the most attractive as part of a larger fully diversified portfolio as they have good systematic risk-to-return ratios.

Md. Taib and Isa (2007) employed seven different performance measures: raw return, market adjusted return, Jensen (1968)'s alpha, adjusted Jensen (1972)'s alpha, Sharpe Index, adjusted Sharpe Index, and Treynor Index to assess 110 unit trusts in Malaysia over the period 1991-2001. They found that, on average, the performance of Malaysian unit trusts fell below the market portfolio and risk free returns. However, the variance of unit trust monthly returns was less than the market. The performance by type of funds indicates that bond funds show relatively superior performance, over and above the market and equity unit trusts. By using the Sharpe (1965) index and adjusted Sharpe (1966) index, Jensen (1968)'s Alpha, Timing and selectivity ability, Abdullah et al. (2007) empirically explored the performances of 65 mutual funds in Malaysia during the period from January 1992 to December 2001. The Islamic funds were documented to perform better than the conventional funds during bearish economic trends, while conventional funds showed better performance than Islamic funds during bullish economic

conditions. From the methodological perspectives, all the above reviewed studies have used traditional methods to investigate the performances of mutual funds.

In general, there have been two major traditional indexes used to measure mutual funds performance, i.e., the Treynor index (Treynor, 1965) and Sharpe index (Sharpe, 1966). The former is the spread between the fund's unadjusted total return and the risk free rate which is divided by the beta of the fund while the latter is the spread between the fund's unadjusted total return and the risk free rate which is divided by the standard deviation of the fund's unadjusted total return. Since the introduction of these indexes, studies on the performance of mutual funds have focused on two dimensions; the risk and return by relying on the Capital Asset Pricing Model (CAPM). The results of these studies relied mainly upon the benchmark portfolio used and the measurement of the risk. Basso and Funari (2001) discovered that although these indexes were potentially very useful, but they did not take into account the subscription and redemption costs in determining the overall return on the investment.

Better methods have been introduced to measure the performance of mutual funds. One recent approach to the evaluation of mutual funds performance is by measuring its efficiency. Two approaches have been used to measure efficiency, namely parametric and nonparametric. The former approach includes the Stochastic Frontier Approach (SFA), Distribution Free Approach (DFA) and Tick Frontier Approach (TFA), while the latter approach includes the Data Envelopment Analysis (DEA), Free Disposal Hull (FDH), Index Number (IN) and Mixed Optimal Strategy (MOS). These two approaches use different techniques to envelope a data set with different assumptions for random noise and for the structure of production technology.

Among those methods, SFA (parametric) and DEA (nonparametric) have been widely used in the literature to measure the efficiency of mutual funds. The SFA is an econometric frontier approach which specifies a functional form for the cost, profit, or production relationship among inputs, outputs, and environmental factors, and allows for random error. The benefit for this method is a composed error model where inefficiencies are assumed to follow an asymmetric distribution, which is usually the half-normal, while random errors follow a

symmetric distribution, usually the standard normal (Berger and Humphrey, 1997). However, there are several limitations when measuring the production efficiency using the SFA method. Although the statistical noise can be distinguished from the random error, the SFA may suffer from strong assumptions, particularly when econometrics has to deal with the hypothesis required on the distribution of the inefficiency component and its independence from other factors determining producer behavior.

On the other hand, the DEA is a non-parametric method that has been widely employed in operations research to compute relative measures of efficiency. For example, the DEA has been used to measure the relative efficiency of public sector activities [e.g., educational programs by Charnes et al. (1978)] and non-profit organizations [e.g., hospitals by Banker et al. (1984)]. Hitherto, the DEA has been extended its application to measure efficiency of many profit oriented companies such as the airlines by Alam and Sickles (1995), the telecommunication industry by Asai and Nemoto (1999), the banking industry by Omar et al. (2006); Mohd. Zamil and Abdul Rahman (2007); and the insurance industry by Md. Saad et al. (2007).

Among the superiorities of the DEA in measuring mutual funds efficiency is its ability to take into account many factors that are associated with the funds' performance. The DEA also allows us to define mutual funds' performance indexes that can take into account different risk measures and the investment costs. Moreover, the DEA does not require any theoretical models such as CAPM or Arbitrage Pricing Theory (APT) as a measurement benchmark. As an alternative, the DEA measures how well a fund performs relative to the best set of funds within the objective settings. The DEA enables the identification of the relative importance among the inputs (transaction costs); for example, we can observe the marginal contribution of each input in affecting returns (Jemric and Vujcic, 2002). Since the DEA does not take into account random errors, we can assume that the underlying distributional form for the error term (Pallegrina, 2005). Therefore, the mathematical programming procedures used by the DEA for efficient frontier estimation is comparatively robust (Seiford and Thrall, 1990). In addition, the DEA also provides robust finding when the sample size of a firm was small (Maghyereh, 2004; and Neal, 2004).

In assessing performances of mutual funds both in the developed and emerging economies, the DEA have been adopted by few studies. Murthi et al. (1997) and Choi and Murthi (2001) measured performances of mutual funds in the US, while Basso and Funari (2001) and Galagedera and Silvapulle (2002) investigated performances of mutual funds in Italy and Australia, respectively. On the other hand, Chen and Lin (2006) assessed the performance of mutual funds in emerging economy of China. While the study of mutual funds' performance is gaining attention in the developed countries and some other emerging economies, research on an open-big developing country of Indonesia has been inexistence. Despite the mutual funds' industry having experienced phenomenal growth in Indonesia, the study on performance and efficiency of the Indonesian mutual funds is highly important and timely. Thus, this study attempts to fill this gap by assessing selected mutual funds in Indonesia using the DEA. The findings of this study will shed some lights for investors to select the right funds and for managers to improve their funds performances and gain their competitive advantages against their contenders.

Specifically, this study empirically measures the performances of selected mutual funds in Indonesia during the period 2004 – 2007. It also attempts to empirically assess the relative efficiency of the mutual funds in Indonesia.

The rest of this study is structured as follows. Section 2 provides a brief overview of the Indonesian mutual funds' industry. Data and methodology framework are in turn discussed in Section 3. The discussion and some implications of the study are presented in Section 4. Finally, Section 5 concludes the paper.

2. An Overview of Mutual Funds' Industry in Indonesia

According to the Capital Market Act No. 8 (1995), mutual fund is referred to an investment company that has been approved by the Supervisory Capital Market of Indonesian Agency (BAPEPAM),⁴ which pools money from shareholders and invests in a diversified portfolio of

⁴ BAPEPAM – Badan Pengawas Pasar Modal is a capital market supervisory agency which reports and is responsible to the Minister of Finance. BAPEPAM shall provide guidance, regulation, and day to day supervision of the capital market.

securities.⁵ Mutual fund investment is simple, accessible, and affordable. There are many advantages of investing through mutual funds such as professional management, diversification, variety, liquidity, affordability, convenience, and ease of record keeping as well as strict government regulations and full disclosure (Investment Company Institute, 2004). Mutual funds were first introduced in Indonesia within the framework of the Capital Market Act No. 8 (1995). After the first mutual fund, BDNI Reksadana was instituted in 1996, in the same year there were 25 mutual funds were established with the total amount of funds managed of Rp 2.78 trillion (see Table 2.1). In 1997, the number of mutual funds has significantly increased to 77 (208 percent) from 1996 with the total funds managed of Rp 4.91 trillion.

The development of mutual funds' industry in Indonesian has been very much influenced by macroeconomic conditions. When the 1997 financial turmoil hit the country, the growth of mutual funds has slowed down. In 1998, the number of issuers only grew by 5.19 percent and the value of issuers decreased dramatically by 39.22 percent from the year 1997. The worse condition occurred in the bond market where there was virtually no new issue during this period (BAPEPAM Master Plan, 2005-2009).

However, the industry grew more rapidly after 2002, due to the dramatic increase in fixed-income funds, which was invested mainly in the Rupiah-denominated government securities. Declining interest rates (and rising bond prices) provided a favourable environment for launching recap bond funds. At the end of 2004, mutual funds were amounting to Rp 104 trillion or US\$10.4 billion (see Table 2.1). In 2005, BAPEPAM reported that the number of managed funds dramatically fell by 72 percent from Rp 104.04 trillion in 2004.

⁵ UU Pasar Modal RI, No.8 (1995), Bab IV (Capital Market Law Republic of Indonesia No.8 (1995) Chapter IV), See http://www.BAPEPAM.go.id/pasar_modal/regulasi_pm/uu_pm/index.htm.

Table 2.1: Net Asset Value of Mutual Funds, 1995-2006
(in billion Rupiahs)

Indicator	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Net Asset Value											
Money Market Fund	16	25	38	575	1,244	2,217	7,181	7,856	9,439	2,080	3,799
Fixed-Income Fund	1,898	3,439	1,894	2,744	3,062	4,661	37,336	57,485	88,059	13,924	19,542
Balanced Fund	350	862	522	729	650	635	1795	3734	4648	5,468	8,483
Equity Fund	519	590	539	927	560	491	302	402	1892	4,934	8,249
Protected Fund										3,008	11,327
Index Fund											29
Total	2,782	4,917	2,992	4,974	5,516	8,004	46,614	69,478	104,038	29,415	51,991
No of products											
Money Market Fund	6	21	22	23	26	29	31	20	31	33	-
Fixed-Income Fund	12	31	32	31	35	46	61	116	146	170	160
Balanced Fund	1	3	4	5	8	10	17	30	46	78	-
Equity Fund	6	22	23	22	25	23	22	20	23	30	34
Protected Fund	-	-	-	-	-	-	-	-	-	18	76
Index Fund											1
Total	25	77	81	81	94	108	131	186	246	329	403

Source: BAPEPAM-LK⁶ (2006).

⁶ BAPEPAM-LK is a merger of Capital Market Supervisory Agency with the General Director of Financial Institution (DJLK–Direktorat Jenderal Lembaga Keuangan) that approved by the Government of Indonesia with the enactment of the President's Rule No. 62 (2005). The merger of these two units of Ministry of Finance of the Republic of Indonesia would subsequently produce a single new unit simply called BAPEPAM-LK.

Moreover, when the world fuel price increased which lead to cost-push inflation, the interest rate which called the Central Bank Certificate Rate (SBI – Sertifikat Bank Indonesia) rose to 12.75 percent. As a result, the banking industry has to increase its deposit interest in order to attract more customers. This condition might cause the investors to withdraw their funds from the mutual funds to the bank depository. Finally, in line with the Indonesian economic recovery agenda to lower interest rates, inflation, and to increase the stock market composite index, the mutual funds become again more attractive for investors. The number of managed funds has significantly increased from Rp 29.40 trillion in 2005 to Rp 51.62 trillion at the end of 2006.

In terms of their types, mutual funds in Indonesia is generally divided into five types, namely equity, fixed-income, money market, balanced-mixed and protected funds. As of 2005, fixed income holds the largest portion which reached 47.3% of total net asset value, followed by balance fund is 18.5%, while money market fund recorded the lowest which only 0.7%. The biggest portion of fixed income was mainly invested on debt/securities issued by government (2.4 percent of total) and corporate (45.1 percent of total). Since interest rate set by Bank of Indonesia increased to around 12% as to maintain currency and inflation rate was badly affected the bond price. High interest rates made the investment in bond less attractive, and it drove the investor to redeem their investment in fixed income fund. This situation made a decrease significantly in Net Asset Value of funds as fixed income holds the biggest portion of the portfolio at the end of 2005.

Hitherto, the mutual funds industry in Indonesia has been playing an important role in promoting economic growth of the country. As reported by BAPEPAM, in 2006, mutual fund industry experienced a positive increase after suffered a massive redemption in 2005. It can be seen from the increasing of the Net Asset Value from Rp29.40 Trillion in 2005 to Rp51.43 Trillion in 2006 which contributed 2.4 percent of total financial assets and 1.5 percent of GDP or increased 0.4 percent of GDP from 2005 (see Table 2.2).

Table 2.2: Structure of Financial Sector

Type of institution	Assets (Rp trillion)		Asset (%)		GDP *(%)	
	2005	2006	2005	2006	2005	2006
Banks	1,470	1,693.5	78.8	80	52.7	51.3
Non-bank financial institutions	393.9	425.4	21.1	20	14.1	13.4
Finance Companies	67.7	108.9	3.6	5.1	2.4	3.2
Insurance Companies	75.1	94.7	4.0	4.4	2.6	2.8
Pension funds	63.4	77.4	3.4	3.7	2.2	2.3
Pawnshops (Pegadaian)	4.8	6.0	0.2	0.3	0.1	0.1
Rural institutions	20.3	23.0	1.0	1.0	0.7	0.6
Mutual funds	29.4	51.6	1.5	2.4	1.1	1.5
Venturecapital companies	2.7	2.3	0.1	0.1	0.1	0.1
Outstanding corporate bonds	62.8	61.5	3.3	3.0	2.2	1.8
Total	1863.9	2118.9	100	100.0	66.9	63.4
Equity market capitalization	801	1,249	n.a	n.a	28.7	37.4

Source: Bapepam-LK, Bank Indonesia, Indonesia Stock Exchanges (IDX), 2006.

Note: *GDP 2005:2,785.0 trillion and GDP 2006: 3,338.2 trillion

3. Methodology Framework and Data

3.1. Data Envelopment Analysis (DEA)

The methodology used the Data Envelopment Analysis (DEA) approach to measure the relative performance of selected mutual funds in Indonesia. It is a suitable method to be used in this study as our sample size is small (Maghyreh, 2004; and Neal, 2004). Additionally, DEA is not vulnerable to the disproportion of small sample error as in the econometric model (Dogan and Fausten, 2003). We specifically uses the generalized output-oriented Malmquist index, developed by Fare et al. (1989) to measure the contribution from the progress in technology (technical change) and improvement in efficiency (efficiency change) to growth of productivity of the Indonesian mutual funds' industries. The

Malmquist indexes are constructed using the DEA and estimated using a program developed by Coelli (1996).

Following Fare et al. (1989), the Malmquist productivity index is written as follows:

$$M_0(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)} \times \left[\left(\frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})} \right) \left(\frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^t, y^t)} \right) \right]^{\frac{1}{2}} \quad (3.1)$$

where the notations $D_0(x^{t+1}, y^{t+1})$, represents the distance from the period $t+1$ observation to the period t technology. The first ratio on the right hand side of the equation (3.1) measures the change in relative efficiency (i.e., the change in how far observed production is from the maximum potential production) between year t and $t+1$. The second term inside the brackets (geometric mean of the two ratios) captures the shift in technology (i.e., movements of the frontier function itself) between the two periods evaluated at x^t and x^{t+1} . That is,

$$\text{Efficiency Change} = \frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)} \quad (3.2)$$

$$\text{Technical Change} = \left[\left(\frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})} \right) \left(\frac{D_0^{t+1}(x^t, y^t)}{D_0^t(x^t, y^t)} \right) \right]^{\frac{1}{2}} \quad (3.3)$$

Essentially, the former investigates how well the production process converts inputs into outputs (catching up to the frontier) and the later reflects the improvement in technology. According to Fare et al. (1994), improvements in productivity yield Malmquist index values greater than unity. Deterioration in performance over time is associated with a Malmquist index less than unity. The same interpretation applies to the values taken by the components of the overall TFP index. An improvement in the efficiency component yield index values greater than one and is considered to be evidence of catching up (to the frontier). Values of the technical change component greater than one are considered to be evidence of technological progress.

In empirical applications, the distance measures that appear in (3.1) above are calculated for each operator in each pair of adjacent time periods using the mathematical programming technique. We assume

that there are $k = 1, \dots, K$ firms that produce $m = 1, \dots, M$ outputs $y_{k,m}^t$ using $n = 1, \dots, N$ inputs $x_{k,n}^t$ at each time period $t = 1, \dots, T$. Under DEA, the reference technology with constant returns to scale (CRS) at each time period t from the data can be defined as

$$G^t = \left[(x^t, y^t) : y_m^t \leq \sum_{k=1}^K z_k^t y_{k,m}^t \right] \quad m = 1, \dots, M, \\ \sum_{k=1}^K z_k^t x_{k,n}^t \leq x_n^t \quad n = 1, \dots, N, z_k^t \geq 0 \quad K = 1, \dots, K, \quad (3.4)$$

where z_k^t refers to the weight on each specific cross-sectional observation. Following Afriat (1972), the assumption of constant returns to scale may be relaxed to allow variable returns to scales by adding the following restriction:

$$\sum_{k=1}^K z_k^t = 1 \quad (VRS) \quad (3.5)$$

Following Fare et al. (1994), this study used an enhanced decomposition of the Malmquist index by decomposing the efficiency change component calculated relative to the constant returns to scale technology into a pure efficiency component (calculated relative to the VRS technology) and a scale efficiency change component which captures changes in the deviation between the VRS and CRS technology. The subset of pure efficiency change measures the relative ability of operators to convert inputs into outputs while scale efficiency measures to what extent the operators can take advantage of returns to scale by altering its size toward the optimal scale.

To construct the Malmquist productivity index of firm k' between t and $t+1$, the following four distance functions are calculated using the DEA approach: $D_0^t(x^t, y^t)$, $D_0^{t+1}(x^t, y^t)$, $D_0^t(x^{t+1}, y^{t+1})$, $D_0^{t+1}(x^{t+1}, y^{t+1})$. These distance functions are the reciprocals of the output-based Farrell's (1957) measure of technical efficiency. The non-parametric programming models used to calculate the output-based Farrell (1957) measure of technical efficiency for each firm $k' = 1, \dots, K$, is expressed as:

$$\left[D_0^t(x_{k'}^t, y_{k'}^t) \right]^{-1} = \max \lambda^{k'} \quad (3.6)$$

subject to

$$\lambda^{k'} y_{k,m}^t \leq \sum_{k=1}^K z_k^t y_{k,m}^t \quad m = 1, \dots, M,$$

$$\begin{aligned}
\sum_{k=1}^K z_k^t x_{k,n}^t &\leq x_{k',n}^t & n = 1, \dots, N, \\
\sum_{k=1}^K z_k^t &= 1 & (VRS) & z_k^t \geq 0 & K = 1, \dots, K.
\end{aligned} \tag{3.7}$$

The computation of $D_0^{t+1}(x^{t+1}, y^{t+1})$ is similar to (3.7), where $t+1$ is substituted for t .

Construction of the Malmquist index also requires calculation of two mixed-distance functions, which is computed by comparing observations in one time period with the best practice frontier of another time period. The inverse of the mixed-distance function for observation k' can be obtained from

$$[D_0^t(x_{k'}^{t+1}, y_{k'}^{t+1})^{-1}] = \max \lambda^{k'} \tag{3.8}$$

Subject to:

$$\begin{aligned}
\lambda^{k'} y_{k,m}^t &\leq \sum_{k=1}^K z_k^t y_{k,m}^t & m = 1, \dots, M, \\
\sum_{k=1}^K z_k^t x_{k,n}^t &\leq x_{k',n}^t & n = 1, \dots, N, & \sum_{k=1}^K z_k^t = 1 & (VRS) \\
z_k^t &\geq 0 & K = 1, \dots, K.
\end{aligned} \tag{3.9}$$

To measure changes in scale efficiency, the inverse output distance functions under the VRS technology are also calculated by adding (3.5) into the constraints in (3.7) and (3.9). Technical change is calculated relative to the CRS technology. Scale efficiency change in each time period is constructed as the ratio of the distance function satisfying CRS to the distance function under VRS, while the pure efficiency change is defined as the ratio of the own-period distance functions in each period under VRS. With these two distance functions with respect to the VRS technology, the decomposition of (3.1) becomes:

$$M_0(x^t, y^t, x^{t+1}, y^{t+1}) = \left(\frac{D_0^{t+1}(x^t, y^t)}{D_0^t(x^t, y^t)} \right) \left(\frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^{t+1}, y^{t+1})} \right)^{\frac{1}{2}} \times \left(\frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^{t+1}, y^{t+1})} \right) \times \left(\frac{D_{oc}^{t+1}(x^t, y^t)}{D_{oc}^{t+1}(x^{t+1}, y^{t+1})} \frac{D_{oc}^t(x^t, y^t)}{D_{oc}^t(x^{t+1}, y^{t+1})} \right)^{\frac{1}{2}} \quad (3.10)$$

Where

$$\left(\frac{D_0^{t+1}(x^t, y^t)}{D_0^t(x^t, y^t)} \right) \left(\frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^{t+1}, y^{t+1})} \right)^{\frac{1}{2}} = \text{Technical Change}$$

$$\left(\frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^{t+1}, y^{t+1})} \right) = \text{Pure Efficiency Change}$$

$$\left(\frac{D_{oc}^{t+1}(x^t, y^t)}{D_{oc}^{t+1}(x^{t+1}, y^{t+1})} \frac{D_{oc}^t(x^t, y^t)}{D_{oc}^t(x^{t+1}, y^{t+1})} \right)^{\frac{1}{2}} = \text{Scale Efficiency Change}$$

Change

Note that when the technology in fact exhibits CRS, the scale change factor equals to one and it is the same decomposition as (3.1).

3.2 Data

A total of 23 selected funds consisting of 11 fixed income, 9 balanced fund and 3 equity funds are investigated in this study. The data for this study are collected from the annual report and prospectus of the selected mutual funds. Data for inputs and output are mainly gathered from the Bloomberg Database (2007) for the period from 2004 to 2007. Three inputs and one output are used to examine performances of mutual funds in Indonesia. Following Galagedera and Silvapulle (2002) and Murthi et al. (1997), front-end load/entry fee, redemption/exit fee and expense ratio are used as the inputs, while total return is used as an output, following (Dorm and Walker, 1996).

Table 3.1 shows the descriptive statistics of inputs and outputs of the 23 mutual funds' industry across categories in Indonesia during the period of study. Si Dana Fleksi was found to have the highest amount of front-end loads within the period of study, while Manulife Phnisi Dana Saham

(equity), Manulife Dana Campuran (balanced funds) and Manulife Pendapatan Bulanan (debt) were recorded to have the lowest front-end loads to the investors. As for redemption fees, Mahanusa Phnisi Dana Saham seems to have the highest, while BNI Dana Berbunga Dua, BNI Dana Plus and BNI Berkembang have the lowest redemption fees, respectively.

In terms of expense ratio, AAA Bond Fund seems to have the lowest expense ratio to the investors, while Manulife Phnisi Dana Saham recorded the highest expense ratio. As for the output, Mahanusa Dana Kapital (balanced funds) has the highest output; return within the period of analysis, while Mandiri Pendapatan Tetap (debt) has the lowest return compared to the others. On average, the amount of front-end loads, redemptions fee and expense ratio were Rp 16.17, Rp 27.67 and Rp 45.92, respectively. Meanwhile, the average of return was 113.21%.

Table 3.1:
Descriptive Statistics of Inputs and Outputs, 2004-2007

Input	Mean	Median	Maximum	Minimum	S.D
Front-end loads (Rp/unit)	16.174	13.395	73.980	0.000	14.740
Redemptions fee (Rp/unit)	27.672	13.665	473.060	0.000	70.204
Expense ratio (Rp/unit)	45.915	30.850	279.110	7.940	43.029
Output					
Total return (%)	113.207	111.715	164.090	75.760	15.956

4. Empirical Results, Discussion and Implications

In this section we will report the findings of production frontier and efficiency level of mutual funds, the productivity performance of individual mutual funds, and the productivity performance for the entire industry.

4.1. Productivity Performance of the Individual Mutual Funds' Industry

In assessing the productivity performance of 23 mutual funds, we used the Malmquist Total Factor Productivity (TFP) index which provides

two types of productivity and efficiency measures, i.e., relative technical change and mutual funds relative efficiency change. However, change in efficiency consists of two components, i.e., pure efficiency change and scale efficiency change. It is noted that the value of the Malmquist TFP index and its components being less than one implies a decrease or deterioration. Values greater than one indicate improvements in the relevant aspects. Subtracting 1 from the number reported in the Tables 4.1 through 4.5 indicates an average increase or decrease per annum for the relevant time period and the relevant performance measurement.

4.1.1. Mutual Funds Relative Malmquist TFP Change

Table 4.1 presents changes in the Malmquist-based Total Factor Productivity (TFP) index. During the period of 2004-2005, none of the mutual funds were found to have a positive TFP change. AAA Bond Fund, Big Dana Liquid, Bhakti Big Nusantara, BNI Dana Berbunga Dua, BNI Dana Plus, Mandiri Dana Pendapatan Tetap, Manulife Pendapatan Bulanan, Mega Dana Kombinasi, Mega Dana Obligasi and Mahanusa Obligasi Pemerintah have positive productivity changes for the years of 2005-2006. However, all funds except Bhakti Big Nusantara and Mega Dana Kombinasi experienced deterioration in TFP for the period 2006-2007. Moreover, only Bhakti Big Nusantara experienced some improvements consistently in TFP change from 2004-2007. Since Bhakti Big Nusantara and Mega Dana Kombinasi have asset class in equity and in balanced funds, respectively, thus no surprise if this funds were still relatively stable in 2005-2007. The funds were not directly affected by a rise in interest rates, depreciation of the rupiah and higher world fuel prices which can cause massive redemption in fixed-income mutual funds by investors.

Table 4.1:
Mutual Funds' Industry Relative Malmquist TFP Change, 2004-2007

No	Funds Name	2004-2005	2005-2006	2006-2007	Mean
1	AAA Bond Fund	0.898	1.209	0.764	0.940
2	Bhakti Big Nusantara	0.973	1.071	1.117	1.052
3	Bhakti Big Palapa	0.858	0.997	0.773	0.871
4	Big Dana Liquid	0.892	1.105	0.857	0.946
5	BNI Berkembang	0.777	0.911	0.673	0.781
6	BNI Dana Berbunga Dua	0.896	1.112	0.819	0.935
7	BNI Dana Plus	0.905	1.119	0.830	0.944
8	Dana Tetap Optima	0.902	0.999	0.871	0.923
9	Danareksa Anggrek	0.761	0.881	0.672	0.767
10	Danareksa Mawar	0.695	0.848	0.657	0.729
11	Mahanusa Danakapital	0.609	0.838	0.761	0.730
12	Mahanusa Obligasi Pemerintah	0.892	1.103	0.840	0.938
13	Mahanusa PDPTAN Tetap Negara	0.883	0.986	0.796	0.885
14	Mandiri Dana Pendapatan Tetap	0.889	1.320	0.817	0.986
15	Manulife Dana Campuran	0.742	0.869	0.708	0.770
16	Manulife Pendapatan Bulanan	0.946	1.157	0.807	0.959
17	Manulife Phnisi Dana Saham	0.682	0.789	0.625	0.696
18	Mega Dana Kombinasi	0.860	1.117	1.000	0.987
19	Mega Dana Obligasi Medali	0.870	1.105	0.873	0.943
20	Nikko Bond Nusantara	0.887	0.901	0.875	0.888
21	Nikko Bunga Nusantara	0.885	0.914	0.877	0.892
22	Nikko Gebyar Indonesia	0.927	0.936	0.876	0.913
23	Si Dana Fleksi	0.761	0.872	0.793	0.807
Mean		0.839	0.985	0.803	0.872

Comparing to other funds, Bhakti Big Nusantara has the highest average TFP growth at an annual average rate of 5.2 percent, while all other funds generally have experienced deterioration in their TFP for the period of 2004-2007. Furthermore, the funds' industry in Indonesia experienced the highest deterioration between 2006 and 2007 at -19.7 percent. Once again, this may be due to the increase in the SBI rate at the end of 2005 which caused many investors to withdraw their funds from mutual funds (especially in fixed income funds) and switch them into the depository bank. Therefore, many mutual funds experienced losses. Indeed, the Indonesian macroeconomic condition at that time was relatively unstable, with a high rate of inflation, higher fuel prices, a depreciation of rupiah and a high interest rate.

4.1.2 Mutual Funds Relative Technical Change

The Malmquist TFP index is decomposed into its two sub components namely technical change and efficiency change.

Table 4.2:
Mutual Funds' Industry Relative Technical Change, 2004-2007

No	Funds Name	2004-2005	2005-2006	2006-2007	Mean
1	AAA Bond Fund	0.898	1.209	0.764	0.940
2	Bhakti Big Nusantara	0.859	1.046	0.777	0.887
3	Bhakti Big Palapa	0.881	1.087	0.804	0.916
4	Big Dana Liquid	0.904	1.115	0.781	0.934
5	BNI Berkembang	0.777	0.911	0.673	0.781
6	BNI Dana Berbunga Dua	0.896	1.112	0.819	0.935
7	BNI Dana Plus	0.905	1.119	0.830	0.944
8	Dana Tetap Optima	0.907	1.130	0.789	0.932
9	Danareksa Anggrek	0.890	1.157	0.795	0.935
10	Danareksa Mawar	0.890	1.155	0.796	0.935
11	Mahanusa Danakapital	0.893	1.166	0.789	0.937
12	Mahanusa Obligasi Pemerintah	0.898	1.210	0.764	0.940
13	Mahanusa PDPTAN Tetap Negara	0.903	1.172	0.775	0.936
14	Mandiri Dana Pendapatan Tetap	0.903	1.179	0.775	0.938
15	Manulife Dana Campuran	0.927	1.130	0.807	0.945
16	Manulife Pendapatan Bulanan	0.927	1.130	0.807	0.945
17	Manulife Phnisi Dana Saham	0.927	0.953	0.861	0.913
18	Mega Dana Kombinasi	0.900	1.192	0.775	0.940
19	Mega Dana Obligasi Medali	0.904	1.161	0.779	0.935
20	Nikko Bond Nusantara	0.910	1.105	0.798	0.924
21	Nikko Bunga Nusantara	0.915	1.060	0.815	0.924
22	Nikko Gebyar Indonesia	0.927	0.953	0.861	0.913
23	Si Dana Fleksi	0.901	1.172	0.790	0.941
Mean		0.896	1.114	0.792	0.925

Table 4.2 displays the index values of technical progress/regress as measured by the average change in the best-practice frontier from period t to $t+1$. All funds except BNI Berkembang, Manulife Phnisi Dana Saham and Nikko Gebyar Indonesia experienced technical progress in period of 2005-2006 and Mahanusa Obligasi Pemerintah had the highest technical progress at 21 percent. However, for the periods of 2004-2005 and 2006-2007, all funds have technical regress. BNI Berkembang had the highest technical regress of -22.3 percent and -32.7 percent for the

respective periods. In addition, on the average, the years 2004-2005 and 2006-2007 were found to be the years of technical regress (-10.4 percent and -20.8 percent, respectively), while in the year 2005-2006, the funds in Indonesia experienced technical progress of 11.4 percent. Over the period of the analysis, on the average, all funds experienced technical regress and BNI Berkembang was found to be the most technical regressive funds (-21.9 percent).

4.1.3 Mutual Funds Relative Efficiency Change

Table 4.3:
Mutual Funds' Industry Relative Efficiency Change, 2004-2007

No	Funds Name	2004-2005	2005-2006	2006-2007	Mean
1	AAA Bond Fund	1.000	1.000	1.000	1.000
2	Bhakti Big Nusantara	1.132	1.023	1.439	1.186
3	Bhakti Big Palapa	0.975	0.917	0.962	0.951
4	Big Dana Liquid	0.987	0.957	1.098	1.012
5	BNI Berkembang	1.000	1.000	1.000	1.000
6	BNI Dana Berbunga Dua	1.000	1.000	1.000	1.000
7	BNI Dana Plus	1.000	1.000	1.000	1.000
8	Dana Tetap Optima	0.994	0.884	1.104	0.990
9	Danareksa Anggrek	0.855	0.762	0.846	0.820
10	Danareksa Mawar	0.781	0.734	0.826	0.780
11	Mahanusa Danakapital	0.682	0.719	0.963	0.779
12	Mahanusa Obligasi Pemerintah	0.993	0.921	1.100	0.999
13	Mahanusa PDPTAN Tetap Negara	0.978	0.842	1.027	0.946
14	Mandiri Dana Pendapatan Tetap	0.985	1.120	1.054	1.052
15	Manulife Dana Campuran	0.800	0.769	0.878	0.814
16	Manulife Pendapatan Bulanan	1.020	1.024	1.000	1.015
17	Manulife Phnisi Dana Saham	0.736	0.827	0.726	0.762
18	Mega Dana Kombinasi	0.956	0.937	1.291	1.050
19	Mega Dana Obligasi Medali	0.963	0.952	1.121	1.009
20	Nikko Bond Nusantara	0.975	0.815	1.097	0.955
21	Nikko Bunga Nusantara	0.967	0.862	1.077	0.965
22	Nikko Gebyar Indonesia	1.000	0.982	1.018	1.000
23	Si Dana Fleksi	0.844	0.744	1.003	0.858
Mean		0.937	0.884	1.014	0.944

Table 4.3 shows the relative efficiency change for each individual mutual fund. The outcomes explain considerable variation across funds and time periods. There were four mutual funds, i.e., AAA Bond Fund,

BNI Dana Berbunga Dua, BNI Dana Plus and BNI Berkembang and they were found no changes in their efficiency in the period from 2004-2007. For the other funds, there were positive and negative changes in efficiency within the 2004-2007 period.

Furthermore, many funds showed improvements in their efficiency during the period 2006-2007. During the period of study, on the average, Bhakti Big Nusantara recorded the highest efficiency change (18.6 percent), followed by Mandiri Dana Pendapatan Tetap (5.2 percent), and Manulife Pendapatan Bulanan (1.5 percent). Although there was an increase in deterioration in relative efficiency from -6.4 percent (2004-2005) to -11.6 percent (2005-2006), however, it generally experienced an improvement of efficiency of 1.4 percent (2006-2007). In addition, there were 17 mutual funds which recorded the mean efficiency changes that were above average, while 6 mutual funds were below average including Si Dana Fleksi, Danareksa Anggrek, Danareksa Mawar, Manulife Phnisi Dana Saham, Mahanusa Danakapital, and Manulife Dana Campuran.

4.1.4. Change in the Efficiency Components by Mutual Funds

In order to identify the sources of change in the efficiency component, the study reports the two sub-components of efficiency change, i.e., pure efficiency change and scale efficiency change. In Table 4.4 there are four mutual funds (i.e., AAA Bond Fund, BNI Dana Berbunga Dua, BNI Dana Plus and BNI Berkembang) which have documented no changes in annual growth for both the scale efficiency and pure efficiency during the period 2004-2007. Comparing to the other funds, Mandiri Dana pendapatan Tetap recorded the highest deterioration of pure efficiency with -17.5 percent, while Mahanusa Danakapital has the highest deterioration of scale efficiency by -31.8 percent in the period 2004-2005. Interestingly, Si Dana Fleksi recorded the highest growth in pure efficiency with 19.5 percent in this period.

Table 4.4:
Changes in Efficiency Components by Firms 2004-2007

No	Funds Name	2004-2005		2005-2006		2005-2007	
		Pech	Sech	Pech	Sech	Pech	Sech
1	AAA Bond Fund	1.000	1.000	1.000	1.000	1.000	1.000
2	Bhakti Big Nusantara	1.094	1.035	0.801	1.278	1.491	0.965
3	Bhakti Big Palapa	1.001	0.973	1.035	0.886	1.038	0.926
4	Big Dana Liquid	0.922	1.070	1.058	0.905	1.117	0.983
5	BNI Berkembang	1.000	1.000	1.000	1.000	1.000	1.000
6	BNI Dana Berbunga Dua	1.000	1.000	1.000	1.000	1.000	1.000
7	BNI Dana Plus	1.000	1.000	1.000	1.000	1.000	1.000
8	Dana Tetap Optima	1.004	0.991	0.948	0.933	1.118	0.988
9	Danareksa Anggrek	1.032	0.828	1.013	0.752	0.863	0.981
10	Danareksa Mawar	1.000	0.781	1.000	0.734	0.864	0.956
11	Mahanusa Danakapital	1.000	0.682	0.863	0.833	0.959	1.004
12	Mahanusa Obligasi Pemerintah	0.996	0.996	0.921	0.991	1.110	0.991
13	Mahanusa PDPTAN Tetap Negara	1.023	0.956	0.957	0.879	1.045	0.983
14	Mandiri Dana Pendapatan Tetap	0.825	1.194	1.282	0.873	1.057	0.998
15	Manulife Dana Campuran	1.000	0.800	1.000	0.769	1.000	0.878
16	Manulife Pendapatan Bulanan	1.000	1.020	1.000	1.024	1.000	1.000
17	Manulife Phnisi Dana Saham	1.000	0.736	1.000	0.827	1.000	0.726
18	Mega Dana Kombinasi	0.990	0.965	0.916	1.023	1.430	0.903
19	Mega Dana Obligasi Medali	0.918	1.049	1.030	0.925	1.120	1.001
20	Nikko Bond Nusantara	1.003	0.972	0.867	0.940	1.134	0.697
21	Nikko Bunga Nusantara	1.038	0.931	0.871	0.990	1.121	0.961
22	Nikko Gebyar Indonesia	1.000	1.000	1.000	0.982	1.000	1.018
23	Si Dana Fleksi	1.195	0.707	0.861	0.865	1.018	0.986
Mean		1.009	0.929	0.964	0.917	1.052	0.964

Nevertheless, Mandiri Dana Pendapatan Tetap documented the highest growth in scale efficiency by 19.4 percent in the same period. Bhakti Big Nusantara experienced the highest growth in scale efficiency as it recorded the highest scale efficiency in 2005-2006. Meanwhile, in terms of pure efficiency, AAA Bond Fund, BNI Berkembang, BNI Dana Berbunga Dua, BNI Dana Plus, Manulife Pendapatan Bulanan, Manulife Phnisi Dana Saham and Nikko Gebyar Indonesia experience to have remained stable in annual growth during the period 2004-2007. On average, only the year between 2005 and 2006 was identified as the year of pure efficiency deterioration, while the average of scale efficiency experienced deterioration during the entire period of study, 2004-2007.

4.2. Productivity for the Entire Industry

Table 4.5:
Summary of Means' Malmquist Productivity Index, 2004-2007

No	Funds Name	TFPch	EFFch	TECHch	PEch	SEch
1	AAA Bond Fund	0.940	1.000	0.940	1.000	1.000
2	Bhakti Big Nusantara	1.052	1.186	0.887	1.093	1.085
2	Bhakti Big Palapa	0.871	0.951	0.916	1.025	0.928
4	Big Dana Liquid	0.946	1.012	0.934	1.029	0.984
5	BNI Berkembang	0.781	1.000	0.781	1.000	1.000
6	BNI Dana Berbunga Dua	0.935	1.000	0.935	1.000	1.000
7	BNI Dana Plus	0.944	1.000	0.944	1.000	1.000
8	Dana Tetap Optima	0.923	0.990	0.932	1.021	0.970
9	Danareksa Anggrek	0.767	0.820	0.935	0.966	0.848
10	Danareksa Mawar	0.729	0.780	0.935	0.952	0.818
11	Mahanusa Danakapital	0.730	0.779	0.937	0.939	0.830
12	Mahanusa Obligasi Pemerintah	0.938	0.999	0.940	1.006	0.993
13	Mahanusa PDPTAN Tetap Negara	0.885	0.946	0.936	1.008	0.938
14	Mandiri Dana Pendapatan Tetap	0.986	1.052	0.938	1.038	1.013
15	Manulife Dana Campuran	0.770	0.814	0.945	1.000	0.814
16	Manulife Pendapatan Bulanan	0.959	1.015	0.945	1.000	1.015
17	Manulife Phnisi Dana Saham	0.696	0.762	0.913	1.000	0.762
18	Mega Dana Kombinasi	0.987	1.050	0.940	1.090	0.963
19	Mega Dana Obligasi Medali	0.943	1.009	0.935	1.019	0.990
20	Nikko Bond Nusantara	0.888	0.955	0.924	1.005	0.960
21	Nikko Bunga Nusantara	0.892	0.965	0.924	1.005	0.960
22	Nikko Gebyar Indonesia	0.913	1.000	0.913	1.000	1.000
23	Si Dana Fleksi	0.807	0.858	0.941	1.015	0.845
Mean		0.872	0.944	0.925	1.008	0.936

Note: TFPch = Total Factor Productivity Change; EFFch = Efficiency Change; TECHch = Technical Change; PEch = Pure Efficiency Change; SEch = Scale Efficiency Change

Table 4.5 shows the performance of the Malmquist TFP index of Indonesia's mutual funds' industry between 2004 and 2007. On the average, Bakti Big Nusantara recorded the highest growth in TFP index with 5.2 percent. Next, the efficiency and technical changes for this fund were 18.6 and -11.3 percent, respectively. However, Manulife Phnisi Dana Saham had the lowest TFP index with -30.4 percent, which was mostly contributed by efficiency regress (-23.8 percent). On the average, deterioration of the TFP index of mutual funds' industry in Indonesia

was mostly due to technical change (-7.5 percent) whereas efficiency also contributed a negative change (-5.6 percent). In a nutshell, the efficiency change was mostly contributed by pure efficiency (0.8 percent) rather than scale efficiency which experienced a deterioration of -6.4 percent. This shows that the larger the size of the funds, the lower their efficiency changes. These funds might experience diseconomies of scale during the period under study.

5. Conclusion

The study assesses the relative efficiency of the mutual funds in Indonesia. On average, the Total Factor Productivity (TFP) had decreased 12.8 percent within the period of 2004-2007 with 2006-2007 recording the lowest growth (-19.7 percent). However, the highest technical efficiency was recorded in the period of 2005-2006 at the rate of 11.4 percent, while 1.4 percent was recorded in the period of 2006-2007. It is necessary to note that the existence of a negative growth in TFP of the mutual funds' industry in Indonesia has been mainly caused by a negative change in efficiency (-5.6 percent), while technical efficiency also contributed a greater negative change (-7.5 percent) to the overall decrease in the TFP growth. The results indicate that the mutual funds' industry experienced diminished productivity and became more technically inefficient from 2004 to 2007. The study concluded that much of the inefficiency increased overtime which was due to the failure of the mutual funds to adopt technological advances made by a few efficient mutual funds. Although the efficiency change experienced a negative growth, the subcomponent of this change, namely pure efficiency, showed a slight improvement (0.8 percent). Thus, the finding indicates that the smaller the size of the companies, the larger the probability for the companies to be more efficient in using their inputs to generate more outputs.

In general, the TFP index experienced a negative growth (-12.8 percent) during the period of study 2004-2007. This indicates that the averages of selected mutual funds in Indonesia are inefficient in using their inputs to generate more outputs. This is not surprising since some mutual funds have experienced a crisis of massive redemption particularly at the end of 2005 which the Indonesian macro-economy condition was relatively unstable and had caused an increase in the interest rate (about 12.75%) as a consequence of a rise in world fuel price and higher inflation.

Moreover, the inefficiency of funds was also mainly caused by the failure of mutual funds to adopt technological advances. This study suggests that the mutual funds' industry in Indonesia has a great opportunity to promote its TFP through an improvement in the technical element such as optimizing the use of information technology in providing good services to customers (investors). Training and technical expertise should be constantly upgraded along with technological evolution. This can be done through education and training programs intended to improve managerial ability, or extension programs designed to speed up the adoption of new technologies. To further enhance the productivity of the mutual funds in the country, the government has to strengthen the macroeconomic stability, to provide competitive environment and transparent regulation, and to assist the industry with cheaper and efficient information and communication technology amenities.

Further study is suggested to adopt both parametric and non parametric approach, especially the Stochastic Frontier Approach (SFA) and DEA in order to arrive at more conclusive finding on the performance of mutual funds in Indonesia. Moreover, we also suggest that the future study to be conducted on mutual funds' industry in Indonesia should use more comprehensive variables such turnover ratio, risk (standard deviation or beta) and should also increase sample size of the study by incorporating as many as mutual funds in the analysis. Finally, we hope that in the future, there will be studies comparing the efficiency of the Indonesian mutual funds' industry with the mutual funds' industry from other countries and regions.

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Real Exchange Rate Misalignment in WAMZ Countries

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This paper investigates the potential costs of membership in a monetary union. We quantify the cost by examining the degree of exchange rate variability of WAMZ² member countries. We take a closer look at exchange rate variability since 2000 - the run-up period. To put it differently, we examined whether member countries exchange rate variability has increased as they prepare to enter into a monetary union. The main hypothesis to be tested in this paper is: has the preparation to enter into a monetary union led to an increased cost to the zone. In order to address the question, we assess the costs of membership in WAMZ zone using real exchange rate (RER) variability. We use panel data, General Least Squares (GLS) and single equation to estimate real exchange rate misalignment of each country from 1980 to 2005. This allows us to assess the cost of WAMZ membership since the run-up period --2000. Using both real and monetary factors, we assessed which variable affects real exchange rate (RER) variability the most and the behavior of these variables since the run-up period.

The empirical result shows that real exchange rate variability has increased substantially across WAMZ zone in recent years -- 2000 to 2005. We concluded that the road to monetary union has so far imposed high cost to members and it highlights the need for member countries to level the playing field by putting their macroeconomic fundamentals in order before entering into monetary union.

1. Introduction

The widely cost of currency union discussed in the literature is the cost of countries losing independent monetary policy. The implication is that

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² WAMZ stands for West African Monetary Zone which consists of The Gambia, Ghana, Guinea, Nigeria, and Sierra Leone.

member countries do not only lose independent monetary policy as a stabilization tool when confronted with economic shocks, but have to give up other revenue generating avenues as they enter into a monetary union.

If the monetary union leads to common market, it implies that all barriers have to be removed which leads to lost of tariff revenue. Similarly, seigniorage revenue that a country generates before entering into a monetary union is either eliminated or reduced. There is also an added cost to be incurred by member countries as they enter into a monetary union. Each country will be required to contribute a certain amount that is to be kept as reserve. Although the main export of the zone is agricultural products, the economies of the zone are diverse. Nigeria, with the largest oil-exporting economy, faces different terms of trade than the rest of the zone. Problems are likely to emerge when economies of different countries with different fundamental structures are to be integrated under one single currency. These different economies range from difference in labor market institutions, preferences of inflation and unemployment, legal systems, growth rates, and fiscal systems and the seigniorage problem.³

Although the labor market institutions for the member countries are similar, labor is relatively immobile within the zone. Consequently a shock may affect wages and prices in these countries at different magnitudes, which apparently make it difficult to correct these differences. Countries also have different fiscal systems. This difference causes countries to use different combinations of tax and monetary financing of certain government debts. The tax system in the zone is underdeveloped and the main option government uses to raise revenue is through inflation. This makes it costly to form a monetary union because of the lack of common smoothing devices to level the impact of shock on wages and prices.

The paper is organized in the following manner: In section 2, real exchange rate variability and a survey of the literature are discussed. Section 3 contained the theoretical framework. The data source and methodology employed for the empirical analysis is discussed in section

³ See De Grauwe

4. Section 5 contains the empirical results. Summary and conclusion is contained in section 6.

2 Literature Review

The era of floating exchange rate is characterized with real exchange rate variability. A large amount of study has documented the deviation of actual real exchange rate (RER) from long run equilibrium real exchange rate. Some earlier papers survey the literature by looking at the sources of real exchange rate variability. Korteweg (1980) investigated the source of RER variability using a group of Organization for Economic Co-operation and Development (OECD) countries. The empirical results show that real exchange rate variability has been influenced by shocks that emerged from both monetary and real variables. Helleiner (1981) surveyed the literature using developing countries. In his study, he separated the sources of real exchange rate variability into external sources and other sources. His findings reveal that even though external sources play an important role in determining exchange rate variability, other sources do have greater influence in other countries. These other sources include among other things such as domestic monetary policy.

Other researchers investigate how the real exchange rate deviates from PPP. Stockman (1983) developed a model to investigate the impact of nominal and real changes on real exchange rate variability. Employing data from a group of 38 developed and developing countries, his findings revealed that variability is greater under a floating regime than under fixed regime. Similarly, Yuravlivker (1982) conducted a study on four developing countries. His results reveal that real exchange rate variability was positively influenced by the instability of the nominal exchange rate.

Degrauwe, Janssens and Lelianert (1984) used cross-sectional data to investigate the effect of inflation and monetary disturbances on real exchange rate variability. Their results support the proposition that an increase in inflation and monetary disturbances increases real exchange rate variability. DeGrauwe and Rosiers (1984) developed a model which added degree of openness of an economy variable in addition to monetary disturbance. The model predicts that both variables positively influence the real exchange rate variability. Their findings supports the

hypothesis that monetary disturbance increases real exchange rate instability. Melvin and Bernstein (1984) surveyed the literature by using only real factors. Using cross-sectional data for 87 countries and regressing bilateral exchange rate variability index against exports and openness, Melvin and Bernstein (1984) found that the two variables significantly influenced exchange rate variability.

Edwards (1986) investigated the potential role of monetary and real factors in explaining real exchange rate variability in certain selected developing countries. He used two indexes of real effective exchange rate variability (short-term and long-term) for 30 countries. In his findings, unstable nominal exchange rate policies reflected high exchange instability in the short-run and unstable terms of trade reflected real exchange rate instability in the long-run. Contrary to other findings, Edwards' (1986) results revealed that both monetary and real factor influenced real exchange rate variability though nominal variability affects the short-wave while real variability factors affect the long-wave instability.

Devarajan and de Melo (1987) evaluate the effect of participation in a monetary union employing a costs and benefits approach using 1960-1983 cross-section and time-series data. Devarajan and de Melo (1987) classified the data into two sub periods: 1960-1973 and 1973-1982, the later sub periods corresponding to floating exchange rates, supply shocks, and greater autonomy in setting monetary policy within CFA zone. Out of eleven classification schemes with the exception of two, CFA Zone countries improved their performance vis-à-vis comparator countries during the 1973-82 periods. The results supported the argument that monetary union imposed discipline which was helpful for adjustment during the period that generalized floating and supply shocks. Devarajan and Rodrik (1991) investigated whether the benefits of currency union outweigh their costs using the CFA zone in Africa. Devarajan and Rodrik (1991) concluded using inflation-output trade off that the CFA zone would have been better off having a floating exchange rate that adjusted to shock than having fixed exchange rate.

Allechi and Niamkey (1994) evaluated the net gains from the CFA Franc Zone membership using partial pool reserve method. Taking into account the costs associated with maintaining operation accounts with the French Treasury, the interest rate cost, and exchange rate risks, their

results reveal more net losers than gainers in the CFA zone. Elbadawi and Soto (1995) contributed to the calculation of long-run real exchange equilibrium and real exchange rate misalignment. Elbadawi and Soto (1995) considered 7 countries including 4 countries from Sub-Saharan Africa⁴ (SSA), Chile, Mexico, and India. Elbadawi and Soto's (1995) result of the long-run cointegration equilibrium equation of the RER and the corresponding dynamic error-correction specification strongly corroborate the theoretical model and mostly agrees with the results from previous studies.

3 Theoretical Framework

The models that motivate the measure of real exchange rate RER misalignment stemmed from the work of Edward (1889), Rodriguez (1989), Elbadawi and Soto (1997), Hinkle and Montiel (1999) and Hallerberg (2002). In their work, they employed the concept of intertemporal model of the determinants of RER. Using this framework as a guide will permit us to separate the effects of short and long run determinants of the RER and compute the equilibrium real exchange rate (ERER). In this setting, real exchange rate is defined as the relative price of tradable to non-tradable goods.⁵

$$RER \equiv e = \frac{EP_T}{P_N}$$

where E is the nominal exchange rate, the price of a domestic currency in terms of a foreign currency. In the framework, the observed real exchange rate is further influenced in the short run by certain macroeconomic policy induced shocks that do have an effect in determining the long run RER. In other words, the RER is affected by the fundamentals and policy-induced shifts in its real fundamentals. In the model RER is a function of the following real fundamentals: terms of trade, government spending a proxy for spending in non tradable goods, and openness used a proxy for commercial policy.

⁴ The four Sub-Saharan countries considered are Cote d'Ivoire, Ghana, Kenya and Mali

⁵ A more traditional but still used relies on the purchasing power parity (PPP) approach. In this approach, the PPP real exchange rate is equal to the nominal exchange rate corrected by the ratio

of the foreign price level (p^*) to the domestic price level given by $RER = \frac{EP^*}{P}$

From the above equation, either an increase in nominal exchange or an increase in demand on tradable goods will cause the RER to depreciate (RER increase). Conversely, a fall in nominal exchange rate and a fall in prices of tradable goods will cause RER to appreciate (RER decrease). While a depreciation of a country's real exchange rate increases its competitiveness in the world market, an appreciation reduces its competitiveness and decreases the demand for its product which will have an adverse effect in the country's current account balance. RER change as a result of a change in any of the fundamentals or policy-induced shift in the real fundamentals. Any policy that deviate the real exchange rate from its equilibrium value will cause real exchange rate misalignment. Real exchange rate misalignment is defined as sustained deviations of the actual real exchange rate from its long-run equilibrium level.⁶ Equilibrium RER (ERER) is defined as the relative price of tradable that, for given sustainable values of other relevant variables such as taxes, international prices, and technology results in simultaneous attainment of internal and external equilibrium. *Internal equilibrium* implies that the nontradable goods market clears in the current period, and is expected to be in equilibrium in future periods. In this definition, it is assumed that this equilibrium exist where unemployment is at its "natural" level. *External equilibrium*, however, is attained when the intertemporal budget constraint that states that the discounted sum of a country's current account has to be equal to zero is satisfied. To put it differently, it is a situation where the current account balance is sustainable to long-run capital flows.⁷ As a result, misalignment may arise as a result of policies that are incompatible with the fundamentals.⁸

Empirical evidence shows that an increase in terms of trade and government spending leads to RER appreciation. However, uncertainty pertaining to the effects of terms of trade arises as a result of the presence of wealth effect of an improvement in terms of trade which tends to expand the demand for non-traded goods and thus raises the prices of non-traded goods appreciating the RER and a substitution effect which works in the opposite direction by lowering the cost of imported inputs in the production of non-traded goods. Similarly,

⁶ In a purchasing power parity environment, the equilibrium real exchange is constant

⁷ See Edwards (1989)

⁸ Edwards and Elbadawi stated that in a system of fixed-pegged nominal exchange rates, expansionary fiscal and monetary policies can result to overvaluation.

government expenditure leads RER to appreciate because of the possibility that government spends more on non-traded goods than on the private sector.⁹ As noted earlier, the equilibrium real exchange rate is obtained when both internal and external balance are attained at the same time. The equilibrium real exchange rate is given as

$$e^* = \sigma' F_t$$

where F_t is a vector for the fundamentals and σ' a vector for coefficients of the parameters of the fundamentals. To obtain the fundamental vector coefficients, the actual (observable) RER is estimated which a function of both real and transitory variables is given as

$$e = \sigma' F_t + \gamma' T_t + \varepsilon_t$$

where, F_t is the vector of fundamentals, T_t is a vector for transitory variables, and ε_t is a disturbance term with mean zero. Whenever e^* (ERER) differs from e (actual) it implies real exchange rate misalignment. If e^* is greater than e , it implies overvaluation and if e^* is less than e , it implies undervaluation. The data source and methodology employed for the empirical analysis is discussed in the next section.

4 Data Source and Methodology

4.1 Data Source

Most studies on real exchange rate variability used bilateral real exchange rates. To construct bilateral exchange rates we collected annual data on price levels from the World Bank's *World Development Indicators (WDI) 2005 CD-ROM* and the normal exchange rates are sourced from the IMF's *International Finance Statistics 2005 CD-ROM*. For real exchange rate determinants, data on exports, imports, output, output per capita, terms of trade, trade balance, monetary growth, government spending, and inflation are sourced from World Bank via *West African Monetary Institute (WAMI)*

⁹ See Elbadawi and Soto (1997)

4.2 Methodology

The sample covers 1980 to 2005 based on the availability of data. Observations on all variables were available for each year. From the data we generate RERs and their determinants. For openness, we followed the literature and measured it as $(\frac{Exports + Imports}{GDP})$ to proxy for trade policy. Ratio of government expenditure to output $(\frac{Gov.spending}{GDP})$ is used as a proxy for composition of government expenditure spending. The terms of trade (TOT) measure defined as the ratio of exports to import prices. The real GDP per capita growth is used as a proxy for real productivity shocks. The ratio of money to output $(\frac{M2}{GDP})$ is used as a proxy to monetary growth instability. Domestic inflation as a proxy to monetary policy and variability of inflation is also included in the regression. All things being equal, a more variable domestic inflation is expected to result in higher exchange rate instability. Similarly, studies have shown that higher inflation level corresponded to higher variability of the real exchange rate.

To assess whether a country's real exchange rate deviates from its run long equilibrium has been a difficult task.¹⁰ The Purchasing Power Parity (PPP) is used to calculate misalignment. An alternative version is used in the literature which takes into account of changes in the "fundamentals."¹¹ Though authors differ in the number of fundamentals use, the basic "fundamentals" included terms of trade, output growth, degree of openness of a country to international trade, and level of government spending. We followed Edward (1988), Baffes, Elbadawi, and O'Connell (1997), and Goldman-Sachs (1997) and used a single equation methodology to assess the degree of misalignment in WAMZ zone.¹² To proceed with the single equation methodology, we first calculated the exchange rate. The real exchange rate defined as the

¹⁰ Attempt to calculate misalignment make use of version of purchasing power parity (PPP). Though simple to apply, it has certain deficiencies in that it does not take into account the changes in the fundamentals in determining equilibrium real exchange rate.

¹¹ An example of these methods is the single equation which defines real exchange rate as the ratio of price of tradable to nontradable goods.

¹² Misalignment occur as a result certain policies which are incompatible in maintaining internal and external balance

nominal exchange rate deflated by a ratio of domestic to foreign price levels as

$$e \equiv s + p^* - p = \ln(SP^*/P) \quad (1)$$

where e is the log of real exchange rate, s is the log of nominal exchange rate which is defined as units of local currency per foreign currency unit and p and p^* are the log of the price levels with asterisks denoting foreign quantities. In other words, the real exchange rate can be written as the product of nominal exchange rate and GDP deflator of the foreign country divided by GDP deflator of the home country:

$$e = \frac{S \cdot GDPdeflator_{foreign}}{GDPdeflator_{home}}$$

where S the nominal exchange rate, $GDPdeflator_{foreign}$ is the GDP deflator of the foreign country and $GDPdeflator_{home}$ is the GDP deflator of the home country.

In the study we considered bilateral exchange rate instead of multilateral exchange rate and the chosen foreign country is the U.S.¹³ This is because the zone members are mainly exporters of primary produce, the prices of which are quoted in U.S dollars in the world market. In addition, bilateral exchange rate is easier to calculate than multilateral exchange rate. In order to compute bilateral exchange rate, all that is needed is a single nominal exchange rate and price indices from the two countries. Any change in U.S dollar vis-à-vis a member country currency will have significant impact in the country's competitiveness level in the world market for her exports. The graphs for bilateral real exchange rate for the zone member currency vis-à-vis the U.S dollar are shown in Figures 1a through 1e. Any change in RER would have an important effect on individual WAMZ member countries. Assuming that

$$v_n \equiv e \quad (2)$$

We follow Edward (1989), and decompose variability of real exchange rate into monetary and real structural factors as

$$\log v_n = \alpha_0 + \sum_i \beta_i \log M_{in} + \sum_j \gamma_j \log X_{jn} + \varepsilon_n \quad (3)$$

¹³ A bilateral real exchange rate is the price ratios between two countries while a multilateral real exchange rate includes a weighted measure of nominal exchange rates and price indices for several foreign countries.

where v_n is an index of real exchange rate variability for country n , α_0 , β_i , and γ_j are parameters, the m_{in} 's represent monetary sources of RER variability, x_{jn} are the real or structural sources of RER variability and ε_n is the error term. An expanded linear version of the above equation can be written as

$$\log v_n = \alpha_0 + \beta_1 \log TOT + \beta_2 \log Open + \beta_3 \log TradeBal + \beta_4 \log Govt + \beta_5 \log rGDP + \gamma_1 \log m2GDP + \gamma_2 \log inf + \gamma_3 \log S + \gamma_4 WAMZ + \varepsilon_n \quad (4)$$

From the above variability of RER, “permanent” determinants include terms of trade (TOT), openness (Open), trade balance (TradeBal), government spending (Govt) and real Gross Domestic Product per capita (rGDP). Measures of openness, government spending, and trade balance are ratio to GDP. The variability of RER “transitory” determinants includes money supply shock (m2GDP), average domestic inflation (inf), nominal exchange rate (S), and a dummy variable monetary union (WAMZ). It captures monetary union impact on real exchange rate variability. In other words, it shows the effect of preparation for member countries has on real exchange rates for member countries since 2000 - the run-up period. The vector coefficients for the real or “permanent” and “transitory” components are $\beta = (\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5)$ and $\gamma = (\gamma_1 + \gamma_2 + \gamma_3 + \gamma_4)$ respectively. In theory, the monetary or “transitory” components play no role in determining the long run variability in real exchange rate. While the term α_0 is the country-specific intercept, ε_n is the error term with mean zero. The dependent variable- $\log v_n$ is an index of real exchange rate variability for country n . $\log TOT$ is variability of terms of trade, $Open$ Openness index, $TradeBal$ Trade balance index, $\log S$ index of instability of the nominal rate with respect to the U.S. dollar, $\log m2GDP$ index of instability of domestic monetary policy, $\log inf$ index of instability of inflation, $\log rGDPgrowth$ index of instability of real GDP growth and $WAMZ$ -- a dummy which takes a value 1 for the years 2000 to 2005 and 0 for other years.

5 Empirical Results

The empirical results obtained from the simulation of the real exchange rate variability equations using General Least Squares (GLS) method. The estimations were performed for both short-term and long-term real exchange rate variability using annual data for the WAMZ members for the period 1980-2005. As prior, it would be expected that the real factors would have an impact in the long-term real exchange variability while the monetary factors have an important influence in the short-term real exchange rate variability.

Tables 1 through 3 contained the real exchange rate variability information for 1980-2005, 1980-1999, and 2000-2005 respectively. Table 4 tabulated the real exchange rate instability using General least square (GLS). Since we have included other monetary measures, we introduced them in the equation one at a time. The results obtained are quite appealing. It is found that the real factors have an important role in determining the long-term real exchange rate variability even with the presences of other monetary factors. While the coefficients of terms of trade, trade balance, government spending and real GDP growth are negative, the coefficient of openness is positive. These coefficients have the same signs even when WAMZ dummy is included. The openness variable remained positive and statistically significant.¹⁴ The main source of explanation of real exchange rate variability across countries during this time period is instability of the countries' openness which remained positive and significant in all equations where it was included. While terms of trade and government spending variability coefficients are negative and statistically significant, the trade balance and real GDP growth though have negative signs are statistically insignificant.

When the WAMZ dummy is added, it does not change the trust of the results. The coefficient of WAMZ dummy have a positive sign and statistically significant. With the exception of nominal exchange rate variability, the rest of the monetary factors remained statistically insignificant when they are all included in the regression equation.¹⁵ However, when the monetary factors are introduced one at a time, both

¹⁴ This is contrary to previous results (Edward (1986)) where openness coefficient was never significant.

¹⁵ The monetary factors are nominal exchange rate, monetary growth, and domestic inflation. The coefficient of nominal exchange rate is positive and statistically significant.

the coefficients of nominal exchange rate (a proxy of the nominal exchange rate policy) and domestic inflation instability remained positive. The nominal exchange rate instability variable remained statistically significant with and without WAMZ dummy. However, the domestic inflation instability is statistically insignificant. These results agreed with that of Edward (1986).

Monetary growth instability coefficient showed a negative sign and is statistically significant. The sign of the coefficient of monetary growth does not change even when other transitory variables are included. While the addition of nominal exchange rate instability lowers the absolute value of the coefficient of the monetary growth, the domestic inflation variability increases the absolute value of the coefficient of the monetary growth. Moreover, the absolute value and significant level of the monetary growth variability increases when WAMZ dummy variable is included in the regression. The finding is in line with the theory and previous results¹⁶ that monetary factors do not have much influence in long-term variability of real exchange rate when all permanent and transitory factors are included at the same time in the regression. The results revealed that monetary growth instability has significant impact in determining long-term real exchange rate when the transitory factors are included one at a time.¹⁷ A caveat is order: when the monetary growth instability enters with either the nominal exchange rate or domestic inflation rate instability with the real term openness, it is statistically significant at a conventional level but have a positive and negative sign respectively.

The short-term real exchange rate variability is also assessed. Due to lack of quarterly data for the countries, short-term real exchange rate variability specification and yearly data are used to assess short-term real exchange rate variability. The results are very interesting and are quite different from those obtained in long-term real exchange rate variability. The coefficients of monetary factors instability shown opposite signs compared to the long-term real exchange rate. As expected, in the short run the monetary factors play a more prominent role in explaining real exchange rate variability. The coefficients of

¹⁶ See Edward (1986)

¹⁷ Monetary growth instability coefficient though negative but become insignificant when nominal exchange rate instability is added in the regression.

monetary growth instability turned out positive, large, and statistically significant. The coefficient of nominal exchange rate instability though remained positive but turned out larger and statistically significant. The domestic inflation instability coefficient show negative sign but remained statistically insignificant. The coefficient of WAMZ dummy though positive is statistically insignificant in the short-term. The implications of the result of short-term real exchange rate variability implies that countries can meaningfully address their exchange problems in the short-run by pursuing more stable nominal exchange rate and monetary policies.

The coefficients estimates obtained from equation 4, is used to construct actual RER, equilibrium RER. To construct the actual RER and equilibrium RER for each period, we take the fitted values from short-term and long-term specification respectively and insert them into the regression equations. Since equilibrium RER is modeled as a function of real variables and actual RER as a function of both real and monetary variables, we used the actual values for the determinants to calculate RER. To compute the degree of RER misalignment (MIS), the actual RER is subtracted from the equilibrium RER. If the equilibrium RER is greater than actual RER, it implies that the currency of that particular country in that period is overvalued. Conversely, if equilibrium RER is less than the actual RER, it implies that the domestic currency is undervalued.

The graphical representation for the two series for each country is shown in figures 2a through 2e. As seen from the figures, all WAMZ members show to some extent an overvaluation of the real exchange rate in the period from 2000 to 2005. The actual RER is always below the equilibrium RER. The average percentage overvaluation for each country in the zone over the period 1980-2005, 1980-1999, and 2000-2005 is tabulated in table 5. Though each country show RER overvaluation, the magnitude differed from one country to the other Nigeria showed an average increase of 58.4 percent while Ghana indicated 29.8 percent increase. Tables 5 shows the average percent increased in overvaluation for each country. Again, Nigeria recorded the highest average percentage increased in RER overvaluation in the entire zone. Though there are substantial percent increased in average RER overvaluation in the zone, Ghana shown a significant undervaluation from (1980-1999) to (1980-2005) and from (1980-1999) to (2000-2005).

The rest of the zone members show a significant percentage increase in RER overvaluation from (1980-1999) to (2000-2005).

The empirical results indicate that an increase in trade liberalization policy leading to ERED depreciation (an increase in RER). This gives the zone a competitive advantage in the world market for the zone's exports. It also supports the proposition that an increase in openness results in the substitution of consumption from the non-traded sector to the traded sector, leading the ERED to depreciate. However, improved terms of trade, trade balance, real GDP growth, and an increased in government expenditure leads to RER to appreciate (a decrease in the LRED).

6 Summary and Conclusion

The empirical result shows that real exchange rate variability has increased substantially across WAMZ zone in recent years -- 2000 to 2005 (since the run-up period). The degree of variability of the real exchange rate, however, is uneven across the zone. While Ghana showed a decrease in variability, the rest of the zone showed an increase. Nigeria and Guinea indicated the highest percent variability increased almost doubling the zone average. The implication is that the increase in misalignment since 2000 --the run-up period means an increase in cost associated with entering into monetary union. The findings reveal that misalignment has increased since 2000 --the run-up period supports the null hypothesis. In addition, terms of trade, trade balance, and money supply percent of GDP are negatively correlated among member countries (see table 4). Nigeria faces different terms of trade and trade balance with the rest. The variation of average RER overvaluation of the zone couple with negative correlations of certain structural variables revealed that the zone does not constitute an optimum currency area.

The unanimity rule though imposed discipline, comes with cost due to the amount of time that might be wasted and the possibility of major decisions and operations of the supranational bank been politicized. In quantifying some of these costs, we concluded that the road to monetary union has so far imposed high cost to members and it highlights the need for member countries to level the playing field by putting their macroeconomic fundamentals in order before entering into monetary

union. Given the trend of RER overvaluation of the zone since the run-up period, it is at a serious disadvantage compared to its comparators countries in the world market. Such a trend must be addressed otherwise it can have serious consequences.¹⁸

**Table 1: Real exchange rate variability in WAMZ
Zone annual average 1980 - 2005**

Country	Period	Mean 2000=100	Variance	Coefficient Variance	Minimum	Maximum
Gambia	1980-2005	87.08	523.96	0.363	47.81	138.28
Ghana	1980-2005	50.64	738.85	0.360	4.75	100.61
Guinea	1980-2005	69.25	621.45	0.367	23.96	117.93
Nigeria	1980-2005	87.26	997.95	0.478	24.31	146.87
Sierra Leone	1980-2005	90.79	613.30	0.367	45.87	143.08

Sources: The raw data for all countries used to construct these indexes were obtained from IFS and WAMI.

**Table 2: Real exchange rate variability in WAMZ
Zone annual average 1980 - 1999**

Country	Period	Mean	Variance	Coefficient Variance	Minimum	Maximum
Gambia	1980-1999	76.61	130.78	0.33	47.81	90.97
Ghana	1980-1999	40.08	414.53	0.36	44.85	64.48
Guinea	1980-1999	58.09	236.30	0.33	64.48	86.36
Nigeria	1980-1999	87.34	1,260.38	0.43	24.31	146.87
Sierra Leone	1980-1999	86.07	690.57	0.35	45.88	143.08

Sources: The raw data for all countries used to construct these indexes were obtained from IFS and WAMI.

¹⁸ It should be noted however that this may not necessarily be cost since member-countries need to address their macroeconomic fundamentals in order to be compliance with criteria outlined in chapter 2. Some of these costs may dilute eventually once a country satisfies these criteria.

**Table 3: Real exchange rate variability in WAMZ
Zone annual average 2000 - 2005**

Country	Period	Mean 2000=100	Variance	Coefficient Variance	Minimum	Maximum
Gambia	2000-2005	122	221.1	0.414	100	138.28
Ghana	2000-2005	85.83	186.95	0.298	68.64	100.61
Guinea	2000-2005	106.46	49.8	0.433	99.48	117.93
Nigeria	2000-2005	87.06	200.26	0.584	62.96	100
Sierra Leone	2000-2005	106.53	56.13	0.384	95.26	113.28

Sources: The raw data for all countries used to construct these indexes were obtained from IFS and WAMI.

Table 4: Real exchange rate instability – 1980 - 2005 (General Least Squares)

Const	2.93 (5.9)	2.53 (2.01)	4.37 (3.12)	3.04 (2.11)	1.83 (1.38)	3.68 (3.25)	5.04 (4.26)	1.26 (3.44)	0.67 (2.1)	2.05 (5.0)	1.93 (6.7)
LNER	0.071 (5.8)	0.072 (5.73)		0.05 (2.65)	0.08 (5.76)				0.09 (6.3)	0.1 (4.8)	0.12 (7.7)
Ltot	-0.44 (4.7)	-0.42 (4.16)	-0.54 (4.46)	-0.42 (3.84)	-0.42 (3.82)	-0.31 (2.83)	-0.58 (5.21)				
LOpen	0.73 13.19	0.73 (12.27)	0.74 (10.98)	0.82 (10.1)	0.76 (9.76)	0.73 (10.10)	0.77 (9.98)	0.86 (12.1)	0.62 (8.8)		
Tbal(-1)				-0.01 (2.43)	-0.01 (2.25)	-0.001 (0.28)	-0.003 (0.95)				
LGovt				-0.42 (3.94)	-0.39 (3.63)	-0.40 (3.60)	-0.31 (2.52)				
LGDP		0.06 (0.34)	-0.14 (0.69)	0.17 (0.85)	0.31 (1.65)	0.02 (0.12)	-0.06 (0.31)				
LM2				-0.08 (0.65)	0.09 (1.01)			-0.24 (2.4)	0.21 (2.3)	0.64 (5.7)	0.68 (8.93)
LDinf			0.02 (0.52)	0.02 (0.58)	0.01 (0.35)			0.02 (0.6)		-0.02 (0.7)	-0.02 (0.64)
WAMZ				0.19 (2.06)		0.32 (5.09)				0.04 (0.44)	
R²	0.95	0.95	0.92	0.97	0.97	0.98	0.96	0.76	0.94	0.98	0.98
F	846	631	344	361	433	846	524	127	648	1313	1727

Note: Regressed is the log of RER; the numbers in parentheses are *t*-statistics. R² is the coefficient of determination and *F*- statistics for the regression as a whole

Table 5 Average RER Misalignment

Country	1980-2005	1980-1999	2000-2005	(1980-1999) (1980-2005)	(1980-1999) (2000-2005)
Gambia	36.30%	33.20%	41.40%	9.00%	25.00%
Ghana	36	36.1	29.8	-14.83	-17.43
Guinea	36.7	33	43.3	11.05	31.23
Nigeria	47.8	42.6	58.4	12.41	37.09
Sierra Leone	36.7	34.5	38.4	6.48	11.4

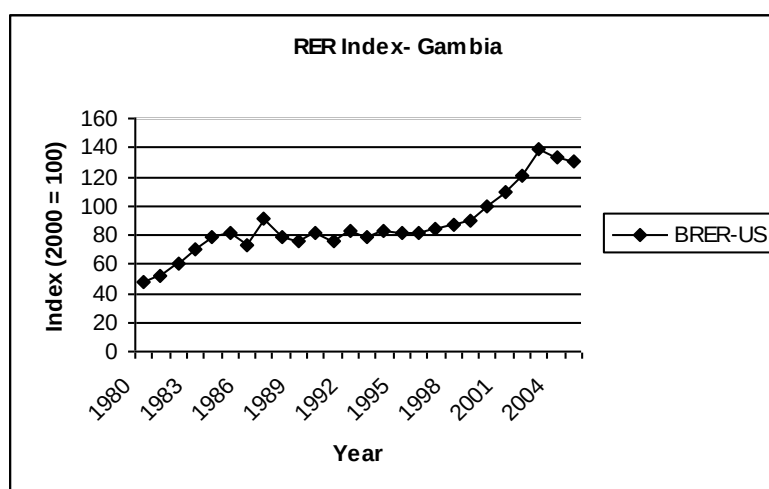


Figure 1a: Real exchange rate for Gambia

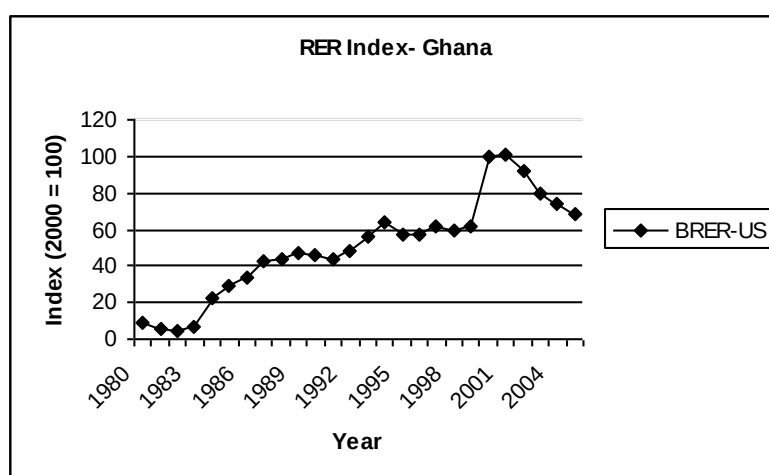


Figure 1b: Real exchange rate for Ghana

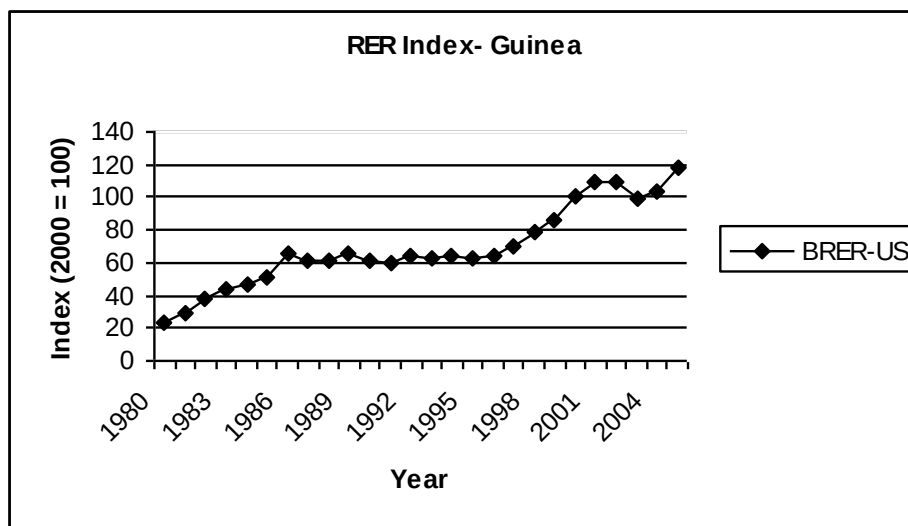


Figure 1c: Real exchange rate for Guinea

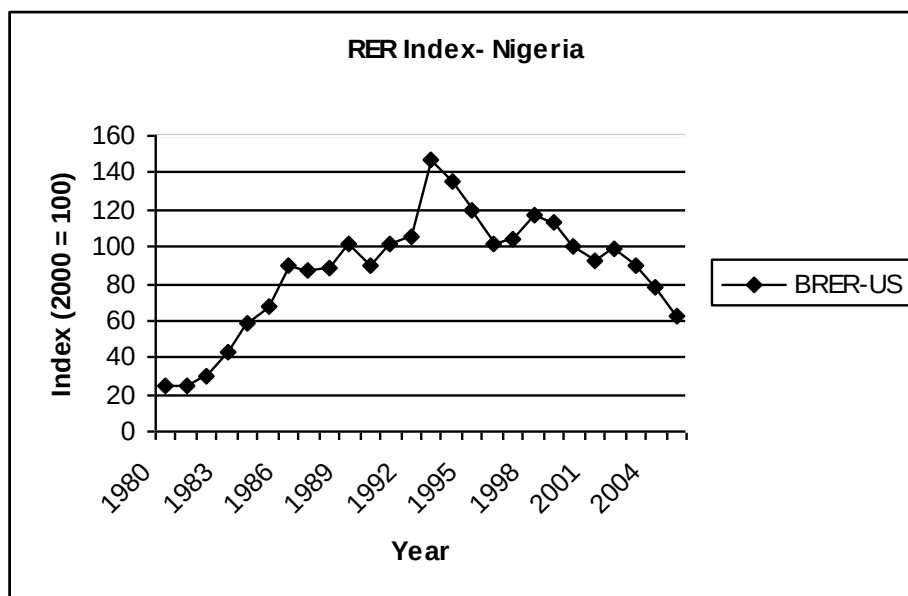


Figure 1d: Real exchange rate for Nigeria

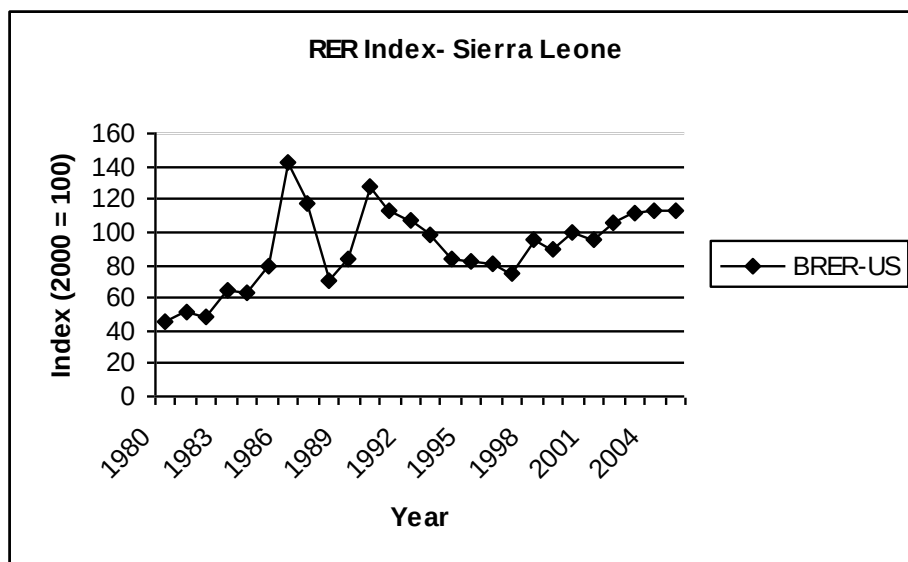


Figure 1e: Real exchange rate for Sierra Leone

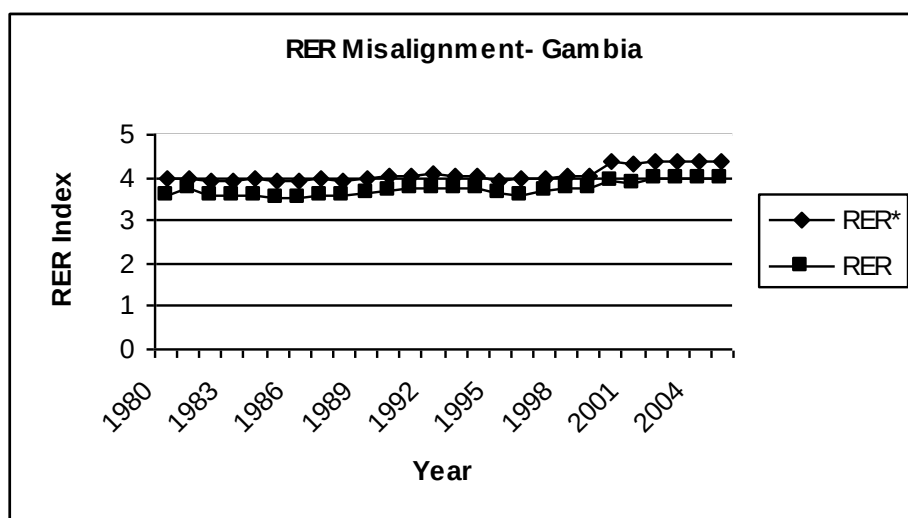


Figure 2a: Real exchange rate misalignment – Gambia

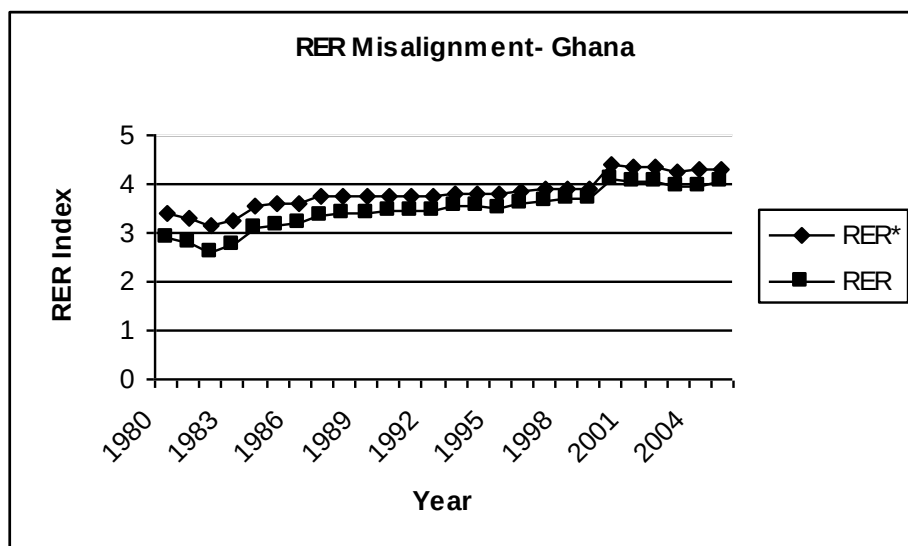


Figure 2b: Real exchange rate misalignment - Ghana

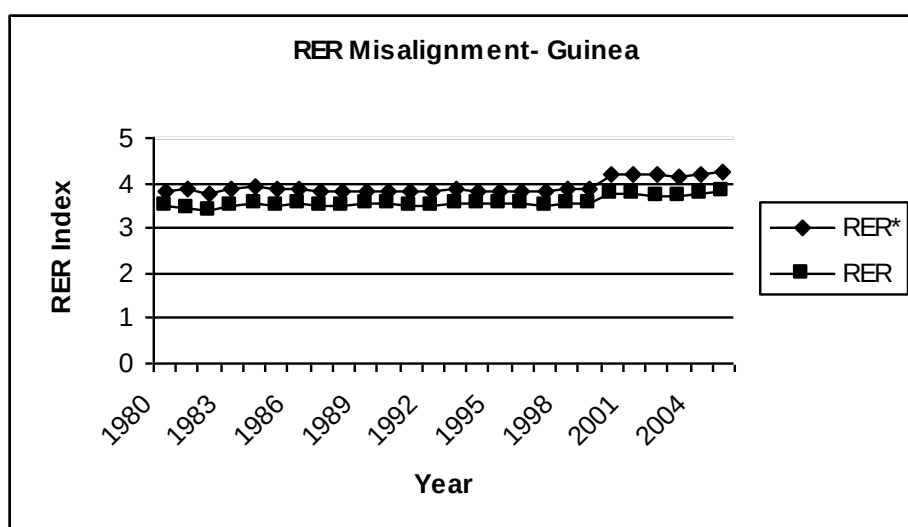


Figure 2c: Real exchange rate misalignment – Guinea

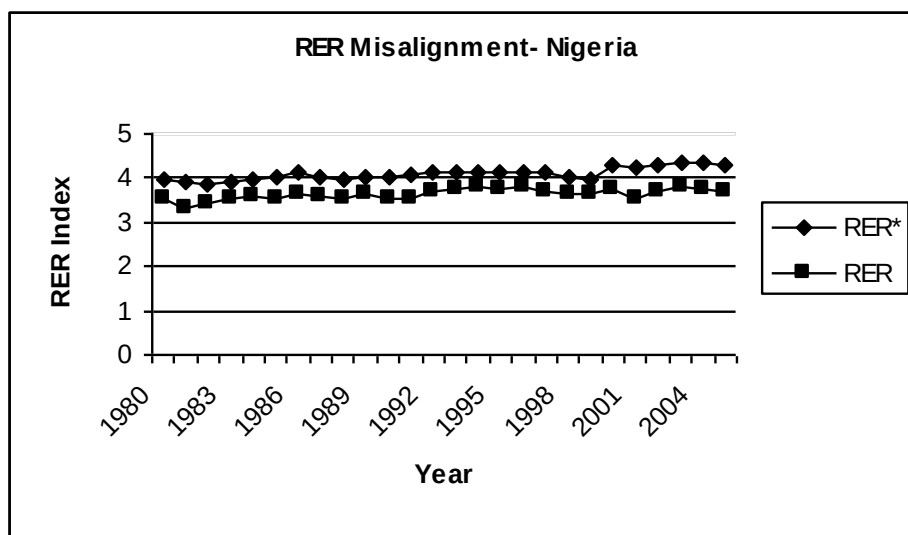


Figure 2d: Real exchange rate misalignment - Nigeria

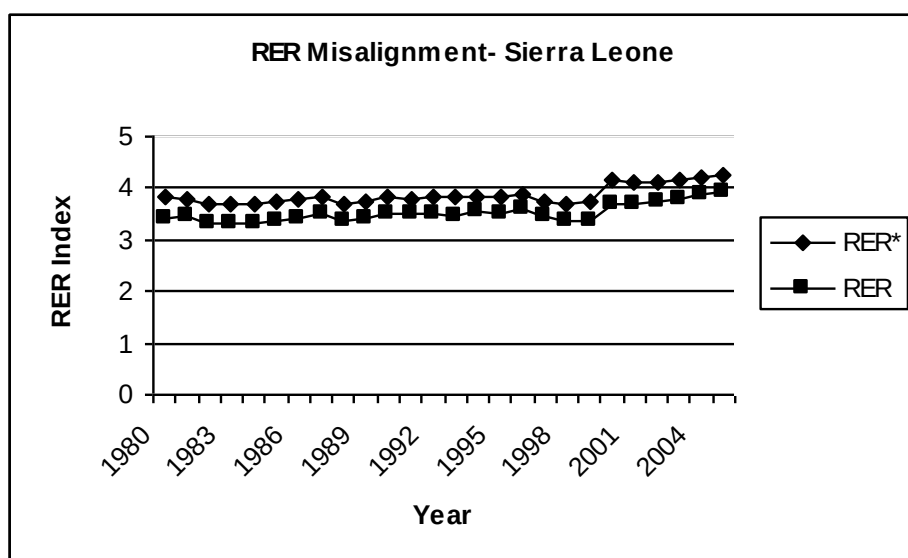


Figure 2e: Real exchange rate misalignment – Sierra Leone

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Potential Diversification Benefits across Global Islamic Equity Markets

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In view of the increasing interests on the Islamic stock markets as a potential avenue for portfolio diversification, this study is indeed timely to assess the degree of integration among five major Islamic stock markets, namely Malaysia, Indonesia, Japan, the UK and the US. It also attempts to empirically explore the nature of the long-run equilibrium relationship among the major Islamic stock indexes and to examine the dynamic causal linkages among them. Based on weekly closing stock indexes of the selected stock markets from 1 January 1999 to 31 August 2006, this study relies on a two-step estimation using the Auto-Regressive Distributed Lag (ARDL) and the Vector Error Correction Model (VECM) based on the Generalized Method of Moments (GMM). The study finds that investors who are interested to diversify their portfolio can gain benefits by diversifying in the Islamic stock markets across economic grouping such as that in the developed and developing countries. However, limited benefits are available if investors only diversify their investments within the same economic groupings.

1. Introduction

Studies on stock markets integration convey important information on the potential international diversification opportunities to the investors. Stock markets which are highly cointegrated suggest the non-existence of diversification benefits since the performance and returns in these markets are highly correlated with each other. The degree of stock markets integration provides several important economic implications. Stock markets which are highly integrated tend to move together and

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have stable long run relationships, which are normally the case for countries having strong economic and financial ties as well as close trade links. Stock markets of two countries could also be highly correlated if there are similarities in the macroeconomic policy implementations in the countries. For instance, countries pursuing macroeconomic policy harmonization could find that their stock markets moving together and becoming more integrated. In the context of emerging markets, Andersen and Moreno (2005) highlight that ongoing efforts of financial integration such as removal of capital controls, financial innovation and technological progress result in increased financial market integration among the countries.

There have been voluminous studies examining the issue of stock market integration. Most of these studies, however, focus on the stock markets in the developed countries. For instance, Taylor and Tonk (1989) study the relationship between the stock markets of the US, UK, Germany, Netherlands and Japan and find that these markets are becoming increasingly cointegrated. Campbell and Hamao (1992) focus on the world's two major stock market, namely the US and Japan and document greater integration due to multi-factor asset pricing. Ayhan et al. (2003) examine the impact of international financial integration on macroeconomic volatility in a large group of industrial and developing economies over the period 1960-99. They found that, on average, the volatility of consumption growth relative to the income growth has increased for more financially integrated developing economies in 1990s. Other studies such as Fischer and Palasvirta (1990), Kasa (1992), Longin and Solnik (1995), and Bracker et al. (1999) also examine the issue of stock market integration in the context of the developed countries. For the case of emerging countries, there has been an increasing body of literature examining this issue particularly for countries in Asia and Latin America. This includes Jang and Sul (2002), Ibrahim (2000; 2005), Mohd. Yusof and Abd. Majid (2006) and Abd. Majid et al. (2007).

Of late, there is an increasing interest towards empirically assessing the integration among the stock markets in the Islamic countries. Some studies focus on the stock markets of a particular region, such as that in the Middle-East and North African (MENA) region. An interesting finding was documented by Marashdeh (2005) whose study suggested that there are no integration between the selected MENA stock markets

(Egypt, Jordan, Morocco and Turkey) and that of the major developed economies (the US, UK and Germany). This suggests potential diversification benefits for the investors from the major stock markets to the MENA stock markets. Bley and Chen (2006) discover that the stock markets of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates provided benefits of portfolio diversification, but there was evidence that the markets are increasingly becoming integrated due to the on-going attempts to synchronize the markets in the advent of the economic union and single currency area. Despite this, there have been several other studies which provide contradictory findings. For example, Darrat et al. (2000) find that the stock markets of Egypt, Morocco and Jordan are integrated with themselves as well as with the major world stock markets.

Very few studies have focused on the emerging stock markets of the Organization of Islamic Countries (OIC),³ which covered a wider geographical area. Earlier attempts to study the stock markets of the OIC countries include that of Zeinelabdin (1991), Hassan (2003) and Ceylan and Dogan (2004). These studies, however, are more exploratory in nature. More recently, Abd. Majid et al. (2007) explore the degree of integration among eight Islamic countries stock markets, namely Turkey, Egypt, Oman, Kuwait, Malaysia, Indonesia, Bangladesh and Pakistan, while at the same time, assess the degree of integration between these markets and the world's largest stock markets, namely the US, the UK and Japan. The study finds that the stock markets of Malaysia, Indonesia, Bangladesh and Pakistan (OIC stock markets in the Asian region) are integrated, while the stock markets in Turkey, Egypt, Oman and Kuwait (OIC stock markets in the Middle-East and North African (MENA) region) are not. The results of the study suggest that investors intended to gain from portfolio diversification can benefit by investing in the MENA region, but not the Asian region. In addition, all the Islamic stock markets are integrated with the major stock markets.

While there are extensive studies on integration among conventional stock markets both in the West and OIC countries, studies on the integration among the Islamic stock markets worldwide are still

³ The Organization of the Islamic Conference (OIC) is an inter-governmental organization which includes membership of 57 states spread over four continents. The Organization was established upon a decision of the historical summit which took place in Rabat, Kingdom of Morocco on 12th Rajab 1389 Hijra (25 September 1969) as a result of criminal arson of Al-Aqsa Mosque in occupied Jerusalem (<http://www.sesric.org/sesric-about.php>).

relatively meagre. Empirical efforts to examine the interdependence of the Islamic stock indices across the globe have been a rather recent phenomena, mainly due to the increasing interest in the area of Islamic banking and finance. Most of the studies in general highlight the diversification benefits of investing in the various Islamic stock markets. For example, Achsani et al. (2007) find that the interdependence of the Islamic stock markets tends to be asymmetric across a wide geographical area. While there are strong correlations between the Islamic stock indices of Indonesia and Malaysia, the US and Canada, and Japan and Asia Pacific, this is not exactly the case for across the regional stock markets. The Islamic stock market in the US was found to have strong influence on the other Islamic stock markets. However, the stock markets of Indonesia, Malaysia, Canada and Asia Pacific have smaller effects on the US' Islamic stock market.

In view of the increasing demand for information on the nature of integration among the Islamic stock markets particularly from investors intending to diversify their portfolios in the *shari'ah*-compliant stocks in both the West and Muslim countries, this topic provides a potential niche area to be explored. Reflecting the strong interest, funds invested in the Islamic equity market as measured by the market capitalization of the Dow Jones Islamic Markets Index reached US\$4.34 trillion at end-2008 (Siddiqui, 2008). Globally, there are more than 500 *shari'ah*-compliant funds available in 2008 and the number is estimated to reach 1,000 by 2010 (Islamic Finance News, September 2008). The rapid growth of the Islamic capital markets have resulted in a more pressing need for more studies on this area. Thus, this study is indeed timely to fulfill the needs of the investors in the current economic and financial situation.

Based on this background, the objective of this study is to analyze the nature of market integration among five major Islamic stock markets, namely Malaysia (Dow Jones Islamic Index of Malaysia), Indonesia (Jakarta Islamic Stock Index), Japan (Dow Jones Islamic Index of Japan), the United Kingdom (Dow Jones Islamic Index of UK) and the US (Dow Jones Islamic Index of America). Specifically, the study aims to empirically determine the long run equilibrium relationship among the Islamic stock indexes and examine the dynamic causal linkages among these markets. To achieve these objectives, the study relies on a two-step estimation of the Auto-Regressive Distributed Lag (ARDL)

approach to cointegration and the Vector Error Correction Model (VECM) based on the Generalized Method of Moments (GMM). Both methods are deemed suitable for the purpose of this study since they help to empirically determine the existence of long-run equilibrium among the markets and assess the nature of dynamic causal relationships among them.

An aspect of novelty of this study is that it covers a larger geographical area of the Islamic stock markets. By considering the Islamic stock indexes of Malaysia, Indonesia, Japan, UK and the US, this study is not confined to considering the Islamic stock markets of a particular region or certain economic groupings as what have been normally the case in the previous studies on the Islamic stock market integration. In addition, the findings of this study are enriching since the study also considers the Islamic stock indexes of the major world stock markets of Japan, UK and the US.

The rest of this study is organized as follows. The next section provides an overview of the Islamic stock markets, while Section 3 discusses the empirical framework and methods undertaken in this study. Section 4 describes the data employed, and Section 5 provides the empirical results and discussions. Finally, Section 6 concludes the study with some implications and recommendations for further research.

2. Characteristics of an Islamic Equity Market

One of the rapidly growing segments of the Islamic banking and finance industry that contributes to the burgeoning growth of the industry is the Islamic equity market. In 2008, market capitalization of the Islamic stock market was valued at US\$4.34 trillion with more than 500 *shari'ah*-compliant funds available for the Muslim investors (Siddiqui, 2008).

Compared to the conventional stock markets, there is a general belief that the Islamic stock markets are relatively more stable to financial shocks due to the *shari'ah* rules governing the Islamic stock markets. In general, any financial dealings in the Islamic context are subject to adhere to the basic rules of trading as outlined by the Islamic law or the *shari'ah* with the objective of ensuring justice, fairness and avoidance of

exploitation. In particular, the *shari'ah* provides a clear guideline that financial dealings that involve the elements of interest (*riba*), excessive uncertainties (*gharar*) and gambling (*maysir*) are strictly prohibited. Trading is not allowable for goods that are prohibited (*haram*) such as alcohol and non-*halal* food items. There is also the need to observe the Islamic tax (*zakat*).

In view of this, the Islamic equity market operations are confined to several basic tenets. In the context of investment in the equity market, Muslim investors are only allowed to invest in *shari'ah*-compliant stocks that fulfilled specified requirements. There are various screening processes or criteria in determining the *shari'ah*-compliance of a particular stock. For example, the screening criteria adopted by the Securities Commission of Malaysia are based on the outcomes of the deliberations of the *Shari'ah* Advisory Council (SAC) which is done at the central level. The screening criteria are based on *shari'ah*-compliance of core activities and benchmark of tolerance for mixed activities. The Dow Jones Islamic Index Screening criteria is another type of screening criteria which is based on acceptable business activities and acceptable financial ratios (debt to asset, liquid asset to total assets, receivables to assets). The third type of screening criteria is the Meezan Islamic Fund criteria, particularly being adopted in Pakistan. The criteria is based on the business of the investee company, debt to total assets, net illiquid to total asset, investment in *shari'ah* non-compliant activities and income from *shari'ah* non-compliant investments and net liquid versus share price (Ali, 2005).

3. Empirical Framework

Since the objective of the study is to investigate the stock market integration in terms of the long-run equilibrium relationships, the adoption of a two-step estimation – Autoregressive distributed lag (ARDL) approach to cointegration and Vector Error Correction Model (VECM) based on GMM – is suitable for this purpose. The ARDL is capable of determining the existence of integration among the stock markets in the sense that there is a tendency of a long-run equilibrium relationship among the markets to move together in the long-run, while allowing for deviations from the short-run equilibrium. On the other hand, the GMM estimation has more flexibility and no stringent assumption as compared to other estimations such as the Ordinary Least

Squares (OLS) and Maximum Likelihood (ML). It also has a strong distributional assumption such as the error terms, u_t is not necessarily normally distributed (Ogaki, 1993). Thus, the market integration is tested in the first step with the ARDL, whereas the dynamic causal relationships among the markets are determined simultaneously in the second step based on VECM which is estimated using GMM.

3.1. ARDL Bound Testing Approach

To examine the long-run relationship among the markets, this study employs the ARDL bound testing approach to cointegration which involves estimating the conditional error correction version of the ARDL model (Pesaran et al., 2001). The choice of the ARDL approach in this study is based on consideration of cointegration analysis are unbiased and efficient given the fact that, firstly, it can be applied to a small sample size study (Pesaran, et al., 2001) and therefore, conducting bounds testing will be appropriate for the present study. Secondly, it estimates the short- and long-run components of the model simultaneously, removing problems associated with omitted variables and autocorrelation. Finally, the ARDL approach can distinguish between dependent and independent variables (Narayan, 2004).

The ARDL models to be estimated can be written as follows:

$$Mal_t = \alpha_0 + \alpha_1 Ina_t + \alpha_2 JP_t + \alpha_3 UK_t + \alpha_4 US_t + \epsilon_t \quad (1.1)$$

$$Ina_t = \alpha_0 + \alpha_1 Mal_t + \alpha_2 JP_t + \alpha_3 UK_t + \alpha_4 US_t + \epsilon_t \quad (1.2)$$

$$JP_t = \alpha_0 + \alpha_1 Mal_t + \alpha_2 Ina_t + \alpha_3 UK_t + \alpha_4 US_t + \tau_t \quad (1.3)$$

$$UK_t = \alpha_0 + \alpha_1 Mal_t + \alpha_2 Ina_t + \alpha_3 JP_t + \alpha_4 US_t + \varsigma_t \quad (1.4)$$

$$US_t = \alpha_0 + \alpha_1 Mal_t + \alpha_2 Ina_t + \alpha_3 JP_t + \alpha_4 UK_t + \zeta_t \quad (1.5)$$

Where *Mal*, *Ina*, *JP*, *UK* and *US* refer to the Islamic stock markets of Malaysia, Indonesia, Japan, the UK and the US, respectively. While ϵ_t , ϵ_t , τ_t , ς_t and ζ_t are the error terms for each model.

The error correction versions of the ARDL framework pertaining to Equations (1.1) through (1.5) can be reproduced as follows:

$$\Delta Mal_t = \delta_0 + \sum_{i=1}^p \epsilon_i \Delta Mal_{t-i} + \sum_{i=0}^p \phi_i \Delta Ina_{t-i} + \sum_{i=0}^p \theta_i \Delta JP_{t-i} + \sum_{i=0}^p \gamma_i \Delta UK_{t-i} + \sum_{i=0}^p \mu_i \Delta US_{t-i} + \lambda_1 Mal_{t-1} + \lambda_2 Ina_{t-1} + \lambda_3 JP_{t-1} + \lambda_4 UK_{t-1} + \lambda_5 US_{t-1} + u_{1t} \quad (2.1)$$

$$\Delta \ln a_t = \delta_0 + \sum_{i=1}^p \varepsilon_i \Delta \ln a_{t-i} + \sum_{i=0}^p \phi_i \Delta \text{Mal}_{t-i} + \sum_{i=0}^p \varphi_i \text{JP}_{t-i} + \sum_{i=0}^p \gamma_i \Delta \text{UK}_{t-i} + \sum_{i=0}^p \mu_i \Delta \text{US}_{t-i} + \lambda_1 \ln a_{t-1} + \lambda_2 \text{Mal}_{t-1} + \lambda_3 \text{JP}_{t-1} + \lambda_4 \text{UK}_{t-1} + \lambda_5 \text{US}_{t-1} + u_{1t} \quad (2.2)$$

$$\Delta \text{JP}_t = \delta_0 + \sum_{i=1}^p \varepsilon_i \Delta \text{JP}_{t-i} + \sum_{i=0}^p \phi_i \Delta \text{Mal}_{t-i} + \sum_{i=0}^p \varphi_i \ln a_{t-i} + \sum_{i=0}^p \gamma_i \Delta \text{UK}_{t-i} + \sum_{i=0}^p \mu_i \Delta \text{US}_{t-i} + \lambda_1 \text{JP}_{t-1} + \lambda_2 \text{Mal}_{t-1} + \lambda_3 \ln a_{t-1} + \lambda_4 \text{UK}_{t-1} + \lambda_5 \text{US}_{t-1} + u_{2t} \quad (2.3)$$

$$\Delta \text{UK}_t = \delta_0 + \sum_{i=1}^p \varepsilon_i \Delta \text{UK}_{t-i} + \sum_{i=0}^p \phi_i \Delta \text{Mal}_{t-i} + \sum_{i=0}^p \varphi_i \ln a_{t-i} + \sum_{i=0}^p \gamma_i \Delta \text{JP}_{t-i} + \sum_{i=0}^p \mu_i \Delta \text{US}_{t-i} + \lambda_1 \text{UK}_{t-1} + \lambda_2 \text{Mal}_{t-1} + \lambda_3 \ln a_{t-1} + \lambda_4 \text{JP}_{t-1} + \lambda_5 \text{US}_{t-1} + u_{3t} \quad (2.4)$$

$$\Delta \text{US}_t = \delta_0 + \sum_{i=1}^p \varepsilon_i \Delta \text{US}_{t-i} + \sum_{i=0}^p \phi_i \Delta \text{Mal}_{t-i} + \sum_{i=0}^p \varphi_i \ln a_{t-i} + \sum_{i=0}^p \gamma_i \Delta \text{JP}_{t-i} + \sum_{i=0}^p \mu_i \Delta \text{UK}_{t-i} + \lambda_1 \text{US}_{t-1} + \lambda_2 \text{Mal}_{t-1} + \lambda_3 \ln a_{t-1} + \lambda_4 \text{JP}_{t-1} + \lambda_5 \text{UK}_{t-1} + u_{4t} \quad (2.5)$$

In the above equations, the terms with the summation signs represent the error correction dynamic, while the second part (term with λ_s) correspond to the long run relationship. The null of no cointegration in the long run relationship is defined by $H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$ is tested against the alternative of $H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq 0$, by the means of familiar F-test. However, the asymptotic distribution of this F-statistic is non-standard irrespective of whether the variables are $I(0)$ or $I(1)$. Pesaran et al. (1996) have tabulated two sets of appropriate critical values. One set assumes all variables are $I(1)$ and another assumes that they are all $I(0)$. This provides a bound covering all possible classifications of the variables into $I(1)$ and $I(0)$ or even fractionally integrated. If the F-statistic lies above the upper bound level, the null is rejected, which indicates the existence of cointegration. While if the F-statistic falls below the bound level, the null cannot be rejected, which supporting no cointegration exist. If, however, it falls within the band, the result is inconclusive.

Finally, in order to determine the optimal lag-length incorporated into the model and to select the ARDL model to be estimated, the study employs the Akaike (1974) Information Criterion (AIC) with the maximum lag-length to be considered of 8.

3.2. Generalized Method of Moments (GMM)

In efforts to investigate the short- and long-run relationships among the selected Islamic stock markets, the study estimates the equation (3) by GMM estimation, where the error correction terms are incorporated in the models. Based on Hung and Cheung's (1995) study on five variables JJ cointegration test, the vector error correction model (VECM) can then be simply reformulated in matrix form as follows:

$$\begin{bmatrix} \Delta Mal \\ \Delta Ina \\ \Delta JP \\ \Delta UK \\ \Delta US \end{bmatrix} = \begin{bmatrix} \delta_0 \\ \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_6 \end{bmatrix} + \sum_{i=1}^k \Gamma_i \begin{bmatrix} \Delta Mal \\ \Delta Ina \\ \Delta JP \\ \Delta UK \\ \Delta US \end{bmatrix}_{t-k} + \Pi \begin{bmatrix} Mal \\ Ina \\ JP \\ UK \\ US \end{bmatrix}_{t-1} + \begin{bmatrix} v_0 \\ v_1 \\ v_2 \\ v_3 \\ v_6 \end{bmatrix} \quad (3)$$

Since the Equation (3) considers the possibility of the past level of parameters to have an effect on current changes in other parameters, the lagged values have to be incorporated in the models. It is important to note that for the GMM estimator to be identified; there must be at least as many instrumental variables Z as there are parameters θ . Following Lee and Lee (1997), this study used lags of explanatory variables as the instrumental variables. These variables were opted for use because of the difficulty in finding other instrument variables, as our study utilized daily data and for an extended period. These variables are, however, obvious instruments and in most cases, should be included in the instrumental list. Another important aspect of specifying GMM is the choice of the weighting matrix to yield a consistent and robust estimate. To get a robust estimate to heteroskedasticity and autocorrelation of unknown forms, the covariance matrix of the orthogonality conditions is estimated as suggested by Newey and West (1987) using Barlett estimators,⁴ while the lag truncation parameter is estimated as suggested by Newey and West (1994) with a fixed bandwidth,⁵ following the study of Heinesen (1995). In addition, the pre-whitening process is run to soak up the correlation in the moment conditions prior to the GMM estimation.

4. Data

To provide a robust and updated results, this study uses weekly closing data of five selected Islamic stock markets (i.e., Malaysia, Indonesia, Japan, the UK and the US), covering the period from January 1, 1999 to August 31, 2006. All these indexes are denominated in local currency units, extracted from *Bloomberg Database*. In this study, the Islamic stock returns for these markets are calculated from the following indexes: (i) the Dow Jones Islamic Index of Malaysia (DJIM) for

⁴ We have also tried the quadratic spectral (QS) kernel estimation as suggested by Andrew (1991); the estimation results are very much the same.

⁵ More specifically, it is estimated solely based on the number of observations in the sample. We have also tried bandwidth selection as suggested by Andrew (1991); the estimation results are very much the same.

Malaysia; (ii) the Jakarta Islamic Stock (JAKIS) Index for Indonesia; (iii) the Dow Jones Islamic Index of Japan (DJIJ) for Japan; (iv) the Dow Jones Islamic Index of the UK (DJIUK) for the UK; and (v) the Dow Jones Islamic Index of America (IMUS) for the US.

There are at least two complications in investigating stock market interdependencies across countries. First is the missing observation problem due to different stock market holiday. Since the study extensively incorporates lags in the regressions, missing data is particularly troublesome. Thus, it is desirable to fill in estimate-based information from an adjacent day. Rather than using a sophisticated interpolation, this study follows the studies of Jeon and Von (1990) and Hirayama and Tsutsui (1998) by adopting the method of Occam's razor, i.e., by just filling in the missing data with the previous day's price. Simplistic as it may be, this study justifies this method on the premise that a closed stock exchange does not produce any information on bank holidays. Since no new information is revealed, the previous day's information is carried over to the subsequent day.

Another complication in investigating the stock market integration is the problem of non-contemporaneous markets or different trading hours among the markets. Except for the US stock market, all other markets are exactly or approximately operating in similar time zones with similar opening and closing times. It is therefore important to know the operating hours of one market relative to another when performing tests, and taking this into account implies incorporating appropriate lagged values where necessary.

5. Results and Discussion

Table 1 provides the summary statistics of the stock returns (i.e., stock prices in first difference) for the selected Islamic stock markets. During the period under review, the Islamic stock market in Japan is shown to earn the highest average daily returns of 0.31 percent, followed by Indonesia at 0.08 percent, UK at 0.04 percent, Malaysia at 0.02 percent and the US at 0.01 percent. In line with the “high risk, high return” maxim, the Japanese stock market is shown to have the highest standard deviation at 0.04, followed by the UK stock market at 0.03. The stock markets of Indonesia, Malaysia and the US are shown to have about similar level of standard deviations of around 0.024-0.026.

Table 1: Summary Statistics of Islamic Stock Market Returns

	Mal	Ina	JP	UK	US
Mean	0.0002	0.0008	0.0031	0.0004	0.0001
Median	0.0020	0.0017	0.0045	0.0019	0.0011
Maximum	0.0963	0.1168	0.1687	0.0806	0.0989
Minimum	-0.1752	-0.1129	-0.1398	-0.1368	-0.0850
Std. Dev.	0.0262	0.0259	0.0406	0.0288	0.0237
Skewness	-0.8677	-0.1621	-0.0541	-0.3481	-0.0509
Kurtosis	8.2206	5.6849	4.4556	4.0005	3.9949

To highlight the short-run relations of the movements among the five Islamic stock markets, the standard correlation coefficient analysis is used to measure the extent of the association between the stock markets. As reported in Table 2, during the period under review, all the stock markets show weak correlation as reflected by the low correlation of coefficients among the stock markets. Nevertheless, of all the correlation of coefficients presented in Table 2, the highest value of correlation is recorded between the UK and the US (0.342), followed by Malaysia and Japan (0.282), Malaysia and Indonesia (0.187), and Indonesia and Japan (0.113). The rest of the stock markets show weaker correlation of lesser than 0.1. The weak correlation coefficients between these stock markets suggest the absence of short-term co-movements among the markets, thus, indicating the potential short-term diversification benefits, or speculative activities, in the stock markets. In particular, the correlation coefficients for the following markets are lesser than 0.1: Malaysia-UK (0.001), Malaysia-US (0.003), Indonesia-UK (0.071), and Japan-UK (0.083).

Table 2: Correlation of the Islamic Stock Returns

	Mal	Ina	JP	UK	US
Mal	1.000				
Ina	0.187	1.000			
JP	0.282	0.113	1.000		
UK	0.001	0.071	0.083	1.000	
US	0.003	0.016	0.046	0.342	1.000

5.1. ARDL Analysis

The ARDL analysis determines the existence of a long-run equilibrium relationship among the stock markets. As shown in Table 3, the result shows that the Malaysian and Indonesian stock markets are weakly cointegrated (90 percent significant level) at lag length 1, suggesting that there is a long-run equilibrium relationship between the two markets. The stock markets of the advanced economies also show long run equilibrium (refer to Model 2). When one of the developing countries' Islamic stock markets of Indonesia and Malaysia are being included in the model consisting the developed stock markets (Models 3 and 4), there are no significant evidences of long run relationships among these stock markets.

Table 3: ARDL F-Statistics for Cointegration

Order of Lag	Model 1: (Mal, Ina)	Model 2: (JP, UK, US)	Model 3: (Mal, JP, UK, US)	Model 4: (Ina, JP, UK, US)	Model 5: (Mal, Ina, JP, UK, US)
1	5.504*	5.232**	0.9777	0.6525	3.9875*
2	4.474	5.553**	0.8307	0.5270	2.8255
3	2.010	4.970*	0.9210	0.4759	2.5059
4	2.323	4.321	0.9137	0.5013	2.6155
5	1.744	4.863*	0.8030	0.6168	2.3261
6	1.980	4.418	1.0539	0.6912	2.4287
7	1.763	4.973*	1.0385	0.8594	2.2002
8	1.929	4.728*	1.0637	1.0605	2.1408

Note: The relevant critical value bounds are taken from Pesaran (2001) [Case iv: unrestricted intercept and no trend. For number of regressors = 5, they are 4.09 – 5.40 at the 99%; 3.28– 3.94 at the 95%; and 2.90 – 3.94 at the 90% significance levels respectively. For number of regressors = 4, they are 4.57 – 5.90 at the 99%; 3.66 – 4.71 at the 95%; and 3.22 – 4.24 at the 90% significance levels respectively. For number of regressors = 3, they are 5.38 – 6.54 at the 99%; 4.23 – 5.29 at the 95%; and 3.71 – 4.68 at the 90% significance levels respectively. Finally, for number of regressors = 2, they are 6.65 – 7.80 at the 99%; 5.17 – 6.15 at the 95%; and 4.50 – 5.35 at the 90% significance levels respectively *, and ** denotes that F-Statistics falls above the 90% and 95% upper bound, respectively.

However, when both the emerging Islamic stock markets are included into the major Islamic stock markets (Model 5), these markets are found to become cointegrated. In essence, the results suggest that the Islamic stock markets of similar economic grouping are cointegrated among themselves, but stock markets of different economic groupings are segmented. In particular, the developed Islamic stock markets are found to be cointegrated among themselves, likewise for the developing Islamic stock markets. In the context of portfolio diversification benefits, the results suggest that investors can only gain portfolio diversification benefits by considering stock markets of different economic groupings. Specifically, investor from developing countries can only gain benefits by diversifying in the developed stock markets, as shown in Models 3 and 4.

It is importance to note that the existence of cointegration among the markets does not rule out the possibility of arbitrage profits through diversifying portfolios across these markets in the short-term, which may last for quite a while (Dwyer and Wallace, 1992). In the context of this study, investor can gain from arbitrage opportunities within the period of one and half week, as will be shown later in Table 5. The varying degrees of business and financial risks of different securities and security cash flows co-vary less than perfectly across the markets (and even within the same country) results in the diversification benefits in these markets to be reduced, but are not likely to be fully eliminated in practice in the long-run.

In addition, the existence of cointegration among the markets also implies a common stochastic trend in these markets (Kasa, 1992; Blackman et al., 1994; Jang and Sul, 2002). Since each Islamic stock price series contains information on the common stochastic trends (which bind all the Islamic stock markets together), the predictability of the Islamic stock prices can be enhanced significantly by utilizing information on the other Islamic stock prices. The presence of common stochastic trends among all these stock markets implies that once new information on a stock price is available prior to other stock prices, the other stock prices will deviate from that trend through a transitory component. Individual prices cannot wander too far away from each other over time (Masih & Masih, 1999).

5.2. Bivariate Causalities

More enriching discussions on short-run causality are enabled by conducting the Granger causality analysis. The Granger causality allows for the determination of the direction of causation, thus enabling us to figure out which stock market exerts influence on the other stock market. As shown in Table 4, among the Islamic stock markets in the developed countries, there is a significant causality from the UK market to the Japanese market; and from the US market to the Japanese market. At the same time, there is a significant bi-directional causality between the UK and the US markets. These significant causalities suggest that the stock markets are correlated in such a way that any changes in a particular stock market results in similar impact on the other stock market, thus, reducing the benefits of diversification in these markets. Notably, the stock markets of the developed economies are integrated with each other, while those of the developing economies are integrated among themselves. There are no significant causalities between the Islamic stock markets of the developed and developing economies, suggesting the benefits of diversification exists in the two groups of stock markets. Clearly, the results based on the Granger causality is consistent and lend further support to the earlier results that investors can only gain diversification benefits by considering the Islamic stock markets of different economic groupings.

Table 4: Summary of Bivariate Granger Causality Tests (Lags =1)

Mal <====> Ina	Ina ===== UK
Mal ===== JP	Ina ===== US
Mal ===== UK	UK =====>JP
Mal ===== US	US =====>JP
Ina ===== JP	UK <====> US

Note: <====> indicates a bidirectional Granger causality between the stock markets; =====> indicates a unidirectional Granger causality from one stock market to another; and ===== indicates no Granger causality between the stock markets. They are at least significance at 5% level.

5.3. Multivariate Analysis using GMM

The existence of cointegration between the Indonesian and Malaysian Islamic stock markets and among major Islamic stock markets of Japan, the UK and US rejects non-causality among them. This implies that at least one of the markets react to deviations from the long-run relationship. The next step is to explore whether the market corrects the disequilibrium, which can be done by adopting the VECM based on the GMM estimation. The existence of the short- and long-run multivariate Granger causalities among the stock markets are indicated by significance of the F -statistics through joint tests of lagged differences and statistic significance of the t -statistic tests for error correction term (ECT). The VECM analysis is conducted on the model containing all five Islamic stock markets during the period under review.

**Table 5: Multivariate VECM Causality Analysis using GMM
(Model 5: Mal, Ina, JP, UK, US)**

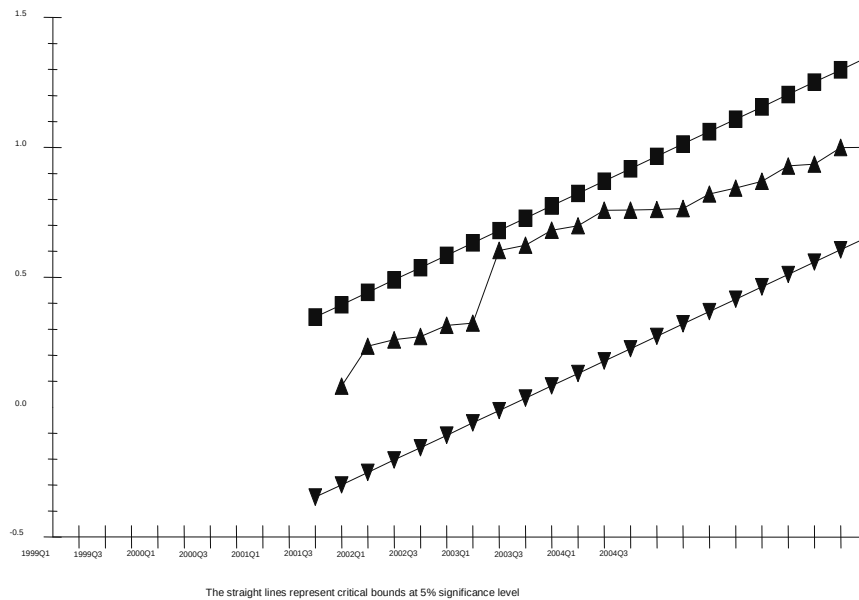
Dependent Variables	Lag = 1 Independent Variables						Diagnostic Test
	[F-statistics]					(t-statistics)	
	ΔMal	ΔIna	ΔJP	ΔUK	ΔUS	ECT_{t-1}	
ΔMal	-	10.1009*** [0.0001]	6.8159*** [0.0012]	6.34749*** [0.0019]	2.7294* [0.0663]	-0.5608*** (-3.3599)	R ² -adj = 0.1593 DW = 2.1240 J-stats = 0.0266
ΔIna	14.3503*** [0.000]	-	0.5423 [0.5817]	0.9639 [0.3821]	0.4133 [0.6617]	-0.8162** (-1.9454)	R ² -adj = 0.0504 DW = 2.0862 J-stats = 0.0270
ΔJP	15.6802*** [0.0000]	2.6131* [0.0743]	-	7.7273*** [0.0005]	16.4151*** [0.0000]	-0.8314*** (-4.8274)	R ² -adj = 0.2479 DW = 2.0448 J-stats = 0.0268
ΔUK	5.8502*** [0.0031]	8.9058*** [0.0002]	0.8216 [0.4403]	-	40.9427*** [0.0000]	-0.6417*** (-4.9984)	R ² -adj = 0.2967 DW = 2.1071 J-stats = 0.0251
ΔUS	2.0778 [0.1263]	0.3994 [0.6709]	1.0419 [0.3535]	59.3061*** [0.0000]	-	-0.6583*** (-3.5594)	R ² -adj = 0.2201 DW = 2.0609 J-stats = 0.0166

Notes: ***, ** and * represent significance at the 1%, 5% and 10% levels, respectively. ECT_{t-1} is derived by normalizing the cointegrating vectors on the dependent variables, producing residual r . By imposing restriction on the coefficients of each variable and conducting Wald test, we obtain F -statistics for each coefficient in all equations. Figures in the (.) and [.] represent t -statistics and probabilities for F -statistics, respectively. The optimal lag-length included in the models is based on the Akaike Information Criteria (AIC). DW is Durbin-Watson d test for autocorrelation, and J -stats is the Hansen's J -statistic test for correct specification (over-identifying restrictions) of the model.

As shown in Table 5, the ECTs are significant for all the Islamic stock markets of Malaysia, Indonesia, Japan, UK and the US, implying that these markets are inter-related with each other in the long run. The ECT coefficients ranging from 0.56 to 0.83 suggest that on average, the stock markets take about one and half week to clear any disequilibrium. In terms of short-run causalities, the Malaysian Islamic stock market is significantly influenced by the Islamic stock markets of Indonesia, Japan and UK, while the impact of the US stock market is somewhat weak. The Malaysian Islamic stock market is shown to be significant in influencing the Islamic stock markets of Indonesia, Japan and UK, but not that of the US. This indicates that there exist diversification benefits by investing in the Malaysian and US Islamic stock markets as there is no significant causal relationship between the two. Similarly, there is no significant nexus of causality running between the Indonesian and the US Islamic stock markets, suggesting the benefits of portfolio diversification still exist between these two markets. With regard to the Islamic stock markets of the developed economies, there seems to be strong short-run causalities among the Islamic stock markets in these countries, suggesting that the potential benefits of portfolio diversification among these stock markets are non-existent.

5.4. Stability Test

Finally, to assess stability of the models and constancy of the parameters and variances, the cumulative sum of recursive residuals of square (CUSUMSQ) tests proposed by Brown et al. (1975) are conducted. The plots of the CUSUMSQ for the model being considered lie inside the area between two critical lines, indicating both short- and long-terms parameters and variances in the models are stable. In conclusion, based on the above batteries of diagnostic tests, therefore, we can conclude that the performances of our estimated models are satisfactory enough to provide information pertaining to the issue of market integration among the Islamic stock markets.

Figure 1: Plot of CUSUMSQ

6. Conclusion

The rapid growth of the Islamic capital market has resulted in an increasing interest on understanding the degree of stock markets integration in the various Islamic stock markets. Thus, this study is indeed timely to fulfill the needs of the investors amid the increasing demand for Islamic capital market products. By studying the nature of market integration among five major Islamic stock markets, namely Malaysia, Indonesia, Japan, the UK and the US, we assess the potential diversification benefits that the *shari'ah*-compliant markets could offer. Specifically, the study aims to empirically explore the short and long-run nature of integration among the major Islamic stock indexes in the period from January 1, 1999 to August 31, 2006. To achieve these objectives, the study relies on a two-step estimation based on the Auto-Regressive Distributed Lag (ARDL) approach to cointegration and the Vector Error Correction Model (VECM) based on the Generalized Method of Moments (GMM).

We find consistent findings that the degree of integration among the Islamic stock markets depends on the level of economic development of the country that the stock markets are in. In particular, the study documents that the Islamic stock markets of Malaysia and Indonesia are closely integrated with each other, while those of the US, UK and Japan are closely integrated with themselves. The argument that stock markets are more closely integrated due to geographical proximity is rejected in this study as there is no strong causal relationship between the stock markets of Japan and Indonesia.

In conclusion, investors who are interested to diversify their portfolio can still gain benefits if they diversify considering the Islamic stock markets across economic grouping such as that in the developed and developing countries. However, limited benefits are available if investors only diversify their investments within same economic groupings that are within the emerging Islamic stock markets or within the developed Islamic stock markets.

Finally, our evidence of the extent of interdependencies among these markets also has important implications for the macro stabilization policies in each Islamic stock market and also for the financial policies of multinational corporations. The extent of the effectiveness of the macro-economic policies of each stock market in dealing with its stock market imbalances will depend crucially on the extent of financial integration of each market with the rest. Similarly, the extent of integration of each of Islamic stock market has important bearings on the formulation of the financial policies of multinational corporations. The findings of cointegrated Islamic stock markets call for policy coordination among these markets to mitigate the impacts of financial fluctuations. Greater policy coordination, including the reduction or removal of trade and investment barriers, is essential for these countries to exploit the advantages of financial interdependence. In addition, since the advanced Islamic stock markets, namely the US, UK and Japan are found to be cointegrated with the Islamic stock markets of Malaysia and Indonesia, any developments in the US, UK and Japanese Islamic markets must be taken into consideration by the Malaysian and Indonesian governments in formulating policies pertaining to their Islamic stock markets.

Further empirical studies on the issue can cover broader areas of market integration, use more advanced techniques of estimation and utilize a more representative data set to add further credibility to the existing literatures on integration among the Islamic stock markets worldwide.

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Impact of Capitalization on Asset Price Bubble in Dhaka Stock Exchange

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The objective of this paper is to investigate whether any of the financial intermediary factors treated as outliers (which stand here as a proxy of capitalization that results through the public policies and huge liquidity of fungible investment funds in the stock market of Dhaka Stock Exchange (DSE) came through easy bank-loans) play any role for the surge in stock prices which is termed as stock market bubbles. To attain this objective, the study employs two techniques. First, the simulation technique is adopted by incorporating the long memory models of Geweke and Porter-Hudak (1983) and second, the ordinary least square regression technique is used to identify the impacts of capitalization on aggregate stock market price. In the simulation process, observed facts reveal that additive outliers affect the *bias* and *MSE* of the estimated fractional parameter. The size of the additive outliers in the data generating process has also important effects on the estimated fractional parameter. The result exhibits non-trend fluctuations that are influenced by a stochastic process of surge in the stock prices shaping in bubbles in the capital market. It is also shown that huge capital availability in the DSE through easy bank loans and other informal sources has a significant influence on asset prices inflating them often into bubbles.

1. Introduction

Asset price bubble is an economic phenomenon in which values in a particular sector become inflated for a short period. If the bubble bursts, the asset price in that sector collapse (Chapman, 2007; Knight, 2002). Yet, it is hard to predict when this will happen (Black, 2002).

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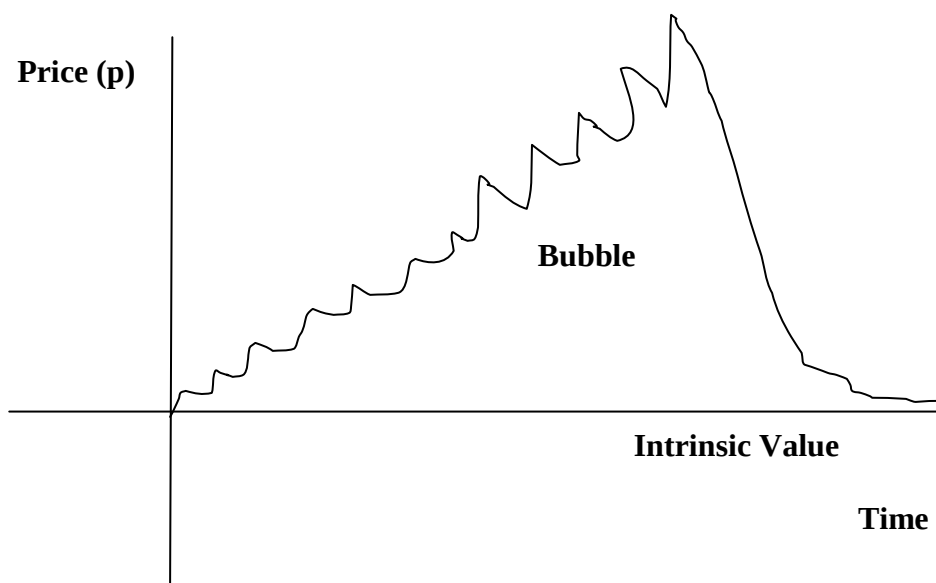
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A description of stock market bubble seems to be more useful in Kindleberger (1987) which notes “positive feedback” and “price increases greater than justified by market fundamentals.” A stock market bubble is a type of economic bubble taking place in stock markets when market participants drive stock prices above their value in relation to some system of stock valuation (see Figure 1). In financial markets, a stock market bubble is a self-perpetuating rise or boom in the share prices of stocks of a particular industry. The term may be used with certainty only in retrospect when share prices have since crashed (Kindleberger, 2000). A bubble occurs when speculators note the fast increase in value and decide to buy in anticipation of further rises, rather than because the shares are undervalued. Typically many companies thus become grossly overvalued. When the bubble “bursts”, the share prices fall dramatically, and numerous general investors as well as business organizations face serious financial loss and ultimate economic hardship.

Numerous intermediary factors have played a significant role in the formation and collapse of stock market bubbles from early times. One of such examples is the availability of easy credit approval and fungible investment funds that are invested in the stock market for buying company shares (Craven & Islam, 2008). Intermediary effects imply two things - one the one hand, there are interlinks between consecutive or successive bubbles (Allen & Gale, 2002) and also some mediatory dynamics cause to shape the bubbles on the other (Craven & Islam, 2008). Intuitively, these interlinks can be interpreted as an existence of a long memory or long range dependence of intermediate factors and stock market bubbles (Ashraf & Rodriguez, 2006). An example for such interlinks has been cited by Carswell (1960) which shows that there were links between the 1719 bubble in the stock of the Mississippi Company in Paris and the 1720 bubble in the stock of the South Sea Company in London. When these bubbles inflated and burst, there were significant flows of information between these two financial centers. Similarly, there were also flows of information between London and Paris and other financial centers in Europe such as Amsterdam and asset price movements were interdependent (Craven & Islam, 2008). In more recent times, stock market interlinks also appear to play an important role in asset price bubbles. For example, Higgins and Osler (1997) consider 18 OECD countries and document a significant simultaneous rise in real estate and stock prices during the period 1984-89 followed by a subsequent fall in the stock prices during the 1989-1993 period.

Similar observation has also been shared by Rahman (2010) in the case of Dhaka Stock Exchange (DSE) in which the painful memories of 1996 bubble is linked with the recent-scenario of the highly inflated asset prices in early 2010 that is being termed as bubble, because DSE had risen by nearly 125 percent over the period from March 2009 to February 2010. Is the current bull run over or are we in for a bigger bubble and a worst burst? Many times, the asset price bubbles might result in economic downfall (Lewis et al., 2010). There were for example, the burst of bubbles in the tulip crisis of 1637 in Netherlands and the South Sea bubbles incident in 1720 in the UK, the cyclical crises in the 19th century, or the great crisis beginning from 1929. Such a process of burst of speculative bubble may be understood by H. Minsky's post-Keynesian financial instability hypothesis (Itoh, 1990).

Figure 1: A Stock Market Bubble



Yet, how far the role as intermediations such as economic, financial and political can go around is also an important question. In this respect, models of long memory can have some clue to underscore whether there is any interlink between successive share market bubbles and also whether the outlier is a cause to shape a bubble in the stock market having short-term or persistent long term effects.

The prime thrust of this paper is, therefore, to investigate whether any intermediary factor such as capitalization treated as outlier (which stands here as a proxy of capitalization that results through the public policies and huge liquidity of fungible investment funds in the stock market came through easy bank-loans) play any role for large upward variations or surge in stock prices which are termed as stock market bubbles in the case of DSE (Rahman, 2010). To achieve this objective, the study adopts two techniques. First is the simulation technique incorporating the long memory models of Geweke and Porter-Hudak (1983) and the other is the OLS technique which applies the primary data collected from the DSE information archive. The simulation model uses the artificial data generated by Vogelsang (1999) and Perron and Rodriguez (2000) by implementing a Monte Carlo design. If there is any observation that the effects of outliers of exogenous intermediary variables influence the bias, the MSE and the size of t-statistics of the fractional parameter, d of the long memory model, it can be concluded that long memory of the past bubbles are present and the intermediary factors have significant impact on affecting trend-stationarity of the asset prices that may lead to inflating the stock prices aberrantly which apparent in the DSE during the period under review.

2. Long Memory Model and Stock Market Bubble

As long memory models have been used by econometricians since around 1980 (Ashraf and Rodriguez, 2009), perhaps the most dramatic empirical success of long memory processes has been in recent work on modeling the volatility of asset prices and speculative revenues. In this context, the approach has yielded much empirical regularities, which have spawned new insights into understanding the stock exchange market behavior and pricing of risk. Very often, stock market prices exhibit bubbles which are disturbed by many economic, financial, psychological and political factors, which are termed as outliers (Craven & Islam, 2008). These outliers are of many kinds by nature. This paper only considers additive outliers which affect the time series process inherent in long memory models (Ashraf, 2001).

Literally, long memory means to rely on past experiences. That is, if something has happened in the stock market in the past, there is a chance to happen again in the future (Ashraf and Rodriguez, 2009). Statistically, in the case of a stationary process with long term autocorrelation

function, $\rho(k)$ is said to be a long memory process if $\sum_{k=0}^{\infty} |\rho(k)|$ does not converge (Beran 1994). However, for some models the correlations decay to zero very slowly which implies that the observations far apart are still related to some extent. An intuitive way to describe such behavior is that the process has a long memory (Chatfield, 1996).

Several models show persistence in shocks and provide an extension of the concept of nonstationarity. An alternative way of testing for nonstationarity models is the process of using the concept of fractional integration. Kennedy (2005) suggests that the concept of fractional integration is useful in testing for nonstationarity in econometric models. The traditional analysis examines $(1-\alpha L) y_t = \varepsilon_t$ where $\alpha \geq 1$, whereas the model developed later is $(1-L)^d y_t = \varepsilon_t$ where $d \geq 0.5$. In the second case, d takes on non-integer or fractional values, from which follows the term 'fractional'.

Seminally, the idea of long memory models appears to have developed its roots in the physical sciences in the 1950s originated from the work of Hurst (1951). In particular, Hurst (1951) adopts the long memory model to solve the problem of determining the storage capacity required in the Great Lakes of the Nile River Basin to ensure that the reservoir would be able to supply an irrigation system for the agricultural land in Egypt and Sudan with water throughout the year. This most single reference of Hurst (1951) broached the question of the effect of very long term autocorrelation in observed time series analysis which later comes to be known as a long memory process applied in econometric studies (Ashraf and Rodriguez, 2006). This astounding model of a long memory process has, indeed, attracted the attention of econometricians along with the pioneering works in this area of econometrics which include Taqqu (1975), Granger and Joyeux (1980), Granger (1981), Hosking (1981), Geweke and Porter-Hudak (1983), Baillie and King (1996), and Vogelsang, (1999).

A variant of causal forecasting is simulation. The impact on the economy of a variant is simulated by using the econometric model to forecast into the future. With the advent of computer software packages, standard dynamic simulation techniques are reasoned to be immensely popular to study macroeconomic policies (UNO, 2002). The analysis of persistence of some time series has been a topic of research interests, especially in

the macroeconomic context. The paradigm of trend stationarity versus difference stationarity involves thinking of persistence as transitory effects versus permanent effects. In the middle of this paradigm exists the analysis of persistence using the fractional integration process, which is known as autoregressive fractionally integrated moving average (ARFIMA) process.

There have been several methods to estimate the fractional parameter such as in the time domain and frequency domain based on OLS estimation or Maximum Likelihood Estimation (MLE). In this paper, OLS estimation is used considering frequency domain. As mentioned earlier, the prime objective of this paper is to observe the effect of any external factor such as capitalization in the stock market of DSE treated as additive outlier on the bias, Means Square Error (MSE) and size of *t*-statistics of the estimated fractional parameter which subsequently produce stock market bubble and probable stochastic shocks in speculative revenue of the share-holders value yielded in the stock exchange market. The study has employed long memory model developed in frequency domain. The model used the artificial data set generated by Vogelsang (1999) and Perron and Rodriguez (2003) by implementing a Monte-Carlo simulation design.

3. Methodology

3.1 Theoretical Framework

There are a variety of ways of estimating the parameter d . In the present study, following Geweke and Porter-Hudak (1983), the definitions of fractional Gaussian noise and integrated or fractionally differenced series are generalized and showed that the two concepts are equivalent. Here, the procedure is based on estimation in the paradigm of frequency domain. For the model $(1 - L)^d x_t = \epsilon_t$, where $\{x_t\}$ is assumed to be a time series process, $d \in (-.5, .5)$ and ϵ_t is serially uncorrelated, the spectral density of the time series $\{x_t\}$ is:

$$f_2(\omega; d) = (\sigma^2/2\pi) |1 - e^{-i\omega}|^{-2d} = (\sigma^2/2\pi) \{4\sin^2(\omega/2)\}^{-d} \quad (1)$$

A time series with the spectral density $f_2(\omega; d)$ is called an integrated or fractionally differenced series, which suggests that $\lim_{\omega \rightarrow 0} \omega^{2d} f_2(\omega; d) = (\sigma^2/2\pi)$ and the autocorrelation function (for $d \neq 0$) is $\rho_2(\tau; d) =$

$\Gamma(10d) \Gamma(\tau + d) / \Gamma(d) \Gamma(\tau + 1 - d)$, which leads to $\lim_{\tau \rightarrow \infty} \tau^{1-2d} \rho_2(\tau; d) = \Gamma(1 - d) / \Gamma(d)$.

Now consider $(1 - L)^d y_t = u_t$, where u_t is a linear and stationary distributed process with the spectral function $f_u(\lambda)$, which is supposed to be finite, bounded away from zero and continuous on the interval $\{-\pi, \pi\}$. Based on this methodology, one has

$$\log \{f_y(\omega_j)\} = \log \{f_u(0)\} - d \log \{4\sin^2(\omega_j / 2)\} + \log [f_u(\omega_j) / f_u(0)] \quad (2)$$

and d can be estimated from a regression based on the above equation using spectral ordinates $\omega_1, \omega_2, \dots, \omega_m$, from the periodogram of y_t , that is $I_y(\omega_j)$:

$$\log \{I_y(\omega_j)\} = a - d \log \{4\sin^2(\omega_j / 2)\} + v_j, \quad j = 1 \dots n \quad (3)$$

where

$$v_j = \log [f_u(\omega_j) / f_u(0)] \quad (4)$$

and v_j is supposed to be *i.i.d.* with zero mean and variance $\pi^2/6$. Thus, the least square estimator of d is asymptotically normal. If the number of ordinates n is chosen such that $n = g(T)$, where $g(T)$ is such that $\lim_{T \rightarrow \infty} g(T) = \infty$, $\lim_{T \rightarrow \infty} \{g(T) / T\} = 0$ and $\lim_{T \rightarrow \infty} \{(\log(T))^2 / g(T)\} = 0$ then the OLS estimator of d in (3) takes the limiting distribution as follows:

$$(est\ d - d) / \{\text{var}(d)\}^{1/2} \sim N(0, 1) \quad (5)$$

When the OLS estimator d is significantly different from zero, the sample of the specific size is fractionally integrated. Here, in this estimation, $n = g(T) = \sqrt{T}$.

3.2 Simulation Design

A Monte Carlo simulation tool is used in this study which consists of generating repeated samples of artificial data for some sample size and analyzing the behavior of the relevant statistics (Kennedy, 2005). In this case, the attention is focused on the behavior of the estimates of the fractional parameter. One way to do this is to calculate some characteristics of this estimate such as the MSE and the bias (e.g. Ashraf, 2001). As the size and power of the t-statistics is one of the principal focuses of the present analysis, the study calculates the number of rejections of the null hypothesis in all the replications used.

The same data generating process is followed as that of considered in Vogelsang (1999) and Perron and Rodriguez (2000) involving the case where additive outliers are considered. The process could be defined as follows:

$$y_t = n_t + \sum_{i=1}^m \delta_i D((T_{a0, i})_t) + u_t \quad (6)$$

$$(1 - L)^d u_t = v_t \quad (7)$$

where, $v_t \sim i.i.d.N(0,1)$, d is the fractional parameter, $D((T_{a0, i})_t) = 1$ if $t = T_{a0, i}$ and 0 otherwise and δ_i is the size of the additive outliers. Four sizes of additive outliers are considered (that is $m = 4$ in expression (6)), along with two different assumptions about their values. In the first case, $\delta_i = 0$ (for $i = 1, 2, 3, 4$). This case illustrates that no outliers, no size distortions and no bias are observed in the estimates. In the second case, $\delta_1 = 10, \delta_2 = 5, \delta_3 = 2, \delta_4 = 2$. This is indicative that the effects of additive outliers of “large” size are present. The second specification is close to that used by Perron and Rodriguez (2000). The goal is to see the effects of large additive outliers. The variable n_t represents the deterministic component. In the experiment, it considers only the case where a constant is included in the regressions; that is, $n_t = \mu$. In the simulations of the expression (6), it, without loss of generality, includes the case where, $\mu = 0$. The sample sizes considered in the study are $T = 50, 100, 200, \text{and } 500$. These sample sizes are fairly common as in any empirical work. The number of replications considered for each set of parameters is 1000 and a seed of 12345 is used. The number of simulations used is similar to those of used in the literature of Pedro (2001).

The study includes the effect of aberrant observations using three indicators such as the *bias*, *MSE* and exact size of *t-statistic* of the estimated fractional parameter, d . The bias is defined as the difference between the true parameter value and expected value of the estimate. In formal expression: $bias = E[d^\wedge - d]$, where E denotes the expectation operator. The *MSE* is calculated as: $MSE(d^\wedge) = bias^2 + var(d^\wedge)^2$, where var denotes variance.

3.3 Regression Model

In parallel to the laboratory test of simulation, this study aims to investigate the field level impacts of the surge of capitalization (which is treated as outlier in the simulation model) on the aggregate stock market prices in DSE. To this aim, the study formulates the following single variable linear regression model which incorporates the observed data collected from the DSE information archive. Thus, the model is:

$$Y_t = \alpha + \beta X_t + \varepsilon_t$$

where,

Y_t : Aggregate stock market price index (in Bangladesh currency of Taka on daily basis)

X_t : Capital value (in Bangladesh currency of Taka on daily basis)

α, β : Parameters to be estimated

ε_t : The disturbance term

The DSE general index is used as the aggregate stock market price index and the capital value is taken as the total market capitalization in DSE which are collected from the DSE Archive (2010).

4. Results and Discussions

4.1 Simulation Results

First, the results are considered for the case where outliers are generated in a simple additive manner. Tables 1- 4 present the results for the case where there are no additive outliers. In terms of the *bias* and *MSE*, there are no significant variations for all of the fractional parameter values ascribed. The *MSE* is observed to be different for the two extreme values of d . In fact, when d is close to unity, the *MSE* is smaller. This is so, because the bias and the variances are smaller, which happens probably as a consequence of a better estimation of the fractional parameter in opposition to the case where d is close to -1 . This result implies that in absence of outliers uncertainties in the stock market are in small magnitude, which indicates that in the absence of massive capitalization

in the stock market the asset price variations are not much significant as well.

Table 1: Bias, MSE and t-statistic with no additive outliers and sample size 50

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.18	0.20	0.61	0.96
-0.72	0.09	0.17	0.46	0.95
-0.48	0.05	0.16	0.30	0.92
-0.24	0.03	0.16	0.16	0.85
0.00	0.02	0.16	0.10	0.75
0.24	0.02	0.16	0.20	0.56
0.48	0.03	0.16	0.38	0.35
0.72	0.05	0.15	0.60	0.17
0.96	0.02	0.13	0.82	0.11

Table 2: Bias, MSE and t-statistic with no additive outliers and sample size 100

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.21	0.14	0.74	1.00
-0.72	0.09	0.10	0.62	1.00
-0.48	0.02	0.09	0.40	0.99
-0.24	0.01	0.09	0.20	0.97
0.00	0.01	0.09	0.08	0.90
0.24	0.01	0.09	0.19	0.73
0.48	0.02	0.09	0.46	0.46
0.72	0.03	0.09	0.76	0.20
0.96	0.02	0.07	0.92	0.09

Table 3: Bias, MSE and t-statistic with no additive outliers and sample size 200

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.20	0.13	0.86	1.00
-0.72	0.07	0.06	0.80	1.00
-0.48	0.02	0.05	0.56	1.00
-0.24	0.00	0.05	0.22	1.00
0.00	0.00	0.05	0.06	0.98
0.24	0.00	0.05	0.27	0.90
0.48	0.01	0.05	0.62	0.64
0.72	0.03	0.06	0.89	0.24
0.96	0.01	0.05	0.97	0.07

Table 4: Bias, MSE and t-statistic with no additive outliers and sample size 500

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.24	0.12	1.00	1.00
-0.72	0.09	0.04	1.00	1.00
-0.48	0.03	0.03	1.00	1.00
-0.24	0.01	0.03	1.00	1.00
0.00	0.01	0.03	0.05	1.00
0.24	0.01	0.16	1.00	1.00
0.48	0.02	0.03	1.00	1.00
0.72	0.04	0.03	1.00	1.00
0.96	0.01	0.03	1.00	0.09

When the true parameter $d = 0$, the exact size is closer to the nominal size when sample size increases and that result is actually expected. When the true fractional coefficient is closer to -1 , the null hypothesis is strongly rejected that the fractional coefficient is equal to zero. That means if there are no outliers present in the design, it has no impact on the estimation of the parameter d . It implies that in the absence of abnormal observations of the massive capital value in the stock market,

there is no such probability of forming any stock market bubbles as well as their crashes. On the other hand, when the true fractional coefficient is close to unity, it is difficult to reject the null hypothesis that the coefficient is different from one. This is also true for very larger sample sizes such as $T = 100$, $T = 200$ and $T = 500$. This result is consistent with the general expectation and the case of unit root tests.

Tables 5 - 8 present the results for the case when there are some large and small additive outliers. For the sample sizes $T = 50, 100$, and 200 , the exact size for the null hypothesis that $d = 0$ is closest to zero when the true fractional parameter is closer to -1 . The reverse is true when the true fractional parameter is closer to unity. The opposite case arises when the true exact size of the null hypothesis that the fractional parameter is equal to unity. However, no size distortion is observed when we use $T = 500$, a sample size that is, unfortunately, not frequently available in macroeconomic applications.

The results with respect to the bias and MSE are also related to the behavior of the true fractional parameter. In fact, when this parameter is closer to -1 , bias and MSE appear to increase. The reverse is true when $d > 0$ but less than unity. For this sample size, the bias is important when $d < 0$. Although bias and MSE are smaller for $T = 500$, the exact size of the t-statistic of the null hypothesis that $d = 1$ is higher compared to other sample sizes.

Table 5: Bias, MSE and t-statistic with large /small additive outliers and sample size 50

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.86	0.76	0.03	0.95
-0.72	0.61	0.41	0.04	0.95
-0.48	0.37	0.18	0.04	0.93
-0.24	0.13	0.08	0.06	0.92
0.00	-0.09	0.11	0.07	0.86
0.24	-0.23	0.18	0.08	0.77
0.48	-0.27	0.19	0.13	0.58
0.72	-0.24	0.19	0.35	0.34
0.96	-0.19	0.16	0.63	0.15

Table 6: Bias, MSE and t-statistic with large /small additive outliers and sample size 100

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.82	0.68	0.05	0.99
-0.72	0.57	0.34	0.06	0.99
-0.48	0.32	0.13	0.07	0.98
-0.24	0.07	0.05	0.10	0.98
0.00	-0.11	0.08	0.09	0.96
0.24	-0.18	0.11	0.08	0.88
0.48	-0.17	0.11	0.26	0.68
0.72	-0.12	0.11	0.63	0.33
0.96	-0.08	0.08	0.87	0.12

Under the given condition of the case of d is close to unity, this behavior is similar to the power problems observed for most of unit root tests in the econometric literature. Finally, some issues that pertain to all sample sizes need to be mentioned here. First, when Table 2 is compared with Table 1, it observes the direct effects of additive outliers are present against a case where no aberrant observations exist. The evidence with respect to higher bias and higher MSE is also obvious. Moreover, it can be readily observed that there are size distortions for the t-statistic of the null hypothesis that $d = 0$. Thus, it is obvious from this evidence that there are significant impacts of capitalization in the DSE on the surging of the stock prices which ultimately causes to make a bubble.

Table 7: Bias, MSE and t-statistic with large /small additive outliers and sample size 200

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.93	0.88	0.01	1.00
-0.72	0.67	0.46	0.02	1.00
-0.48	0.40	0.18	0.03	0.99
-0.24	0.14	0.06	0.07	0.99
0.00	-0.01	0.05	0.07	0.98
0.24	-0.05	0.06	0.19	0.92
0.48	-0.03	0.06	0.56	0.69
0.72	0.00	0.06	0.87	0.28
0.96	0.00	0.05	0.97	0.07

**Table 8: Bias, MSE and t-statistic with large /small additive outliers
and sample size 500**

Parameter D	Bias	MSE	Size of t-statistic $H_0: d = 0$	Size of t-statistic $H_0: d = 1$
-0.96	0.91	0.84	1.00	1.00
-0.72	0.65	0.43	1.00	1.00
-0.48	0.36	0.14	1.00	1.00
-0.24	0.09	0.03	0.96	1.00
0.00	-0.01	0.03	0.05	1.00
0.24	-0.01	0.03	0.98	1.00
0.48	0.01	0.03	1.00	1.00
0.72	0.03	0.03	1.00	1.00
0.96	0.01	0.03	1.00	0.63

As mentioned, one of the motives of this paper is to analyze the effects of additive outlier of massive financial capitalization present in the asset market on the behavior of the estimated value of the fractional parameter. With this end in view, an extensive set of simulation has been done employing additive outliers. When there are additive outliers which are generated according to the pre-specified data generating process, the exact size of the t-statistic of the null hypothesis that $d = 0$ goes to zero. This fact is more pertinent particularly when the true fractional parameter is negative. The opposite situation occurs or the t-statistic of the null hypothesis that $d = 1$ when the true fractional parameter is positive. In the case of the bias and the *MSE*, t-statistics are more affected by the size of the fractional parameter. Comparison between a situation in which there exists additive outliers (observations on aberrant behavior of massive influx of financial capitalization present in the stock market) to a situation in which these kinds of observations do not exist, showed that they have important effects on the estimation of the fractional parameter and on the estimation of the t-statistic for verifying the null hypothesis that $d = 1$ or $d = 0$. Overall, it has been observed that clear size distortions and the bias and the *MSE* are higher or clearly different with respect to the case where these kinds of observations do not exist. This outcome implies that intermediary factors such as capital influx present in the stock market are effectively changing the asset price trend and this trend is not following any systematic variation rather inducing an abnormal random walk phenomenon that is effectively responsible for forming bubbles. This study lends further support to

Allen and Gale (2002), and Craven and Islam (2008) that different financial, political and psychological intermediaries may cause to form the stock market bubbles.

4.2 Primary Evidence in DSE

In analyzing the impact of capitalization on the aggregate general price of the stock market, the study employs the regression technique. The regression results are based on the sample size of 1456 daily data starting from January 1, 2004 to June 24, 2010. The model incorporates single exogenous variable of market capitalization of DSE in order to see its sole explanatory impact on asset price bubble. The analysis has been done with the SPSS 13.0 version. Though in analyzing time series data, there is a need to ensure the unit root property of the series, the study purposively excludes it. As the primary motive of this section of analysis is to see the direct impact of capitalization on the asset prices rather than to see its stationarity or non-stationarity property, the study uses only the regression analysis. The regression results indicate that explanatory variable of market capitalization and the intercept are statistically positively significant at .001 levels which are provided in the Table 9.

Table 9: Impact of capitalization on stock market prices of DSE

	Coefficients	Standard Error	t-Statistics
Intercept	1192.466	10.955	108.854***
Capital Value	1778E-03	000	155.855***
Adjusted R²	0.94		
F	24290.88***		
N	1456		

Note: ***p<.001, **p<.01, Dependent variable = Stock market price

The adjusted R² value is 0.94 which indicates that financial capital can alone explain the variability in asset prices by 94 percent and only 6 percent variability is due to other factors which are not incorporated in the regression model of this study. Now the question remains how this

result of the regression estimation can be interpreted as a result of financial intermediations which take place in DSE in Bangladesh. This interpretation will assist to realize how it initiates a bubble as well as the indirect role of the banking system in extending loans which may cause a bubble to burst.

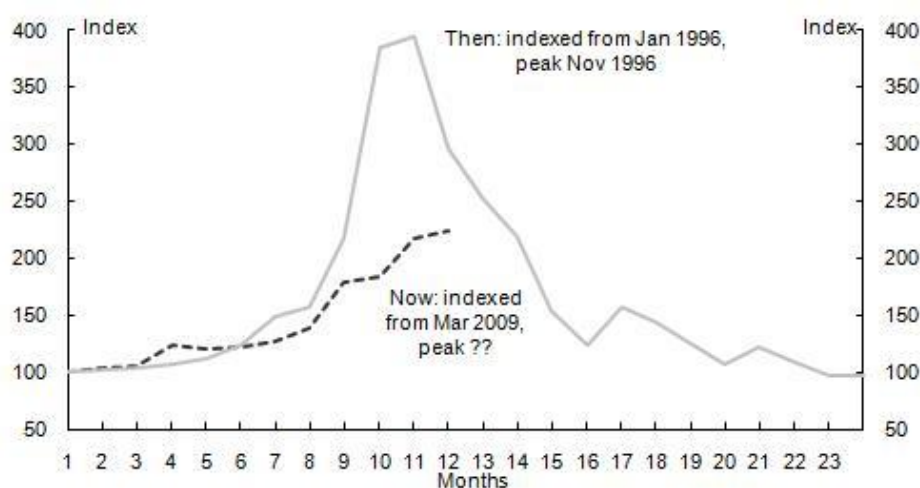
Standard theories of asset pricing presume that people buy assets and stocks with their own capital. In most financial systems, this is not whole true (Allen and Gale, 2000). Many of the investors used to buy houses, stocks and other assets with other people's money. The purchase of real asset is normally debt-financed. If the investment is finally successful, the borrower repays the loan and retains the difference between the value of the asset and the principal plus interest. If the investment failed, the borrower has limited liability and the lender bears the loss (Allen and Gale, 2000). In a similar fashion, a significant proportion of stocks are held by mutual-pension funds and insurance companies. Finance managers also have incentives to be a risk-lover. If the investment plan is successful, the managers can expect to be rewarded by a split of the returns, but most notably it will attract new investors to invest in the future. As the firms collect management fees in proportion to the assets under control, the managers will be significantly better off as a result of their good performance. If the investment policy fails, there is a limit to the downside risk that the manager bears. In the worst case, these failed managers lose the jobs but in any way the liability is limited. Hence, when financial intermediaries formulate investment decisions, the incentive scheme they face exhibits convex payoffs. This is termed as agency problem in the finance literature (Allen and Gale, 2000).

If there is an agency problem as portrayed above, the people articulating the investment plans will have a reason to go for risky ventures. As a matter of fact, lenders are not in a position to observe all the features present in a project which implies that the borrowers can shift risk to the lending agents and amplify their payoffs. This reality encourages investors to bid up the prices of risky assets above the fundamental values and consequently it causes a bubble. The more risky the asset, the greater is the amount that can be shifted and the larger is the bubble will be (Allen and Gale, 2000). This risk can emerge from two sources, namely the asset revenue risk and the financial risk. The financial risk is the risk associated with future financial conditions such

as the amount of credit that will be available through the intermediary role of the banking systems.

The bulls in the DSE are running ahead with all share price index of the DSE crossing 6,324-mark recently. The surge in the price index and the associated increased market volatility somehow remind the boom and bust of 1996 in the DSE (see Figure 2).

Figure 2: Comparing recent price rises in DSE with what happened in 1996



Note: Adopted from Mansur and Hoque (2010).

A sudden influx of funds and a surge in retail investors are pushing the DSE index forward without regard to economic fundamentals, but the unfolding scenario is virtually a re-enactment of the early period of the 1996 stock market episode. Obviously when there is a lot of liquidity and fungible money in the system, there is no way to prevent people from borrowing that is officially stated for the purpose of trading, housing, agriculture and other uses and investing in the stock market (Mansur and Hoque, 2010).

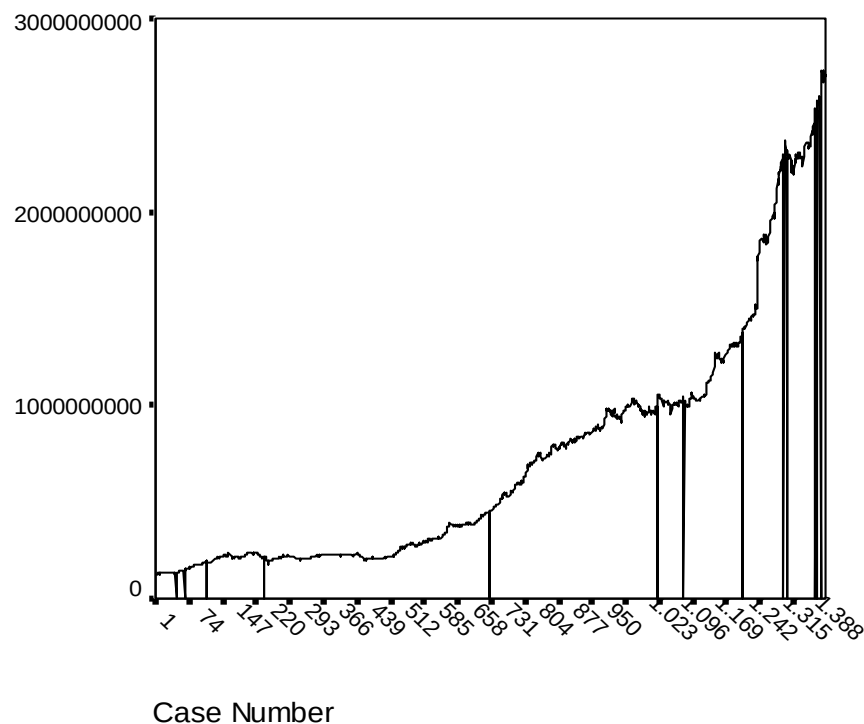
Irrespective of the on-going debate on whether the bubble is on the verge of burst or not, it is being observed that there is a bubble in the DSE (Rahman, 2010). This bubble may be resulted through microeconomic as well as macroeconomic phenomena (Uddin, 2009). Among the

macroeconomic phenomenon, fiscal, monetary and financial factors are involved (Allen and Gale, 2000). Generally, most stock market bubble episodes have some common characteristics. Some of these characteristics include exuberant demand manifested through weak correlation between price and economic value, high price volatility, acceleration in money and margin lending, narrow market leadership, structural weaknesses like lack of institutional investors and weak regulatory regime (Mansur and Hoque, 2010). In the current economic environment of Bangladesh, there has been involved a plethora of stimulators that are blamed to cause directly or indirectly to induce the asset price bubble in DSE.

Assessing the existence and size of exuberant demand is a difficult task. However, as new records for the DSE general index week after week are observed, we really wonder whether "irrational exuberance" is also dominating the DSE. The index, which was at 2,941 in August 2009, has crossed 5800 points in February 2010 (see Figure 2), or a growth of 98 percent. This surge is certainly not normal and cannot be explained by economic fundamentals (Rahman, 2010; Mansur and Hoque, 2010).

Similar dynamics have been recorded in market capitalization, price-earnings ratio, market volatility and in other indicators during this period. Market capitalization (total number of shares times the average market price of shares) in August 2009 was Tk 1,307 billion (US\$18.9 billion) and on February 17, 2010 it has risen to Tk 2366 billion (US\$ 34.2 billion), recording an increase of 81 percent within the five-month period. Just to put it in proper perspective, the market capitalization was only Tk 97 billion (US\$ 1.7 billion) in Dec 2003 before the beginning of the current bull-run. The daily average turnover showed a similar trend, increasing from Tk 0.14 billion in Dec 2003 to Tk 12 billion in January 2010 and further to Tk 14 billion in the first half of February. In 2009, daily turnover did not fall below Tk 10 billion which was a miniscule Tk 0.26 billion in 2004 (Mansur and Hoque, 2010). In Figure 3, the surge in market capitalization in DSE is shown which incorporates data on daily basis from January 1, 2004 to June 24, 2010 representing the peak on the vertical axis at present.

Figure 3: Trend in Market Capitalization in DSE from January 1, 2004 to June 24, 2010



While the supply of stocks is almost unaffected, except for the launching of Grameen Phone IPO in November 2009, pressures in stock prices are simply exerted from the demand side. Among many factors, huge number of new investors with fresh funds is primarily responsible for this price pressure. In January 2009, some 0.115 million new Beneficiary Owners' (BOs) accounts have been opened while, the number was 58,000 in December 2009. The increase in the number of BO account holders has accelerated further to 0.123 million in the first 10 days of February. This means that 12,000 new investors are joining the market every day (Mansur and Hoque, 2010). Huge amounts of fresh money are being channeled into the stock market through these accounts, undoubtedly pumping the stock market balloon to grow bigger almost every day. If the average account size is Tk 0.1 million, everyday Tk 1.2 billion is being poured into the market, mostly by the first time retail investors (Rahman, 2010).

Now the question remains why this is happening and what else the government can do in order to prevent a repeat of 1996 stock market debacle. Obviously when there is an enormous liquidity in the system and money being fungible, there is no way to stop people from borrowing and investing in the stock market. As surging flood water cannot be contained by putting a weak dam downstream and water simply bypasses or overwhelms or washes away the barrier, money keeps pouring into the stock market ignoring the Security and Exchange Commission's (SEC) signals lured by quick capital gains (Uddin, 2009).

With broad money (M2) expanding by more than 20 percent last fiscal year and once again this year, fueled by inflow of workers' remittances, certainly there is more than enough liquidity to shrug off the limited efforts by the SEC. The budgetary provision to allow whitening of black money into the stock market is also playing an important role in flooding the market with liquidity (Rahman, 2010).

Presently, it is being observed that people of all walks of life are moving toward the stock market for investment, but the market is not for everyone. Professionals and market manipulators are expected to gain, while others must lose at the end. The market is already overheated and in the midst of the stock market frenzy, market manipulators are very active. All these uncomfortable indicators send one clear message that the stock market is currently not a good time for new and uninformed investors. It is imperative on the part of policy makers to send clear warning signals and highlight the heightened risks in order to protect ordinary investors. Measures are also needed to be taken to minimize the exposure of banks to the stock market in order to safeguard depositors' interest (Mansur and Hoque, 2010).

5. Conclusion

The main objective of this paper is to analyze the impact of financial capitalization on the asset prices which would form bubble eventually. First, the paper attempts to observe the long memory evidence of asset price bubble and then employs the ordinary least square regression method in order to see the impact of the liquidity of financial capital in DSE in Bangladesh. In the case of simulation, the impact of additive outliers is observed on the estimated value of the fractional difference parameter, d . Overall, additive outliers or aberrant size of market

capitalization are observed to affect the bias and the *MSE* and the size of t-statistics. This result implies that there has been a momentary shock process involved rather than a systematic trend in the asset price change. This outcome appears to be grim and could result in no more than a complex process of momentous stochastic uncertainty in forming the stock market bubble which is not at all desirable in order for maintaining a healthy share market trade.

The regression results show that surge in market capitalization has a highly statistical significant impact on the stock market aggregate price index. The abnormal observation on market capital accumulation in DSE is particularly remarkable since 2009. Myriads of potential reasons are thought to be active in shaping the asset price bubble in DSE based on the evidence noted earlier in the text. However, the enormously surging market capitalization in DSE creating asset price bubbles owing to the potential reasons that are stylized in this paper can be summarized as: (a) credit policies for lending existed in the banking and financial systems are based on very easy terms and conditions by which new investors from all walks of life are funneling fungible funds to the capital market enormously; (b) significant amount of foreign remittance is being invested into stock market; (c) budgetary provision of opportunity to transform huge black money into white money mostly of which is spent for purchasing stock share and (d) expansionary fiscal policy which has a spillover effect into increasing money and capital availability in the stock market.

The analyses provided in the text indicate a potential rationale for policy makers to monitor the stock market. Since asset prices in the stock market serve as a signal to investors to invest, bubbles can mislead the investors when it is not profitable. The overinvestment, which becomes apparent after the bubble bursts, can lead to a period of low investment and that can cause a recession. Thus, policy makers ought to step in to end the bubble before asset prices go too far out of line relative to their fundamentals.

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